

Payments modernization

2020



Building a better working world



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What is payments modernization?

Financial institutions for the past decade have undergone various efforts to modernize their payments systems. Phase 1 of the payments ecosystem modernization effort was the consolidation effort of channel and payment client-facing applications over time either via a “hub” strategy or via strategic partnerships to perform these payment activities. The next phase is underway in which institutions are aligning to various global standards (i.e., International Organization for Standardization (ISO) 20022, Open Banking) and looking for ways to be able to add new, faster payment methods and leverage the most cost-efficient rail to settle a payment. Clearing and settlement systems over time have not been able to meet the new challenges of faster time to market and the new demand to provide consumer instant-gratification experiences to their business clients. Institutions are looking at multiple ways to achieve their goals. The modernization approach now takes a holistic look at the end-to-end payments value chain, from client initiation to the clearing and settlement, targeting middle and back office functions to enable innovation and connect to new networks and schemes.

Drivers for payments modernization

Payments systems have always been complex but critical parts of the banking world. Over the last decade, the payments environment has become much more dynamic, creating even greater challenges for financial institutions. Complex regulatory requirements, outdated and poorly integrated legacy systems and an increasingly competitive marketplace all put pressure on traditional financial institutions to evaluate opportunities for payments transformation. In addition, increasing demands to create a consistent customer experience across multiple access channels (i.e., omnichannel) are pushing banks to consider major technology investments as well as significant process and cost improvement activities. In this environment, bank executives are challenged to balance a range of considerations: customer experience, technology disruption and regulation.

01 Customer experience

Today, there are several interaction channels – corporate, commercial, small to medium enterprises and consumer – that clients leverage to complete payment activity where a consistent and scalable architecture is in demand:

File transfer

Transmission of files for payment processing via systems integration with large enterprise resource planning (more commonly known as ERP) vendors for batch file processing

Desktop/online

Professionals logging in to initiate payments, perform reconciliation activities and retrieve historical information (documentation/statements)

Mobile

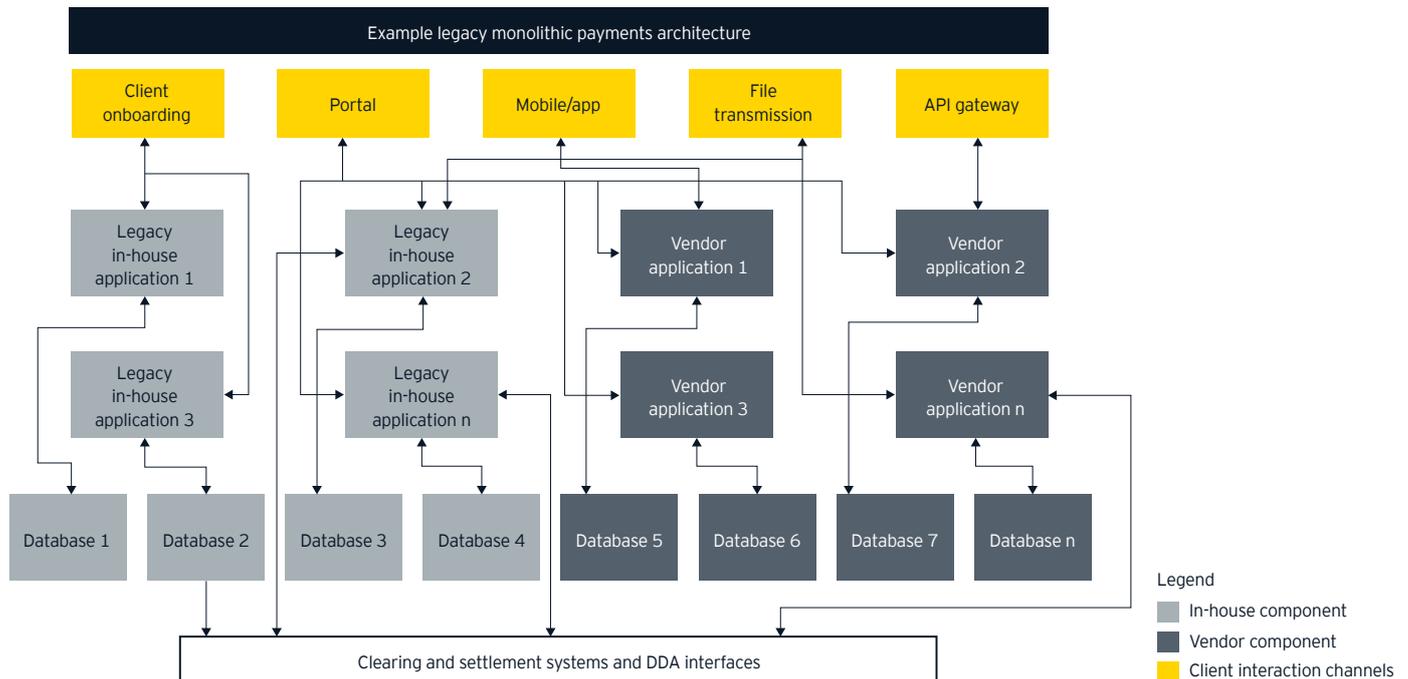
As we have moved to being constantly on the go, performing the same services available online on mobile devices with a focus on new digital interactions



Increasingly sophisticated clients expect to be able to access every bank payment service from any channel, on demand and at their convenience. Clients expect consistent experiences and information across channels, and they want all fraud, risk management, authentication and exception management activities to be seamless. Legacy payments architecture is often constrained for its inability to be scalable and responsive to changing client demands. There are multiple factors to consider when undergoing architecture transformation. Key pain points to address when defining a future payments ecosystem include:

- ▶ Significant platform and application fragmentation
- ▶ High total cost of ownership due to legacy and vendor systems
- ▶ Monolithic architecture that does not allow for nimble changes
- ▶ Slow time to market for change to existing or new products and services
- ▶ Significant dependence on multiple vendors, each with their own aging solutions
- ▶ Risk of being unable to respond to regulatory mandates, cybersecurity and environmental threats

Most importantly, as new payment channels emerge and gain adoption across the industry, banks will be expected to integrate these channels quickly and seamlessly to retain and grow their client base. This client expectation is now a competitive imperative that most traditional banks struggle to address, given their fragmented payments environments.



02 Innovation

Tackling the task of effective payments transformation begins with identifying the challenges of a legacy payments environment. Siloed environments with a product-centric view of payments drive a host of redundancies, inefficiencies and inconsistent customer experiences. Layering in multiple vendors to assist with facilitating certain payment capabilities creates additional complexity. As the market demand moves toward an open-banking model with sharing and integrating through application program interface (API), there is a need for modernization to provide this plug-and-play experience. At the same time, nontraditional players are working to disintermediate banks from higher-margin, branded payments, even as they use traditional banks to do the heavy lifting on costly functions like customer service and complaints. The next disruption phase as open banking gains wide adoption across the globe is the banking-as-a-service (BaaS) model. A nimble, modern and scalable architecture is required to participate in this service model. The lack of end-to-end consistency and seamless customer experience is particularly relevant in the digital space, where leading players are transforming their experience with vendors that are partnering to provide some of the services required to offer these payment capabilities.

The need for flexible, open, real-time and easy-to-integrate solutions is critical when thinking about what the future payments ecosystem will look like. To fully understand the context for payments transformation, The EY team believes viewing payments system challenges in the context of all drivers for change, using the framework below.

1 Customer experience

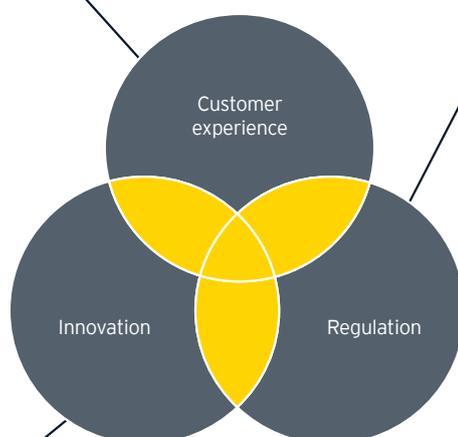
- Heightened customer expectations
- ▶ Demand for speed and convenience
 - ▶ Seamless end-to-end user experience
 - ▶ Speed to market and faster payments
 - ▶ Immediate availability of funds

- New, innovative products to enhance efficiency of payments
- ▶ Need for scalable, real-time and user friendly solutions
 - ▶ Increased API connector enablement to address system integration needs
 - ▶ New, digitized capabilities that enrich current products and payment types

2 Innovation

3 Regulations

- Trend toward open architecture
- ▶ Regulation fast-tracking customer-centric banking
 - ▶ New, level playing field for FinTechs
 - ▶ Increased scrutiny on privacy, security, resiliency and resolution planning
 - ▶ Modernized, secure payments that provide customers with customizable options



03 Intense regulatory environment

With the adoption of Open Banking Standards and the Revised Payment Services Directive in Europe, the journey to standardization for use of APIs is in flight and will make its way to the US. The Berlin Group was created as a pan-European payment interoperability technical standardization body, focusing on detailed technical and organizational requirements to achieve a true open-banking environment. After the financial crisis of 2008, resolution planning activities have driven further attention on having an enterprise view of payment activities that appear to mandate that banks have an end-to-end perspective on payments. The latest thinking from key regulators is that banks not only need to provide end-to-end payments reporting, but also must demonstrate end-to-end payments operations that treat critical functions as a business.



Why payments transformation is needed now

Why is change needed now? What is different this time versus past attempts to tackle thorny payment issues?

The next wave of disruption with BaaS, as mentioned above, will see the need to begin modernizing the existing payments architecture. As banks have seen investment to their payments engines by building or partnering with a vendor, the need to scale and take advantage of emerging trends while controlling and reducing costs is imperative. We feel that as existing and new rails require maintenance and updates, now is the time to build for the future, allowing the ability to scale and adopting a modular component approach for the reusability and testability of future investments. This approach will help keep expense management in line while building for a future where scale, cloud and microservices will be leveraged to execute and communicate with partners and vendors throughout the payments value chain.

How can financial institutions address these challenges?

The EY team believes that while technology solutions play a key role, successful transformation requires a broader view that optimizes an end-to-end business system perspective, rather than a purely functional, product or even market segment view. When organizations start going down a technology path too quickly, the broader operating context and the business objectives that the organization wishes to achieve often get lost.

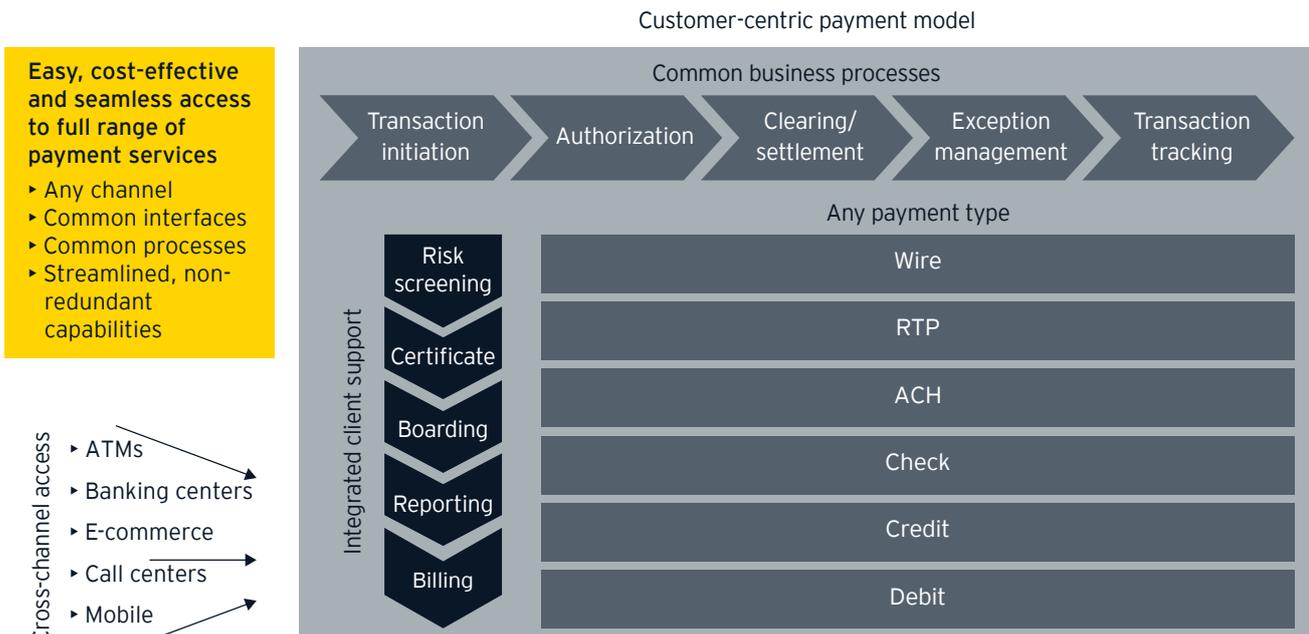
So, even though legacy infrastructure considerations, manual processes and strict regulatory oversight create challenges for banks to pursue this agenda, the EY team believes it is critical to approach payments transformation with this end-to-end perspective. Financial institutions can address these challenges with a combination of the following:

- ▶ Payments process optimization
- ▶ Payments platform of the future

Payments process optimization

Effective payments transformation should start with an end-to-end assessment of the entire payment business system. The end-to-end business system analysis should identify key metrics, including costs, transaction volumes, processing times and other key requirements that may vary across segments. As the diagram below illustrates, the costs and metrics will highlight priorities for operating model and technology architecture improvement.

Ultimately, the goal is for each bank to understand the end-to-end customer requirements for each payment path, with a view to creating shared infrastructure and processes wherever possible while preserving the appropriate customer-driven distinctions for specific channels, segments and offerings. This will enable the development of business services that can be initially created and shared across each payment path. When payment processing functions are similar, they can be handled as utilities, with rules to accommodate differences.



Optimization should outline not only the most obvious technology and process requirements, but also look for opportunities to transform processes to reduce waste, enhance self-service, and improve customer experience and speed outcomes, not to simply automate processes or move them from one platform to another. It's also critical to consider key people issues, including fungibility of customer support resources, level of knowledge and back office infrastructure required to address exceptions. Probably the most critical and most neglected issue is that a clear framework is needed for initiative governance so that decision-making is comprehensive and efficient so projects don't stall due to management decision-making or resource allocation issues.

A comprehensive review of payments processes would identify a set of services and processes that are common across parts of the value chain that can easily be consolidated into a common utility or process. When teams examine the life of a payment when processed, its different phases and steps can be translated into enterprise components. Some of these can be consolidated right away, while other components can be added later. Supporting technology capabilities can immediately begin to exploit the commonalities across operating silos and build in flexibility to accommodate key differences.

Payments platform of the future

Past legacy platform approaches focused on rationalizing the payments platforms by consolidation, and over time with acquisitions and mergers, banks realized that duplicative platforms were set up performing the same activities. This included multiple systems performing similar payment transactions (e.g., ACH) between channel applications, and multiple integration points via different middleware and file parsing systems throughout the now complicated architecture.

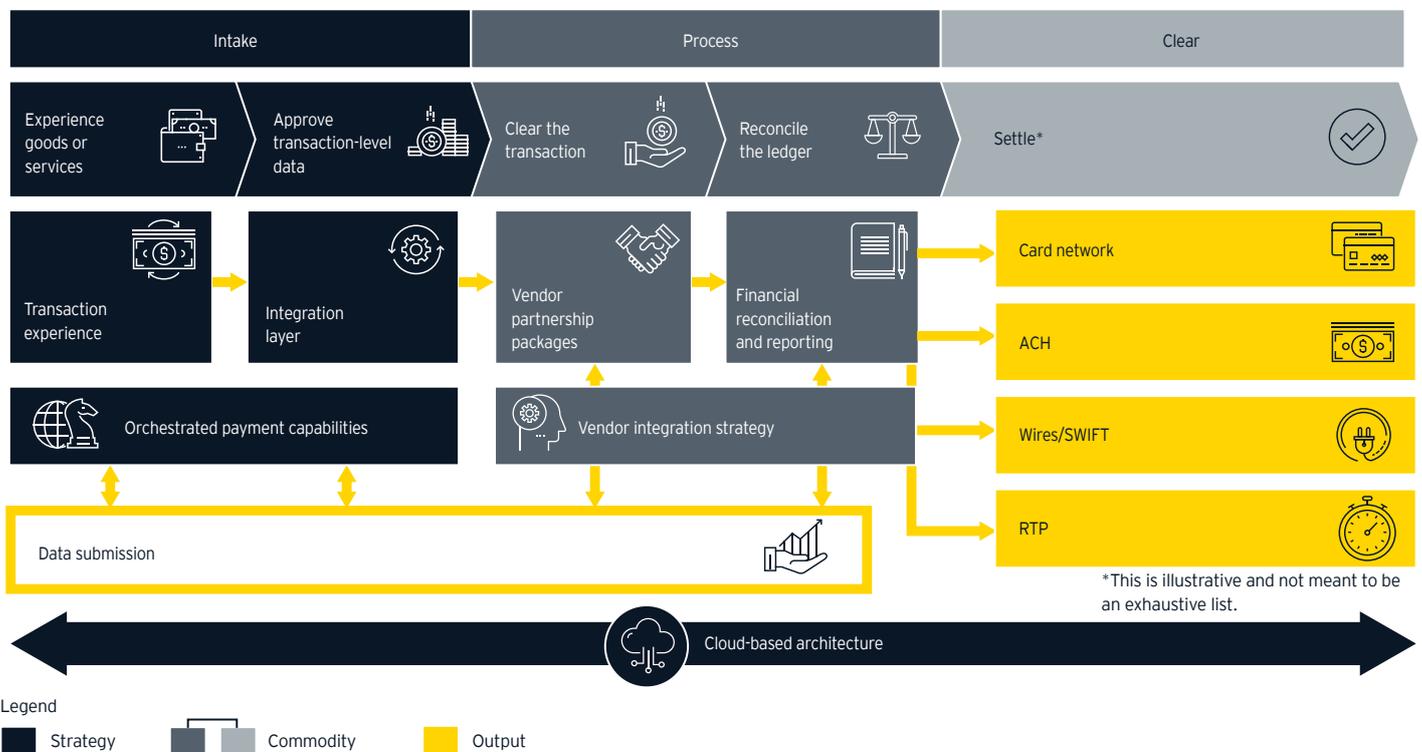
Step 2 of this modernization journey is now taking the framework initially created through consolidation to have a single consolidated payments platform supporting channels, middle office and back-end systems, and with clear API endpoints for integration, with the goal to support the next evolution of BaaS. BaaS will open platforms for innovations and consistent regulatory compliance standards (i.e., Open Banking Standards). For this step to be successful, lessons learned from step 1 and a strategic vendor partner are key.



Modernization approach to payments architecture

Modernization principles

The proposed modernization approach augments current investments and focuses on the unique transaction experience provided while achieving scalability through vendors and commoditized solutions. This approach is executed by the key components of orchestrated payment capabilities and a vendor integration strategy that is built on a cloud-based architecture.



To move away from the current legacy monolithic payments architecture or to enhance efforts completed in step 1 of the modernization journey, the EY team believes in a strategy around key characteristics that will allow banks to finally modernize their infrastructure. A modern payments architecture can be built on a cloud or hybrid model using a modern, microservice-based framework that empowers organizations with scalability, seamless integrations with vendors, and a nimble and adaptive ecosystem.

The EY team believes the journey of the architecture transformation should align to core modernization principles that underpin and set a foundation that will scale and evolve as further investment and development occurs.

Vendor integration strategy

- ▶ Maintain ownership of end-to-end payments intake, processing and clearing activities
- ▶ Integrate individual components of business processes as separate vendor services
- ▶ Establish buffered architecture between external vendor code and internal legacy systems

Orchestrated payment capability

- ▶ Reduce build vs. buy friction by enabling vendor and/or in-house components to be connected via APIs
- ▶ Improve platform adaptability and maintenance by modeling and deploying business processes outside of vendor packages

Cloud-based architecture

- ▶ Scale and provision on demand based on shifting business needs, providing significant flexibility and operational efficiency
- ▶ Enable modular and independent deployments of microservices rather than large, “big bang” releases

Microservices

- ▶ Service-driven payment value chain, segmented into specific, independent components able to plug into the overall payments engine as needed
- ▶ Independent components that offer enhanced resiliency, differing from older, monolithic systems that tightly integrate components within a large, single deployment

Fast transformation engine

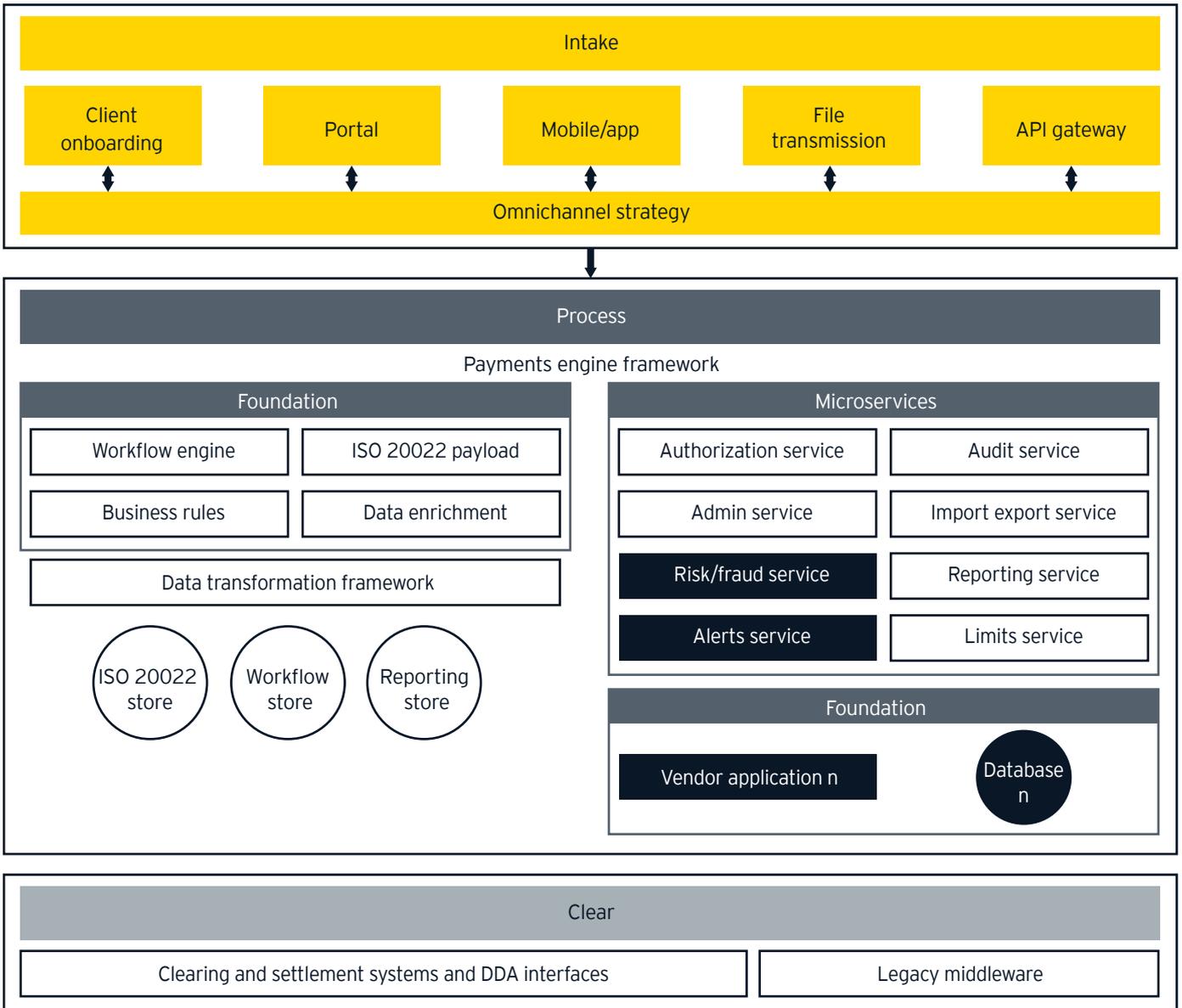
- ▶ Ability for fast, in-process data transformation between different endpoints
- ▶ Streamlined data movement and alignment with larger enterprise data strategy efforts and industry standardization (i.e., ISO 20022)

Continuous delivery

- ▶ Enabled testing and iterative delivery of nimble API-based components that can change independently
- ▶ Legacy programs that frequently focused on an end-to-end delivery of functionality, causing long lead times to realization of business value

Building modern components including a vendor integration layer offers flexibility and control, allowing additional technologies to scale quickly as required. The EY team works closely with all the key vendors in the financial services space to help clients identify and implement appropriate technology solutions that are best aligned with client needs. Understanding the complex nature of most global banks' payments environments, the EY team does not believe that there is a “silver bullet” that solves all payments systems challenges.

Example modern payments architecture



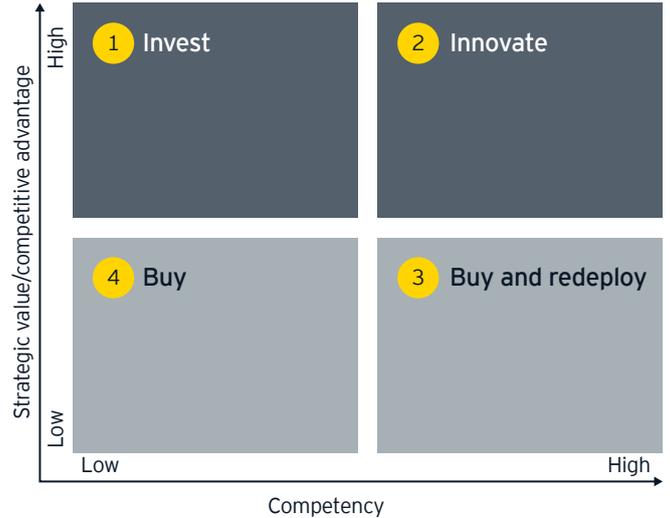
Vendor integration and decision matrix

Legacy build-versus-buy approaches have yielded mixed success. Clients who have gone all in with one vendor have been stuck with too many vendor product customizations to meet their business needs and hence have failed in their flexibility goal, as many FinTechs have entered different areas of the payment value chain offering these flexible and scalable experiences. A modern approach recommended by the EY team is the middle-of-the-road approach to find a strategic vendor partner for commodity payment product solutions that provide industry-standard payment formats (ISO 20022) and processing (settling and connections to payment rails) while maintaining an architecture recommended below to avoid vendor lock-in and to create a flexible payments ecosystem that does not solely rely on the vendor for all change when future needs arise.

During collaboration with a vendor to complete the payments modernization journey, a defined strategy is required to determine when to use a vendor's capabilities versus building these services in-house. There are many drivers to consider when making this decision, including cost, strategic value or competitive advantage and current competency across people, process and technology (systems). To assist with making these decisions, the EY team uses a decision matrix to understand where to best invest or team with a vendor (see illustrative example below).

Teaming with a vendor can present several benefits:

- ▶ Vendor keeps platform current with:
 - ▶ Regulatory updates and requirements – both domestic and globally
 - ▶ Card network regulations
 - ▶ Industry standardization (i.e., ISO 20022)
 - ▶ Data privacy (i.e., General Data Protection Regulation)
- ▶ Vendor products have a history of proven scalability in production
- ▶ Faster time to market given that vendor has a vetted in-production solution



Legend

Build Buy

1 Invest
 Make the strategic investment to build capabilities – Function has strategic value to financial institution but does not have a high competency in driving out this function. Make the strategic investment to own through either diverting/investing resources or through acquisition.

Innovate 2
 Continue to innovate and invest in these capabilities to maintain market position – The financial institution has the capabilities to develop and innovate while it is of high strategic value. This could be a function that is differentiating in the marketplace.

3 Buy and redeploy
 Capitalize on vendor commodity solutions and redeploy highly skilled resources – Functions have a low strategic value, but the financial institution has high competency. Buy the capability (either platform or outsource process) for all the buy benefits and redeploy resources – people, investment – to more strategic functions (e.g., internal payments engine).

Buy 4
 Leverage vendors for commodity solutions – Functions have low strategic value, and the financial institution has low competency (can be specific expertise such as tax function) – just buy the capability (either platform or outsource).

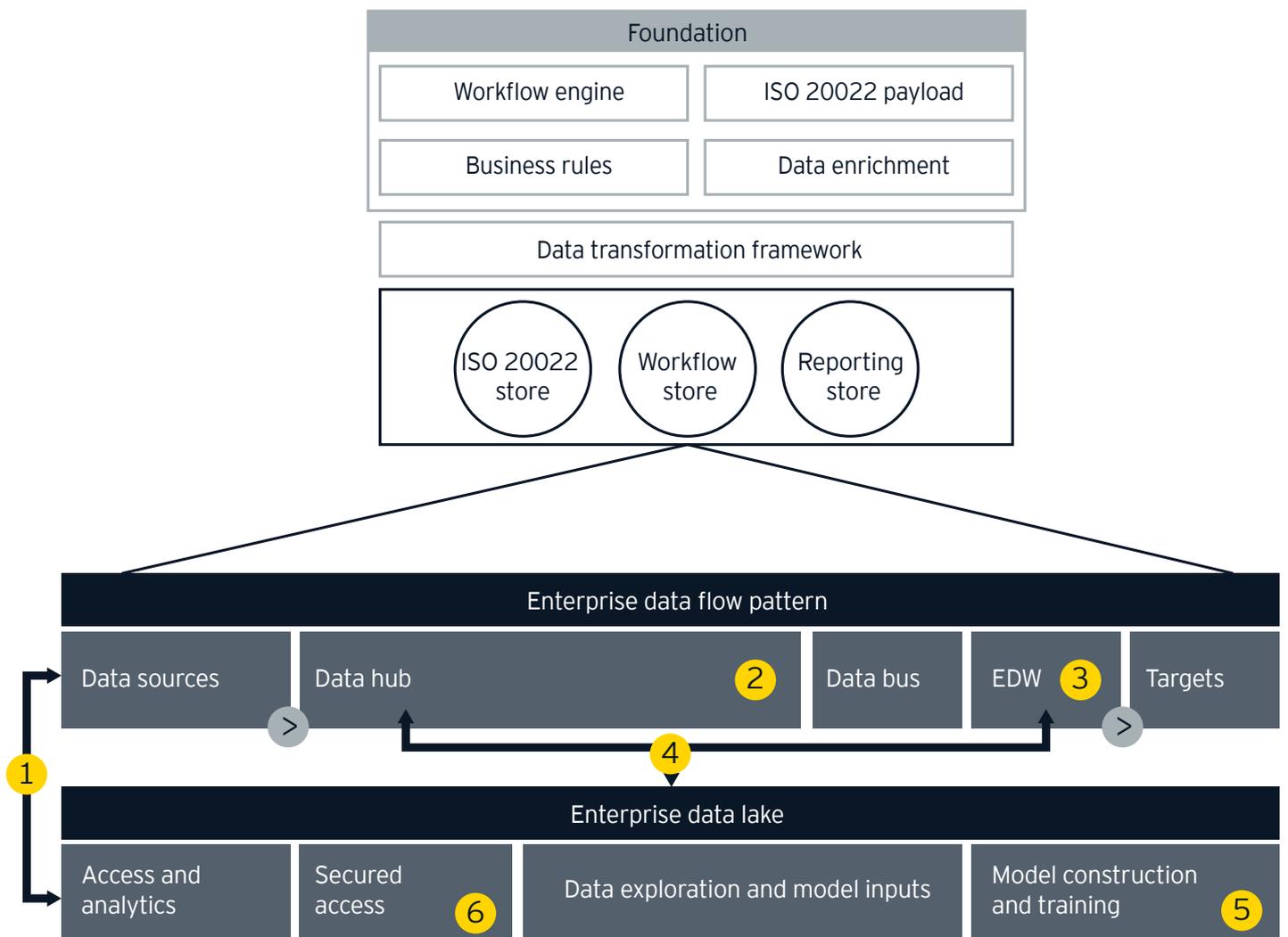
Orchestration, data and cloud-based architecture

New bank systems are being designed and implemented to leverage APIs that help them connect with both their in-house payments technology across payment channels and the vendor components, which allows for execution of key process steps with the in-house payment technology still owning the orchestration capability. Before the decision on whether to operate on a cloud-based platform, the fundamental success of a modern payments platform lies in its breakup of monolithic architecture. Microservices are the new approach to create modular components that have finite business and operational boundaries that work independently to provide a set of services and capabilities that can be plugged into an orchestration engine for creating a flexible deployment model. Continuous delivery in the current payments landscape is a challenge for any bank as they look at their component deployment model. The ability to scale up and down in an infrastructure-as-a-service or platform-as-a-service model is restricted due to the interdependencies of these components and the complex deployment. A holistic view of the component breakdown and its associated deployment model is a prerequisite to the cloud deployment model.

An environment without boundaries that is accessible and scalable is a key element when building the next payments ecosystem. Public or private cloud models enable ubiquitous, on-demand access to a shared pool of configurable computing resources (e.g., computer networks, servers, storage, applications and services) that can be rapidly provisioned and released in direct response to business need. This model, whether a fully integrated cloud or a hybrid model with cloud and on-premise components, will allow cost to be configured on a pay-per-use basis and truly enable the future of a BaaS.

How data is stored and transmitted is critical when building a scalable, nimble ecosystem. A strategy is needed in which data is stored and transmitted and where, if a payment step in the life cycle is interrupted, that step is logged and resumed when the system goes back online and is operational.



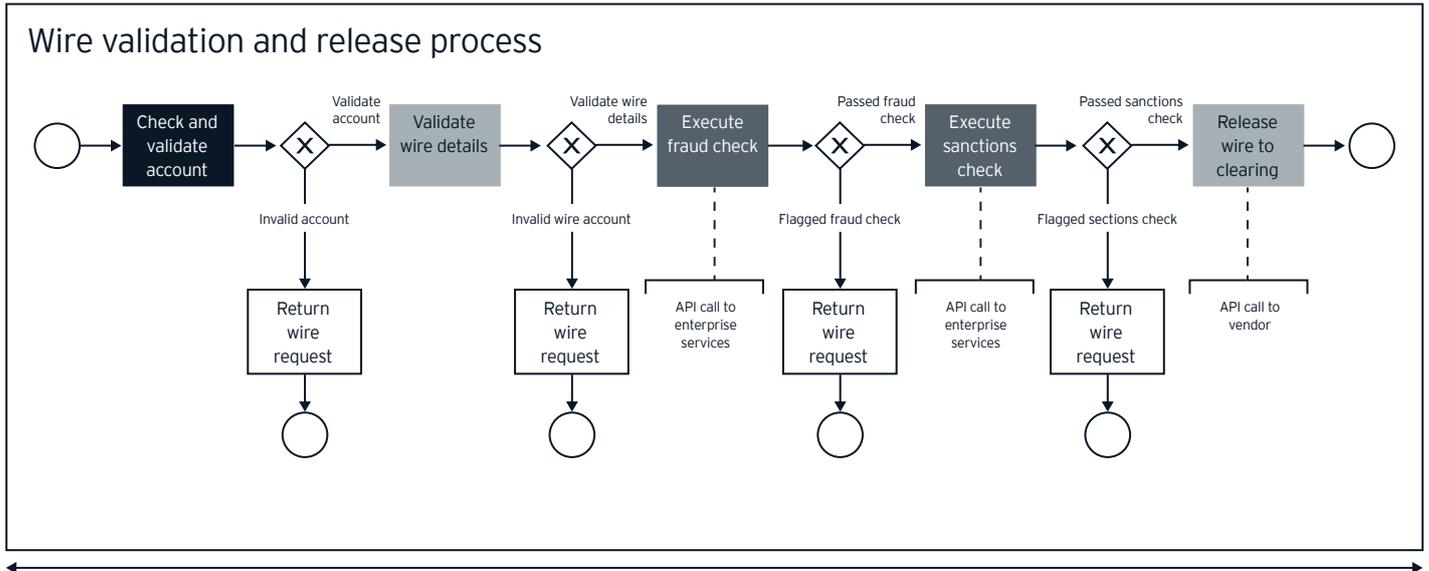


- 1** Data is ingested from data sources, both transactional data stores and external/third-party sources.
- 2** An integrated data hub can be augmented using big data platform and tools to provide alternate data analytics for different use cases.
- 3** EDW can be augmented using big data platform and tools by offloading pre-processing and constraining EDW for reporting.
- 4** Data flows from the initialization on-demand holder and enterprise data warehouse (EDW) into the enterprise data lake. Validated data products and models are deployed back to input/output data specification and data warehouse.
- 5** Data analysts and scientists can use the platform to perform advanced query/report functions or build models.
- 6** Underlying big data platform can serve as a transactional data store in limited but critical circumstances (HBase, MongoDB, Elasticsearch, Titan).

Examples in action

Payment flow based on API integration architecture

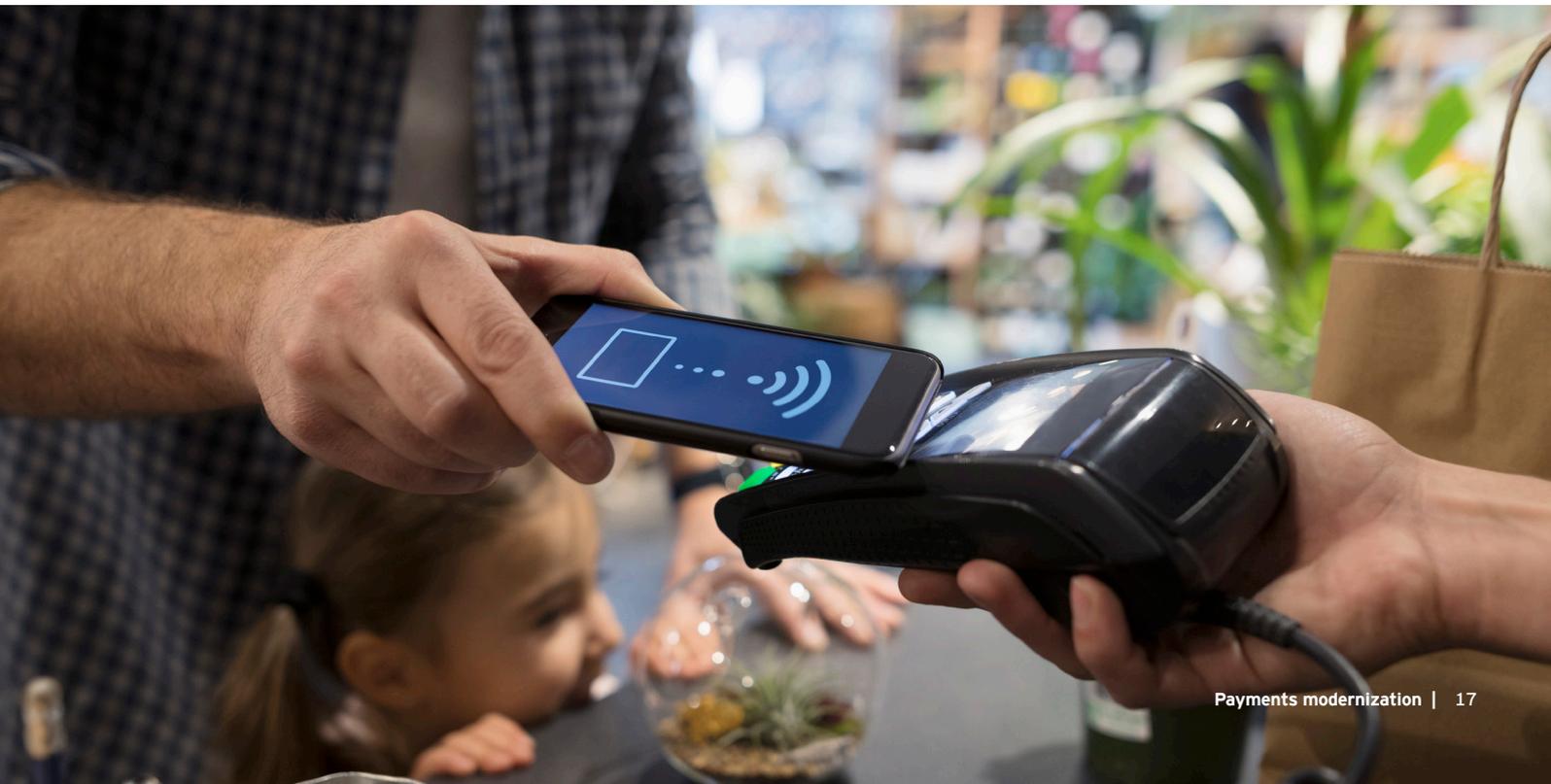
Each function in the payment chain is a microservice that is either an in-house-built payment service or an enterprise service or vendor-provided service called via an API. Dynamic end-to-end payment orchestration is built and owned in-house for better efficiency and experience.



End-to-end payments orchestration owned in-house

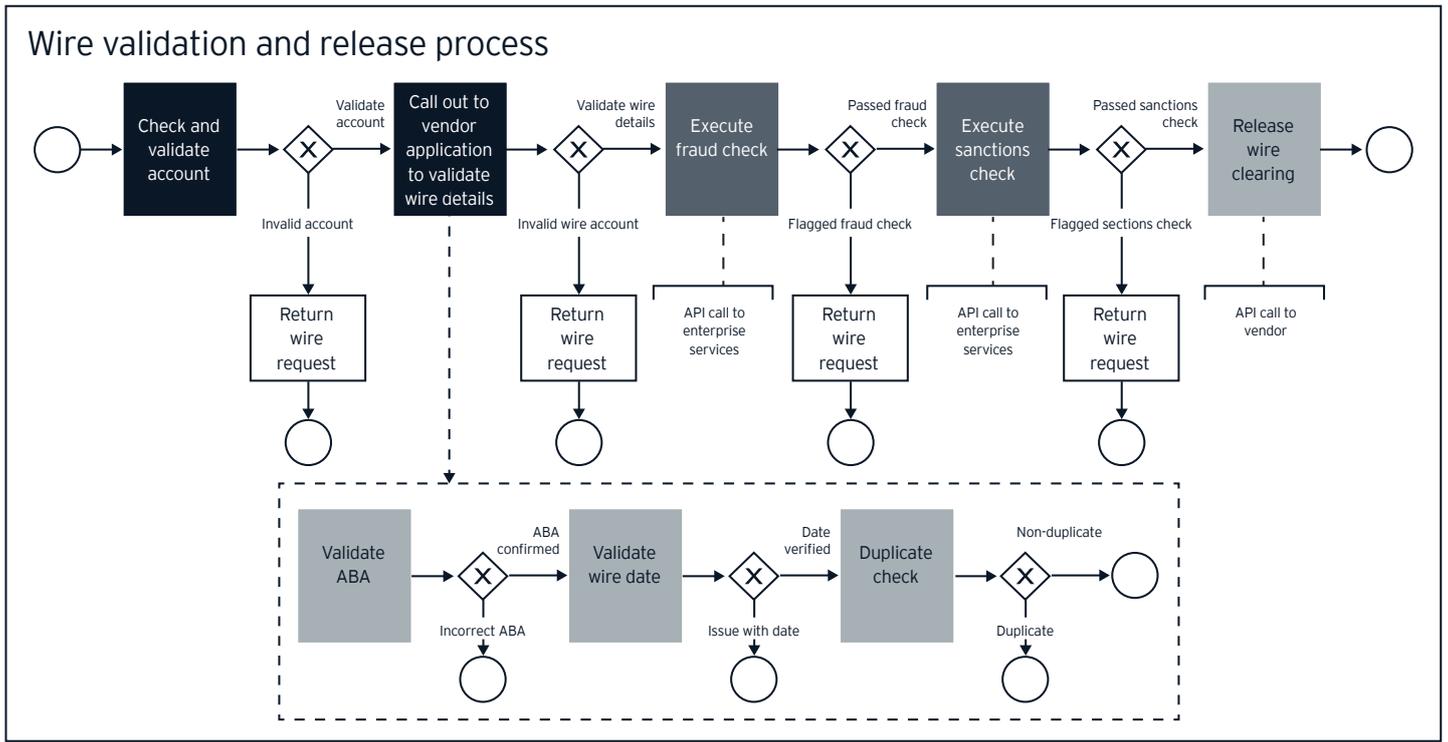
Legend

- In-house payments technology owned
- Enterprise services
- Vendor components



Sample payment flow based on lack of vendor APIs

Building upon a vendor integration strategy empowers organizations to plug and play and control key pieces of the platform, use open source tools with low-cost licensing and reduce the software development life cycle. Each function in the payment chain is a microservice that is either an in-house-built payment service or an enterprise service or vendor-provided service called via an API. Vendor packages, while providing value-added business services, are often not able to provide APIs at a granular level to be integrated within the end-to-end orchestrated flow. Hence, the model below demonstrates the interaction between a vendor boxed business process flow and the in-house orchestration engine that controls the end-to-end payments value chain. Dynamic end-to-end payment orchestration is built and owned in-house for better efficiency and experience using industry-standard Business Process Model and Notation tools. The below example is a use case where wire validation and release process is calling out the vendor process for wires validation based on the cutoff and ABA lookups.



End-to-end payments orchestration owned in-house

Legend

- In-house payments technology owned
- Enterprise services
- Vendor components

Operational benefits of an architecture modernization

As you journey to modernize your payments infrastructure, the benefits that will be realized will allow for your payments ecosystem to be ready to tackle the ever-changing drivers outlined earlier.

Decreased cost

- ▶ Greater agility implementing modifications to the ecosystem
- ▶ Creation of common services, which offers lower cost by building once and reusing across different payment channels
- ▶ Limited vendor customization requirements, minimizing total delivery costs

Enhanced resiliency

- ▶ Improved failover for each individual component
- ▶ The disaggregation of payments services, which enables 24/7 availability of the ecosystem should a single service go down
- ▶ If any component in the microservices architecture goes down, payment flow not required to restart because of the persistence at each stage of the workflow

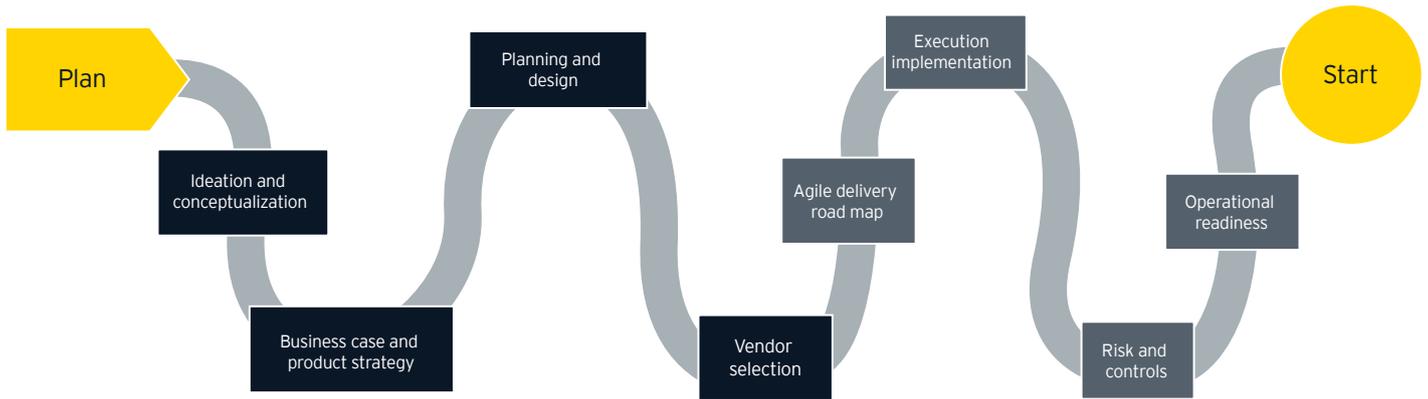
Faster deployment

- ▶ Common services and components that improve testability and integration into the orchestration engine
- ▶ Integrated with legacy payments engines where possible to avoid full legacy engine replacement
- ▶ Speed to market with new alternative payments channels to address shifting business and market needs

How do you implement change?

Road map

To truly realize and adopt a modern architecture, the EY team has outlined a two-part road map largely around strategy and implementation.



Legend

■ Strategy ■ Implementation

Ideation and conceptualization

Identify key initiatives and standards selection to align with an enterprise-wide modernization approach.

Business case and product strategy

Understand key use cases for modernizing payments with a business plan to support the cost of build and to clearly articulate when potential benefit can be realized.

Planning and design

Perform a capability assessment to understand current and target functions along with identified gaps and an industry outlook to see where market leaders fall in the journey.

Vendor selection

Conduct a full vendor assessment with integration review to understand and futureproof innovation capabilities. Understand key vendor requirements and guidelines so that the partnership will be successful without the need to fully customize a potential solution.

Agile delivery road map

Developing an agile delivery plan with clearly identified sprints and minimum viable product (MVP) selection will allow for progress tracking and offer the ability to iterate effortlessly. Included in the sprints are vendor and integration partner tests of MVP criteria to support a successful implementation.

Execution implementation

Production implementation includes the target-state infrastructure deployment with vendor integration.

Risk and controls

Definition of a vendor engagement model includes defined controls and the incorporation of lines of defense, allowing your environment to remain secure.

Operational readiness

Define the process for exception handling and risk and compliance impacts to support the new and ongoing architecture enhancements. Anti-money laundering and know-your-customer requirements as new payment channels are developed or enhanced. The requirements for 24/7 uptime and support enable a fully scalable and always-on solution.

Summary

Given the rapid pace of change in payments modernization, as well as the various stages where institutions currently are in their journey, the EY team believes that the question isn't to pause or stop and reassess. The goal is to continue your journey following the guiding principles outlined above to futureproof the new capabilities being built to drive your investments on current systems. If you haven't begun the modernization journey, leveraging the guiding principles above outlines a proven framework in modernizing legacy systems in a way that will allow for continuous enhancement, provide the opportunity to build and integrate future technologies, and drive the investment to move money safely and efficiently, and continue to be innovative in giving your customers a truly differentiating experience. Modernization should be aligned with the strategic initiatives at your institution to start the journey leveraging investments already underway to futureproof the new capabilities and to drive your investments on current systems.

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