



Conference on
**Use of Smart Contract in Public
Procurement and Supply
Chain**

**Application of AI & ML
in
Smart Contract**



Presented By

Prof. Manoj Kumar Tiwari
Director, NITIE Mumbai

Agenda

- Smart Contract
- Benefits & Use of Smart Contracts
- Smart Contract Challenges
- Artificial Intelligence (AI)
- AI & Smart Contract
- AI-driven Smart Contract Process
- AI & Procurement
- Chat Bot
- Automation & Smartness
- AI in Anomaly Detection
- Case Studies
 - Unprecedented transparency to the food supply chain
 - Digitizing Global Trade



“45% of chief procurement officers are using, piloting, or planning to use AI”

~ Deloitte (The global chief procurement officer survey 2018-Leadership: Driving innovation and delivering impact.)

Smart Contract

Traditional Contracts

Takes 1-3 days to write

Remittance is manual

Expensive

Physical Presence is necessary

Intermediary necessary

Smart Contracts

Takes few minutes to few hours

Automatic Remittance

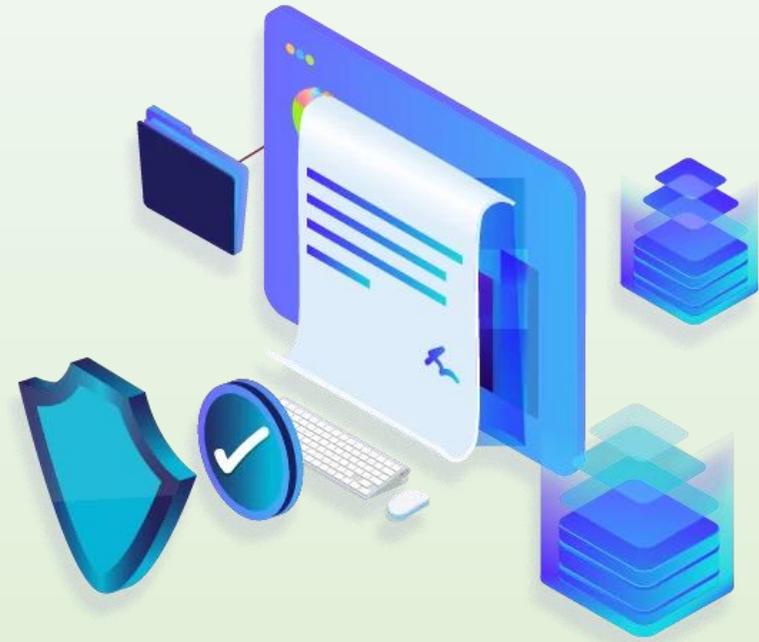
Cost-Effective

Virtual presence would be significant

No need of intermediary

- Contracts that are ‘self-executing’ with terms of the agreement between two or more parties.
- Independent of intermediary for execution
- Based on blockchain technology
- Blockchain is distributed ledger technology that stores data at assigned nodes giving access only to verified parties.

Benefits Of Smart Contracts



Accurate



Speed



Transparency



Backup



**Smart
Contracts**



Security



Savings



Communication



Trustworthy

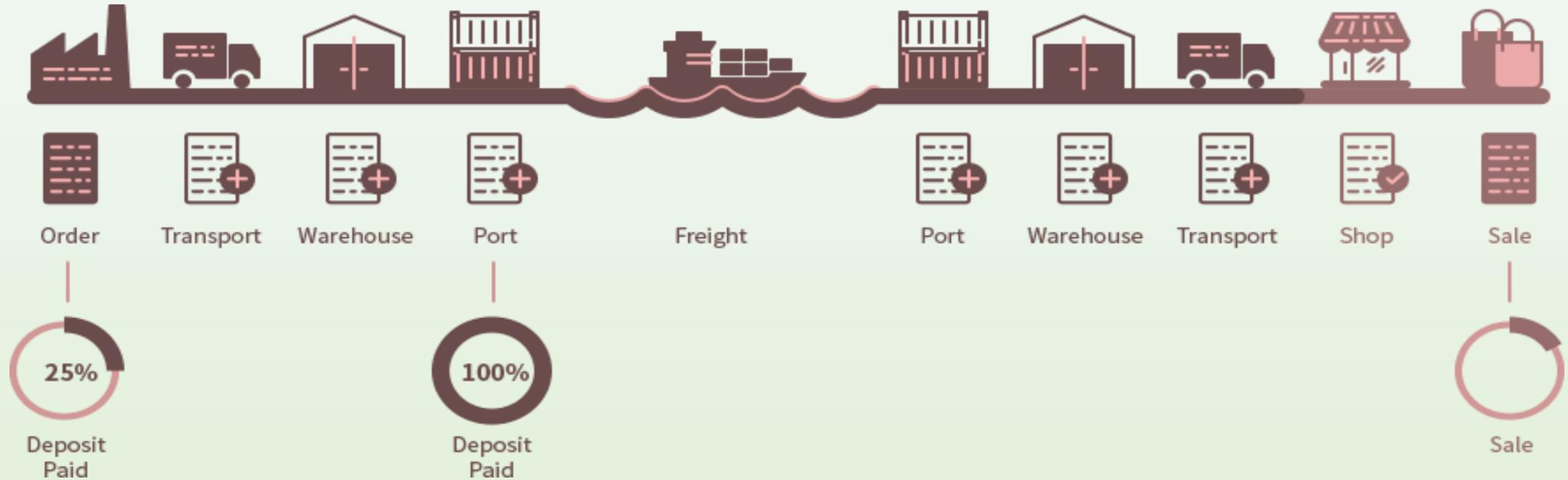


Efficient



Paperless & Sustainable

Uses of Smart Contracts



Smart contracts can help to trace quality, price, and all transactions along the supply chain

Smart Contracts Challenges

Technological Challenges

Scalability
in speed of execution

Interoperability
with legacy systems



Privacy and Security
of users and transactions

Legal Challenges

Regulatory Challenges
in applicable laws



Common Challenges

Inflexibility
of smart contracts

Organizational Challenges

Governance
of blockchains

Lack of Talent
in smart contracts



High cost of operations



Slow turnaround time, manual process, siloed



Loss of revenue due to unclaimed entitlements

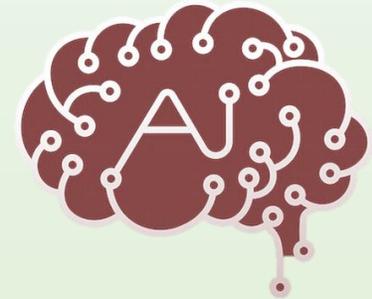
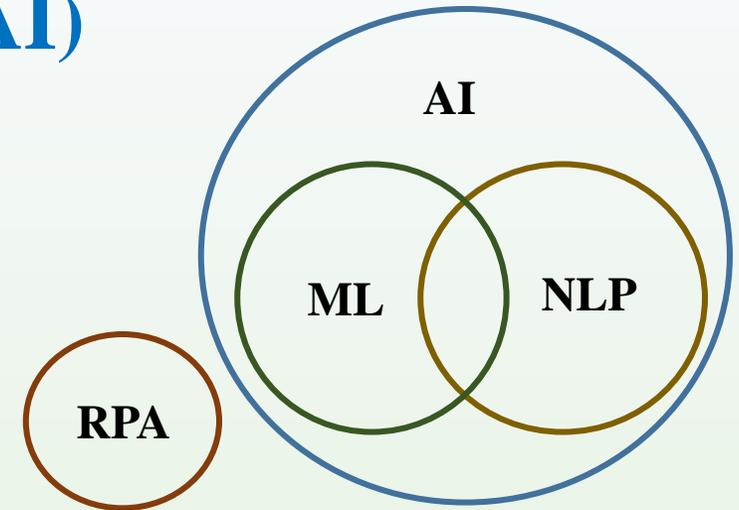


Regulatory enforcement due to non-compliance

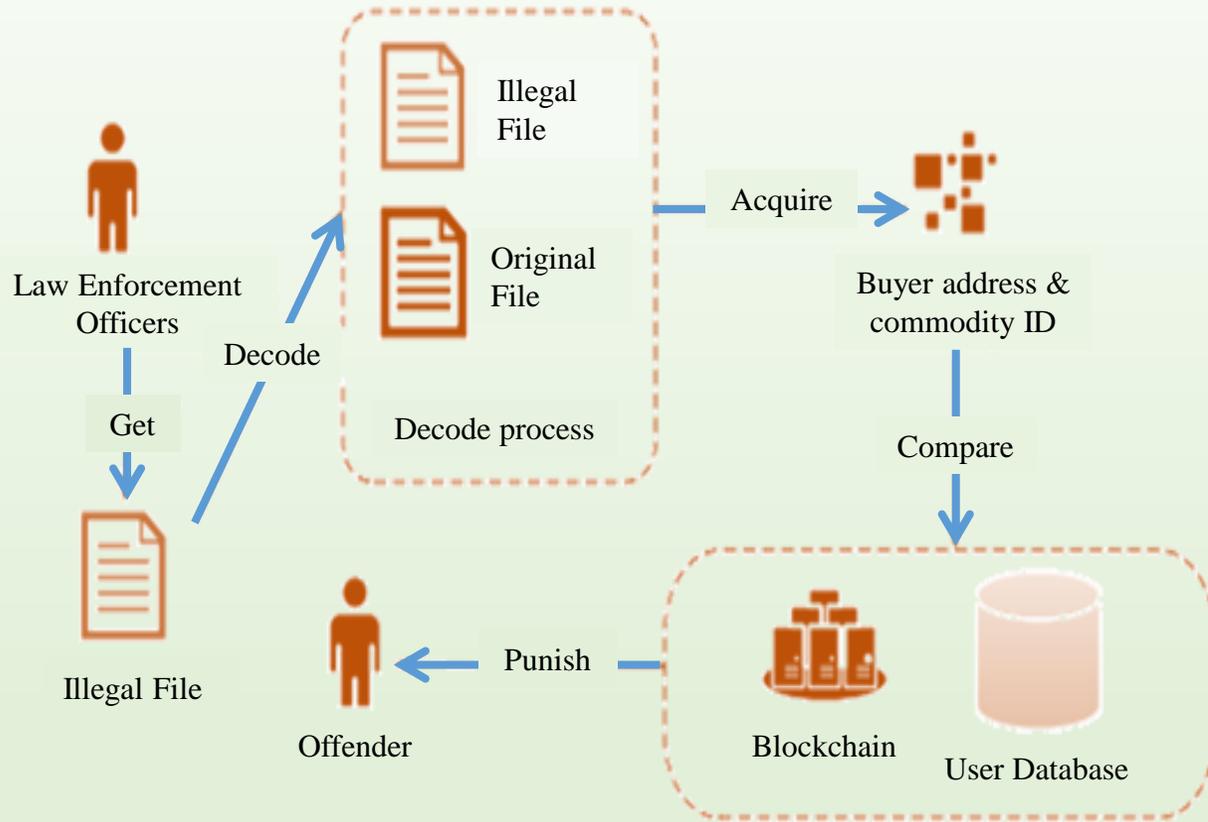
Artificial Intelligence (AI)

- AI is machine-displayed intelligence that simulates human behavior or thinking and can be trained to solve specific problems.
- AI is a combination of Machine Learning techniques and Deep Learning.
- Types of Artificial Intelligence models are trained using vast volumes of data and have the ability to make intelligent decisions.

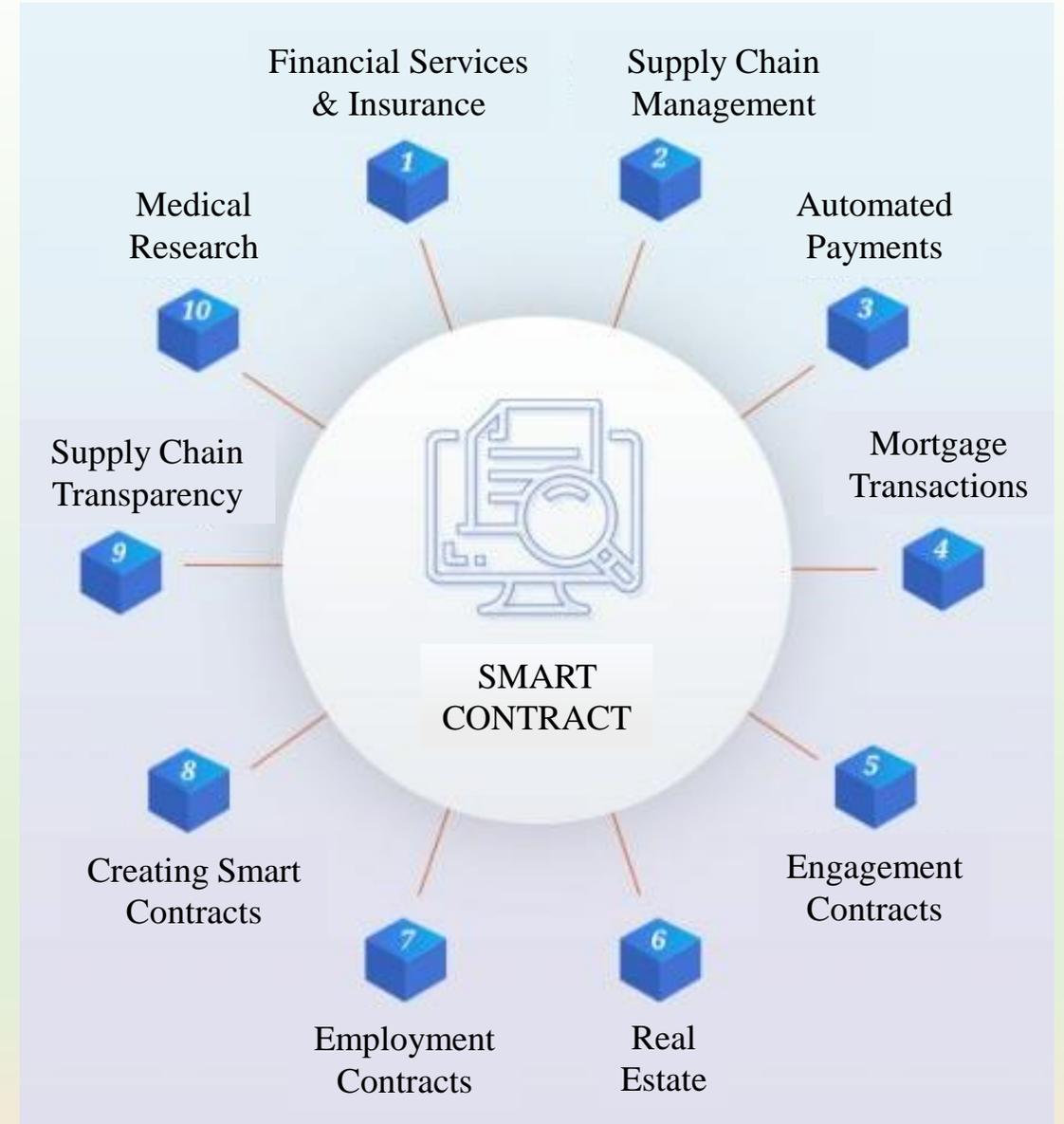
- **Machine Learning (ML):** Algorithms that detect patterns and use them for prediction or decision making
- **Natural Language Processing (NLP):** Algorithms that can interpret, transform, and generate human language
- **Robotic Process Automation (RPA):** Algorithms that mimic human actions to reduce repetitive simple tasks.



AI & Smart Contract



Blockchain-Driven Smart Contract



AI-driven Smart Contract Process

Negotiation and agreement on terms of contracts between all parties involved

Contracts terms are encrypted in codes and stored on block chain.

Evaluation of contract and auto execute the contract when eligible conditions are met

Outcomes are recorded as well as updated on all involved nodes



Contract Management Process

Contract Management Process Detail

Request for a new contract or review of the existing contract

Authoring the contract

Negotiation and Approval

Contract performance and Analysis

Amendment and Expiry/Renewal

Objective: To eliminate Pain Points by Automating Price Negotiation via an AI-Based Chat Bot

- Map the functioning of AI-based Chatbot
- Layout the activities/steps involved in the negotiation

Historical procurement data

Vendor KPIs
Fill Rate, OTD,
Availability, Defect
rate etc.

Getting Vendor Input
– performance
scorecard

Recommended price
using statistical or
machine learning
methods (Linear
regression, Lasso
regression)

Classification of Vendor
into High, Low, and
Medium performance
categories using statistical
or ML methods(Logistic
regression, Decision trees)

Vendor KPIs, Recommended price

AI and Procurement



Key areas AI can support Procurement:

- Make better decisions
- Identify new opportunities
- Improve operations
- Automate manual tasks – AI can automate many time-consuming tasks, such as monthly processes, or Procurement performance reporting.
- Free up time – by taking care of more routine tasks
- Capture or apply scarce knowledge
- Identify new suppliers or markets
- Optimize supplier relationships

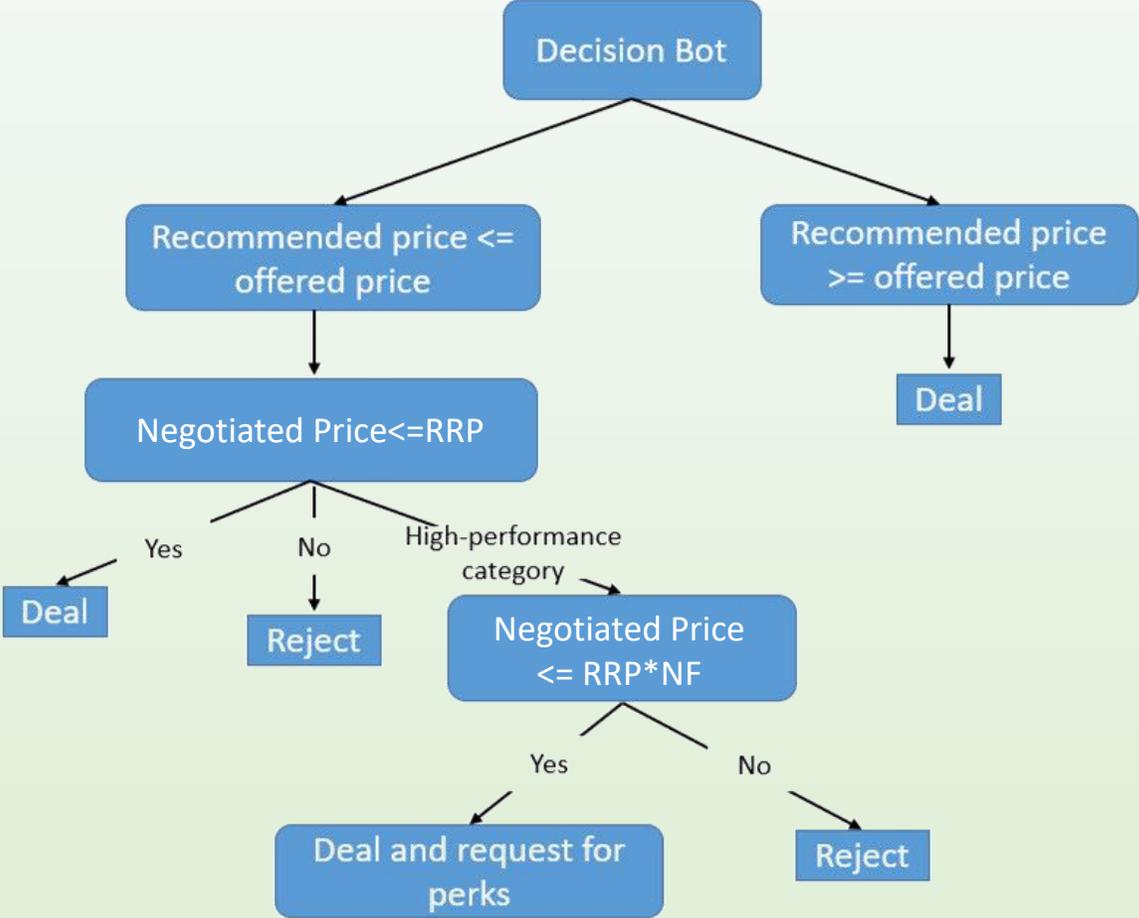
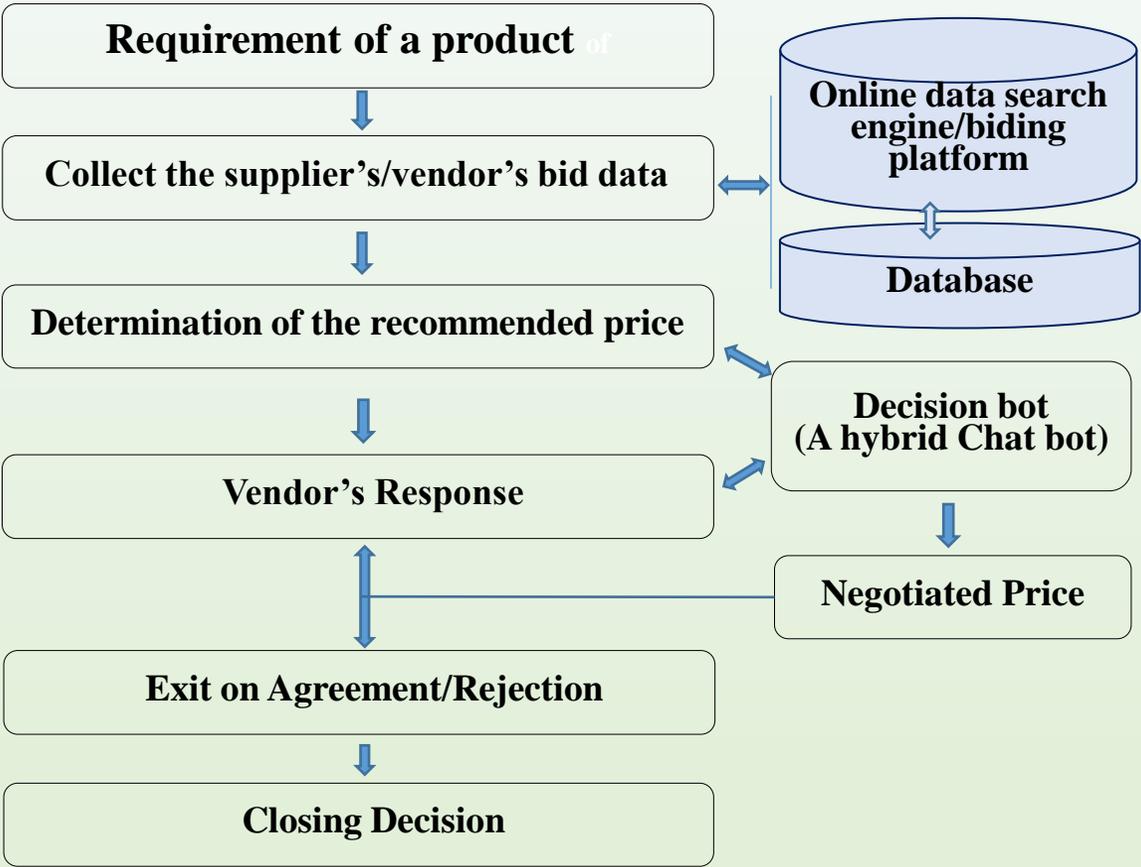
“There are two ways in which AI can be used for smarter sourcing in procurement.

The first is automation For example, AI-powered... bots

The second—and more important—use relates to AI-powered tools helping to rapidly collect, present, and even analyze commodity, market, and supply intelligence to inform market strategies.”

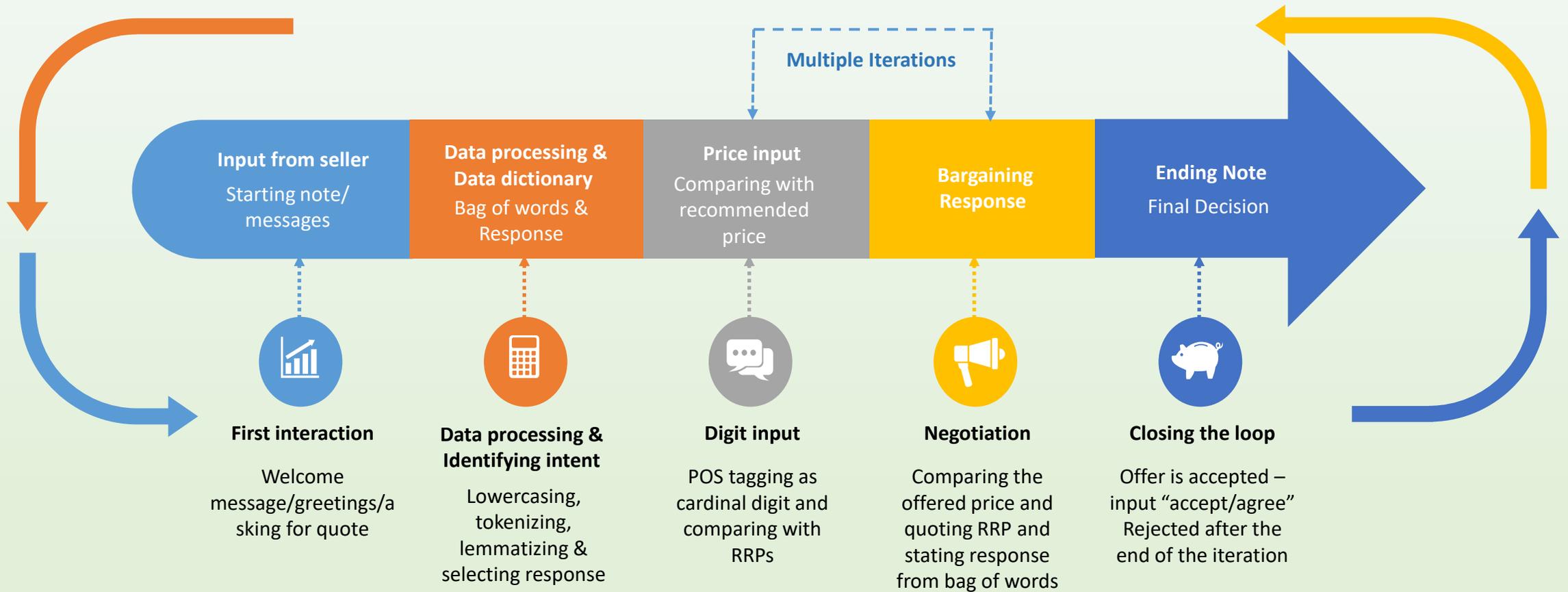
-- Nicholas Walden, Senior Director at The Hackett Group (HICX Solutions (2018) ‘The AI revolution in procurement’)

Smart Contract & Chat Bot



NF: Negotiating factor
RRP: Revised Recommended price

Interface of the Negotiating Bot



Automation & Smartness

Automation:

- Without smart controls, Chatbot buyers receive a higher wholesale price quote than human buyers.

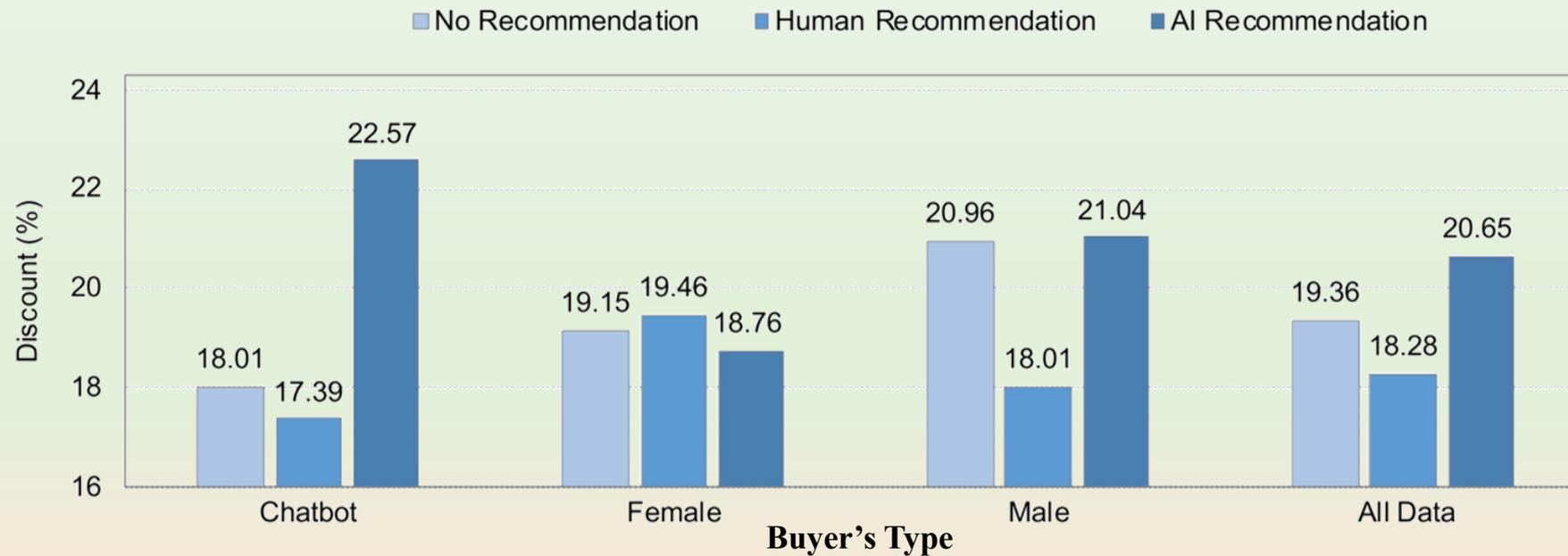
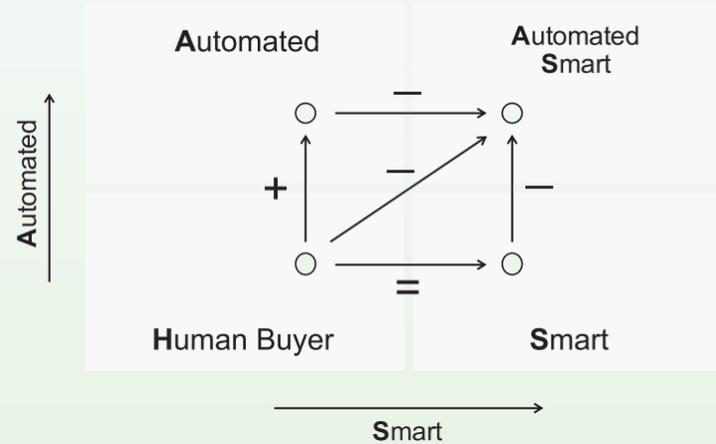
Smartness:

- Chatbot buyers, when informing suppliers that they are selected by smart AI algorithms, receive a lower wholesale price quote than Chatbot buyers without AI recommendations.
- Human buyers, when informing suppliers that they are selected by smart AI algorithms, receive a similar wholesale price quote as human buyers without AI recommendations.

Automation & Smartness:

- When informing suppliers that they are selected by smart AI algorithms, Chatbot buyers receive a lower wholesale price quote than human buyers.
- Chatbot buyers, when informing suppliers that they are selected by smart AI algorithms, receive a lower wholesale price quote than human buyers without AI recommendations.

Effect of Automation & Smartness



AI in Anomaly Detection

Benefits

Automated KPI analysis

Prevention of security breaches and threats

Discovery of hidden performance opportunities

Stretch budgets, resources and talent further

Faster results

Banking Industry

- **Danske Bank**, Denmark's largest bank, teamed up to develop a deep learning-based fraud detection system.

CPG

- **Fractal Analytics**, a CPG firm that used anomaly detection for demand planning to estimate a better forecast .

Telecom Industry

- **GeakMinds** helped a Fortune 500 Company to fix issues in their CDN Network and improved customer satisfaction using anomaly detection.

Healthcare Industry

- The National Library of Medicine, and a grant the National Science Foundation uses anomaly detection as a potential tool for spotting abnormal events that could indicate a medical error or unexpected clinical effects.

Advanced Analytics in FinTech

Real-World Use Cases

Benefits

Decreased costs

Minimized risks

Decreased fraud

Personalized services

Increased revenues

Increased employee satisfaction

Cutting the costs of budget building

- **PwC**, a second-largest professional services network, helped a large financial institution to better predict daily cash flow and increase return on payment activities.

Reducing prediction risks in investment banking

- **Overbond** is a Canadian startup that provides investment bankers and their clients with an AI quantitative analytics services that helps eliminate human fallibility from the business of issuing, selling, and buying bonds

Providing political risk signals for hedge fund managers

- A New York-based startup received \$3.25 million in venture capital to create a platform for hedge fund managers to identify potential political events and forecast their effects on sensitive strategies.

Fraud prevention

- **DataVisor** is one example of a fraud-detection engine that can accurately assess the likelihood of fraud across a range of transaction types, from card purchases to loan applications.

Managing credit card default risk

- **DataRobot's** AI Cloud platform allows **Carbon** (a digital bank for the underserved African market) to automatically assess the creditworthiness of individual customers

Optimizing customer journeys

- **Teradata Vantage** is an intelligent multi-cloud data platform that streamlines data analytics for large enterprises.

Case Studies 1

How Walmart brought unprecedented transparency to the food supply chain with Hyperledger Fabric

Food Walmart Track with Hyperledger



Produce
Such as mangoes,
strawberries



Meat & Poultry
Such as chicken, pork



Dairy
Such as yogurt
, almond milk



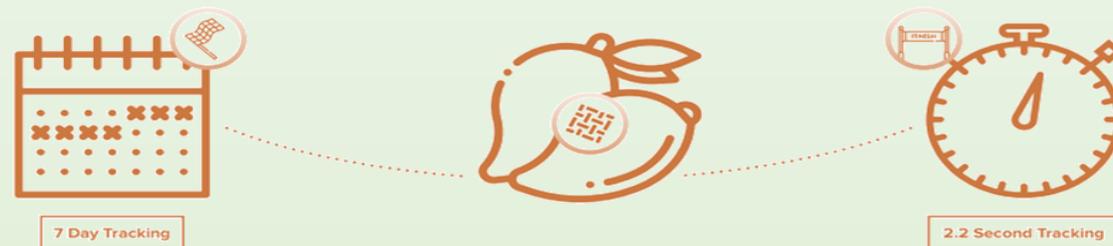
**Multi-ingredient
Products**
Such as packaged
salads, baby foods

Challenges:-

- Tracing source of food-borne disease outbreak.
- Completing the task in minimal time.
- Marking and Protecting those farms which were not affected by the outbreak

Approach:-

- Walmart, through smart contracts, uses a blockchain decentralized food supply system ecosystem.
- The company partnering with IBM, developed a food traceability system on Hyperledger fabric.
- They tested it on two products at two different locations.
 - Tracing mangoes sold in US Walmart stores.
 - Tracing pork sold in China Walmart Stores.
- For Pork, they need to upload a certificate of authenticity to the Blockchain in the form of a smart contract



Results:-

- Walmart can now trace the origin of over 25 products from 5 different suppliers using the system powered by Hyperledger Fabric.
- For mangoes in US stores, the time needed to trace their provenance went from 7 days

Case Studies 2

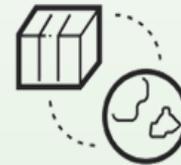
Digitizing Global Trade with Maersk and IBM



More than **\$4 trillion** in goods are shipped each year



80% of the goods consumers use daily are carried by the ocean shipping industry

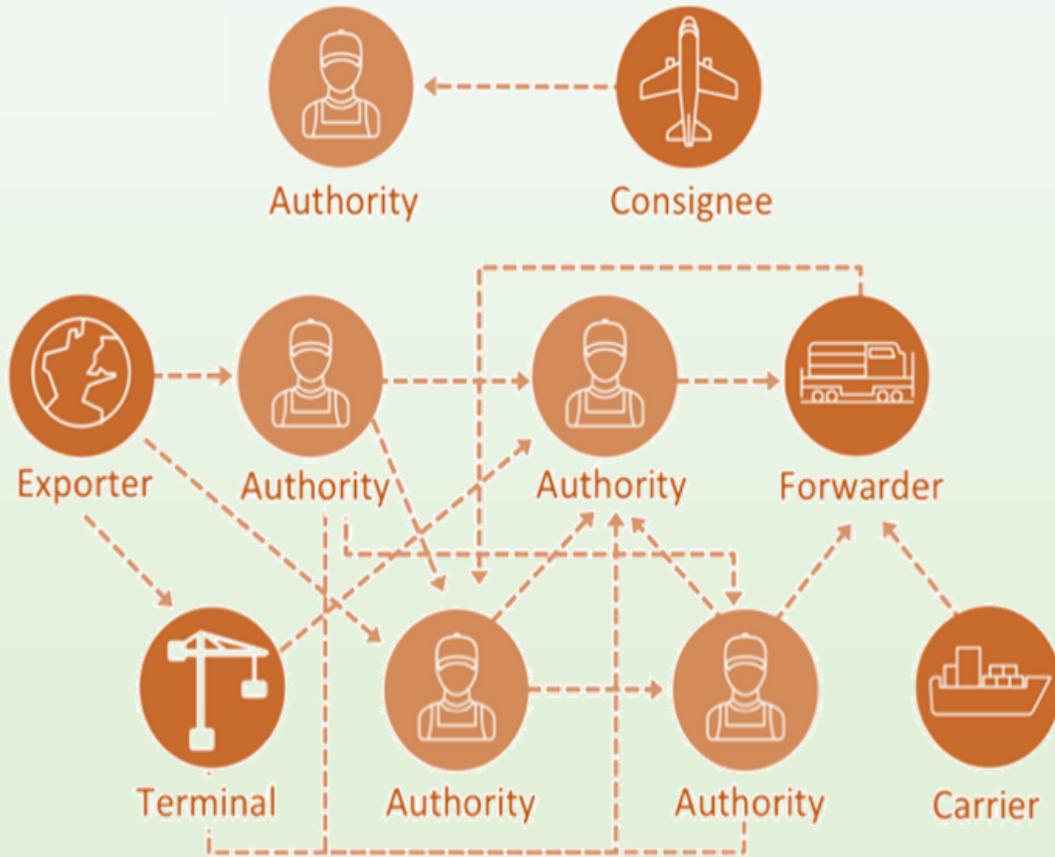


By reducing barriers within the international supply chain, global trade could increase by nearly **15%**, boosting economies and creating jobs²



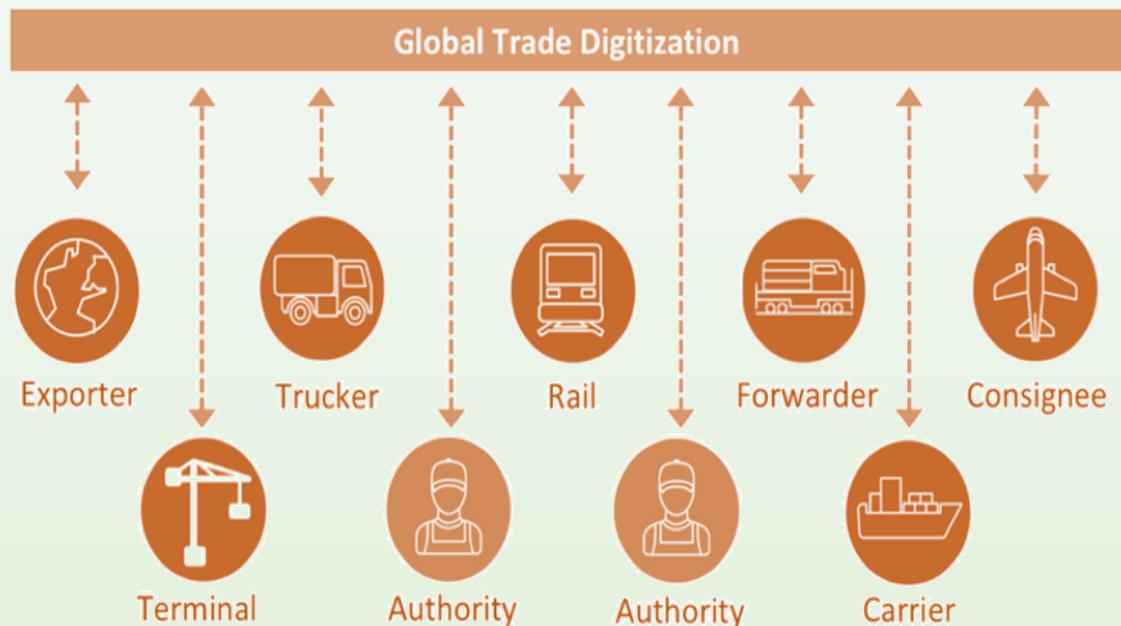
The cost of the required trade documentation is estimated to reach **one-fifth** of the actual physical transportation costs

Challenges



- The inconsistent flow of information across the organizations involved creates blind spots throughout the supply chain, which hinders the efficient flow of goods.
- Manual, time-consuming paper-based processes.
- Risk assessment often lacks sufficient information, which might hinder clearance processes leading to fraud
- The administrative cost of handling container shipment is comparable to the cost of the actual physical transport.

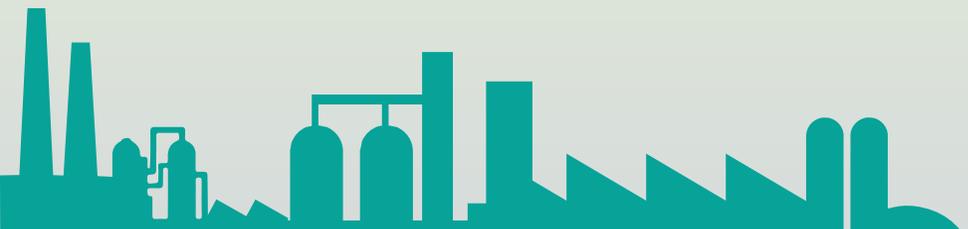
Results & Outcomes



- Fast, secure access to end-to-end supply chain
- Verifiable, the immutability of digital documents.
- Trusted cross-organizational workflow.
- Better risk assessment with lesser intervention
- Far lower administrative expense and eliminates the cost to move physical papers to move across international borders

After Digitization through Smart Contracts and it's technologies based solutions.

Thank You



Query & Suggestions
