FOOD SAFETY, TRACEABILITY & STRATEGIC RECALLS

Digitalizing Food Supply Chain

Tech Mahindra's DSC Portfolio for Retail and Consumer Goods Industries

Sustainable Food Supply Chains is our Responsibility for Future - Digital Supply Chains help food wastage reduction, enhance safety, security & transparency and effective recalls

Providing safe and healthy food for consumers is the key to socially responsible and economically fair organizations. FAO estimates show that 1/3rd of all food produced globally is lost or goes to waste. This includes the food along with the resources that go in the supply chain. As per FAO, the definition of Food Loss refers to any food that is lost in the supply chain between producer and the market and the definition of Food Waste refers to discarding that is unsafe and not nutritious for human consumption.
(Source: http://www.fao.org/food-loss-and-food-waste/en/)

Along with controlling food loss and food waste, it is important to address food safety. According to WHO, an estimated 600 million – almost 1 in 10 people in the work fall ill after eating contaminated food and 420K die every year, resulting in the loss of 33 million healthy life years. Children under 5 years of age carry 40% of the foodborne disease burden with 125K deaths every year.
WHO provides strategic directions for increasing Food Safety and lower food Borne diseases. The directions are –
Provide the science based measures to reduce health risks along the food chain
Improve international and national cross-sectoral collaboration and communication
Provide leadership and assist in development of risk-based, integrated systems for food safety
(Source: https://www.who.int/foodsafety/publications/strategic-plan/en/)

Globalization and global connectivity increases the complexity and supply chain risks for retail and consumer goods companies. Ineffective supply chain management, Lack of end-to-end visibility, Margin erosion & sudden demand changes, ripple effect due to extended value chain, obsolescence of technologies etc. are a few to mention. Hence, it becomes very important to have effective collaboration and communication between all entities in supply chain from farmers/producers, government, consumer goods companies, retailers, third party logistics and consumers to ensure food safety.

Food Supply Chain: Absence of End-to-End Visibility
According to Gartner, there are five layers to Supply Chain visibility that determines the maturity of the applications built – three layers of foundation requirements and two layers of value creation requirements [refer pic below]
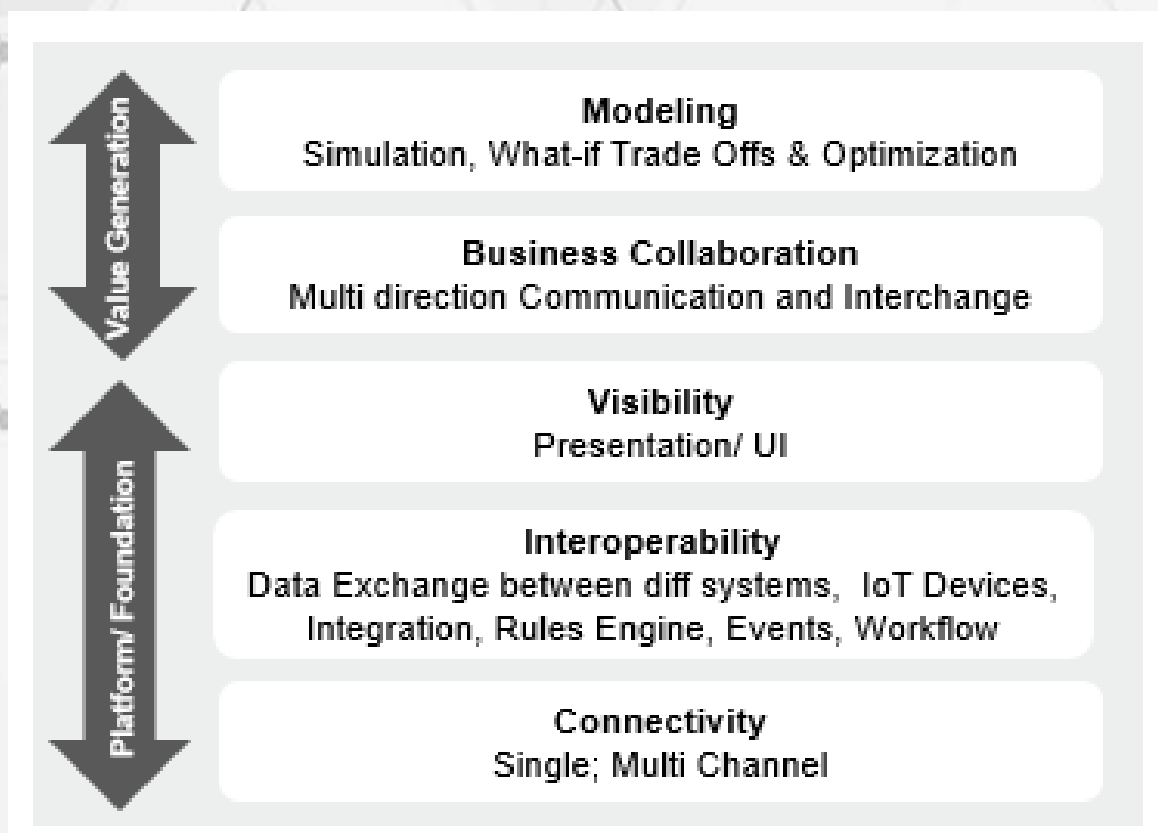

Fig 1: Gartner's Five Layers of Supply Chain Visibility

Any application built to provide the supply chain visibility, if it covers the above five layers of requirements will be very useful and addressing the supply chain issues effectively. While evaluating the adequacy of the existing market solutions, many of the white spaces are not addressed [refer fig below]
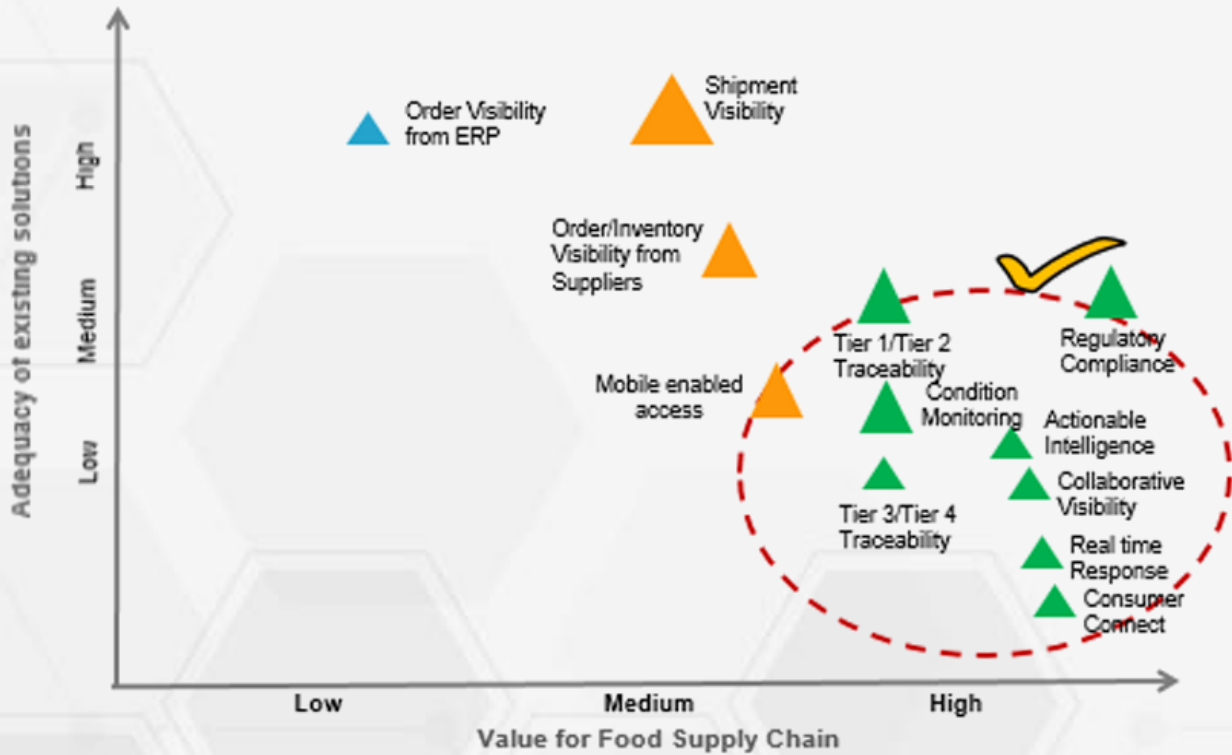

Fig 2: Supply Chain Whitespaces

For example, Tier 1to4 traceability, Condition monitoring, Real time response, Actionable Intelligence etc. are still the white spaces and these map on to the Five layers of supply chain visibility in creating value based solutions in supply chain.
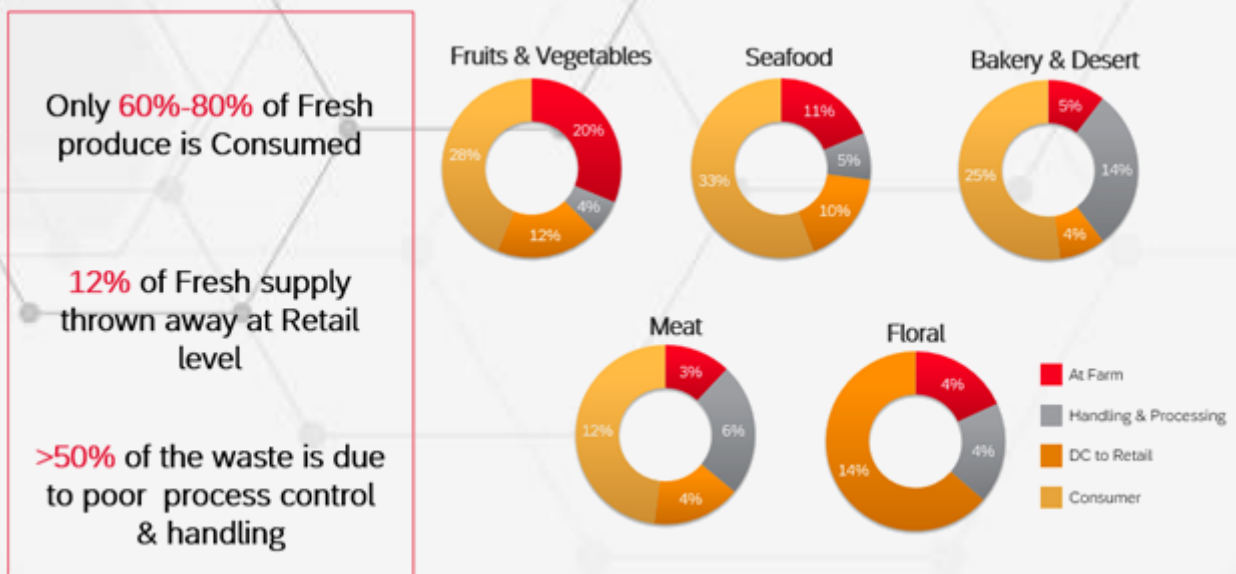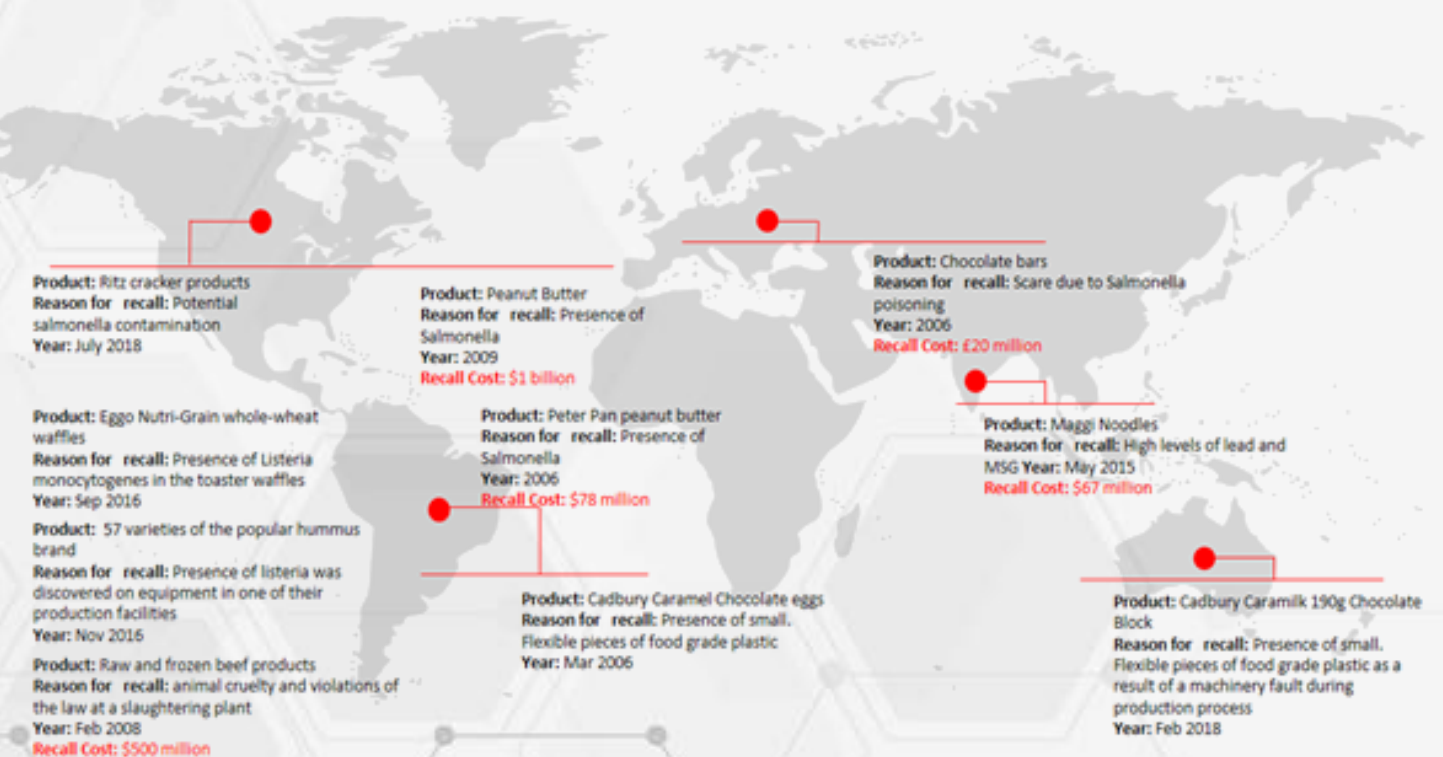
Food Wastage and Costly Recalls, a snapshot

Fig 3: Report on Food Wastage across World

Above statistics, show the percentage of food wastage across different produces with reasons that can occur at the farm, handling and processing, during transit from distribution center to retails store and even at the customer end.

Clearly, the food business is undergoing far-reaching change. Global forces like rising demand for food across the world and shifts in consumer buying behavior, and technology advances that deliver detailed profiles of products moving in the supply chain etc. are making today's food supply chain extremely complex. In addition, *Food Safety and Strategic Recalls* have been of prime importance and challenge due to the severity of the risks and the impact they can have on the brand reputation. Below are the major recalls across the world and the cost incurred per recall.

Product: Ritz cracker products
Reason for recall: Potential salmonella contamination
Year: July 2018

Product: Eggo Nutri-Grain whole-wheat waffles
Reason for recall: Presence of Listeria monocytogenes in the toaster waffles
Year: Sep 2016

Product: 57 varieties of the popular hummus brand
Reason for recall: Presence of listeria was discovered on equipment in one of their production facilities
Year: Nov 2016

Product: Raw and frozen beef products
Reason for recall: animal cruelty and violations of the law at a slaughtering plant
Year: Feb 2008
Recall Cost: $500 million

Product: Peanut Butter
Reason for recall: Presence of Salmonella
Year: 2009
Recall Cost: $1 billion

Product: Peter Pan peanut butter
Reason for recall: Presence of Salmonella
Year: 2006
Recall Cost: $78 million

Product: Cadbury Caramel Chocolate eggs
Reason for recall: Presence of small. Flexible pieces of food grade plastic
Year: Mar 2006

Product: Chocolate bars
Reason for recall: Scare due to Salmonella poisoning
Year: 2006
Recall Cost: £20 million

Product: Maggi Noodles
Reason for recall: High levels of lead and MSG **Year:** May 2015
Recall Cost: $67 million

Product: Cadbury Caramilk 190g Chocolate Block
Reason for recall: Presence of small. Flexible pieces of food grade plastic as a result of a machinery fault during production process
Year: Feb 2018

Source: https://www.fsis.usda.gov , https://www.fda.gov/Safety/Recalls/ucm614253.htm

Fig 4: Large recalls across world for CPG Sector

Tech Mahindra provides Industry Platform Solutions to enhance collaboration, communication and food safety through its DSC solutions for RCG:

- *Farmguru* – IoT enabled precision agriculture for farm and crop condition and quality monitoring
- *FEEDS* – IoT & Blockchain enabled, module based solution connecting all the partners in the value chain from Farm to consumer
- *CONSUMER CONNECT* – Mobile application for customer interactions
- *SPRINT* – Blockchain enabled strategic recall management through end to end guided process

TechM Digital Supply Chain Solution portfolio of solutions

Tech Mahindra analyzed the above issues, identified an opportunity to build solutions to tackle the food safety and bring in traceability to provide various insights to the different entities, thereby, controlling the wastages and take quick decisions in near real-time.

Below is the snapshot of TechM's Digital Supply chain portfolio solutions for the CG industry both for the forward and reverse supply chain.
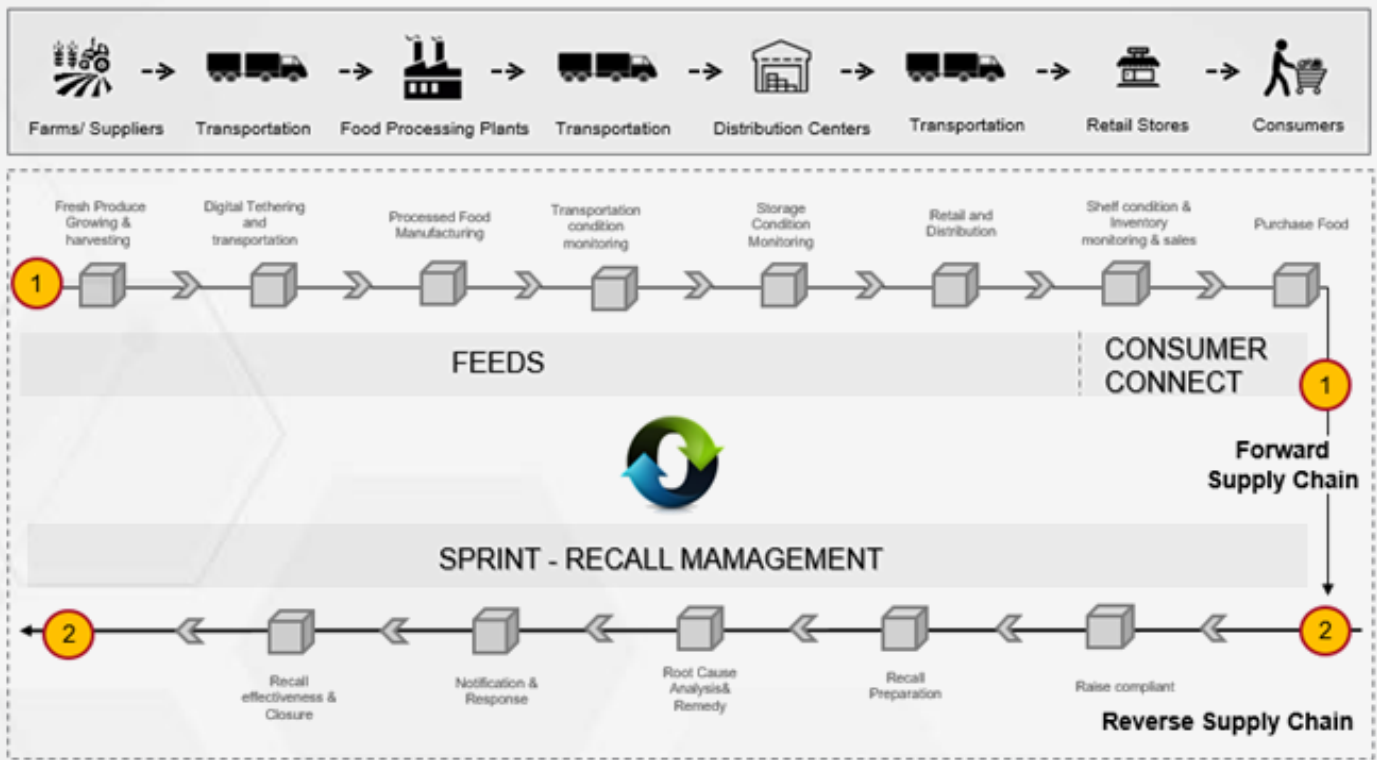
Fig 5: Business Process in Forward and Reverse Supply Chain

Key Capabilities include

Assess: The platform captures the real time information from different sources at different stages of the supply chain with IoT and AI capabilities.

Validate & Authorize: Each of the transactions during the entire process is validated and recorded in blockchain ledger agreed by the ecosystem.

4T Indicators : Track and Trace in Trust and Transparency

Connect: The platform brings stakeholders in the ecosystem together to be able to view, agree and communicate.

FEEDS: Fresh Product End to End Digital Supply Chain

The solution provides an End-to-End visibility of Fresh Food Supply Chain with Real time traceability, Condition Monitoring of Food Products in Transit, and Unified Common Platform for collaboration between different roles of Business Network. On field, we track three essential parameters – unique identity, condition & event/milestone data of the product through the supply chain. Provides a precision farm management suite that can help the farmers/suppliers manage, predict, respond and control the crop with data driven scientific accuracy. It helps farmers save money from excessive, and often unnecessary use of resources (water, fertilizer etc.) while being able to predict quality and quantity of their yield with high accuracy.
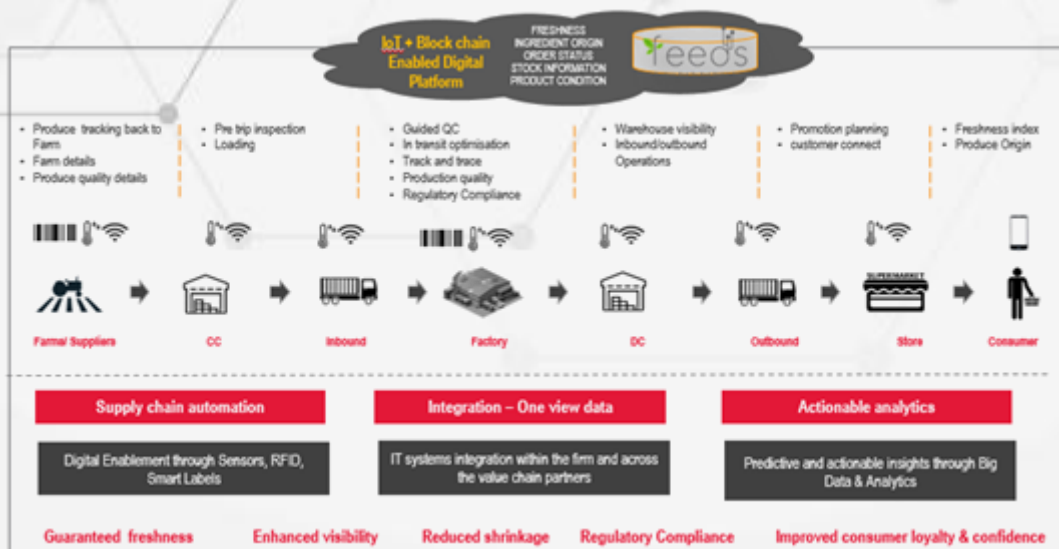

Fig 6: FEEDS Solution

Consumer Connect:

Consumer connect can be established through mobile & other interactive devices to provide required information to the consumer. All the information that captured for analysis and review, which the customer would like to verify, is made available using customer connect. There can be different avenues and digital touch points, which is enabled for customer that provides excellent consumer experience, confidence and trust.

Forward supply chain solution focuses

    To bring all the extended partners of the supply chain on to a single platform
    Identification of products and their constitution uniquely
    Track event & milestone data across all the partners in the supply chain till it reaches the consumer
    Enable farms with IoT and AI to track produce yield & quality
    Get the data provenance in the supply chain via Blockchain.

SPRINT: *Strategic Product Recall in Transparency*

To drive reliability, resilience, efficiency and create futuristic supply chains, need of the hour for the CG Enterprises are Visibility, Flexibility, Control and Inferred Trust.

This solution is for the retail and consumer good industry provisioned for different entities in the supply chain to help to take critical ad quicker decisions in case of product recall scenario. This addresses Food Safety, Traceability and effective Strategic Recalls.
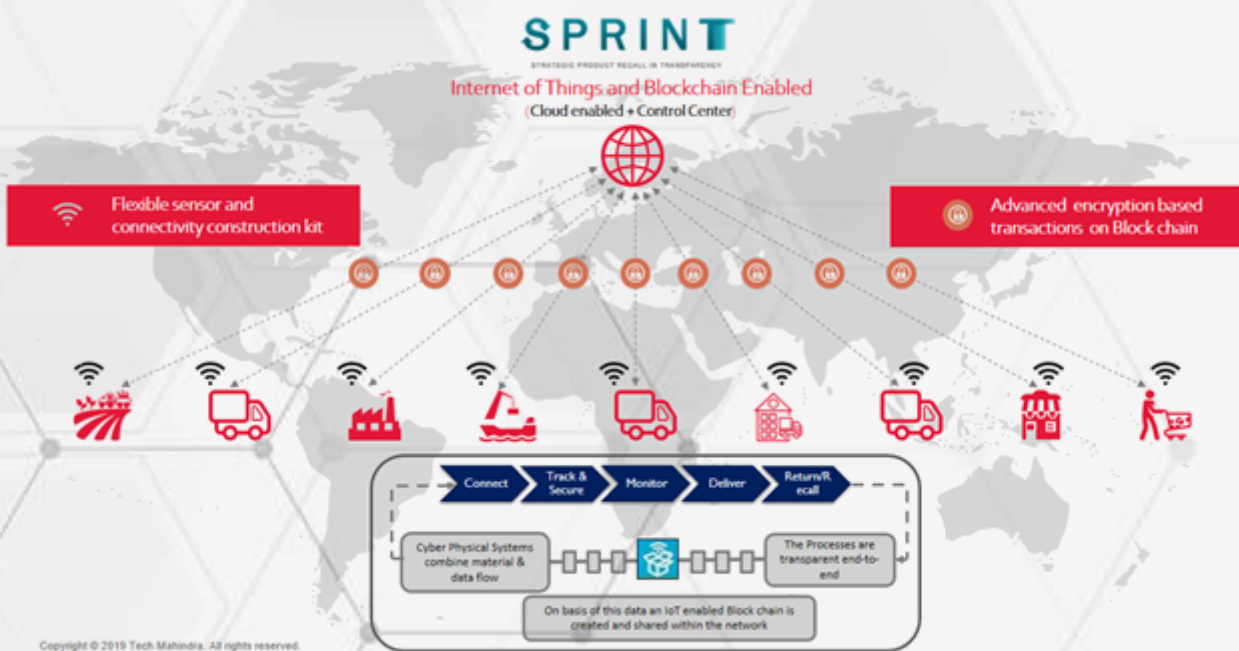

Fig 6: FEEDS Solution

Backward Supply Chain solution

    To track and trace the produce information from farm to consumer.
    In case of any issues , to identify and categorize problems and issues with the product
    Trace the root cause of the problem (where & how the issue occurred)
     Identify other products impacted due to the root cause
    Trace the complete recall management activities like product return status, recall notifications etc. till the program closure
    Provide supporting documentation of successful recall to the Regulatory authorities

Bringing all the solutions together onto the same platform helps simplifying the Supply Chain providing track and trace in trust and transparency. This helps entire supply value chain to achieve enhanced Visibility, speedy, immutable traceability for faster decision-making and better process control.

Digital Supply Chain on SAP Leonardo

The suite of applications (FEEDS, Consumer Connect & SPRINT) is built on SAP Leonardo leveraging the Digital Platform with Internet of Things, Big Data, Blockchain and Machine Learning technologies.
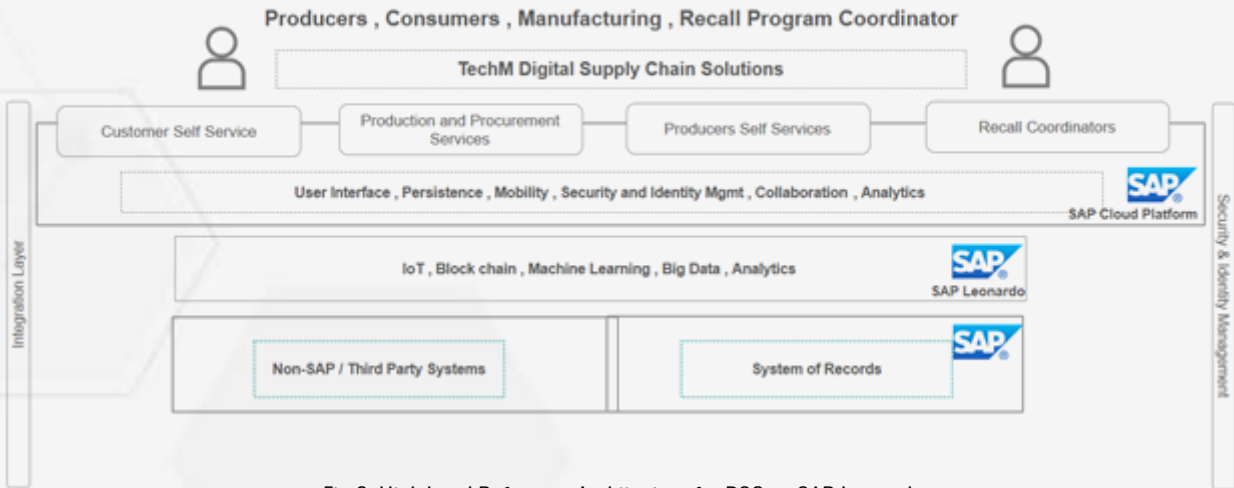

Fig 8: High Level Reference Architecture for DSC on SAP Leonardo

Key Architecture Features:

- Cloud based Architecture – Solutions are developed and deployed on SAP Leonardo Innovation Platform powered by SAP Cloud Platform.
- Security – The SAP Cloud Platform is compliant to high levels of industry security standards i.e. ISO 27001, SOC1 and SOC2. Tenant based segregation of data and application.
- User Management – SAP Identity Authentication Services is used for authentication and management of application users' identity. Authorization matrix ensures complete role based access.
- Maintainability - Built-in app lifecycle management for seamless update and maintenance
- Standards - Standards-based development and runtime environment.
- Availability - SAP Cloud Platform provides 99.9% availability for the cloud platform and its services.
- Scalability – The platform is scalable both horizontally and vertically.

Benefits

Customer Experience & Brand value protection from easy, quick & guided recall management process

End to end traceability – Time reduction from days to hours/minutes

Enhanced visibility across supply chain partners with Immutable track n' trace products to enable dynamic and collaborative decision-making

Improved consumer loyalty & confidence with quick response to product safety & recalls

Credentials
- Co-innovated with SAP COIL, Certified and endorsed by SAP
- Unique SAP based solution in the market
- Positive feedback from analysts- Gartner, ISG and Forrester
- Simplified, Cost effective licensing model

Deployment and Commercials Models
Deployed on cloud, this solution implementation requires a perpetual license and allows three deployment models to license and pay for only the functionality and number of users you need. Tech Mahindra offers SAP Leonardo DSC Solutions in three deployments models categorized and differentiated as below:

Deployment and Commercial Models				
			OEM Based	
		Deployment Scenario 1	Deployment Scenario 2	Deployment Scenario 3
		Customer Owned	TechM Bundled	TechM Owned
Business	Platform Licenses	Already owned by customer	Bought from TechM	Owned by TechM
	Licenses Renewal	Customer Responsible	TechM Responsible	TechM Responsible
	Licenses (Application + Devices)	Bought from TechM	Bought from TechM	Supplied from TechM
Technical	Infra	Owned by Customer	Owned by Customer	Owned by TechM
	Sizing	Customer Responsible	TechM Responsible	TechM Responsible
	Scalability /Availability	Customer Responsible	TechM Responsible	TechM Responsible
	Upgrade	Customer Responsible	TechM Responsible	TechM Responsible
	App Customization	Possible	Possible	App Specific Only
Commercial	Pricing Models	• Tiered Licensing	• Tiered Licensing	• Tiered Licensing

Value Proposition
Business/ Social:
- Improved shelf life and quality , Holistic supply chain visibility for quick response to business problems
- Ensuring food safety and quick product recalls.
- Control of wastages.
- Brand loyalty.
- Food Provenance

Technology:
- Collaborative, Unified, integrated digital platform for all stakeholders in the supply chain to get real time insights and transact with system of records.
- Differentiate true claims from false
- Thwart counterfeiters and ensure safety & Eliminate costly batch recalls

Human Empowerment:
- Changes the way how customers are served
- Get crucial data from single receipt : suppliers, plant, inspection, pallet to package

Conclusion
Bringing all the solutions together onto the same platform helps simplifying the Supply Chain providing track and trace in trust and transparency with key focus to enhance the visibility. Bringing better process control mechanisms through dynamic and collaborative decision-making is the need for complex supply chain.

Tech Mahindra

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