

Supply Chain and BlockChain

Δρ. Αθανάσιος Λόης

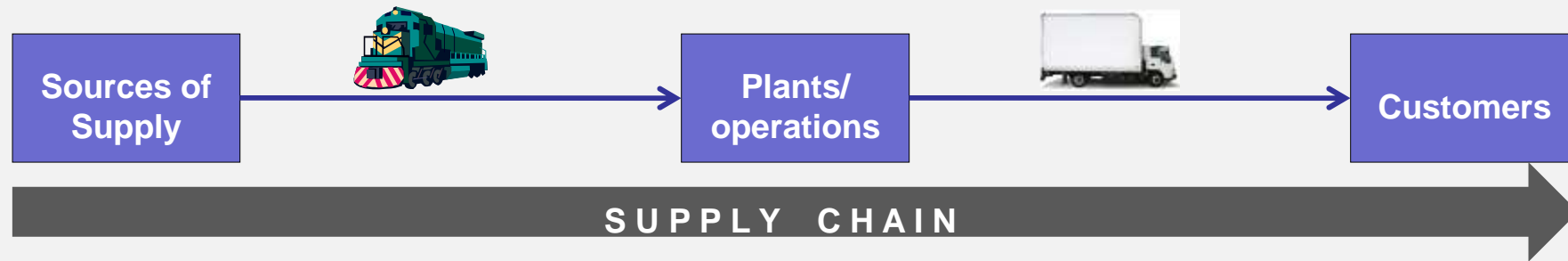
TMM/Π.Θ

al@uth.gr



Supply Chain ? – A short reminder.

The ‘*supply chain*’ encompasses all activities associated with the **flow** and **transformation** of goods from the raw materials stage to the end user (along with the associated information flow).



Supply Chain Management is the...

*“**integration** of these activities, through improved supply chain relationships, to achieve a sustainable competitive advantage”*

Supply Chain ? – Is an old or a new trend?

Supply chain is OLD. It goes back to ancient times

1. The concept of “*Supply Chain*” was used by Greek generals (Alexander the Great ,Leon the Wise) in order to describe all the procedures for the army’s procurement on food, clothing, ammunition. (Alexander the Great was a big fan of the mobility of his troops and he tried to resolve the issues of supplies by using supply chains!)
2. World War II was the major motivation of Supply Chains
3. Now, it is part of every life

Supply Chain ? – What is its Impact?

European Commission

The European Commission's science and knowledge service

European Commission > EU Science Hub > Research Topic > Transport Sector Economic Analysis

Research

Commission priorities

Science areas

Research topics

Centre for Advanced Studies

Laboratories & facilities

Crosscutting activities

Transport sector economic analysis

Science Areas

Energy and transport

Keywords

industry
transport

Related topics

- Aviation safety
- Aviation security
- Biofuels and bioenergy
- Carbon capture, utilisation and storage



Transport sector economic analysis

Transport plays an important role in today's economy and so has a large impact on growth and employment. The transport industry directly employs around 10 million people and accounts for about 5% of gross domestic product (GDP). Effective transport systems are fundamental to the European companies' ability to compete in the world economy. Logistics, such as transport and storage, account for 10-15% of the cost of a finished product for European companies.

The quality of transport services has a major impact on people's quality of life. On average 13.2% of every household's budget is spent on transport goods and services. Transport also depends heavily on oil resources and represents an important source of CO₂ emissions. The strategy outlined in the [Transport 2050 Roadmap to a Single Transport Area](#) aims to introduce profound structural changes to transform the transport sector.

In this sense, the methodologies and tools developed by the JRC focus on

research and innovation capacity in transport infrastructure

Mapping accessibility to generic services in Europe: A market-potential based approach

Policy Evaluation Studies in City Logistics: A Review of the Literature

Fully electric and plug-in hybrid cars - An analysis of learning rates, user costs, and costs for mitigating CO₂ and air pollutant emissions

10%-15% of the cost of finished product

Supply Chain – Issues?

Plenty of them!

1. Complexity.~ NP-HARD problem!
2. Traceability and monitoring
3. Compliance and standardization
4. Adaptation and responsiveness
5. Trust and communication among stakeholders
6. Dispute resolution

Supply Chain – Complexity an example?



A simple shipment of refrigerated goods from East Africa to Europe can go through nearly **30** people and organizations, with more than **200** different interactions and communications among these parties.

<https://www-03.ibm.com/press/us/en/pressrelease/51712.wss>

Supply Chain Problems?

A 2017 report found that 408 organizations from 64 countries were facing consistent supply chain visibility challenges:

69% do not have full visibility into their supply chains

65% experienced at least one supply chain disruption

41% still rely on **Excel** spreadsheets to keep track of supply chain disruptions

<https://www.riskmethods.net/resources/research/BCI-Resilience-Report-2017.pdf>

Supply Chain – Problems?

In the news:

Every year, **200 million tons** of food [spoil before reaching market](#), due in large part to insufficient cold transport technology

In 2017, The Guardian found evidence that the UK's top chicken supplier had [tampered with food safety records](#), leading consumers to buy **expired chicken**

<http://www.tradeready.ca/2015/trade-takeaways/innovation-global-cold-chain-transport-helping-reduce-food-medical-waste/> |

<https://www.theguardian.com/business/2017/sep/28/uks-top-supplier-of-supermarket-chicken-fiddles-food-safety-dates>

<https://www.supplychaindive.com/news/Walmart-OTIF-April-deadline-supplier-effects/515935/> |

<https://www.cdc.gov/ecoli/2015/O26-11-15/index.html>

In the news:

Walmart is tightening **on-time in-full enforcement** in Spring 2018, [implementing fines](#) for suppliers who do not deliver at least 85% of their shipments on time

After months of investigation, Chipotle and the CDC were [unable to definitively identify](#) the source of the infamous **E. coli outbreak**

Supply Chain – and the Blockchain era



BlockChain starts as the supporting technology for cryptocurrencies.

Supply chain on the other hand doesn't care so much for cryptocurrencies. It has much bigger problems to solve

Supply chain sees an opportunity to Blockchain due to its unique features

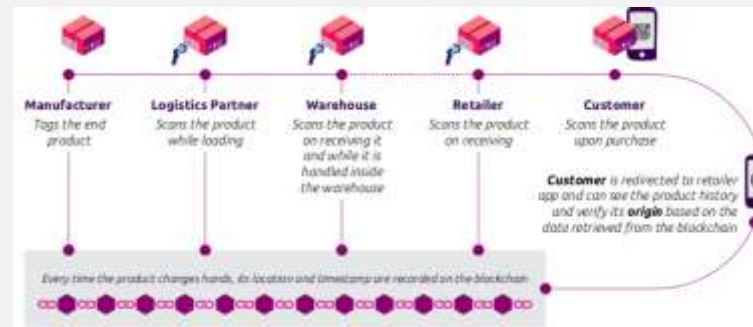
Supply Chain – Blockchain Solutions#1

Supply chain Problem

Blockchain Solution

Traceability

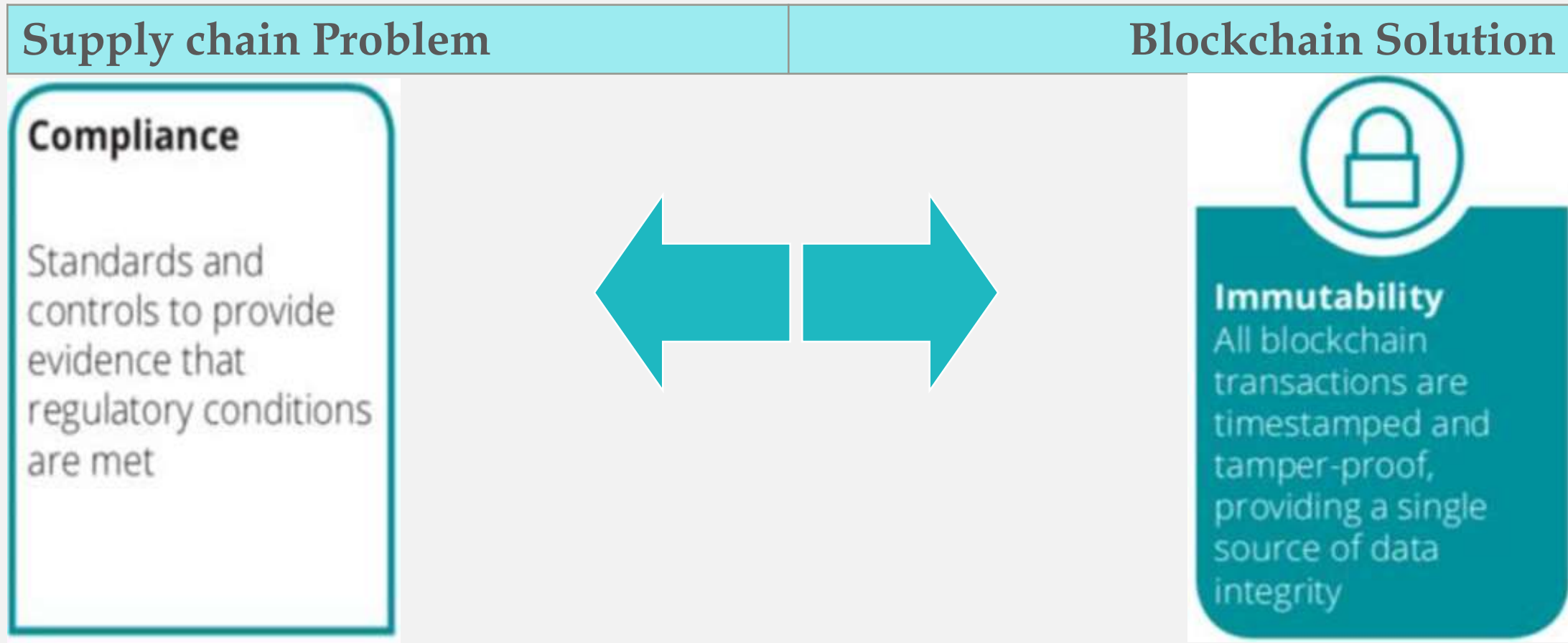
Capability to monitor events and meta data associated with a product



Auditability

Blockchain provides a full audit trail of data, creating an everlasting means of record keeping along a supply chain

Supply Chain – Blockchain Solutions#1

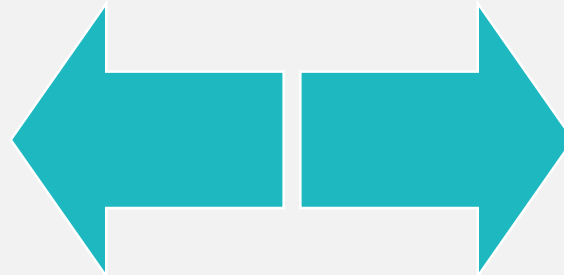


Supply Chain – Blockchain Solutions#1

Supply chain Problem

Flexibility

The ability to adapt rapidly to events or issues, run various scenarios, without significantly increasing operational costs



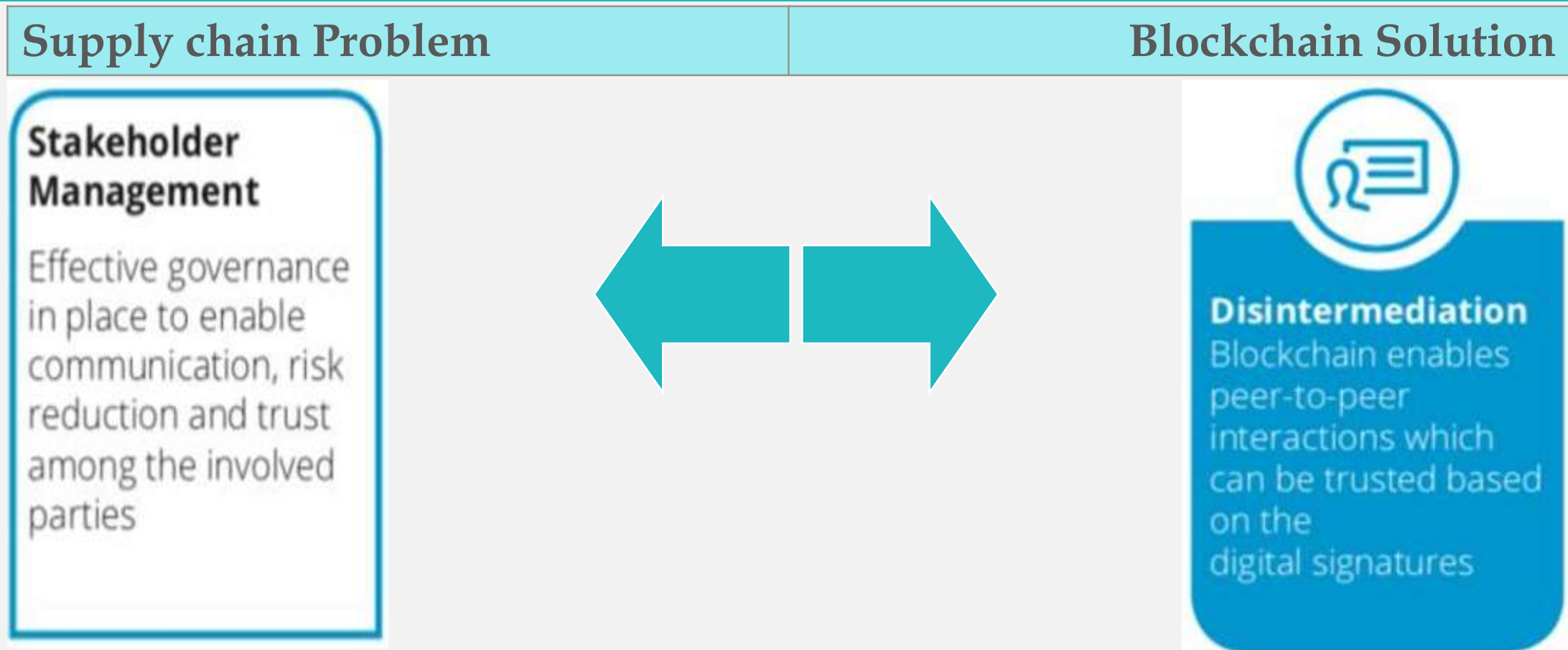
Blockchain Solution



Smart Contracts

Continuous real-time tracking of data is facilitated through the use of smart contracts across the supply chain

Supply Chain – Blockchain Solutions#1



Supply Chain – Blockchain Solutions#2

Supply chain Problem



Issues with traditional supply chains

Lack of traceability
◆
Risks involved with multiple stakeholders
◆
Lack of responsiveness
◆
Largely manual processing
◆
Regulatory compliance
◆
Reconciliation burden

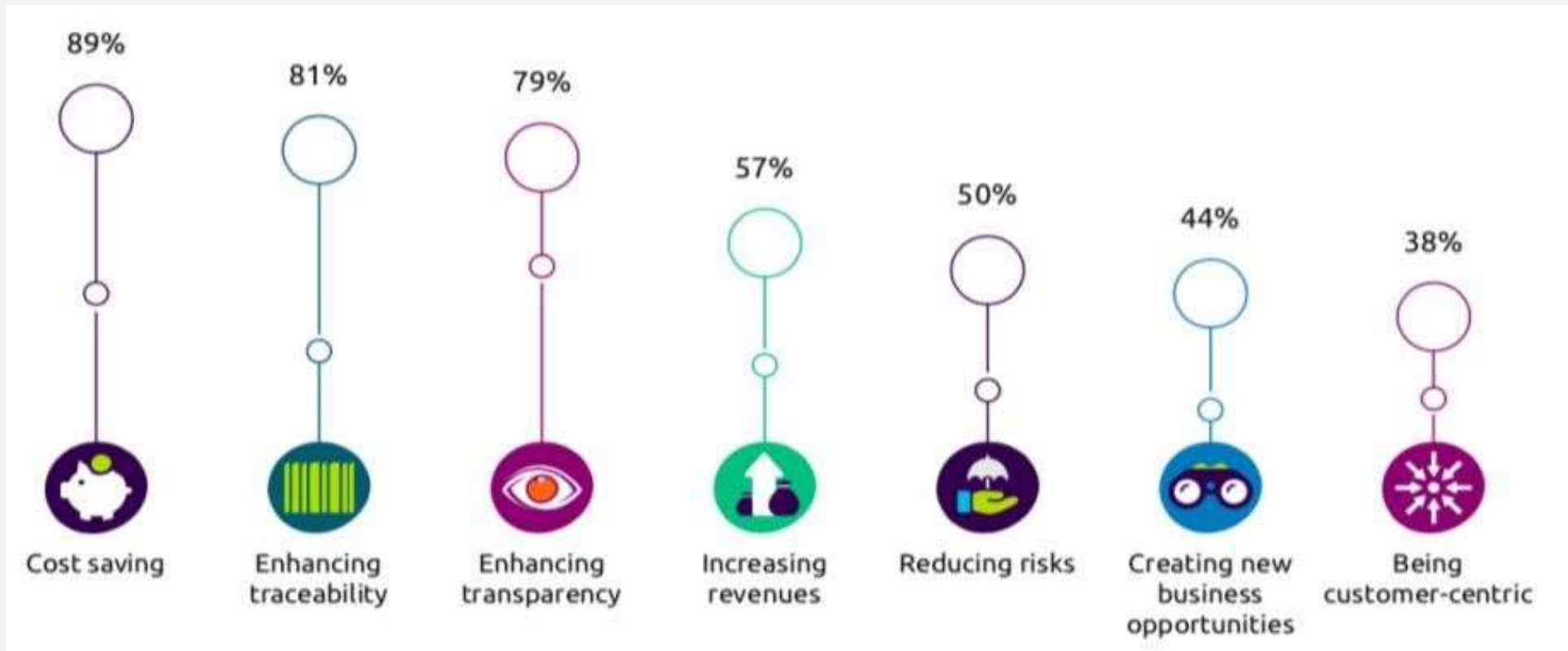
Blockchain Solution



How blockchain could address these problems

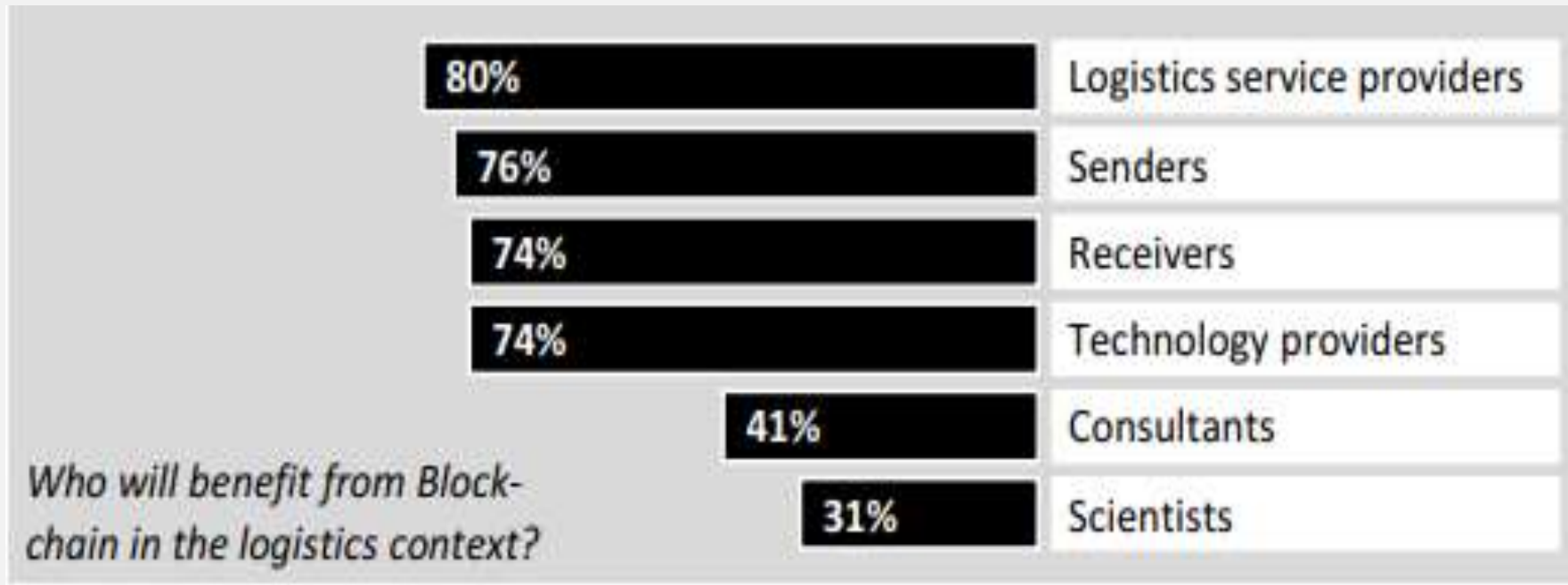
Audit trail for all transactions
◆
Immutable - secure against undesired changes
◆
Near real-time
◆
Digitalized means quicker
◆
Tamper-proof data is easily verifiable
◆
Single shared source of truth

Drivers behind blockchain investment in supply chains



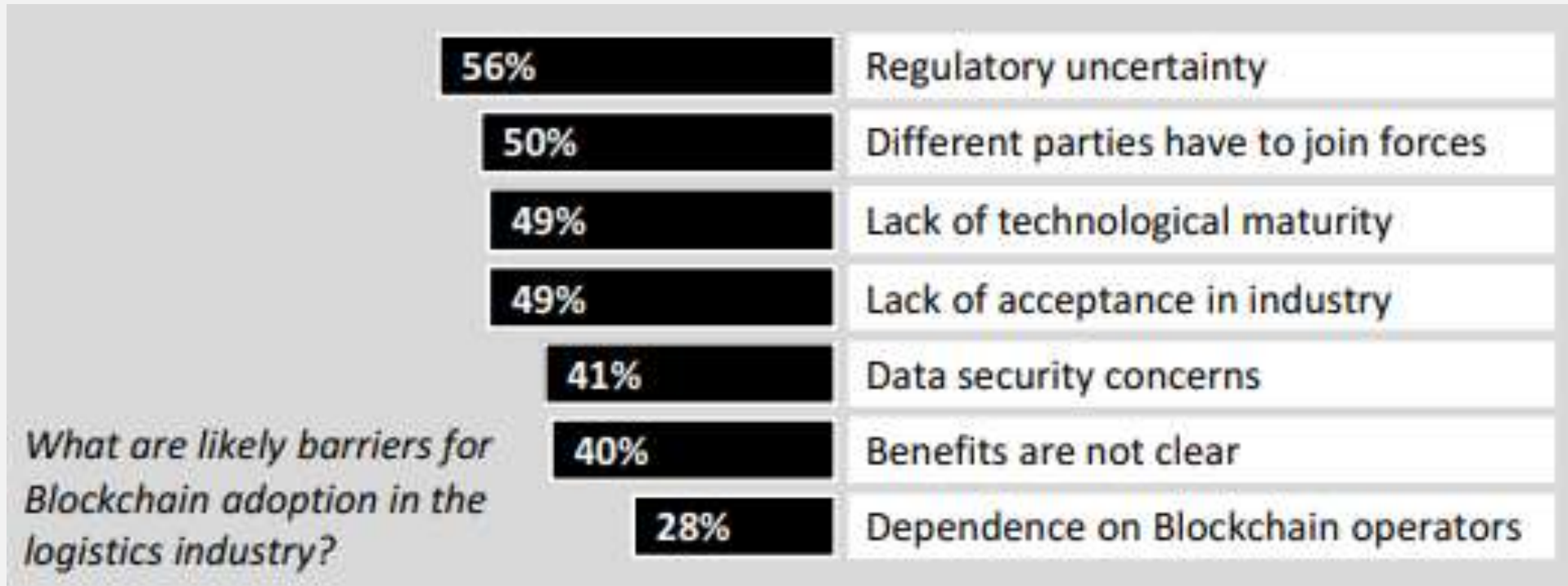
Pai, et al. *Does blockchain hold the key to a new age of supply chain transparency and trust?* Capgemini Research Institute.

Who will benefit from BC Apps in in SC?



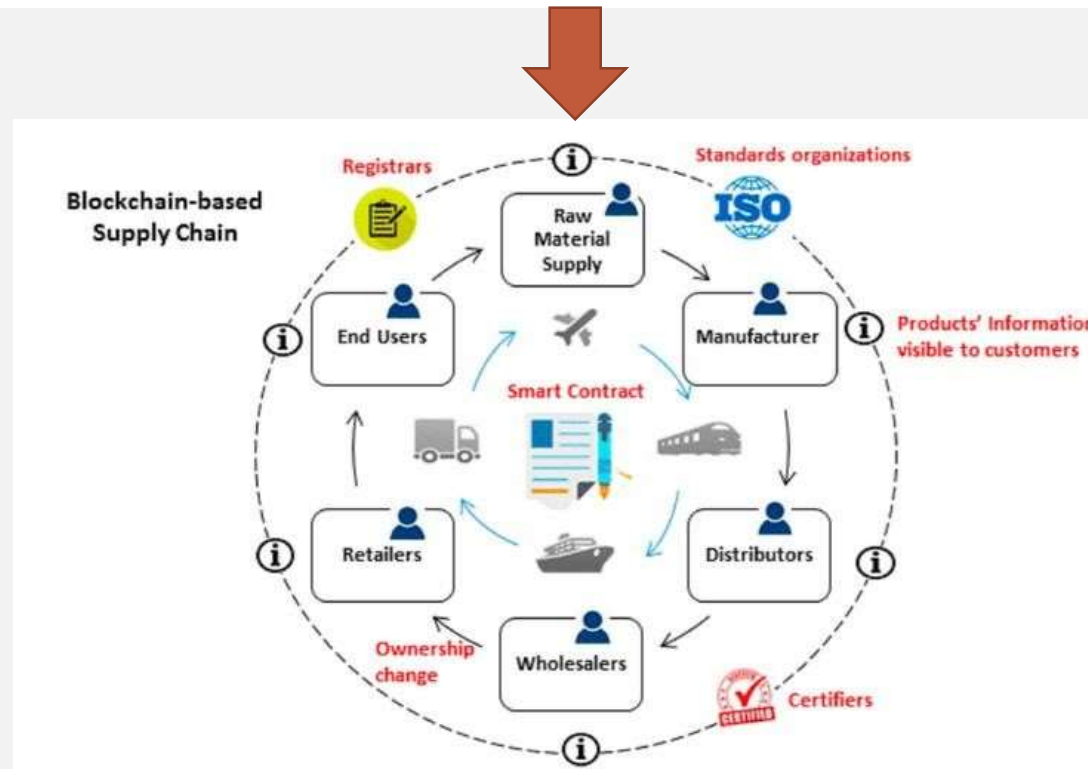
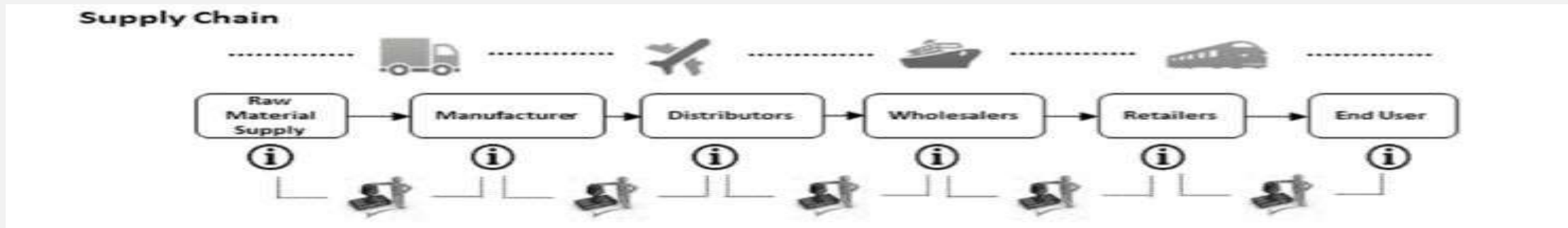
Petersen, K. J. (2017, June). *Blockchain in Supply Chain*. Thesis, IT University, Copenhagen. Retrieved from ResearchGate: <https://www.researchgate.net/publication/320559792>

Are there any barriers for BC adoption in SC?



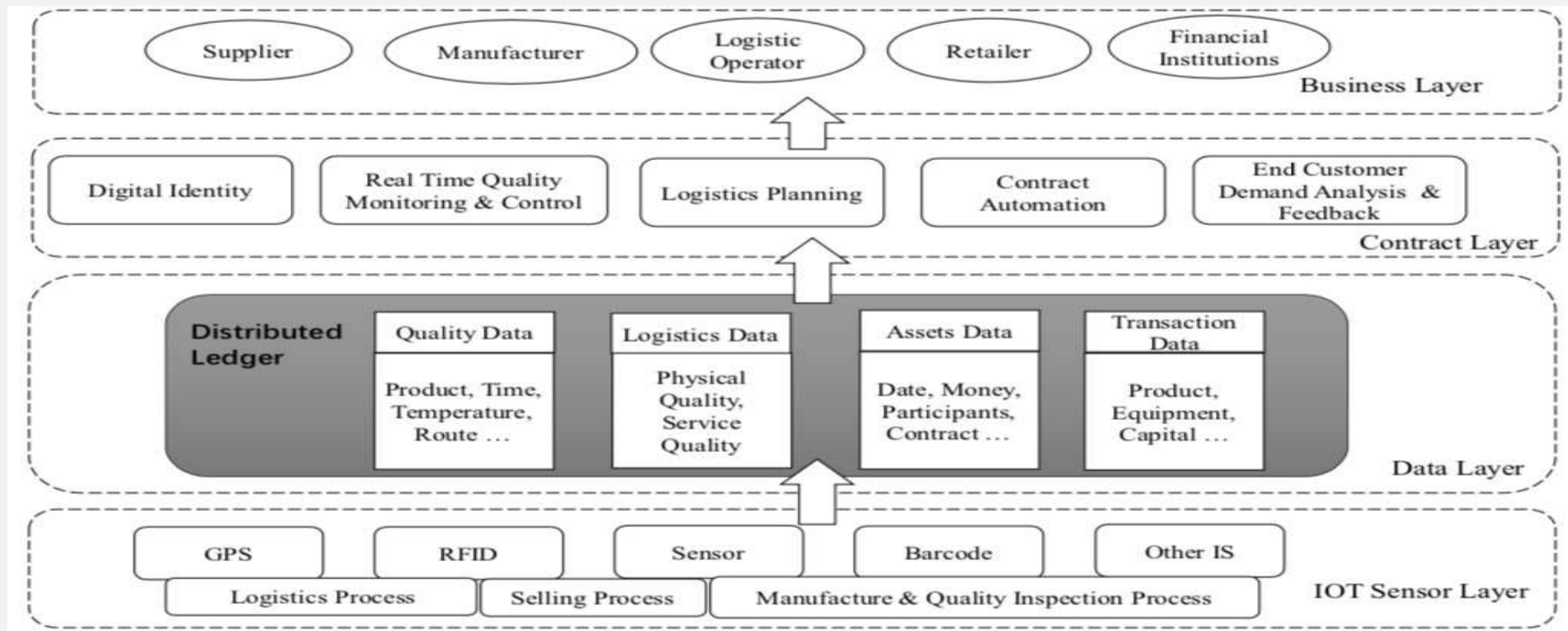
Petersen, K. J. (2017, June). *Blockchain in Supply Chain*. Thesis, IT University, Copenhagen. Retrieved from ResearchGate: <https://www.researchgate.net/publication/320559792>

Old fashion supply chain => BC fashion supply chain



Saberi, S., Kouhizadeh, M., Sarkis, J., & Shen, L. (2018, September 26). Blockchain technology and its relationships to sustainable supply chain management. *International Journal of Production Research*

Supply chains and BC integration future architecture



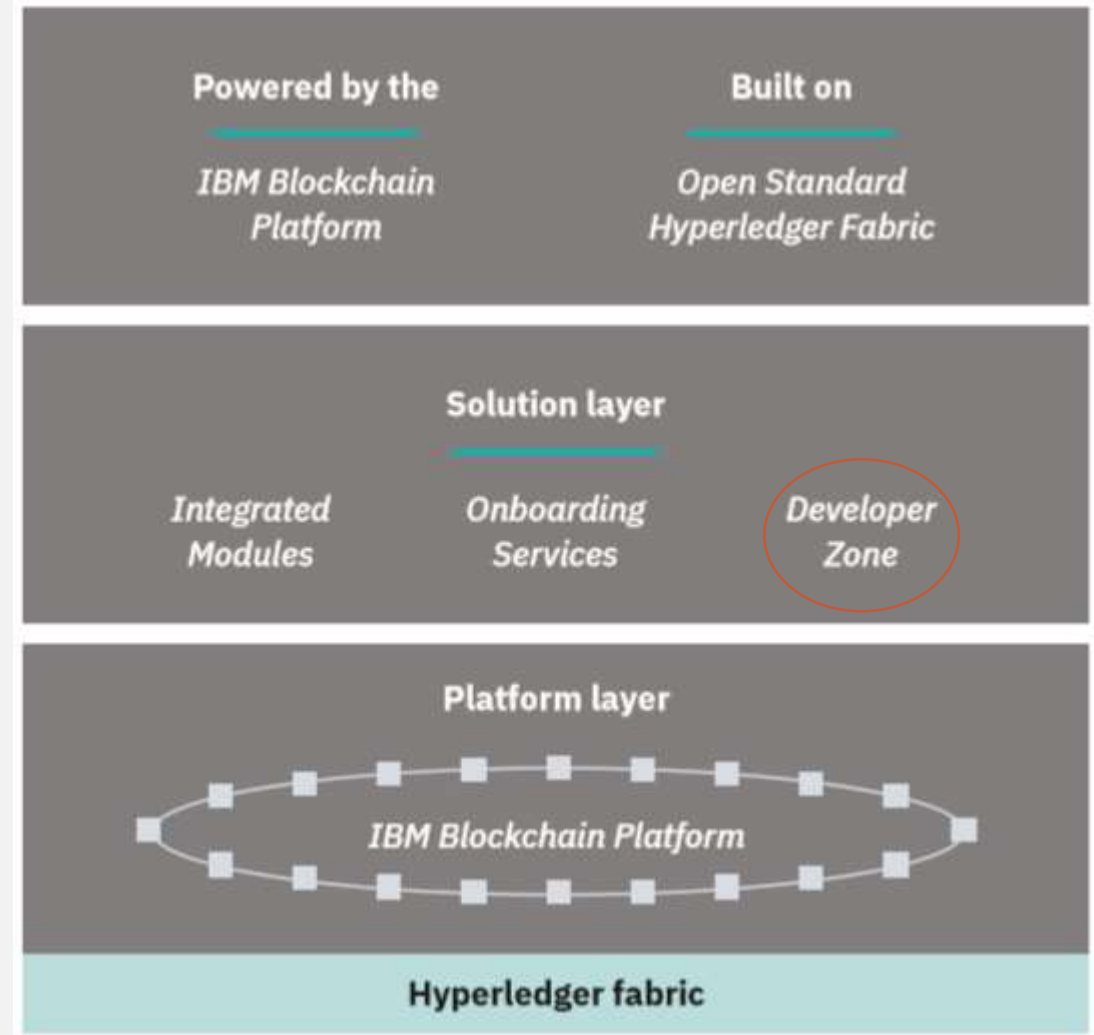
Chen, S., Shi, R., Ren, Z., Yan, J., Shi, Y., & Zhang, J. (2017). A Blockchain-based Supply Chain Quality Management Framework. The Fourteenth IEEE International Conference on e-Business Engineering (pp. 172-176).

The FoodTrust Case



It might lead to a new standard.

It might produce new regulations for food handling and safety



Is BC the “Deus ex Machina” for Supply chain problems?

- BC might be evolved as the “Facebook” of trade.
- It provides solutions on many supply chain problems.
 - Paper work processing
 - Identification of counterfeit products
 - Origin Tracing
 - IoT in SC
- For Big enterprises in the field of Logistics Blockchain’s adoption remains to be seen.

“The big industrials want to use their own technology because, historically, technology has been a market differentiator, That’s why they don’t go out and tell you exactly what they’re doing and that’s why none of them are open source. ” . (James Brehm, founder and technology evangelist at James Brehm & Associates)

For SME in supply chain, Blockchain might be the only way

Supply Chain and BC

Ευχαριστώ για την προσοχή σας