Gathering25

Realising vision, advancing automation

CitA25

Driving Digital Construction for 25 years

Welcome to the CitA BIM Gathering

The Clayton Hotel, Ballsbridge, Dublin, 6th November 2025.

Introduction

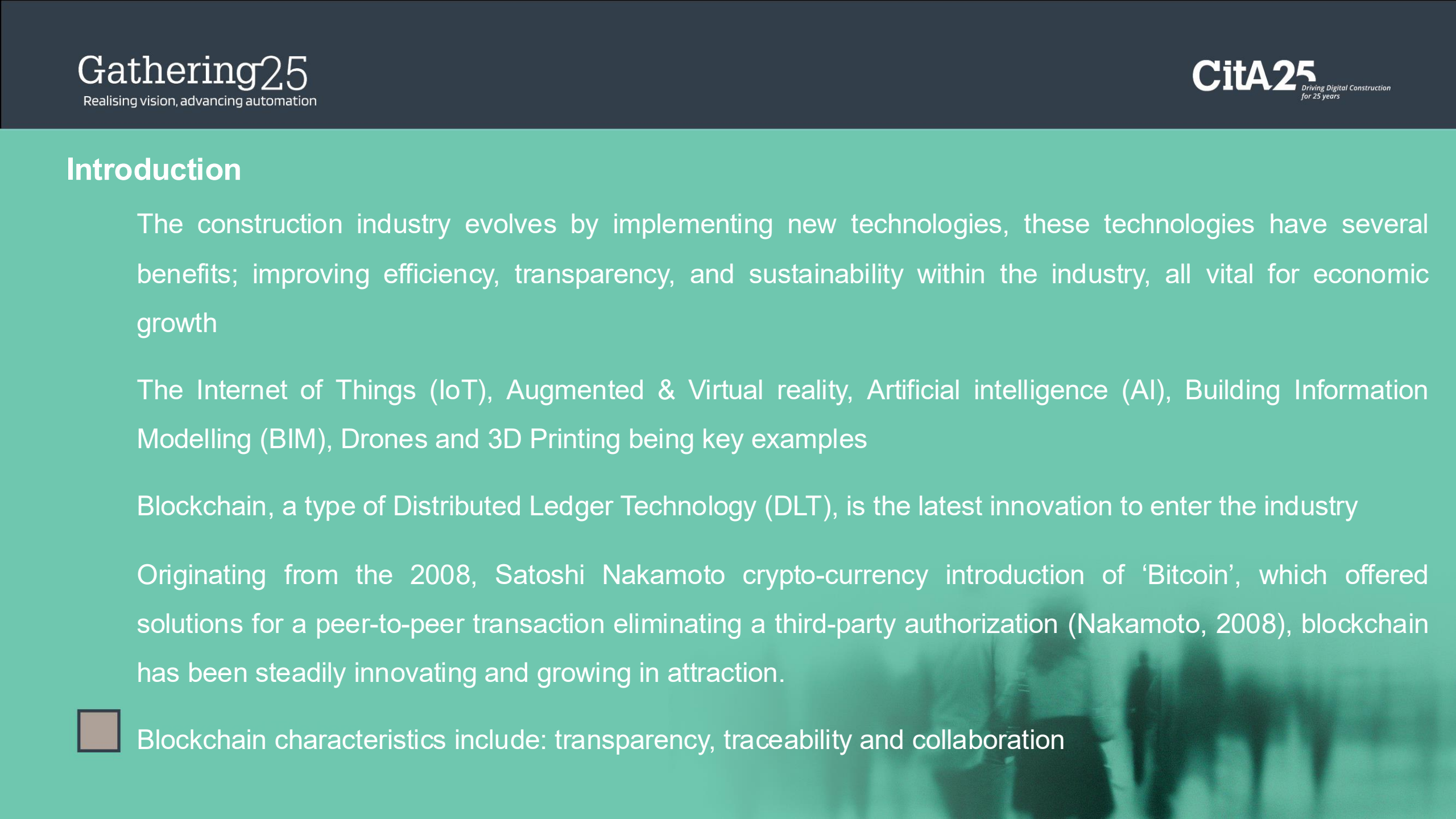
The construction industry evolves by implementing new technologies, these technologies have several benefits; improving efficiency, transparency, and sustainability within the industry, all vital for economic growth

The Internet of Things (IoT), Augmented & Virtual reality, Artificial intelligence (AI), Building Information Modelling (BIM), Drones and 3D Printing being key examples

Blockchain, a type of Distributed Ledger Technology (DLT), is the latest innovation to enter the industry

Originating from the 2008, Satoshi Nakamoto crypto-currency introduction of ‘Bitcoin’, which offered solutions for a peer-to-peer transaction eliminating a third-party authorization (Nakamoto, 2008), blockchain has been steadily innovating and growing in attraction.

- Blockchain characteristics include: transparency, traceability and collaboration



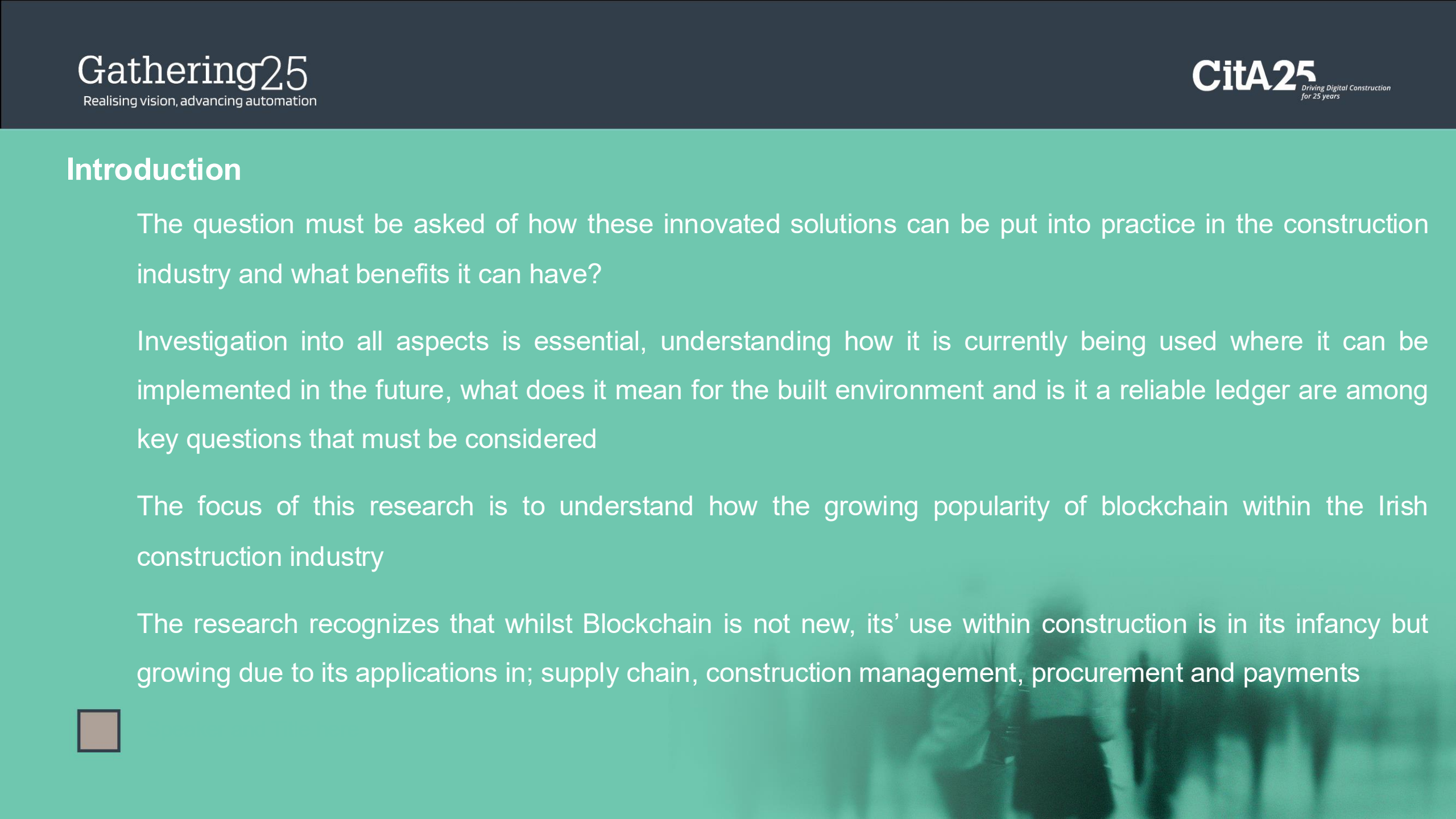
Introduction

The question must be asked of how these innovated solutions can be put into practice in the construction industry and what benefits it can have?

Investigation into all aspects is essential, understanding how it is currently being used where it can be implemented in the future, what does it mean for the built environment and is it a reliable ledger are among key questions that must be considered

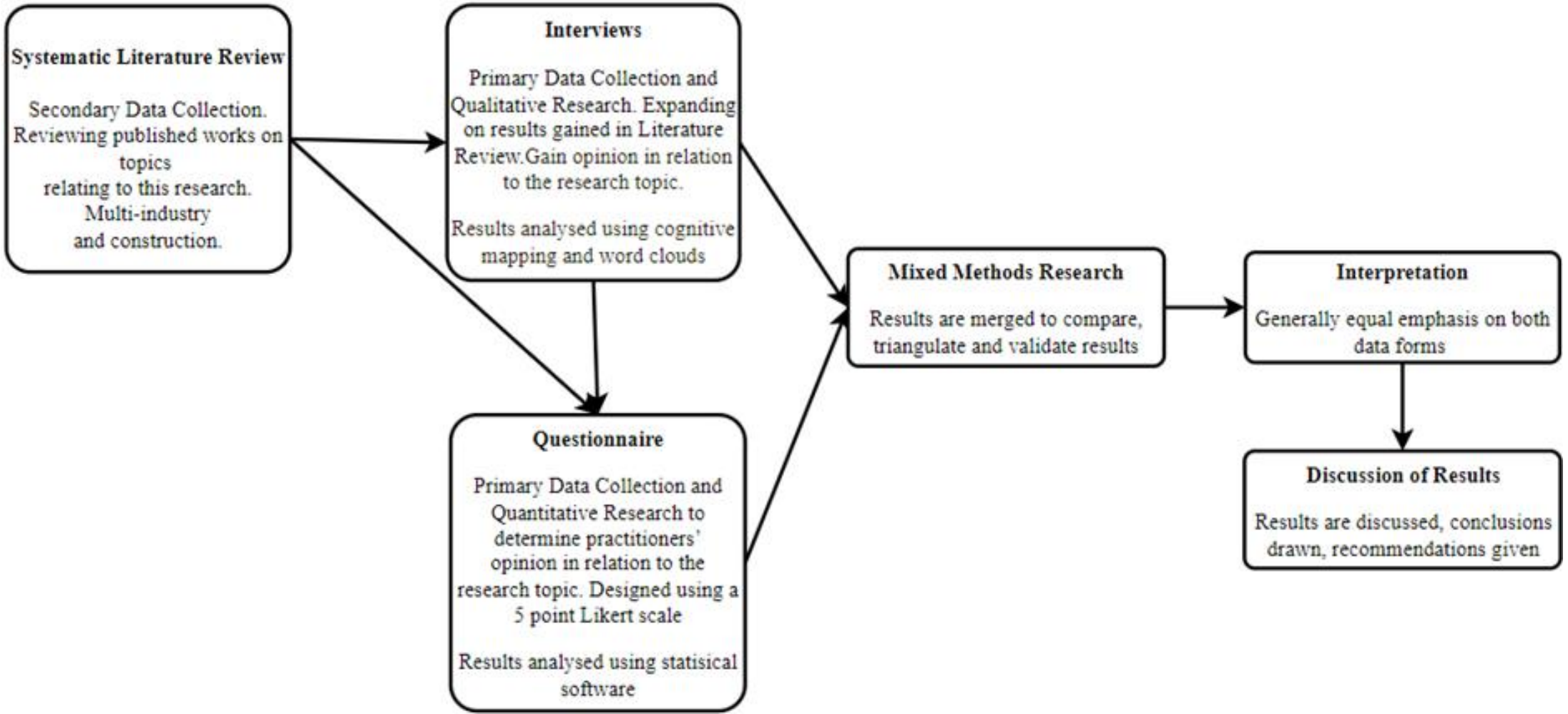
The focus of this research is to understand how the growing popularity of blockchain within the Irish construction industry

The research recognizes that whilst Blockchain is not new, its' use within construction is in its infancy but growing due to its applications in; supply chain, construction management, procurement and payments

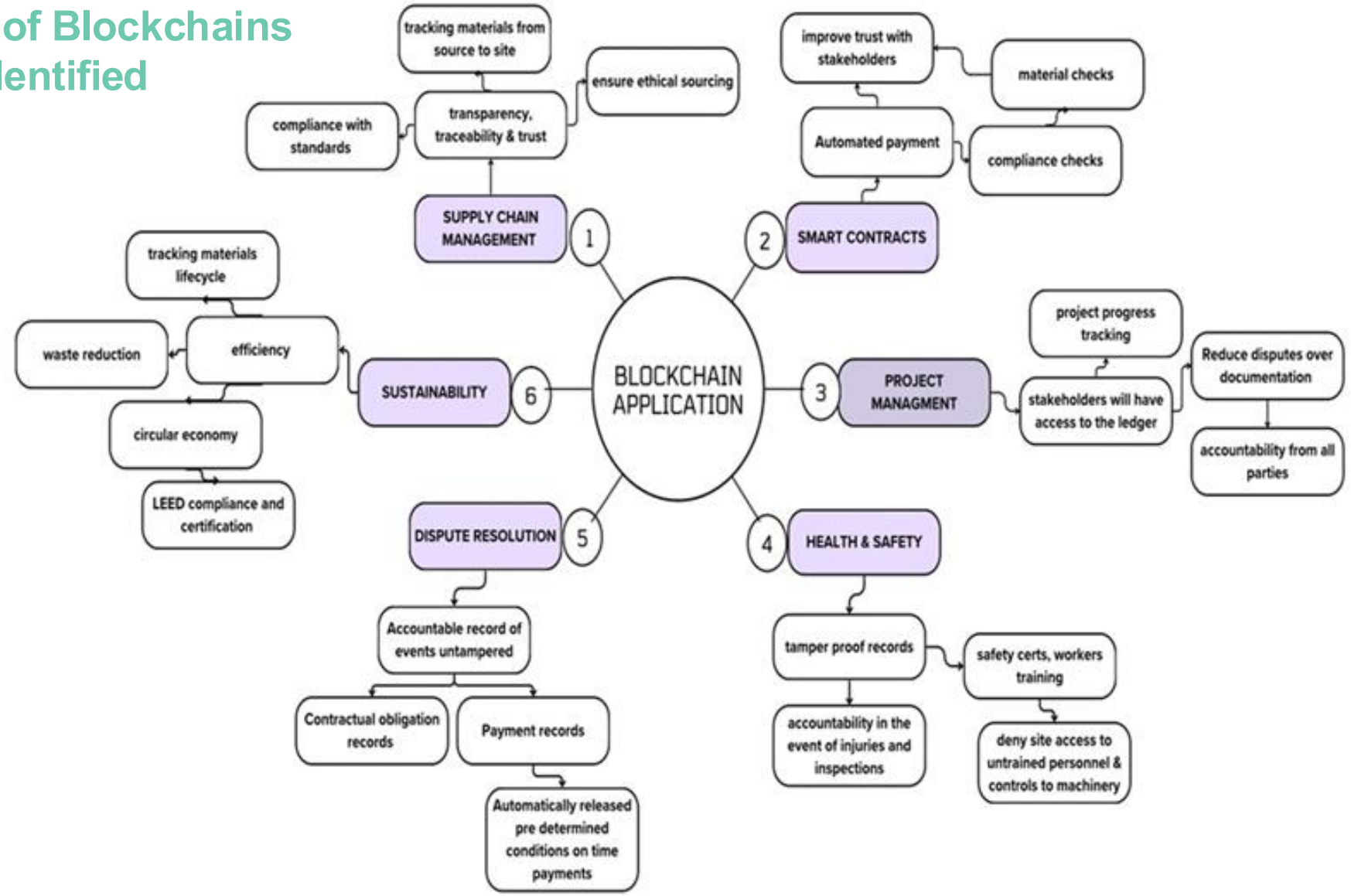


Methodology

This study uses a sequential mixed methods research



Cognitive Map of Blockchains Applications Identified



Summary of Challenges with Blockchain Identified

Smart Contracts

Smart contracts are frequently discussed in the literature as a transformative tool in construction, particularly for automating payments upon milestone completion, reducing administrative delays and increasing trust through immutable records

Interview responses reflect a more cautious, mixed reality response

They cited that both large and small companies would resist compromising control over cashflow, highlighting that financial trust is built through profit but did state that it would be more likely to be adopted if profitability increases

This diverges from the literature's suggestion that smart contracts alone can rebuild trust

There was consensus that while smart contracts could streamline processes, human verification, dispute mechanisms, trust and integration with existing platforms remain essential for its application

Sustainability

The literature presents blockchain as a tool capable of transforming sustainability in construction through lifecycle material tracking, transparent verification of environmental claims and support for certifications such as LEED

Interviewees described blockchain's potential in tracking carbon output, waste management and supply chain compliance, positioning it as ideal for meeting client sustainability expectations and certification demands

Blockchain is identified as useful for verifying supplier claims, particularly around emissions and recycled materials, reinforcing its role in enhancing accountability and reducing greenwashing

Blockchain cannot support sustainability on its own and would need to be integrated into a wider system of sustainable practices

Blockchain identified as a supporting mechanism rather than a driver

Future Blockchain Application - Integration with Emerging Technologies

The integration of blockchain with existing digital technologies such as BIM, IoT, and AI is largely supported in the literature to enhance transparency, automate processes, and contribute to the circular economy

The interviewees showed different views on how blockchain could integrate with these existing technologies. BIM is essential for higher-level contracting, its integration with blockchain is likely to be relevant only for larger companies

Smaller contractors are unlikely to be familiar with these technologies, suggesting a gap in adoption across the industry

A significant barrier to blockchain integration being the need to ensure that all existing platforms are compatible with blockchain systems

The challenge of seamless integration could disrupt current workflows and payment systems, making full adoption more difficult

Future Blockchain Application - Facilities Management

The research revealed that blockchain's potential in facilities management revolves around enhancing efficiency, reducing paper-based processes and improving decision-making through real-time data and analytics

The research supports the notion that blockchain can be particularly beneficial in managing vendors, equipment maintenance and ensuring better cybersecurity, especially as the number of IoT devices in facilities increases

Blockchain can enable data storage and analysis with increased security, protecting against cyberattacks while improving processes such as lifecycle assessment, cost, and analysis

Integration with IoT sensors allowed for automated monitoring and servicing, where a smart sensor would trigger the required maintenance alerts, automatically notify the relevant parties and trigger payment through a smart contract without manual intervention

The research acknowledges that blockchain adoption in FM is still in its early stages and whilst blockchain offers advantages, widespread application is still a long way from being fully comprehended

Challenges with Blockchain - Cultural Resistance

Cultural resistance is a significant barrier to blockchain adoption in the construction industry

This cultural inertia, where long-standing beliefs and habits hinder the openness to new technologies, is particularly prominent in Irish construction

Whilst Irish construction might appear slower in adopting certain technologies, it is not due to a lack of innovation within the industry but rather due to regulatory hurdles and slow-moving government processes

Irish construction professionals are adaptable and progressive but face challenges with government-led restrictions

Senior staff, who are accustomed to traditional ways, are often hesitant to embrace digital tools like blockchain

Unless leadership actively supports innovation with proper training, blockchain adoption will remain slow

Cultural barriers and a need for a clear legal framework, prevent blockchain from gaining traction in the industry

Challenges with Blockchain - Regulatory Uncertainty

The research highlights that the development of industry-wide standards and regulatory frameworks is essential for blockchain adoption in construction

Current legal ambiguity surrounding blockchain, particularly regarding the enforceability of smart contracts, data ownership, privacy rights such as GDPR compliance, and liability issues, poses significant challenges

International projects face the added complexity of varying blockchain governance across jurisdictions

Reliance on historical legal precedents could delay blockchain's acceptance and there may be challenges in ensuring that stakeholders fully understand the smart contracts they sign

This could lead to disputes, especially if users do not comprehend the contract terms

Construction law has not yet caught up with blockchain technology, especially around the legal recognition of smart contracts in Ireland

Challenges with Blockchain - Regulatory Uncertainty

Without legal backing, companies may be hesitant to adopt blockchain due to uncertainty about its enforceability.

Smart contracts and blockchain are not widely standardised in legal systems, particularly in public projects

This lack of legal clarity creates risks for companies, especially when dealing with disputes or cross-jurisdictional projects

Conclusion

The research found that blockchains' key features are decentralisation enhancing collaboration among stakeholders, immutability reinforcing trust among parties, transparency ensuring a history of records and transactions between parties and security by encrypting data and protecting it from unauthorised entities and cyber-attacks

Key uses of blockchain have been identified as being beneficial to the supply chain by enabling transparency and traceability of the tracking of materials and ensures ethical sourcing, which leads to promoting sustainability by improving the tracking of materials throughout their lifecycle and promoting waste management and re-use of materials

Smart contracts are a key use of blockchain, improving trust among stakeholders and ensure obligations are met without reliance on intermediaries

Blockchain can aid disputes, by recording actions and exchanges of information in real time

Conclusion

It has a real chance to sustain popularity by integrating it into existing systems and platforms like BIM and IoT

Blockchain can improve FM, through secure, decentralized systems for tracking assets, managing maintenance, and improving cybersecurity

Blockchain has the potential to improve industry efficiencies, aid in reducing project delays and cost overruns, and support key goals such as sustainability and digital integration but with current regulations remaining fragmented and underdeveloped, this leads to legal ambiguity around smart contract enforceability, data ownership, and cross-border compliance

Challenges to blockchain implementation included Cultural Resistance to change and Regulatory Uncertainty

Despite identified limitations, the research suggests that if concerns were properly addressed, blockchain applications have significant potential for successful adoption enabling the industry to capitalise on the identified benefits

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Thank you