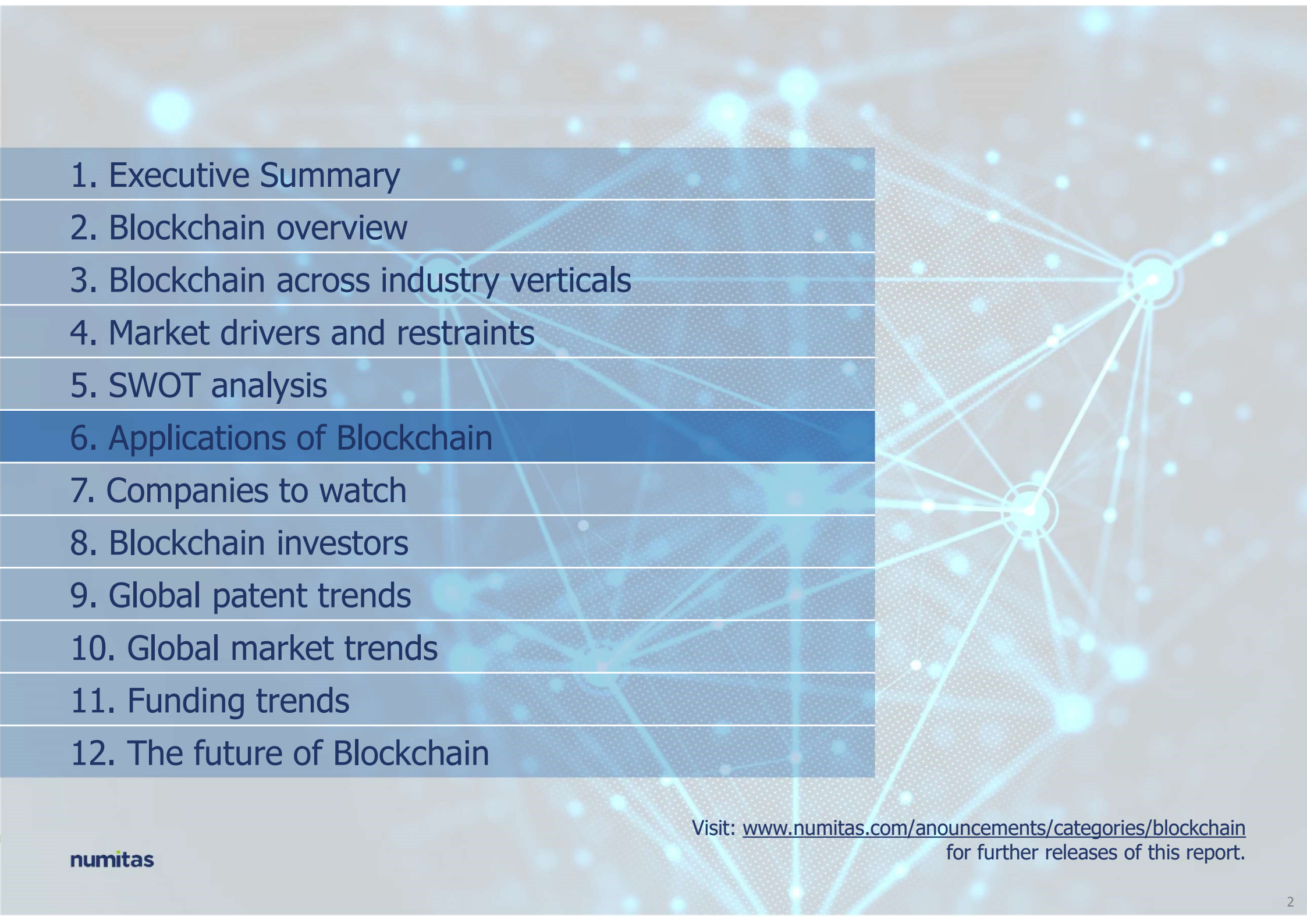




Future Applications of Blockchain and Technology

Partial release:
Application of Blockchain in industry

Visit: www.numitas.com/anouncements/categories/blockchain
for further releases of this report.

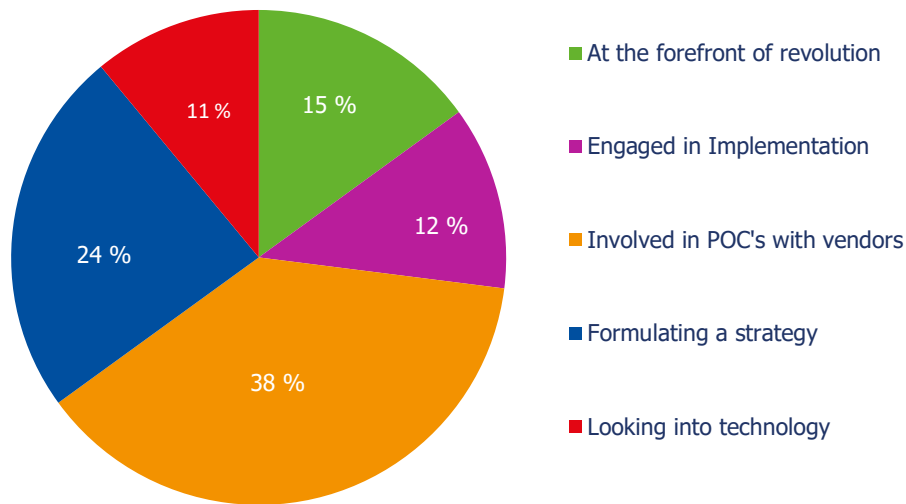
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6.1 Implementation of Blockchain in retail

- With the growth of online shopping and an increase in counterfeit products, small margins and increasing competition is squeezing retailers worldwide. While there is no way to solve all the said challenges in one go, a sophisticated technology like Blockchain has the ability to address most of the retail challenges.
- Using Blockchain's distributed ledger concept and powerful encryption capabilities along with its ability to generate smart contracts, retailers can significantly collaborate and enhance trust across the value chain.
- Implementation of Blockchain into the Retail Industry will enable retailers to provide more information about their products to customers.

Retail current stage in Blockchain adoption



Key players exploring Blockchain in retail

- Walmart
- Woolworths
- Walgreens
- Alibaba

Blockchain Impact on Retail Industry

Current



5 years from now



6.2 The use of Blockchain in retail



Locate Stolen Merchandise

Blockchain can be used to tag and verify products (based on authenticity) immediately post consumer purchase. In regard to the product being stolen or missing, it will be incredibly easy to trace, as any subsequent transaction will be recorded in Blockchain, instantly notifying the legitimate owner.



Supply Chain Transparency

Blockchain will help the consumer to track product movement right from manufacturing to sale, by creating a permanent history of the transaction. This would dramatically reduce time delays, human errors and added costs that are effecting todays transaction.



Loyalty Programs

With a variety of loyalty programs offered by different vendors, Blockchain will offer a single platform for instant redemption and exchange of multiple loyalty points.



Secure Transactions

Blockchain powered transactions will reduce the need of third-party authentication for transaction verification. This will minimize transaction time and transaction cost.



Product Authenticity / Identifying Counterfeit Products

Blockchain can be utilized as public ledger where information on all new products can be registered. This will help to track the owner of the product. If a duplicate entry appears on the Blockchain without proper authorization, this is identified as a counterfeit product.

6.3 Blockchain application in retail

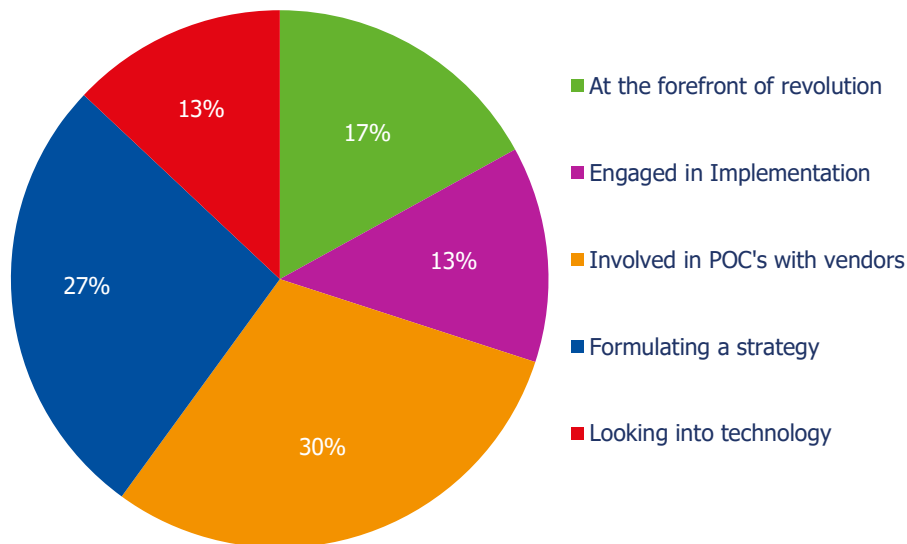
INSTITUTION:	Microsoft	IBM	IBM	Foodler	Future Group Retail
PARTNER:	Mojix	Walmart	Hejia	NA	NA
DESCRIPTION OF PROGRAMME:	Mojix is teaming with Microsoft to offer a Blockchain-enhanced version of its solution so that members of an enterprise supply chain - retailers, suppliers and logistic providers - can view their transactions related to RFID tags read via Blockchain-empowered smart contracts.	Global retail giant Walmart has partnered with IBM to develop a distributed, transparent supply chain tracker. The tracker will help to track product from origin to Walmart store. Blockchain along with adequate IoT sensors allow tracking of products quickly and efficiently in a trusted and reliable way.	Yijian Blockchain Technology Application System is a permissioned Blockchain platform, which will solve financial challenges that occur in the Chinese pharmaceutical industry. The platform is designed to track the flow of drugs.	US based online food ordering company, Foodler, has started accepting digital currencies as a mode of payment for food deliveries.	Future Group Retail (India) has launched a Consumer and Digital (C&D) Lab, that will help Blockchain technology companies to collaborate and develop applications to solve retail business issues pertaining to payments and supply chains.

6.4 Implementation of Blockchain in banking

- Blockchain is expected to radically change today's Banking and Financial business, it is emerging as one of the most enhancing technologies which has the potential to change the financial industry by making transactions faster, cheaper, secure and transparent.
- Being a secured and open source platform, Blockchain will help banks to minimize processing fees and also offer a platform to create new products and services. They will generate a new revenue stream. Banks are experimenting various use cases to determine how they can leverage Blockchain to attract new customers.



Banks current stage in Blockchain adoption



Key Players exploring Blockchain in banking

- | | | |
|-------------------|----------------------|---------------------|
| • Barclays | • Standard Chartered | • ING |
| • CITI | • Lloyds Bank | • Visa |
| • RBS | • ABN- Amro | • JP Morgan Chase |
| • BNP Paribas | • HSBC | • Commonwealth bank |
| • Bank of America | • NASDAQ | • Societe Generale |
| • DBS | • Deutsche Banks | • Morgan Stanley |
| • BNY Mellen | • Santander | • Westpac |
| • Western Union | • Fidor Bank | • ANZ |

6.5 The use of Blockchain in banking



Clearing and Settlements

Clearing and settlement is expected to be the most active use case. Blockchain will reduce the clearing and settlement cycle by eradicating intermediaries between two parties. As a result, the payment process would be optimized, faster and more secure.



In-Trade Finance

Finance transaction involves cumbersome paperwork that requires international courier services and is vulnerable to documental frauds. Blockchain will offer secure electronic record-keeping that will help all parties to track documentation without the need of a third-party and will also speed up trade transactions.



Know Your Customer (KYC)

According to a survey, Financial Institutes spend more than \$60m on KYC compliance. Blockchain creates a secured shared ledger, which will reduce the effort and time spent in performing repeated due diligent processes. By leveraging a Blockchain powered KYC system, time and efforts of verifying documents is much saved.



Insurance Price Quoting

Improved accuracy of insurance plans via transparent quantification without the need of any brokers or insurance advisors.



Insurance Claim Settlement

Using smart contracts, Blockchain will offer automatic payments to insurers and will provide transparent proof of claim.

6.6 Blockchain application in banking

INSTITUTION:	ANZ Bank	IBM	Westpac	NASDAQ	UBS
PARTNER:	Ripple	Europe Banking Consortium	Ripple	CITI and Chain	Clearmatics
DESCRIPTION OF PROGRAMME:	The partnership is testing various banking uses to experiment the potential use of Blockchain.	EBC are developing a Blockchain based platform to simplify trade finance for small and medium business. The consortium will work with IBM to help small business in Europe to manage and track domestic and international trade transactions.	Westpac, in partnership with Ripple, is developing a low cost, cross-border payment platform.	NASDAQ and CITI has partnered with a Blockchain start-up chain to link Citi's business payment services to Nasdaq's Blockchain platform that has been used for activities such as buying and selling shares of private companies.	UBS is developing an enterprise-wide product called 'utility settlement coin' in partnership with Clearmatics to experiment various Blockchain usage cases pertaining to banking and finance, such as smart bonds.

6.7 Implementation of Blockchain in healthcare



- Advancement in IT has helped the Healthcare industry in genetic research and precision medicine, and has provided an innovative approach for disease prevention and treatment.
- Healthcare is expected to have maximum benefit from Blockchain, especially in the areas of Health Management, Payment and Payer Contracts, Medical Trials and Patient Generated Health Data.
- Present IT healthcare infrastructures do not provide security or interoperability for connected living. Blockchain-powered health solutions will provide a solution to health data interoperability. Most importantly Blockchain will provide secure data exchange systems.

Blockchain in healthcare – case study

Challenge: Counterfeit drugs are one of the serious problems in the pharmaceutical industry according to Health Research Funding Organization (HRFO), 10%– 30% of drugs sold in developing countries are counterfeit. The globally counterfeit drug market is valued at US \$200billion annually. According to the World Health Organization, 16% of counterfeit drugs contain wrong ingredients or unnecessary ingredients, which can trigger unexpected secondary effects.

Solution: Blockchain will play a key role in eradicating counterfeit medicine by providing traceability and security. The manufacturer will assign a unique code to each drug, the information is then stored on Blockchain. Once the distributor receives the medicine they will check for authenticity in the Blockchain ledger and record its confirmation in Blockchain. The pharmacist verifies the origins of the products and registers them in Blockchain. It is a full circle of verifications.

Benefits: Blockchain will provide complete drug traceability allowing companies to track their products across the supply chain and making it difficult for counterfeit products to enter the market.

6.8 The use of Blockchain in healthcare



Population Health Management

Blockchain will create secure networks, which can be used within specified populations or communities for managing and sharing patients medical records and information such as patients health patterns and information on doctors visits.



Patient Generated Health Data (PGHD)

PGHD has lots of potential in managing health conditions of patients. With effectively no solution to store the data available at the moment, this data is not utilized properly by a physician. Blockchain can be used to store PGHD data securely without the fear of tampering. This data can be integrated with Electronic Health Record and clinical visits improving overall patient experience.



In-Drug Supply Chain

Blockchain will help track the movement of drugs from manufacturer to end consumer. Blockchain will create a transparent tamper-proof network, which will record the flow of drugs from end-to-end. This will make the counterfeit product difficult to enter the market.



Payments and Contract

Blockchain will ease the job of insurance and medical companies. By using Blockchain, a single network can be created which brings together hospitals, insurance companies and patients for hassle free and well integrated payments in one go. Blockchain helps to reduce redundancies across the industry, leading to significant savings in cost and efforts. In addition, Blockchain-based 'smart contracts' can trigger automatic notifications to providers and patients in the event of potential threats.



Medical Trials

Blockchain can be used to increase the trustworthiness of medical trials results. Blockchain will address the challenge of outcome switching, data dredging and selective publication, which plagues clinical trials.

6.9 Blockchain application in healthcare

INSTITUTION:	Philips Blockchain Lab	Estonian Health Records	Beth Israel Deaconess Medical	FDA	DeepMinds
PARTNER:	Tierion	Guardtime	MIT Media Lab	IBM Watson	NA
DESCRIPTION OF PROGRAMME:	The partnership is developing various healthcare use cases especially in the areas of patient and provider identity, clinical data sharing and health care finance information.	The Government of Estonia has partnered with data security startup Guardtime to develop a Blockchain based platform to secure medical records of more than 1 million patients. The system integrates Keyless Signature Infrastructure and an oracle database engine for authentication.	Researchers are working on a pilot program called MedRec. The program is planned to track blood records, vaccination history and other therapeutic treatments.	The Food and Drug Administration is using IBM Watson to study Blockchain tech and to explore how data from electronic health records, clinical trials and health data from wearable's would better be served using Blockchain.	The company is working on a tool called "Verifiable Data Audit" that will allow hospitals, and potentially even patients, to see exactly who is using health-care records, and for what purpose.