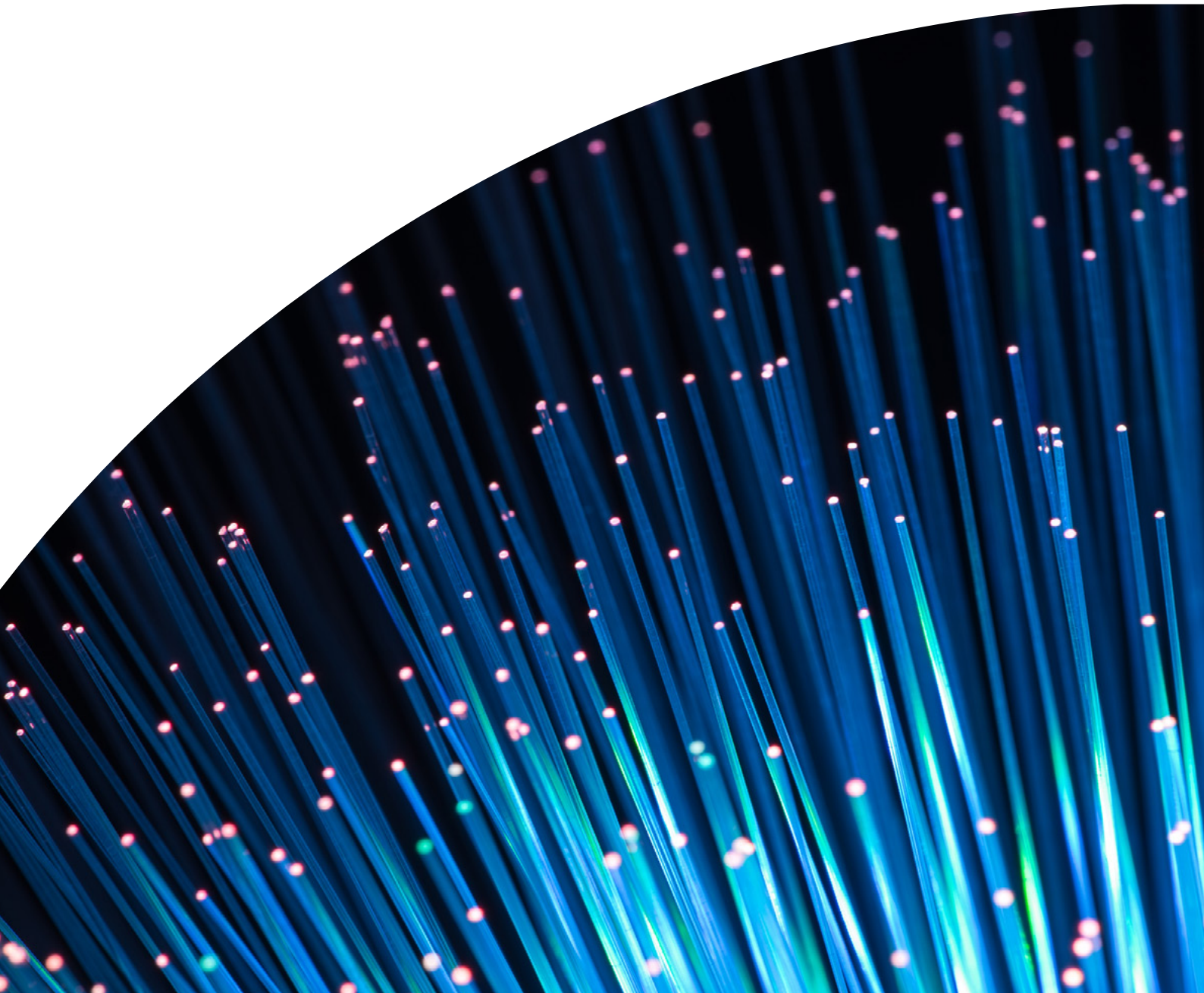
Grant Thornton

The future of capital markets

A path to simplicity



"When you start looking at a problem and it seems really simple, you don't really understand the complexity of the problem. Then you get into the problem, and you see that it's really complicated, and you come up with all these convoluted solutions. That's sort of the middle, and that's where most people stop… But the really great person will keep on going and find the key, the underlying principle of the problem — and come up with an elegant, really beautiful solution that works."

Steve Jobs, 1994

"Simplicity and complexity need each other. The more complexity there is in the market, the more that something simpler stands out. And because technology will continue to grow in complexity, there is a clear economic benefit to adopting a strategy of simplicity that will set your product apart."

John Maeda, "The Laws of Simplicity" Law 5

Introduction

As financial services embrace new technology, the capital markets sector is at an inflection point. Digital transformation is critical to future business success, but in order to create genuine value, processes must be adapted to exploit these new technologies. They must support and streamline the technology environment, rather than bringing additional complexity.

Since the 2008 crash, financial institutions have struggled to return to a position of growth. While balance sheets may look healthier, fundamental elements of business infrastructure have not recovered or evolved. Some of the firms caught in the initial wave of mergers and acquisitions are still not operationally consolidated. The tough regulatory agenda post-crisis has limited firms' capacity for change beyond immediate regulatory requirements. There is typically no scope for investment in innovation, strategic transformation or simplification. Many institutions are struggling to maintain complex technology platforms which are too embedded to migrate away from, leading to unsustainable high cost-income ratios, along with reduced return on equity to shareholders. In the cases where firms have simplified their offering, they have been unable to realise the benefits fully, as the technology costs have remained stranded due to the complexity of the architecture. As new technologies are being applied, they are layered on top of existing architecture, creating increasingly complex and fragmented IT architecture, which is unresponsive to change.

Since 2008, there has also been a significant change in technological innovation, which is commonly referred to as Industry 4.0 or the next industrial revolution. The transformation that started with the cloud, and big data is now enabling advanced analytics, robotics, distributed ledgers and artificial intelligence on a scale not seen to date. Accessing these capabilities will be critical to the next wave of cost efficiency and value creation in the sector.

The key challenge for capital markets firms is working out how to use these innovations, to transform from an organisation that differentiates based on process or price effectiveness, to one that differentiates based on insight. Firms that do not do this will find their value propositions are increasingly ineffective.

This paper reviews the current state of firms' architecture and poses two critical questions:

- What does capital markets architecture of the future look like?
- How can it be simplified to maximise the value of investments?

Working towards a simplified future state can improve agility, as well as reduce people and technology costs – in turn supporting a reduction in Cost Income Ratios (CIR) and an increase in Return on Equity (ROE) to shareholders. Addressing these questions can create a more agile environment and increase data insight.

Mark Heaton
Director
Digital Transformation, Financial Services Advisory

Why do we need to simplify?

Trading technology architectures have not fundamentally changed in the past fifteen years. Electronic trading has changed the way in which clients trade, but this still feeds through a trading platform to a middle office, back office and risk function. Banks have embraced straight through processing and implemented trading platforms to support this. But in many cases, selecting a best in breed approach across asset classes has exacerbated the complexity in the architecture.

The main drivers for simplification

Regulatory compliance

Boards need to be able to explain how their bank works and the Senior Manager and Certification Regime (SM&CR) makes this requirement more explicit. Regulators are also starting to ask questions around the robustness of technology. The simpler the architecture, the easier it is to explain.

Differentiated offer

Regulators are increasingly driving commonality of pricing and other aspects of the offer. Banks that succeed will be those that best understand customer needs and can use the information they own, or can access, to construct the most compelling offer and create a seamless customer journey.

Cost efficiency

Regulatory spend on technology and processes has not allowed financial institutions to take out cost. This has maintained high cost income ratios and low return on equity.

Talent retention

Banks are losing the war for technical talent and need to switch from maintaining legacy architecture to innovation to create exciting places to work. Reducing the legacy estate is critical to enabling this.

Agility

The pace of change due to innovation is accelerating. Amazon, for example, deploys a change every 11 seconds whilst equivalent timings for a typical bank are orders of magnitude slower. We are seeing a pivot from process-efficient organisations winning to those best able to gain insight from the information they hold. Adopting modern development techniques such as DevOps requires both technical change to decompose solutions and cultural change around governance and ways of working.

Driving innovation through technology

The last ten years has seen a significant acceleration in technology innovation – primarily, moving compute power and storage capabilities to the cloud and third-party providers.

We have seen a number of key technology innovations over the years, from networking in the 1960s to the world wide web in the 1990s. Today it is the availability of cloud-based compute and storage that is enabling the current wave of technical innovation. Many firms are realising the benefits of cloud technologies and how it can help to reduce the cost of IT infrastructure – which is further encouraged by the 2016 PRA guidance[1] on the subject. The availability of mass CPU and GPU compute facilities have enabled the development of big data and artificial intelligence, which have in turn fueled a revolution in customer experience across all service industries.

Firms operating on older technologies are struggling to innovate at pace and increasingly run the risk of being left behind.

Applying emerging technologies

	Technology	Potential benefits
Emerging technologies	**Cloud** Cloud is providing enabling technologies on either a public or private basis around on demand compute, AI frameworks, structured and un-structured data storage. Cloud offerings have evolved from simple virtual machines into complex data analysis services and auto-scaling compute, along with enabling elements such as Infrastructure as Code to speed deployments.	Cloud technologies allow businesses to reduce the cost of maintaining hardware and access emerging technologies. Cloud simplifies scalability through on-demand compute, reducing the need for physical hardware and data centres through a serverless approach, eliminating many IT support roles for hardware and operating system maintenance.
	Containers A container is a small, standalone executable package that includes everything required to run the application. This includes executables, libraries and configuration files. Containers do not include operating system images and are therefore much lighter and simpler to deploy.	Containers 'virtualise' the application, configuration and dependencies, which greatly improves portability. This enables a continuous development and integration process (CI/CD) and DevOps processes allowing faster adoption of innovative ideas. Multiple containers can be deployed in clusters and orchestrated with technologies such as Kubernetes.
	Distributed ledgers Distributed ledger technology is a decentralised storage that removes the need for a central authority or intermediary to validate or authenticate records, removing the possibility of a central and single point of failure.	Distributed ledgers allow reconciliation activities to be reduced to a single operation as truth is agreed automatically between entities. They also allow versions of data to be stored and referenced to ease subsequent processing.
	Data Databases historically simply stored relational data such as transactions associated with accounts. Modern technologies such as Snowflake, Hadoop and Graph databases optimise storage, scalability and analysis of unstructured and real-time streamed data.	Globally distributed consistent data makes it much easier to operate at scale and eliminate duplicate processes maintaining this data across disparate systems. It also enables technologies around artificial intelligence and machine learning.
	Artificial intelligence Artificial intelligence is the combination of traditional and machine learning algorithms to make informed decisions or predictions.	Enables more sophisticated analysis and moves beyond simple product pricing towards actionable insight. Consideration must be given to potential bias by ensuring clean data for the machine learning.

1. https://www.bankofengland.co.uk/prudential-regulation/publication/2016/pra-note-outsourcing-functions-to-the-cloud-jul-2016

Simplifying the architecture

As priorities shift, firms' architectures have evolved to meet short term considerations. This has resulted in layers of complexity as, for example, MiFID II reporting processes were added to legacy platforms. Simplification is about establishing consistency, mutualising services and taking the source of truth out of the bank and onto a distributed ledger.

Today there is a strong focus on robotic automation which is being widely deployed to achieve further cost savings, at the expense of further complexity. In parallel, rapid technology innovation, in particular around cloud enablement and distributed ledger technology, is enabling inter-organisation sharing to a level that has not been seen to date. A single version of the truth gives management access to synergies that, to date, have been considered too hard to access. Companies such as Cobalt, R3 and Axoni have products, that are live or in beta test, which will drive significant change in business practices and operating models.

Taking a more holistic look with this context enables more robust challenge and consideration of potential future outcomes. This drives a vision where the bank is centred on three fundamental components:

- a data store
- a risk management platform
- a sub-ledger.

Everything else should be procured as on-demand services.

These three components are orchestrated and coupled together via micro-services, which drive calculation engines for risk, P&L, collateral and curve construction amongst others. This approach allows the services to be delivered as part of a continuous integration and continuous delivery lifecycle (CI/CD).

Leveraging capability outside the organisation

Emerging technologies offer ample opportunities for simplification – not only in the individual organisation, but across the market itself. For example, distributed ledger technologies offer opportunities to centrally manage data in real time – making it simultaneously available to all appropriate stakeholders in the market. Essentially this means key operational elements can be moved outside the individual organisation and be managed collectively, lowering ongoing costs, simplifying infrastructure and helping firms focus on their core capabilities.

To make this a reality, firms should review their infrastructure and consider:

- **Mutualising** – identifying activities that can be moved outside the individual organisation
- **Removing** – taking out individual firm activities that are consequently no longer required
- **Adding** – leveraging new capabilities to extend the offering and increase differentiation.

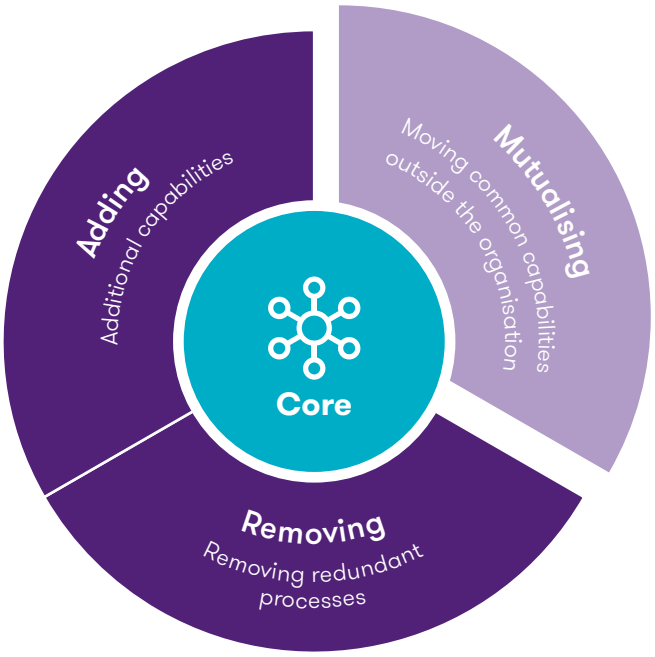
This leaves a core set of activities that must remain part of the organisation as they either contain specific intellectual property or other sensitive data.

Re-thinking the ecosystem

Applying this thinking to the participants in the capital markets ecosystem will lead to a de-coupling and a re-thinking of the boundaries between organisations, services, distributed ledgers, regulators and the core of the firm.

This will take time. The current technology may not be fully there yet to support this vision – but with the current pace of change, it probably isn't far off. Distributed ledgers need to develop beyond the current live FX and commodities implementations and standards such as the ISDA Common Domain Model (CDM) would need to be adopted more broadly.

As these technologies come to market, care should be taken to prevent a proliferation of overlapping distributed ledgers. We believe an asset class aligned approach would be optimal. However, we recognise that geographically separate solutions could emerge, or a regulator-centric approach.



Identifying services to be mutualised

Looking across the ecosystem as a whole, an increasing number of capabilities have already been moved out of the business and are available for purchase 'as a service'. Examples include relatively well established technology such as cloud storage, to newer technologies such as infrastructure as code and AI frameworks.

Firms should review the elements of their architecture which are unique to them, versus elements that can be addressed through third parties or mutualised across multiple organisations. Where possible, cloud services should be applied to reduce the need for in-house technology. Where pay-per-use or subscription based services are available in the market place, these should be the preference, rather than building similar capabilities in-house.

Market and reference data services

Current market and reference data providers, such as Reuters, Bloomberg and IHS Markit, are all adapting to deliver their data to cloud providers. However, the utopian vision of shared market and reference data across vendors will remain unviable without solving the inherent liability challenge of relying on data.

Customer data

Customer data should be centralised, not duplicated and leverage customer relationship management (CRM) platforms, such as Salesforce, for distribution and as a single source of truth. Data treatment should be differentiated depending on whether it is owned by the client, bank or publicly available.

Know your customer processes

The processes of background checking customers are now widely available as services. As such, they're an easy element to move outside IT and business infrastructure.

Processing services

Many capabilities can be moved outside the organisation and be consumed on a subscription basis. Cloud technologies can cover a broad range of services and be leveraged for frameworks around artificial intelligence and machine learning, amongst others. It can also provide benefits around cost reduction of technology and people.

Open source

Open source technologies provide off-the-shelf frameworks and services that are contributed to by a wide network of developers. Bank are starting to adopt Open Source solutions and are providing code and developer time to initiatives such as OpenFin and FinOS. Open Source has the advantage of not being a closed ecosystem and being continually refreshed and tested by a global developer community.

Centralised trade ledgers

The key technology offering radical change is the availability of distributed ledgers. Today, a trade is recorded independently by each party, triggering a need for reconciliation across the trade lifecycle. Adopting a distributed ledger would see these records being shared, eliminating the need for much of this, including matching and confirmation processes, while also facilitating trade netting, compression and allocations. Direct connectivity from the trading venues to the distributed trade ledgers, would create a 'golden source' of truth and establish an immutable and visible record of all transactions.

Taking the source of truth out of the firm and on to distributed ledgers facilitates a further wave of simplicity, covering:

Payments and clearers

Direct connectivity to the distributed ledger would allow payments to be made either through intermediary platforms or via the existing market infrastructure such as CLS and SWIFT. Similarly, clearers would interact directly with the distributed ledger. There would be no need for connectivity directly from the firm for these payments.

Regulators and depositories

The regulator, after some legislative changes, could take a feed directly from the distributed ledger, removing the ambiguity inherent in today's fragmented reporting and offering total transparency.

Reviewing the residual architecture

Once key elements of infrastructure have been designated to third parties or mutualised, firms should assess the remaining architecture to identify elements which are now surplus to requirements. Equally, the transition would allow firms to focus their energies on differentiating their services further, which may require additional capabilities.

Removing redundant processes

Key elements which will no longer be needed include:

Middle and back office processes

The adoption of distributed ledgers will radically change the scope and purpose of the traditional middle and back-office. The 'truth' will be determined earlier in the trade lifecycle and as a result a significant number of processes around matching, confirmations and reconciliations will disappear. The regulators will need to be part of this journey.

Matching

Matching will take place on the shared trade ledger with trades coming directly from the execution venues. The internal processes around matching can now be removed.

Confirmations

A distributed ledger implicitly means the trade is confirmed. The historic processes of dispatching confirms becomes obsolete.

Reconciliations

Distributed ledgers remove the need for duplicate trade records within the bank and counterparty. This, in turn, reduces or eliminates reconciliation processes.

Robotic process automation (RPA)

RPA has supplied a tactical cost saving but has further added to complexity. RPA should be removed as the processes and technology are optimised.

Adding elements to differentiate services

Separating out the architecture in this way gives firms the freedom to identify areas that can help to differentiate the offering, such as:

Data driven insights

Using a data centric approach and ensuring lineage of the data, Machine Learning and AI based technologies can start to be applied to create client insight. This is also an opportunity to extend the modelling IP away from pricing and risk and into client insight and behaviours, adding value to the sales/trader process.

Micro-services

Orchestrating the core with micro-services. The use of large legacy compute platforms can be challenged and decomposed into services and engines such as pricing services, accounting postings or yield curve construction.

DevOps

DevOps should become central to technology delivery and all new deployments must enable it. Continuous Integration and Deployment create agility, but this will only come with the removal of silos and the simplification of the architecture. It is critical that this is not just a technology change, but a cultural change in the organisation around the build, test, release process.

Cyber and connectivity layers

Ensure a cyber layer around the core and a Security Operations Centre (SOC) unit is providing 24/7 pre-emptive monitoring.

The core

Once the above has been applied, the core architecture will focus on managing confidential information and critical intellectual property. It only needs to consist of the following three components:

Data

Data will be core to differentiating the offering. The bespoke pricing and risk modelling of today needs to be extended across all the available data to create actionable client insight by leveraging AI and ML techniques as those pricing and risk models become harmonised.

Enterprise risk management

The need for a traditional trading platform is removed with the source of truth residing in a distributed ledger. These platforms should be re-purposed for enterprise risk management or replaced with a single risk platform.

Sub-ledger

The need for statutory accounting along with the sensitivity of this information still drives a need for a sub-ledger.

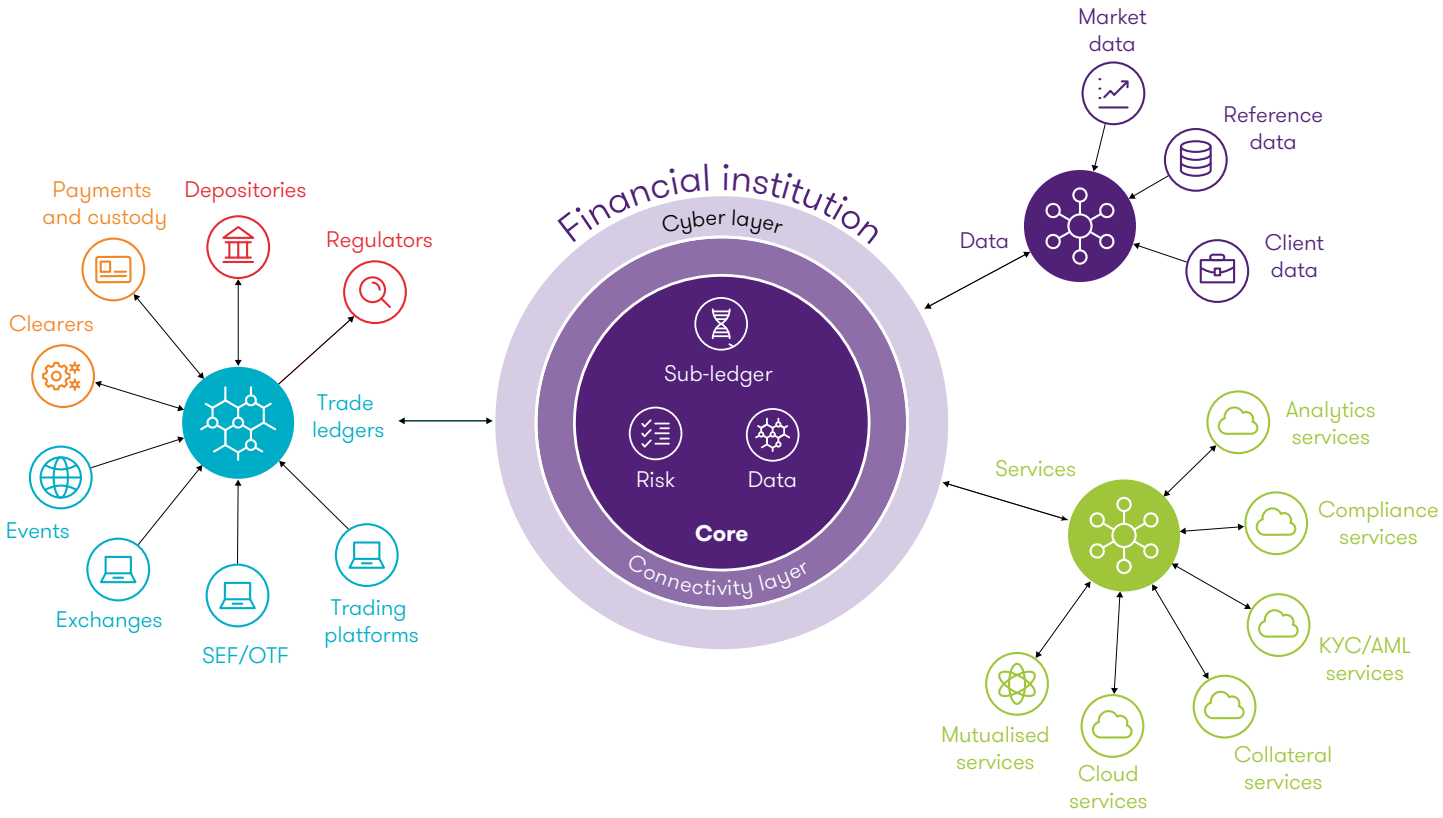
Working towards a simplified vision

The challenge for firms, is to have a vision for a simplified future and establish an effective plan to get there.

While some of the required technology is still evolving, a significant amount is already available and it's about leveraging it effectively. Identifying areas where your technology is lagging behind can help the firm identify areas for future innovation and support the development of a simplified ecosystem across capital markets.

The previous pages discussed how a mutual approach can be achieved, based around a decoupled, service-oriented architecture (SOA). Applying shared data across the wider ecosystem offers an opportunity to create a simpler, lower cost technology architecture and greater transparency to clients and regulators. But what does this architecture look like in practice?

The diagram below demonstrates this new approach, summarising the mutualising, decoupling and regrouping of organisational architecture. Once this is achieved, a firm's remaining IT architecture will be the core services and distributed ledgers that help to differentiate its offering.

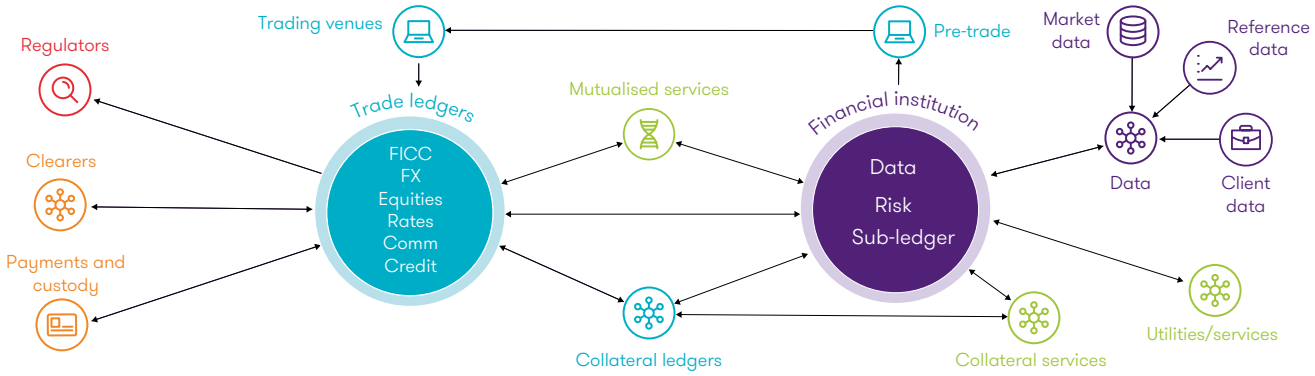


Developing the wider ecosystem

Extending this vision across the wider ecosystem of regulators, trading venues and other market participants creates a vastly different market. Outsourcing key functions is already widespread and will become the default position rather than developing in-house approaches.

Services such as KYC checks are typically outsourced and the same model can extend to managing activities such as collateral management, where elements such as documentation and margin calculations can fall under these new types of workflow, as outlined below.

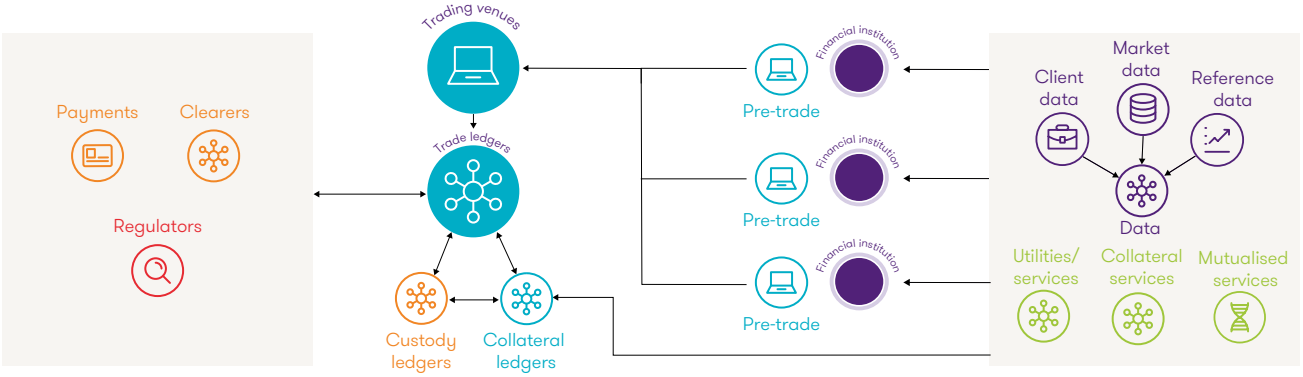
Financial institution within the wider ecosystem



Firms are already using distributed ledgers, for example, FX business is moving to the Cobalt DL ledger, and their use can be extended across other areas of business. Across the wider market, one approach to adoption could include the use of shadow ledgers which will allow the legacy technology to exist in tandem with the new.

As banks adjust and accept the new technologies, the legacy can be decommissioned and further cost reduction realised. The diagram below demonstrates the use of ledger stacks and how they can simplify the market.

Evolution to custody ledger within a ledger stack



A key point to note is the danger of applying so many distributed ledgers that the market infrastructure becomes a complex web of ledgers – returning the market to its original complexity.

Moving towards a simplified future

Capital market institutions are at a crossroads. After ten years of historic low interest rates and poor returns there is a need to achieve a significant change in their offer and cost base, radically rethinking their operating models. The technology to enable this is available today and, although the patterns for deployment of distributed ledgers will mature over the next few years as regulators and innovators trial various models, their adoption will be key for unlocking further growth.

The simplification processes can be driven by mutualising processes, removing redundant elements and adding a data centric approach which supports a differentiated offering. Applying distributed ledgers can help firms reinvent their core and move their intellectual property away from process and pricing, into insight, whilst adopting architectures that support regulatory compliance This transition is essential within financial institutions and is key to future innovation.

Looking beyond the individual firm, mutualising services across the wider ecosystem can identify synergies across banks, regulators and other market participants. It can reduce duplication and simplify operating models. Cloud technologies are increasingly being adopted and have evolved from simple virtualisation through to richer offerings, such as infrastructure as a service, platform as a service and containerisation technologies, such as Docker. This has allowed a further step toward infrastructure as code and instantaneous on-demand deployment of hardware, which historically would exist inside a data centre.

The traditional technology cost model creates future obligations that impede the ability to invest. This is exacerbated by commitments to upgrade legacy. A switch to consumption-based pricing will also allow supply and demand to be matched more easily.

Is the technology advanced enough?

A significant proportion of the technology needed to enable this future vision is available today. Adopting distributed ledgers will be key to unlocking a huge proportion of its value. However, addressing the architectural issues inside the organisation will take time. The transition will be complex – each firm has their own challenges and priorities. The current approach of tactical fixes is unsustainable and there is a need to be more ambitious.

This complexity is driving firms to define their target end state now so other initiatives can facilitate a move in the right direction. The first distributed ledger solutions have recently gone live – there is a real risk of being left behind or wasting investment on ideas that, while interesting, are not aligned to a technology strategy. The successful firms will be those that draw insights from rich analytics in order to genuinely innovate. But this requires a simplified architecture to support differentiating service and mutualising the remainder.

The biggest open question is how each firm starts the journey to embrace this vision and start to innovate. Along with reducing the embedded costs, removing redundant processes and functions, creating increased returns to shareholders and looking to a more efficient and agile future. Firms need to start addressing the challenges inside their organisations, in anticipation of a radically different future.

How we can help

Financial institutions face unprecedented challenges caused by low interest rates, significant regulatory burden and growing customer expectations. Digital transformation can help businesses meet those challenges, but it can create additional complexity if layered onto legacy infrastructure. We can help you simplify complexity and support the creation of streamlined capital markets architecture.

We envisage a simple future state for capital markets, dependent on a mutual infrastructure to help you focus on the elements that genuinely differentiate you. Drawing on significant industry experience, our team understand the barriers presented by legacy infrastructure and the challenges faced when driving true innovation. We work with firms across every strand of the market and are well placed to identify those recurring themes that can be addressed collaboratively. A bold step now, from the market as a whole, can embed greater agility, release stranded IT costs and improve profit margins.

Transformations are essentially business-orientated initiatives, which can be facilitated and fuelled by effective use of technology.

We can support our clients through all aspects of the transformation journey through:

- IT strategy and solution design
- business case for change
- target operating models
- regulatory insight
- business insights and analytics
- system selection and implementation
- cloud enablement
- distributed ledger technology.

Please contact us for more information on the above and how we can help.

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