Executive summary
The digital future of exchange operations is imminent

The vast majority of executives in the securities industry have recognised that change is imminent for the operations function. A poll conducted at the most recent Securities Industry and Financial Markets Association (SIFMA) Operations Conference indicated that the majority of operations leaders believe their work will be transformed by emerging technologies within three to five years. The progressive leaders in this space have developed a holistic vision for the future of exchange operations and are adopting a modularised approach to execute on their vision. Many have started with proof of concepts for various tools and technology to gain familiarity, launching scaled transformation programs that encompass:

- Hiring of new skill sets (e.g., data scientists, bot engineers) and realigning existing “superstar” resources to a lean team to pilot transformation in a limited area
- Launching processes and data improvement initiatives to standardise the current operating environment to take advantage of new and traditional technologies
- Training their current operations workforce to be more data and technology savvy to create a workforce of the future
- Partnering with external providers or vendors to build out their knowledge base and establish an ecosystem network

These leaders have recognised that the critical success factor to any major transformational change is not technical abilities—it’s a mind-set change. They have embraced the fact that they are uniquely positioned to be change agents for their organisations. This modernisation journey will not be easy, but organisations that avoid the journey risk being displaced in the era of digital disruption. The digital future of exchange operations is imminent, a theme we will continue to demystify through the reimagining the future of capital markets series.

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Introduction

The purpose of this document is to layout a vision and hypothesis for the future of exchanges and related components of the Financial Markets Infrastructure (FMI) ecosystem. For 25 years, trading, clearing and settlement have been primarily fully electronic where orders are electronically routed to an exchanges, validated, matched, and executed. With billions of orders and executions, technology enablement has been essential to the access to the traded markets, development of new products and services and available to a broad investor community.

Everyday we see advances on high frequency trading, co-location venues and direct market access for trading partners, we have not seen the same level advances in the non-trading functions of the exchanges. Everyday exchanges are searching for better margins, improved shareholder value and improved risk management, yet many operational functions remain dependent on spreadsheets, manually intensive operations and a limited control environment due dependency on desktop tools, email, end-user-computing tools (EUCTs).

This paper focuses on two primary areas of the future of exchanges: (a) digitised operations and controls and (b) new revenue streams. While there are many dimensions of the ecosystems that we can focus on, we believe the priority is that of the exchanges.

Over the course of this paper, we will layout a set of hypothetical areas of focus where exchanges begin their journey to move to a more efficient and effective, non-trading operational functions.
Global securities exchange industry

The global securities exchange industry is being reshaped by business challenges, strategic choices and the new possibilities that emerging technologies offer.

**Financial pressure**
- **Revenue pressures** resulting from regulatory mandates and restrictions (e.g., fee transparency for market data services, connectivity, etc.)
- **Tightening margins** resulting from increased competition (easy access to new exchanges and products) and lower switching costs driven by tech advancements

**Legacy challenges**
- Older and traditional exchanges facing stiffer competition from new nimble exchanges, further exacerbating legacy operational inefficiencies and technology debt

**Regulatory scrutiny**
- Heightened regulatory activity globally with focus on transparency, oversight and robust operational controls and risk management processes
- **Operational Resilience & risk under constant scrutiny** - spanning surveillance, recovery and ability to handle stressed markets

**Emerging revenue streams**
- Exchanges are exploring alternate mechanisms for revenue generation. Avenues include direct market access platforms, monetisation of data and analytics, etc.

**Concerns on cyber security**
- Constant and evolving nature of cyber security threats, requiring laser focus on protecting data and technology ecosystems

**Consolidation of exchanges**
- Significant consolidation of exchanges driven by technological, legal and competitive changes, and the need to expand into new markets, products and service offerings

**Evolving ecosystems**
- Evolving technological ecosystem driven by integration of new capabilities such as FinTechs, incorporation of emerging technologies such as, blockchain, big data analytics, cloud, and AI / ML
Defining the FMI landscape

In approaching the future of exchange’s it is key to understand the ecosystems in which they operate and the interconnectivity related to these entities. All dimensions of the ecosystem have similar operational challenges and pressures.

**Exchanges**
There are over 130 global exchanges trading equities, options, ETFs, futures, swaps, derivatives, for cash, energy, and commodities. Each exchange model is similar yet there are significant opportunities to reduce the operational footprints and enhance the value offerings through technology.

**Market Data Providers**
As part of the ecosystems, market data providers play an essential role in industry coordination, and are significant revenue enhancers for the FMI community.

**Post Trade Functions**
Core to risk management are the clearing and settlement functions. Clearing and settlement agencies across the global mitigate risk, yet are due for technology modernisation.

**Regulators and Trade Repositories**
Regulatory requirements continuously increase demands on the FMI communication. Trade warehouses, repositories are the lifeblood of the regulators and one of the greatest risks to the infrastructure.
Exchange non-trading operations

In order to understand the future direction of exchanges, it is essential to decompose the organisations functionally and to address each area’s challenges and evaluate various solutions to the problem at hand.

Financial Markets Infrastructure Case for Change | An Exchange Perspective
Digital transformation

Over the past few years, some global exchanges have embarked on digital transformation journeys to reshape business models, redefine customer / employee experience, and strengthen compliance.

1. Reduce manual operations
   - Automate processes through digital interventions across member onboarding, payments etc.

2. Provide data on demand
   - Develop new age models to provide data to clients to make effective trading decisions (e.g., subscription models)

3. Reduce latency for various services
   - Reduce TaT for high volume activities through new age technologies (e.g., Artificial Intelligence)

4. Help clients better manage capital
   - Provide clients data and information in an effective manner (through AI, ML etc.) to take efficient trading decisions

5. Offer emerging technology based products and services
   - Launch new age digital products and services with a reduced time-to-market (e.g., Blockchain, Chatbots)

6. Access global exchanges
   - Partner with global exchanges to provide additional benefits for companies such as dual listing, increased investor reach, etc.

7. Enhance market surveillance
   - Utilise the power of Artificial Intelligence to better identify fraud and compliance issues with minimal manual intervention

Source: Deloitte Analysis
Digital transformation
These transformations are enabled by a portfolio of emerging technologies, making exchanges “future-ready” while managing business and cyber risk

<table>
<thead>
<tr>
<th>Reimagined UX</th>
<th>Open APIs</th>
<th>Big Data and Analytics</th>
<th>Robotic Process Automation</th>
<th>Artificial Intelligence and Cognitive</th>
<th>Distributed Ledgers</th>
<th>Cloud Services</th>
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<tbody>
<tr>
<td>• Reimagined, state of the art user experience for end customers, members and employees</td>
<td>• Modular architecture and reusable components at UX, domain and system levels</td>
<td>• Enhanced insights (trading patterns, audit trail, market behavior, etc.)</td>
<td>• Increased operational productivity; ability to deploy staff on value added activities</td>
<td>• Improved customer experience supported by digital virtual agents</td>
<td>• Enables reduction of information asymmetry, and greater compliance</td>
<td>• Reduced capex</td>
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<td>• Any time, any device, any place access to key customer end user touchpoints</td>
<td>• Seamless, yet controlled integration with exchanges core systems</td>
<td>• Improved compliance through surveillance and fraud analytics</td>
<td>• Improved customer service enabled by increased processing accuracy and faster response times</td>
<td>• Predictive operational risk controls</td>
<td>• Enables transparency, trust and increased operational efficiency across the network</td>
<td>• Flexible consumption models</td>
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<td></td>
<td>• Critical component to enable a “market place” of “plug and play” services</td>
<td>• New revenue stream enabled by data monetisation opportunities</td>
<td></td>
<td>• Increased resiliency through predictive maintenance of IT systems</td>
<td>• Enables transparency, trust and increased operational efficiency across the network</td>
<td>• Unprecedented access to innovation and increased time to market</td>
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Exchange of the future
The exchange of the future will be characterised by new revenue streams, streamlined operations and a symbiotic network of ecosystem partners made possible by emerging digital shifts.

New and alternate revenue streams
• Monetisation from raw transactional feeds, curated historical data and analytical models
• Application hosting platform for Fintech and other ecosystem players
• Small Market exchange platform providing a suite of “soup to nuts” listing and secondary market services
• Direct Market Access targeting specific customer segments (e.g., targeting VCs to trade in small market stocks)

Run by an augmented workforce
• Human and digital labor working symbiotically performing core operations processing at scale and with precision
• Automated workflows, with exceptions based middle and back office processing

New age “retail like” customer experience
• Intuitive and seamless customer experience focused on E2E “retail-like” customer journeys
• Any-time, any-place, any device access for applicable customer interfaces and interactions

Focus on new age products
• Focus on listing, trading and settlement of digital products (e.g., ICOs)
• Focus on digitising physical assets through tokenisation to enable efficient transactions processing

Enhanced and automated controls
• Automated operational controls supported by state-of-the-art dashboards that allow for proactive risk identification and mitigation

Supported by next-generation scalable architecture
• An operating environment architected on next generation technology platform
• Systematic focus on innovation and reduction of technology debt
• Shift from legacy systems to platforms and ecosystems supported by emerging technologies
Successful FMIs design resilience in their technology

The world is more interconnected every day. Customers and business partners have come to expect technology to be ubiquitous and “always on”

**Benefits of technical resilience**

- **“Always on”**
  - Aligns all organisational elements to support zero downtime expectation

- **Improved cyber risk posture**
  - Protection against evolving cyber threats

- **Risk optimisation**
  - Aligns all organisational elements to support zero downtime expectation

- **Cost savings**
  - Focus on scalable, rapidly-provisioned solutions over redundancy

- **Improved speed to market**
  - Adaptability supports accelerated change management processes

- **Increased flexibility**
  - Cloud-enabled solutions reduce dependence on physical data centers
How to win
To develop winning value propositions, FMIs must focus on some key design principles, placing customers/users at the epicenter

- **Reinvent the personalised user experience**
  Strive to bring personalised experiences to mobile. Clients should get the personal touch and attention that they can get in person on mobile as a part of any reinvented and personalised customer experience.

- **Engage users**
  Start by making your stakeholders and clients a part of the process and maintain their involvement throughout the life of the program. Designers can employ any of the below methodologies based on the context:
  - Focus group discussion
  - User Interviews

- **Define the experience**
  We collaborate to conduct user research to define personas, use cases, and customer experience maps that match the business direction—specifying not just functionality but also how users will interact with each digital channel most effectively.

- **Enable the experience**
  Then determine how to enable that functionality across your processes and infrastructure.

- **Achieve user adoption**
  Achieving results for any new user experience is driven by user adoption. In this case, if the clients are not able to make use of the new digital experience in a way that is easy and valuable to them, they will not adopt.

- **Iterate the experience**
  Iterate with mock-ups and wireframes and even end-user devices to eliminate as much interpretation as possible and get down to a design that clients will love.
Revenue enhancement and operational enablement
A number of initiatives can enable FMIs to create revenue enhancing and streamlining opportunities

**IPO listing and post listing compliance**
Streamline listing and post listing operations through automated workflows, NLP and analytics

**Securities lending & borrowing (SLB)**
Improve SLB registration and transactions management through a distributed ledger platform and smart contracts

**Data monetisation**
Generate new revenue streams for Exchange by creating an ecosystem to monetise Exchange generated data and analytics

**Small market storefront**
Develop a next generation marketplace targeted at SME institutions to buy and sell end to end listing and post listing services

**Open API enabled platform**
Generate an ecosystem of services provided by Fintech providers enabled by an Open API platform

**Shared KYC**
Streamline end-to-end KYC specific operational processes through application of distributed ledgers and smart contracts and automated workflows

**Trade surveillance**
Monitor and proactively detect market manipulation and fraud by leveraging big data and next generation analytics capabilities

**Continuous model validation**
Model Risk Management, continuous monitoring and testing of financial models used to managed risk and exposure