

# NAVIGATING AND MAKING THE AI AND DLT PARADIGM SHIFT SUSTAINABLE: CHALLENGES AND OPPORTUNITIES IN THE FINANCIAL SERVICES MARKET

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 **ELEVANDI**



**POINT  
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# Content

About	<b>03</b>
Summary	<b>04</b>
<hr/>	
<b>Today's paradigm and towards the shift</b>	<b>05</b>
Balancing sustainability, transparency, and accountability in AI and DLT	<b>05</b>
<hr/>	
<b>Algorithmic law and smart contract development</b>	<b>06</b>
Adapting regulatory frameworks to decentralised ecosystems built on DLT	<b>06</b>
<hr/>	
<b>Connecting with AI</b>	<b>08</b>
The convergence of DLT, AI, and the IoT	<b>08</b>
<hr/>	
<b>Structuring this 'scientific revolution'</b>	<b>10</b>

## ELEVANDI

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Elevandi's flagship product is the Singapore FinTech Festival, which runs alongside other prominent platforms such as the Japan FinTech Festival, Point Zero Forum, 3i Africa Summit, Inclusive FinTech Forum, Elevandi Insights Forum, The Capital Meets Policy Dialogue, The Founders Peak, and Green Shoots.

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The Bank of Italy is the central bank of the Republic of Italy. It is an integral part of the Eurosystem, which is made up of the national central banks of the euro area and the European Central Bank. The Bank pursues aims in the general interest in the sector of money and finance: price stability, which is the main objective of the Eurosystem under the Treaty on the Functioning of the European Union; the stability and efficiency of the financial system, thus implementing the principle of the protection of savings embodied in the Constitution; and the other duties entrusted to it by Italian law.

As regards supervision, the Bank of Italy is the competent national authority for the Single Supervisory Mechanism (SSM) for banks. As regards to resolution, Bank of Italy is the competent National Resolution Authority (NRA) that performs the tasks envisaged by the Single Resolution Mechanism. The Bank of Italy is an organization of about 6,800 people who have multidisciplinary skills; it uses its technological and financial resources to offer quality services in an efficient, responsible and impartial way.

## Summary

This report draws insights from a recent roundtable held during the Point Zero Forum 2024. It builds upon a paper published last year on the sustainability of distributed ledger technology (DLT) in the financial sector, where ESG (Environmental, Social and Governance) factors, technological and legal considerations, and regulatory approaches were analysed. This edition further considers how DLT-based solutions might shift from traditional models towards algorithmic governance.

The roundtable delved into the specific challenges and opportunities that arise with this shift. By exploring these key areas and considering the potential integration with Artificial Intelligence (AI) and eventually Internet of Things (IoT), the roundtable sought to contribute to the creation of a sustainable, robust and secure future for this transformative technology.

The roundtable brought together policymakers, academics, and financial experts to navigate the legal and regulatory complexities arising from the transition towards AI and algorithmic governance in DLT-based finance.

The discussion focused on three key areas:

- **The shifting landscape:** The present status of AI and DLT in the financial sector was analysed, addressing issues such as sustainability, transparency, accountability and potential biases in algorithms. The prospective impact of wholesale Central Bank Digital Currency (wCBDC) on Foreign Exchange (FX) operations was also examined.
- **Algorithmic governance:** The discussion emphasised the necessity for DLT solutions and financial tokenization to comply with regulations such as Anti-Money Laundering (AML) and Know Your Customer (KYC) across different jurisdictions. Furthermore, ongoing research in this field was discussed, including efforts to develop guidelines for smart contracts. The necessity for a form of “algorithmic law” was discussed, referring to legal frameworks designed to govern automated processes and transactions facilitated by smart contracts. This is a field where traditional law is unable to adequately address the issues involved, and regulations must adapt to accommodate the evolving landscape of algorithmic governance in DLT-based finance.
- **Connecting with AI:** The potential for synergies between DLT, financial tokenization, AI, and IoT was also addressed, with particular attention paid to the ways in which these technologies might converge to create intricate and interconnected financial ecosystems. One such example would be AI dynamically adjusting smart contracts based on market conditions, while IoT devices automatically trigger transactions based on pre-defined parameters.

## Today's paradigm and towards the shift

### Balancing sustainability, transparency, and accountability in AI and DLT

The rapid advancements in AI and DLT have raised important considerations around sustainability, transparency, and accountability. As these technologies become increasingly integrated into various sectors, it is crucial to address the challenges and opportunities they present.

A key theme that cuts across AI, DLT, and other emerging technologies is the issue of sustainability. The tremendous energy usage required for the development and deployment of these technologies must be carefully considered in the context of the global climate transition and net-zero targets. As the IoT expands and integrates with physical infrastructure, the energy demands will only increase, necessitating a comprehensive approach to managing the environmental impact.

When it comes to AI, the focus on transparency and explainability of models is paramount. Regulators around the world have emphasised the need for explainable AI to combat potential biases. However, AI can also be leveraged to enhance transparency by providing accessible and concise summaries of vast amounts of data and information. This can empower knowledge workers to better understand and utilise the information available to them.

Accountability is another critical aspect that has been at the forefront of ethical frameworks for AI. The private sector has also recognised the importance of ensuring accountability in the use of these technologies. This extends beyond operational risk to include legal risk, particularly for sectors like finance and accounting, where the integration of AI and DLT can have significant implications.

The regulatory [approaches to AI](#) and DLT vary across jurisdictions. For instance, in the United States, the administration has directed government agencies to analyse, understand, and apply AI within their respective sectors.

Looking at the potential impact of tokenization and permissioned DLT on global financial stability, the analysis presented three key points: the promise of tokenization for improving cross-border payments, the need to address potential macroeconomic side effects, and the role of policy measures in mitigating volatility.

The use of cross-border platforms that leverage tokenization or wholesale Central Bank Digital Currencies (wCBDCs) to enhance international money transfers hold the potential to make cross-border payments faster, cheaper, more secure, and more accessible. Various international institutions and central banks are exploring different angles, with a primary focus on the implications for global financial stability. However, the implementation of these platforms requires careful consideration. Issues of governance, compliance, and macroeconomic stability must be addressed. It is important to understand the potential impact on capital flows and their volatility. Capital flows are crucial for trade, insurance, and economic growth, but sudden reversals or increased volatility can be detrimental to countries.

The introduction of tokenization and faster cross-border flows may create the basis for sudden reversals or increased volatility in capital flows. This is not a given, as large retailers already enjoy relatively low-cost and fast cross-border payments. However, the impact on small retailers and retail payments could be more significant. To manage the volatility of capital flows, countries often implement Capital Flows Management measures (CFMs), such as restrictions on inflows and outflows. They are only admissible under certain circumstances and if they do not avoid warranted macroeconomic adjustments. At an international level the use of tokenization and wCBDCs to enhance the implementation of CFMs by leveraging the information-sharing properties of these technologies has been explored.

International standard setters see great promise in tokenization and believe it can significantly improve cross-border payments. However, the potential side effects, particularly on capital flow volatility, must be considered. For this reason, G20 countries are working closely to ensure that the discourse on these technologies includes the voices of both advanced and developing economies. By leveraging the information-sharing capabilities of these technologies and implementing appropriate policy measures, it is possible to harness the power of innovation while maintaining global financial stability.

## **Algorithmic law and smart contract development**

### **Adapting regulatory frameworks to decentralised ecosystems built on DLT**

The regulatory landscape for smart contracts and DLT is complex and evolving. According to statistics, the number of smart contracts deployed across all available chains is approximately 1,047 billion. As scaling solutions become more efficient and accessible, fewer Ethereum Virtual Machine (EVM) smart contracts are being deployed directly on the Ethereum blockchain. More than 637 million EVM contracts have been deployed across 7 layer-2 blockchains since January 2022, according to a report from Flipside Crypto . Accordingly, the majority of smart contracts are not deployed on Ethereum.

The rapid development of smart contracts and the increasing interconnectedness of DLT platforms raise important questions about the path forward for standardisation and regulatory harmonisation. As the DLT ecosystem continues to evolve, key considerations emerge around achieving global-level comparability and compatibility across different jurisdictions.

Regulators have generally followed the principle of “same risk, same activity, same regulation” proposed by the Financial Stability Board (FSB) when approaching crypto assets. This has led to a concentration of regulation at the asset class level, drawing on decades of experience from traditional financial markets.

At a high level, there are more similarities than differences between regulating traditional markets and DLT-based systems. International standard-setting bodies like the FSB, CPMI, and IOSCO have contextualised existing standards to stablecoin arrangements and broader crypto/digital asset markets. National regulations around anti-money laundering, governance, and disclosures also show many parallels.

However, these efforts have made allowances for differences in the underlying technology, especially in implementation. For example, the safe custody of customer crypto assets in hot versus cold wallets is a novel distinction that supervisors and policymakers have in assessing the overall risk of crypto/digital markets since hot wallets, for instance, are more exposed to cyberattacks and frauds.

Most regulatory work has focused on centralised entities like digital asset exchanges. The regulation of centralised and decentralised entities can reinforce each other. However, as we move towards regulating truly decentralised networks built on DLT, the differences in technology will become even more apparent. This makes the topic of regulatory adaptation highly pertinent.

Three key themes emerge:

1. **Shifting the regulatory paradigm:** With centralised entities, it is still feasible to apply a traditional model of centralised accountability – a board of directors, management team, etc. – that can be held responsible. But in a decentralised ecosystem governed by smart contracts, the question of “who do you hold accountable?” becomes more difficult. The Bank of Italy’s occasional paper acknowledges this challenge and elevates the problem to ensuring good governance overall, discussing different approaches needed for various DLT types and use cases. There is likely no single answer, but rather a need for nuanced, context-specific solutions.
2. **Leveraging DLT’s inherent traits:** In the quest for good governance, there is an opportunity to utilise blockchain’s core characteristics of traceability, transparency, and immutability. Public blockchains are “trustless by design” which may not be enough for all stakeholders, but the transparency and traceability still offer a wealth of data to inform regulatory decisions. Regulators are already using blockchain data to assess risks posed by supervised entities. Ecosystem players are also using this data to self-regulate better.
3. **Implementing compliance by design:** In a world governed by code and algorithms, there is an opportunity to build risk management and compliance into the very infrastructure. Some decentralised protocols are already leveraging APIs to systematically restrict risky activities, screen for sanctions and money laundering risks, and block these in an automated way. This “compliance by design” approach is a promising avenue for decentralised ecosystems.

Adapting regulatory frameworks to decentralised systems built on DLT is a complex challenge without simple answers. However, a paradigm shift in regulatory thinking, leveraging blockchain’s unique properties, and implementing compliance by design can help chart a path forward. Regulators must remain nimble and innovative to keep pace with rapidly evolving decentralised technologies.

The inherently borderless nature of DLT-based financial systems poses a significant challenge in establishing global standards. Unlike traditional regulated spaces, where standards have historically been developed over time, the DLT landscape presents a more complex and accelerated landscape for regulatory convergence. The quest for global standards is a perennial issue that has plagued regulated industries.

However, in the context of DLT, this challenge is amplified by the distributed and interconnected nature of the technology. Platforms built on DLT do not adhere to geographic boundaries, necessitating a rethinking of how standards and governance frameworks can be harmonised worldwide.

Given the inherent difficulties in achieving a single, universal standard for DLT-based finance, a pragmatic approach may be to focus on establishing minimum baseline standards. This could provide a foundation upon which individual ecosystems and jurisdictions can build more tailored governance frameworks that address their unique needs and market dynamics. As suggested, market forces may also play a significant role in driving the development of governance standards that exceed regulatory minimums. The diverse range of DLT-based platforms and applications could foster a competitive environment where best practices and heightened standards emerge organically through market competition and innovation.

It is important to recognise that while the underlying DLT may be decentralised, the financial activities and services built upon it are often more accurately described as “distributed” rather than “decentralised”. This distinction is crucial, as it highlights the need to consider the interconnected nature of DLT-based platforms and the potential for standards to be developed collaboratively across these distributed systems.

Navigating the path towards global standards for DLT-based finance will require a nuanced and adaptive approach. Regulators, industry participants, and standard-setting bodies must work together to identify common principles and minimum requirements, while also allowing for flexibility and market-driven innovation. This delicate balance will be essential in fostering a harmonised, yet dynamic, regulatory landscape that can keep pace with the rapid evolution of distributed ledger technologies.

## Connecting with AI

### The convergence of DLT, AI, and the IoT

The third part of the roundtable explored the burgeoning convergence between DLT, smart contracts, and AI tools. This confluence presents significant transformative potential across various industries, with a particular focus on the financial sector. This unprecedented rate of innovation, both individually and through the combination of these technologies, is leading to an explosion of new use cases and increased interconnectedness within financial ecosystems.

The integration of these technologies is fostering greater decentralisation, network creation, and the emergence of AI agents that can interact and transact autonomously. The sheer scale of connectivity is staggering, with projections of over 30 billion connected devices by 2030, far exceeding the human population.



Examining the technology stack, the convergence of DLT and AI can be observed at various layers. DLT's properties of immutability, decentralisation, smart contracts, and tokenization can be leveraged to enhance data management, computation, and the functionality of AI agents. Conversely, AI can be applied to DLT-based systems to improve smart contract creation, data feed selection, and automated market-making for tokenised assets.

The integration of IoT with DLT and AI is already evident, particularly in the insurance sector, where IoT data is used to improve risk assessment, claims processing, and overall value chain efficiency.

There are also numerous ways in which DLT and AI can complement and enhance each other in addressing the challenges of the energy transition:

- **Provenance:** DLT can be used to establish the provenance of data used to train AI models, ensuring the legitimacy and traceability of the information sources. This is particularly important for climate-related data, where reliability and transparency are paramount.
- **Permissioning:** DLT can facilitate the management of permissions and rights for the use of data in AI training and applications, empowering data owners to control access and monetise their contributions.
- **Payments:** DLT-enabled micropayment systems can enable the equitable distribution of royalties to data owners whose information is utilised in AI-powered energy solutions, fostering a more sustainable data ecosystem.
- **Processing:** The immutable and transparent nature of DLT can enhance the security and compliance of AI-driven energy applications, enabling real-time monitoring and fraud detection.

Conversely, AI could also play a crucial role in improving the efficiency and effectiveness of DLT-based energy solutions:

- **Ledger security:** AI-powered tools can scan DLT source code and smart contracts, identifying potential vulnerabilities and bugs to enhance the overall security of the system.
- **Automated compliance:** AI can automate the enforcement of sustainability-focused rules and benchmarks within DLT-powered energy applications, ensuring adherence to environmental regulations and standards.
- **Intelligent Energy Management:** AI algorithms can optimise the management of distributed energy resources, such as renewable generation and storage, by leveraging the transparency and traceability provided by DLT.
- **Predictive maintenance:** AI can analyse DLT-recorded data on energy infrastructure performance to predict and prevent failures, improving the reliability and efficiency of the energy system.

The combination of DLT and AI can enable the development of energy solutions that are inherently sustainable by design. For example, smart contracts could be programmed to only execute transactions or energy trades when certain sustainability criteria are met, such as the availability of renewable energy or the achievement of emissions reduction targets. Similarly, AI-powered systems could be integrated with DLT-based energy platforms to continuously monitor and adjust the system's operations based on real-time data, ensuring optimal energy efficiency and environmental performance.

The convergence of these technologies also has implications for regulatory and supervisory approaches. Regulators are already exploring the use of AI to inform their supervisory practices, such as the Bank of France's use of AI on market data, and the UK's Financial Conduct Authority's (FCA) "tech sprints" and hackathons to leverage AI for fraud detection and other regulatory purposes.

The FCA's requirement for financial institutions to ensure consumers understand the contracts they sign when purchasing financial products is another example where the combination of AI and DLT can be leveraged. AI can be used to break down contracts and tailor the presentation to the consumer's needs, with the entire process tracked on a DLT-based system to ensure transparency and portability of the consumer's understanding across institutions.

## Structuring this 'scientific revolution'

This roundtable underscored the balancing act that needs to be struck between enabling progressive technologies with the potential to advance the financial system and sustainability goals, and global financial stability. The complexities of stewarding the emerging capabilities from evolving technologies as they interact with traditional systems in increasingly interconnected economies are significant. Establishing minimum baseline standards would support navigating and making this revolution sustainable and could provide a foundation for tailored governance frameworks in the future.