DEEP KNOWLEDGE ANALYTICS

Scottish Enterprise

Scotland's Financial Sector and Blockchain Opportunities

Overview

Economic Opportunities for Blockchain Application in Finance

Payment processing & Money transfer

Cost-effective and secure payment processing and money transfers for Scottish businesses.

Blockchain for global payments

An international bridge for financial institutions in Scotland to strengthen their position in global payments.

Blockchain for peer-to-peer payments

A cost-effective and secure solution for peer-to-peer payments without intermediaries or high fees.

Blockchain for trading

Greater efficiency and transparency for trading systems in Scotland's finance sector, with reduced counterparty risk and simplified settlements.

Blockchain for loyalty reward programs

More secure and cost-effective loyalty rewards programs for financial institutions in Scotland.

Blockchain for insurance claims

Faster, easier and more secure insurance claims processing for financial institutions in Scotland.

Blockchain for cybersecurity

Protection against cyber attacks with strong cryptography and decentralisation.

Blockchain for credit scoring

Efficient credit history tracking and more accurate credit scores for financial institutions in Scotland.

Blockchain for sustainable finance

Smart contracts and automated compliance for a sustainable and responsible approach to finance in Scotland.

Blockchain for digital identity verification

Streamlined, secure and accessible digital identity verification for customers across different financial institutions in Scotland.

Blockchain for regulatory compliance & audits

A single source of truth for compliance with regulations and efficient audits.

Blockchain for automated loans

Automation and transparency for loan decisions, creating a secure and transparent lending platform.

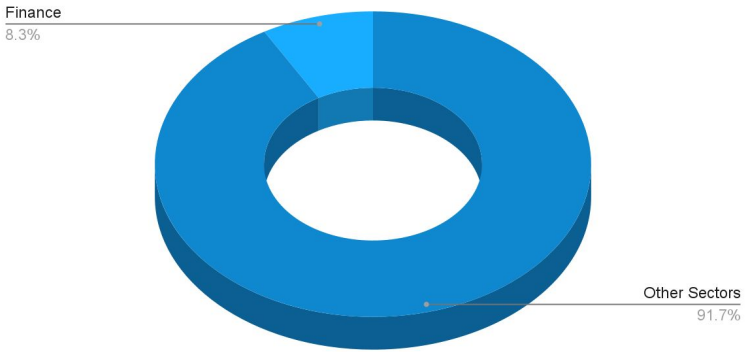
Source: Scottish Development International , insider.co.uk , Royal Bank of Scotland, FinTech Scotland, University Of Dundee

Economic Opportunities for Blockchain in Scotland - Finance

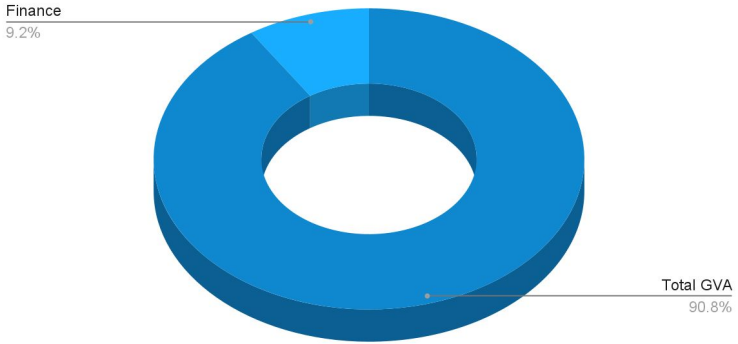
Scotland has several unique advantages that make it an ideal location for businesses working with blockchain technology. Scotland has a supportive regulatory environment and numerous research universities, as well as a vibrant technology ecosystem that encourages innovation. Additionally, Scotland has a strong financial sector, making it an attractive home for new finance businesses.

Scotland's Finance Sector at a Glance

In 2021 the Scottish Finance sector contributed £173.6bn to the UK economy, 8.3% of total economic output.



Finance is the biggest sectoral contributor to Scotland's economy representing £13.6bn or 9.2% of GVA (Gross Value Added) and accounting for 160,000 jobs (9% of national employment).



Scotland's Finance Sector at a Glance

Scotland is a leader in FinTech, with Edinburgh known as one of Europe's leading FinTech hubs	Scotland has a strong academic base in finance-related topics and a pool of finance and technology talent	The growing FinTech sector is estimated to generate £598m GVA for Scotland FinTech Roadmap	91% of banks have invested in Blockchain for financial service

Source: The House of Commons Library, Financial Services in Scotland, IBM

The Benefits of Using Blockchain in the Financial Sector

Blockchain technology has the potential to revolutionise the financial sector by providing additional security, transparency, and accountability, while driving trustworthiness through the increased efficiency and reliability of financial transactions.

Immutable Ledger

Blockchain creates an immutable ledger, which means that once data is recorded on the blockchain, it cannot be altered or deleted., eliminating the possibility of fraud, tampering, or errors.

Smart Contracts

Blockchain enables the creation of smart contracts, which are self-executing contracts with the terms of the agreement written directly into code. Smart contracts automatically execute the terms of the agreement without the need for intermediaries or manual intervention.

Decentralisation

Blockchain is decentralised, which means that there is no central authority controlling the network. This makes it harder for malicious actors to compromise the system, as there is no central point of control

Digital Signatures

Blockchain uses advanced cryptography, including digital signatures, to secure data and transactions. Digital signatures provide additional security by ensuring that transactions are authorised by the correct parties and that data is authentic.

Improving Regulatory Compliance

Blockchain creates a transparent record of all transactions, providing a comprehensive audit trail of financial activity and providing real-time access to transaction data. This makes it easier for regulators to monitor financial transactions and ensure compliance.

Blockchain for FinTech Companies

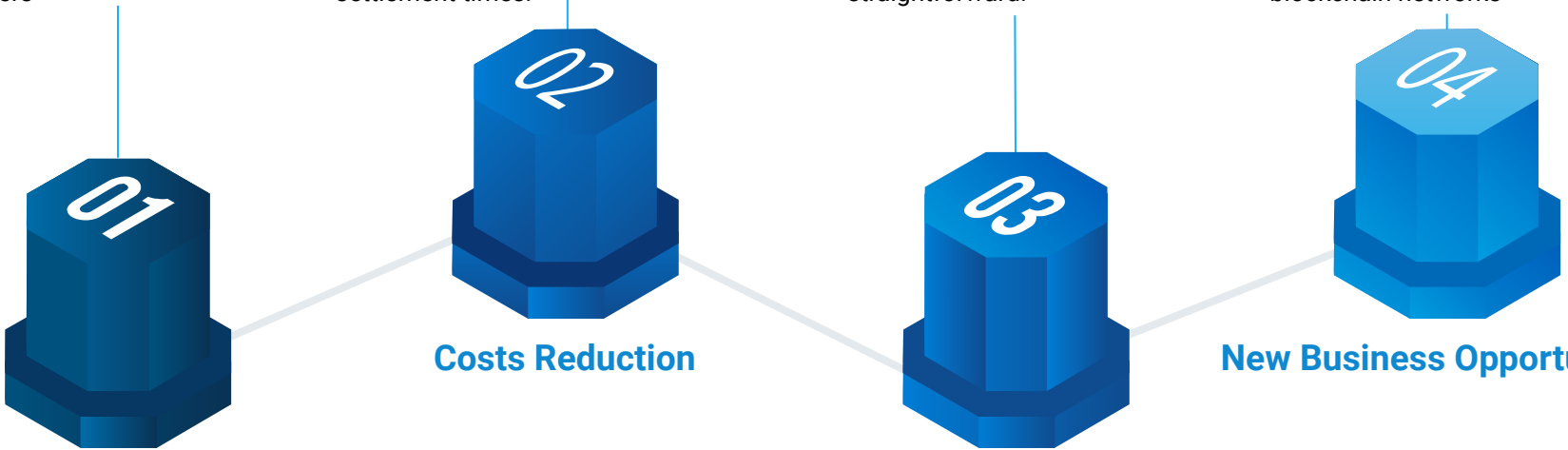
Blockchain technology holds immense promise for FinTech companies, offering many benefits to help provide better services, reduce costs, and gain a competitive advantage.

FinTech companies can use blockchain to improve the security of their platforms, preventing fraud and enhancing the trust of their users

Blockchain can reduce the cost of FinTech transactions. It eliminates the need for intermediaries, such as banks and payment processors, reducing transaction costs and speeding up settlement times.

The creation of an unchangeable and public ledger of all transactions by blockchain technology makes monitoring and evaluating data much more straightforward.

The technology enables the creation of new asset classes, such as cryptocurrencies and digital tokens, that can be traded on blockchain networks



Security

Costs Reduction

Transaction Records

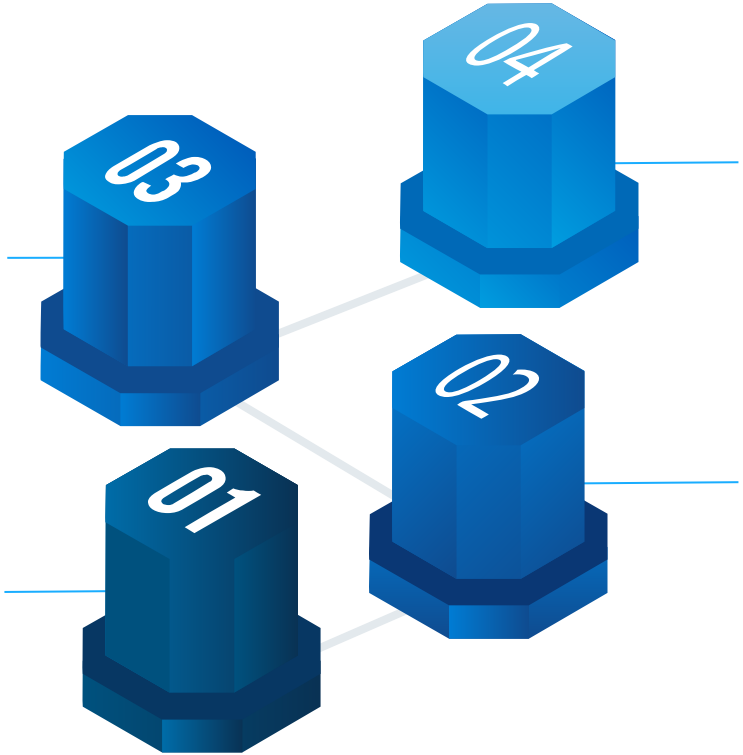
New Business Opportunities

Blockchain for InsurTech Companies

Insurtech companies are at the forefront of utilising the latest technology to streamline their operations, enhance their services, and provide better value to their customers.

Blockchain can **enhance the claims management process.** It can provide an immutable record of an insurance policy, which can help automate the claims process and reduce fraud. This will result in faster claim settlement times and increased customer satisfaction.

Reinsurance. Blockchain technology may make it easier for insurers to transfer risk to reinsurers in a more secure and transparent manner. This would allow for more efficient risk management and result in lower costs.

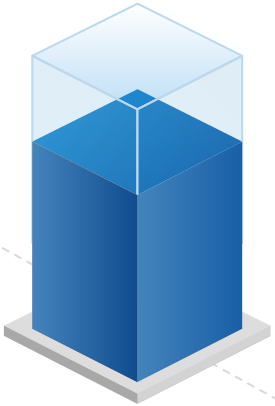


Improving the underwriting processes. By utilising data stored on a blockchain, insurers can gain a more accurate understanding of risk and tailor their policies accordingly. This can lead to more precise risk assessments and pricing, resulting in lower premiums for customers.

Enhancing customer experience. By providing accessible records and storing policy information on a blockchain, customers can easily access their policies and track claims in real-time. This will lead to greater transparency and trust between insurers and customers.

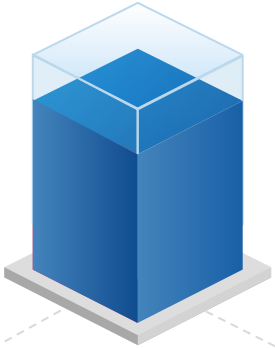
Blockchain and PensionTech

Improved Record-Keeping



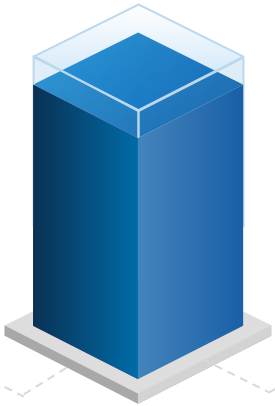
PensionTech firms can improve accuracy and transparency by creating a decentralised, tamper-proof database that records every pension account transaction and update. This makes pension contributions, investments, and payouts transparent and immutable, reducing errors and fraud.

Automation



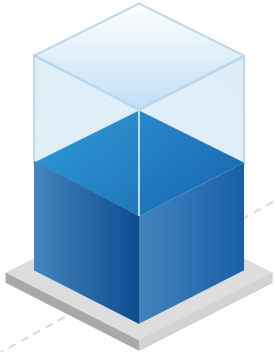
Companies that specialise in PensionTech have the ability to lessen the burden of administrative work and free up resources for the provision of additional value-added services by automating processes such as record-keeping, investment management, and compliance procedures.

Increased Security



Blockchain technology can improve PensionTech data security and privacy with advanced cryptography and consensus mechanisms. Blockchain enables PensionTech companies to securely share information with pension scheme members, employers, and other stakeholders while protecting personal data.

New Investment Opportunities



Blockchain technology allows PensionTech companies to create new fund investments. Through tokenization, pension funds can invest in digital assets, private equity, and real estate. Tokenization allows fractional ownership, liquidity, and transparency, giving pension funds more investment options and diversification.

Blockchain and Payments

- **Faster and Cheaper Payments:** Blockchain technology can enable faster and cheaper payments by removing intermediaries and reducing the cost and time required for settlement. Blockchain-based payment systems can process transactions within seconds or minutes, compared to traditional payment systems that may take days.
- **Increased Security:** Blockchain technology offers a secure and tamper-proof way to store data and conduct transactions making them less vulnerable to fraud and cyber attacks.
- **Cross Border Payments:** Blockchain-based payment systems can enable cross-border payments without the need for intermediaries or correspondent banks. This reduces the time and cost of cross-border payments, improves financial inclusion and supports global trade.
- **Smart Contracts:** Smart contracts are self-executing contracts with the terms between buyer and seller being directly written into lines of code. Blockchain-based payment systems can use smart contracts to automate payment transactions and ensure that the terms of the agreement are met before payment is released.
- **Micropayments:** Blockchain-based payment systems can enable micropayments.This can help develop new business models, such as pay-per-use services, and can support content creators, such as musicians and writers, who may require micropayments for their work.
- **Tokenization:** Blockchain technology can enable payment providers to tokenize traditional assets, such as fiat currency, and create digital versions of them. These digital assets can be used to facilitate payments and reduce the time and cost of settlement.

Blockchain - Empowering AgeTech for a Better Future

The AgeTech industry develops technology solutions to improve the lives of older adults, including financial inclusion

1. **Secure data storage**: Blockchain technology offers secure and decentralised storage of sensitive data, such as health records, financial information, and personal preferences.

2. **Improved identity verification**: Blockchain-based identity verification systems can provide a more secure and efficient way to verify the identity of older adults.

3. **Better healthcare outcomes**: Blockchain technology can enable secure and efficient sharing of medical records, improving communication between healthcare providers and reducing errors in diagnosis and treatment.

4. **Enhanced financial inclusion**: Blockchain technology helps older adults access financial services - such as loans and insurance - more easily and at a lower cost.

5. **Smart contracts**: Blockchain-based smart contracts are able to automate transactions and agreements, such as end-of-life planning, inheritance, and estate management.

6. **Decentralized social networks**: Blockchain-based social networks can enable older adults to connect with each other, share experiences and advice, and reduce social isolation.

Leveraging Blockchain use through AI

Fraud Detection: AI can be used to analyse transaction data and identify patterns indicative of fraudulent activity. By combining this with blockchain technology, a secure and transparent record of all transactions can be maintained, making it easier to detect and prevent fraud.

Loan Underwriting: AI can analyse customer data to determine creditworthiness, while blockchain can be used to create a tamper-proof record of loan applications and approvals. This can help banks streamline their loan approval processes and reduce the risk of fraud.

Compliance: AI can be used to automate compliance checks, while blockchain can provide a tamper-proof record of all compliance-related activities. This can help banks reduce the risk of regulatory non-compliance and streamline their compliance processes.

Customer Service: Chatbots driven by AI can be connected to customer databases stored on blockchains to provide more individualised and effective customer service. The use of blockchain technology can also assist in protecting the privacy and safety of sensitive customer information.

Asset Management: AI can analyse market data and provide investment recommendations, while blockchain can be used to create a tamper-proof record of asset transactions. The management of an institution's investments can become more transparent and efficient due to this.

Supply Chain Finance: While artificial intelligence is able to assess data from supply chains and make recommendations for funding, blockchain technology may be used to generate a record of all supply chain transactions that are both safe and transparent.

Blockchain and AI in Green Finance

Smart Contract Management

Smart contracts automate the process of verifying compliance with sustainability standards. AI algorithms can data and automatically trigger payments when certain conditions are met, reducing the need for manual verification and improving efficiency.

Predictive Analytics

AI algorithms can scrutinise data from IoT sensors and other sources and predict changes in energy demand and supply. This can help to optimize the use of renewable energy sources and reduce waste.

Energy Trading

Blockchain can create a decentralised platform for trading energy and AI algorithms are able to optimise the matching of supply and demand in real-time. This helps to reduce energy waste and increase efficiency.

Carbon Footprint Tracking

AI and blockchain offer tamper-proof records of carbon emissions, allowing for greater transparency and accountability in carbon offsetting and trading. This can help businesses to accurately track their carbon footprint and take steps to reduce their environmental impact.

Sustainable Investment Management

AI algorithms analyse large amounts of data from various sources, such as environmental impact assessments, energy usage data, and financial performance data. This can help investors to make more informed decisions about sustainable investments, and blockchain can be used to create a secure and transparent record of investment transactions.

Blockchain-Based Investment Products

Blockchain Technology has Enabled the Creation of a New Class of Investment Products.

Cryptocurrencies

Blockchain technology secures and transparently transacts cryptocurrencies like Bitcoin, Ethereum, and Litecoin.

Cryptocurrencies are decentralised, and they are not backed by any physical commodity, such as gold. Instead, their value is determined by market demand and supply.

Security Tokens

Security tokens are digital assets that represent ownership in a company, real estate, or other tangible assets. Unlike cryptocurrencies, security tokens are subject to securities regulations, which means that they must be registered with regulatory authorities and comply with securities laws.

Stablecoins

Stablecoins are cryptocurrencies that are designed to maintain a stable value, typically pegged to a fiat currency, such as the US dollar. Stablecoins are designed to provide the benefits of cryptocurrencies, such as fast and secure transactions, whilst reducing the volatility associated with other cryptocurrencies.

Decentralized Finance (DeFi) Products

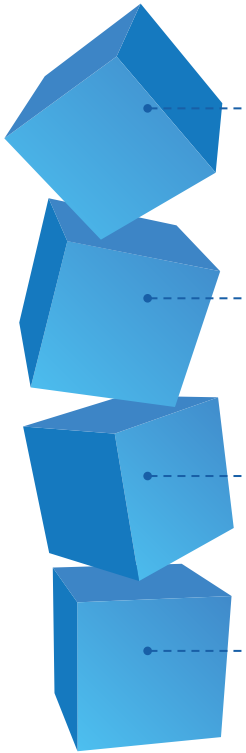
DeFi products are blockchain-based financial products that operate on a decentralised network, rather than being controlled by traditional financial institutions. Examples of DeFi products include lending and borrowing platforms, decentralised exchanges, and prediction markets.

Non-Fungible Tokens (NFTs)

NFTs are unique digital assets that are stored on a blockchain. They can represent a wide range of assets, such as artwork, music, and video games. NFTs provide a way to verify the ownership and authenticity of digital assets, which can have significant value in the creative industries.

Blockchain Transforming Scotland's Financial Services

Blockchain technology has the potential to transform many other financial services sub-sectors in Scotland



Trade Finance

Blockchain technology can facilitate trade finance by providing a secure and transparent platform for trade transactions. The technology can help to streamline the trade finance process, reducing the time and cost of transactions.

Digital Identity

Blockchain technology can provide a secure and decentralised platform for storing and managing digital identities, enabling users to control their personal data and reduce the risk of identity theft and fraud.

RegTech

Blockchain technology improves regulatory compliance by providing a transparent and tamper-proof ledger for regulatory reporting, enabling automated compliance checks and reducing the risk of non-compliance

Green Finance

Green finance is an emerging sector that focuses on funding environmentally sustainable projects. Blockchain technology can improve traceability in green finance transactions, providing a secure and transparent record of sustainable investments. Green projects could also raise capital by issuing digital tokens

WealthTech Blockchain ETFs

For interested investors, several **Blockchain ETFs (Exchange Traded Funds)** are available .

ETF Name	Symbol	Total Assets ($M)	Latest ETF Price (as of 10/26/21) ($)	Volatility of Daily Returns	Mean Daily Return
Amplify Transformational Data Sharing ETF	BLOK	1,150.00	54.35	1.52%	0.09%
Siren ETF Trust Siren Nasdaq NexGen Economy ETF	BLCN	291.09	49.31	0.90%	0.09%
First Trust Indxx Innovative Transaction & Process ETF	LEGR	139.24	44.49	3.43%	0.21%
Bitwise Crypto Industry Innovators ETF	BITQ	88.96	27.56	3.59%	0.15%
Global X Blockchain ETF	BKCH	66.25	30.25	3.98%	0.37%
VanEck Digital Transformation ETF	DAPP	56.30	29.00	3.69%	-0.08%
Capital Link NextGen Protocol ETF	KOIN	29.02	44.53	1.03%	0.08%

- As of the third quarter of 2021, the Blockchain sector contains seven ETFs, with the largest of them being **Amplify Transformational (BLOK)**, with more than **$1.1B** in assets.
- The volatility of ETF prices is relatively high in the sector, with only **Siren (BLCN)** and **Capital Link (KOIN)** showing moderate fluctuations.
- Overall, all the funds apart from **VanEck (DAPP)** show positive mean daily return, with **Global X (BKCH)** and **First Trust (LEGR)** offering the best performance.

Barriers to Blockchain Implementation in Government

Incompatibility between blockchain-based solutions and existing legal and organizational frameworks is a significant barrier to unlocking blockchain's transformative capability. The main policy objective should be to develop the technological and ecosystem maturity of distributed ledgers. Policy actions should aim not only to adapt the technology to existing ecosystems but also to transform existing processes, organizations, and structures using the disruptive potential of blockchain.

According to the European Commission research, primary policy targets are the following:

Guidance and knowledge sharing	Creating programs for sharing best practices on blockchain deployments and providing guidelines and recommendations to develop knowledge on the technology. A better understanding of the topic for all ecosystem actors will result in easier adoption and increased effectiveness.
Focused pilot development	Identifying key use cases and ongoing implementations and co-financing pilot projects which experiment with blockchain technology and new re-engineered administrative processes in the areas of relevance. It could still result in the various blockchain protocols being used in similar use cases while allowing for the development of common requirements for standards and infrastructures.
Standards definition	Supporting the development of international standards on security, privacy, and governance, creating certification processes to ensure compliance of blockchain architectures with these standards. Standards compliance will mark a critical point on the maturity scale of distributed ledger technologies.
Blockchain foundational components	Providing foundational components to support the utilization of blockchains, such as data model for certificates credentials and distributed identity management. This policy action would require a lot of research and market consultation, yet it could enable a high degree of interoperability on a service level.
Use case-based dedicated infrastructures	Defining reference conditions and creating shared infrastructures most suitable for specific use case types, such as land title registries or tax systems.

Conclusions

- Blockchain is one of several technologies that has remarkable potential to facilitate major economic growth, reduce inefficiencies, enhance transparency and accountability, and enable technology-driven trust so as drive Scotland's financial industry towards its next inflection point of stable, risk-optimized growth.
- The diversity and necessity of its applications for specific use-cases including WealthTech, InsurTech, PensionTech, InvestTech and FinTech are nearly unparalleled, and its infrastructural capacity to be efficiently integrated with other next-generation digital economy technologies like AI and IoT (which are likewise driving transformational growth in Scotland's financial sector) make it perfectly poised to reap synergies with other ongoing innovations in Scotland's techno-economic ecosystem.
- The use of blockchain technology in Scotland's financial sector could provide a more secure platform for financial transactions, reduce the risk of fraud, and speed up the settlement process. This could lead to a more efficient and cost-effective financial system, which in turn could lead to improved economic growth and job creation.
- Moreover, blockchain technology could also open up new opportunities for businesses in Scotland. It could create new opportunities for companies to access financial services, to access global capital, and to facilitate cross-border payments. This could lead to increased investment and growth in Scotland's financial sector.
- Blockchain technology could also create new opportunities for Scotland's FinTech companies. The use of blockchain technology could allow these companies to develop innovative products and services that are more secure, cost-effective and efficient. This could lead to increased competition and create more opportunities for businesses in Scotland's financial sector

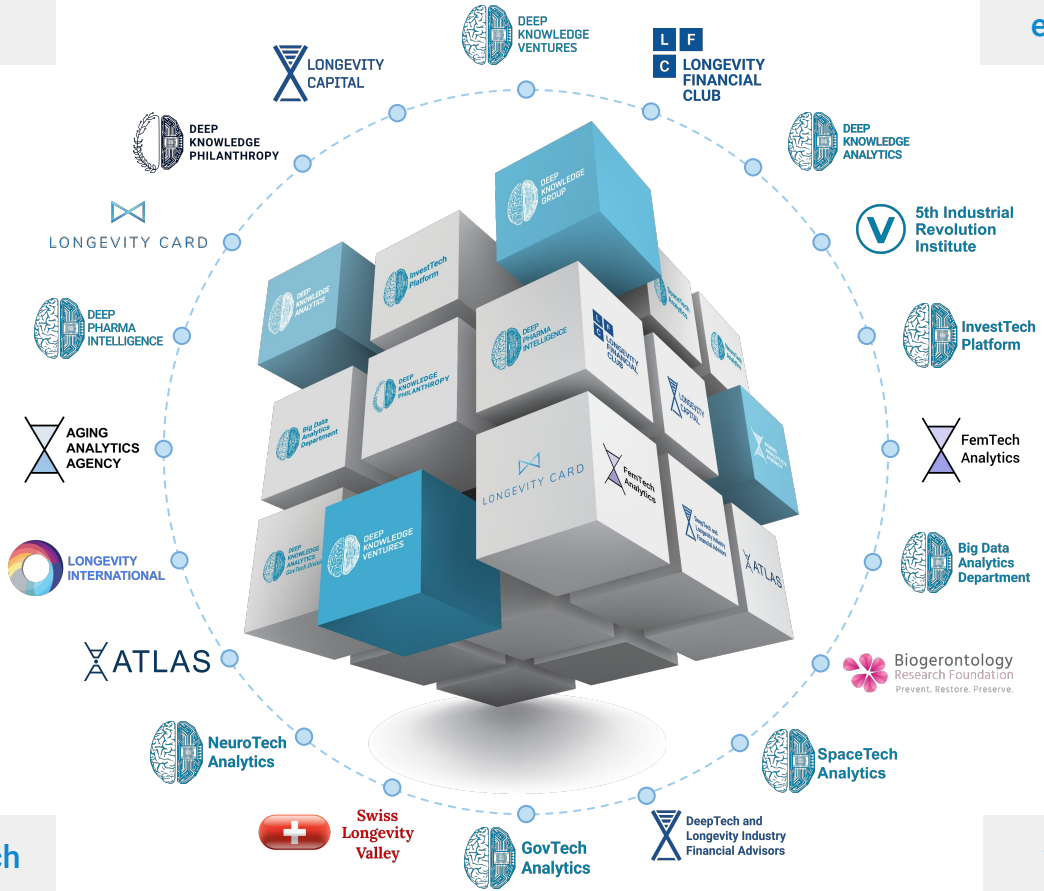
www.dka.global

info@dka.global

Deep Knowledge Group

www.scottish-enterprise.com

enquiries@scotent.co.uk



www.deep-innovation.tech

www.longevity.network