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How Pega DPA + Blockchain Can Enable Manufacturing Warranty Management Value Chains

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Executive summary

Blockchain is of particular interest to the manufacturing industry due to its benefits regarding verification and transparency. The potential use cases are ever expanding, from financial services to asset ownership, to intellectual property and to integration with the Internet of Things (IoT).

Warranty management has been one of the most significant expenses for manufacturing companies. Despite a reduction in the number of claims issued, there has been a noted increase in costs across the warranty value chain. Existing legacy systems are disparate, standalone requiring manual interventions and hand-offs, with zero immutability of records. The onus is transferred to the customer to prove ownership and warranty coverage to OEMs via physical invoices, contributing to decreased customer satisfaction, duplication of work and inability to handle counterfeiting and fraudulent claims.

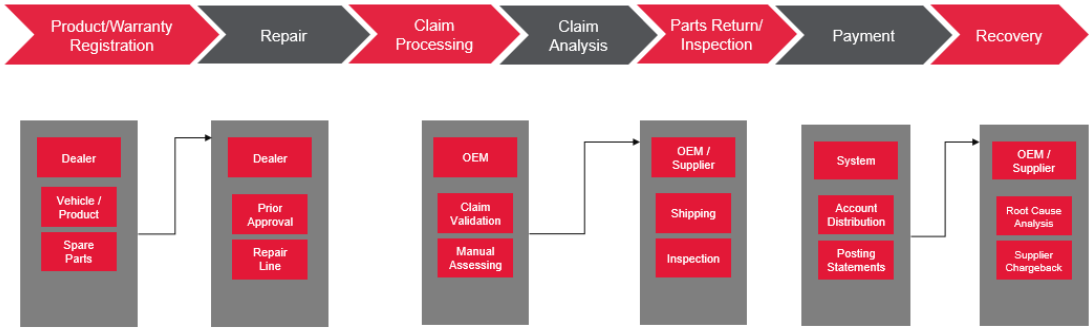
The dual combination of DPA + blockchain aims to target these inefficiencies by optimizing the warranty. Organizations gain the power to track the part with a digital twin for the entire lifecycle of production -> distribution -> sale -> service -> recovery.

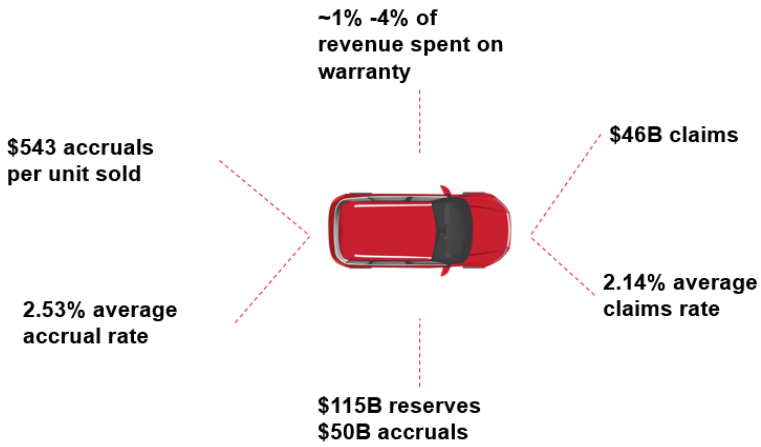
Such an automated warranty value chain is estimated to provide – (1) 50% - 70% reduction in document verification time (2) 40% - 60% reduction in fraudulent claims (3) 60% - 80% reduction in warranty information mismatch.

The Warranty Challenge

Managing warranty has now emerged as a key area in the aftermarket for manufacturers. Customers spend $2 trillion in warranted product sales on owned assets. 3%-4% of a typical manufacturer's revenue is now spent on warranty management.

Warranty spend in the auto & discrete industry worldwide is up sharply. With reliable warranty expense data in hand from 24 of the world's largest carmakers, we have calculated some worldwide metrics:





With slowing new car sales, there is a growth shift in the space of extended warranty, spare parts sales and over the counter parts and accessories. Firms generate an estimated 30–50% of their revenue from servicing products and which represents 45% of gross profits. However, with disruptions to the traditional dealership sales model with online and reseller marketplaces arises the challenge of counterfeit and fraudulent parts and claims.

For example in emerging markets such as India, the counterfeit auto parts industry is matching the growth rate of automotive sales. The fake spares industry in the latest fiscal year was estimated to be a whopping $3 billion (30-40% of the overall spare parts industry

market share), while traditional sales for OEMs is just marked at $10 billion in this region. This has led to governmental agencies needing to intervene and mandate the manufacturers to enforce measures that help consumers and dealerships/distributors authenticate their spare parts.

Warranty Pain Points

Warranty is a consumer experience involving manufacturing production, service, dealers, suppliers, as well as a large ecosystem of regulatory and product policies and decisions that must be executed to handle claims. Historically, warranty management has been relegated to an administrative back office function, and so everyone involved suffers from several challenges and "pain points" that include:

- **Claims Processing Inefficiencies:** Processing claims is too manual, administrative and wasteful. Manufacturing is under constant pressure to reduce warranty costs. This results in cost-cutting policies that are often detrimental to dealer, supplier and customer relationships. The responsibility of proving warranty coverage and origin of the part is shifted to dealers and suppliers respectively. This contributes to an increased percentage of a denials and appeals loop and incorrect cost recovery.

- **Fraudulent Handling:** Manufacturers and dealers also deal with fraud claims that could substantially add to the cost of warranty processing. The detection as well as prediction of potential fraudulent claims are important objectives for warranty. Another aspect of fraud causing concern for OEMs is around counterfeit spare parts. Failure to distinguish the fake parts right from the installation until the repair/claim step results in brand dilution, tarnished reputation and financial losses to manufacturers.

- **Exception Handling:** Packaged warranty systems are meant to provide standardized adjudication controls & process. They were not designed to handle the dynamism of exceptions required for specialized claim types such as service part warranty without custom code. Exceptions require rapid response and therefore manual workarounds abound. Organizations lose agility and visibility.

- **Customer Churn:** Perhaps most importantly, customers are churning due to poor warranty processing. Customer satisfaction declines with poor handling of claims. Sometimes the paperwork is lost, damaged, or erroneous. The customer experience is further aggravated when rigid company policies conflict with customer expectations. Customers lose or are unaware of eligible warranty coverages during a transfer/sale.

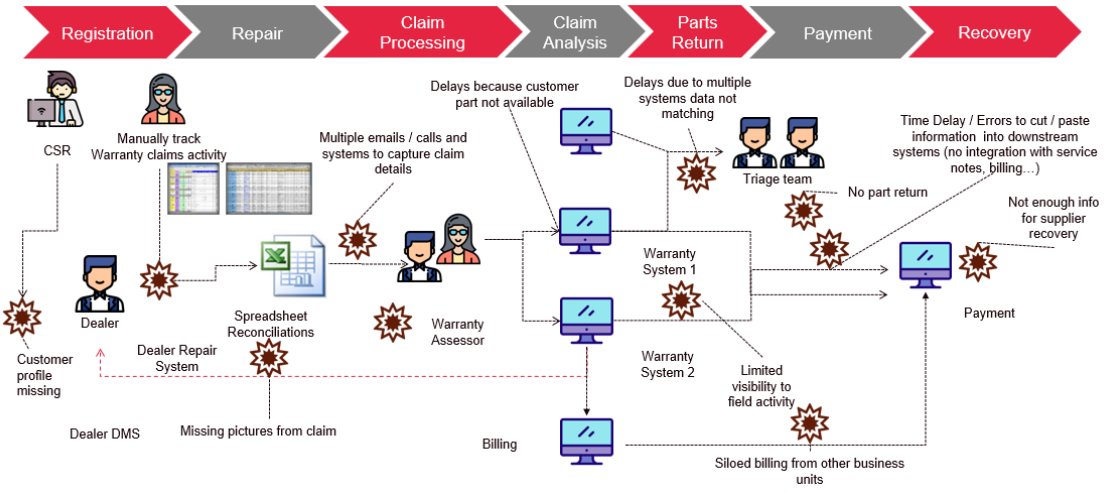
- **Fleet Benefits:** In addition to benefits for manufacturers and individual customers, fleet owners can benefit greatly by integrating service and warranty with OEMs for tracking original and after-market parts. OEMs can enhance the benefits of using original parts in the maintenance cycle of the life of any vehicle.

- **Regulatory Compliance:** The cost of regulatory compliance and reporting is climbing. Regulations keep increasing in complexity. There are also corporate policies that need to be addressed.

How Warranty Value Chains Work Currently

A value chain is a process that orchestrates various applications and participants through a journey of milestones towards a business objective. The following diagram illustrates the "as-is" challenges of the warranty value chain.

Illustrating a value chain, such as the warranty chain, does not mean it is modeled, digitalized and automated. Typically, the value chain is just "on paper" with no work automation monitoring, operational optimization, or aggregation of digital technologies to complete the end-to-end process.



The warranty ecosystem spans manufacturers, suppliers, dealers, field service technicians and perhaps the most important participant in warranty value chains: the customer.

Therefore, manufacturers are paying an increasingly high price of inefficiency while processing warranty claims that involve various participants.

The warranty chain inefficiencies described above primarily highlight specific issues within tasks or activities for resolving warranty claims. In addition, for the end-to-end warranty value chain, inter as well as intra organizational silos are pervasive.

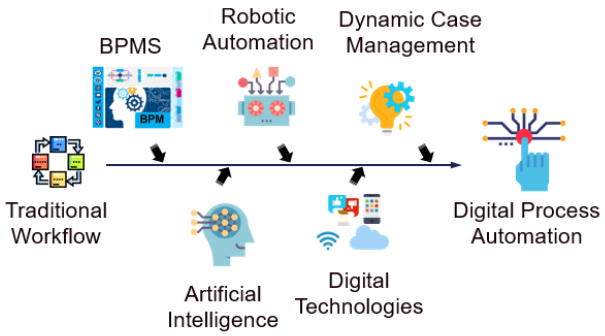
This white paper highlights how two core digital transformation technologies can provide innovative, robust, and efficient solutions for warranty chain management. These two technologies are digital process management and blockchain.

Automated Warranty Value Chain via DPA

The lack of end-to-end digitalization and automation of value chain work means many of the tasks will fall through the cracks and the overall efficiency of the specific tasks as well as the end-to-end value chain will suffer. Supporting operational efficiency through digitalization and automation is exactly the realm of Digital Process Automation (DPA).

Digital enterprises are realizing that the end-to-end chain of value work assigned to different units and trading partners is as strong as the weakest link. This is especially true for the warranty value chain.

DPA has evolved from traditional workflow and business process management. Digital technologies such as social, mobile, cloud, Internet of Things, artificial intelligence and robotic process automation have each had their share of influence on BPM. The new digital era business process platforms now incorporate low code/no code capabilities to support citizen developers. Furthermore, the process flow-chart and swim-lane paradigm is now superseded with Dynamic Case Management (DCM) capabilities. Each of these disruptors are contributors - think of them as major "features" of modern-day DPA.

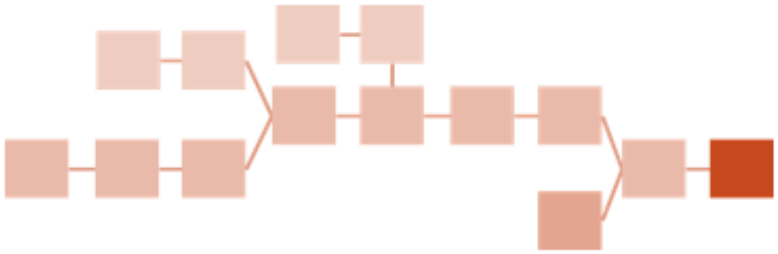


DPA is the prime enabler for Warranty Digital Transformation: the catalyst to shift the warranty value chain from silos, manual tasks and legacies to a digitally transformed operation.

Blockchain for Warranty

The past few years witnessed the emergence of a powerful technology that is very much another commanding enabler of digital transformation: blockchain! The impact of blockchain is now seen within organizational communities for decentralized exchanges of information as well as the public internet - especially as an enabler of cryptocurrencies. One way to view the impact of blockchain is to place it in the overall evolution of the internet. In the 1990s, we started with the Internet of Information: the traditional internet - the one we use every day

searching for information. Next, came the Internet of Things or connected devices that are becoming pervasive in consumer (e.g. Connected Homes), public sector (e.g. Smart Cities) and industrial applications (e.g. Smart Manufacturing).



Blockchain enables the Internet of Value

Blockchain is a distributed, decentralized database that allows direct peer-to-peer exchange of "value" such as digital currency. Blockchain is a particular interest to the manufacturing industry due to its benefits regarding verification and transparency. The potential use cases are ever expanding, from financial services to asset ownership, to intellectual property and the integration with the Internet of Things (IoT). More importantly, the "value" can also be data that supports inter and intra organizational exchanges supporting business objectives, both being relevant for warranty.

Blockchain decentralization and smart contracts executing within the blockchain provide tremendous advantages for complex value chains such as warranty. In fact, warranty value chain optimizations can be flexible and leverage the best of on-chain and off-chain business logic execution.

It could also act as a powerful tool in the fight against the counterfeiting of parts. With manufacturers moving from a transactional 'after-sales service' model to a subscription based model, there will be a need for increased uptimes and this is where blockchain as a technology can be leveraged to its maximum.

DPA + Blockchain for Warranty Value Chains

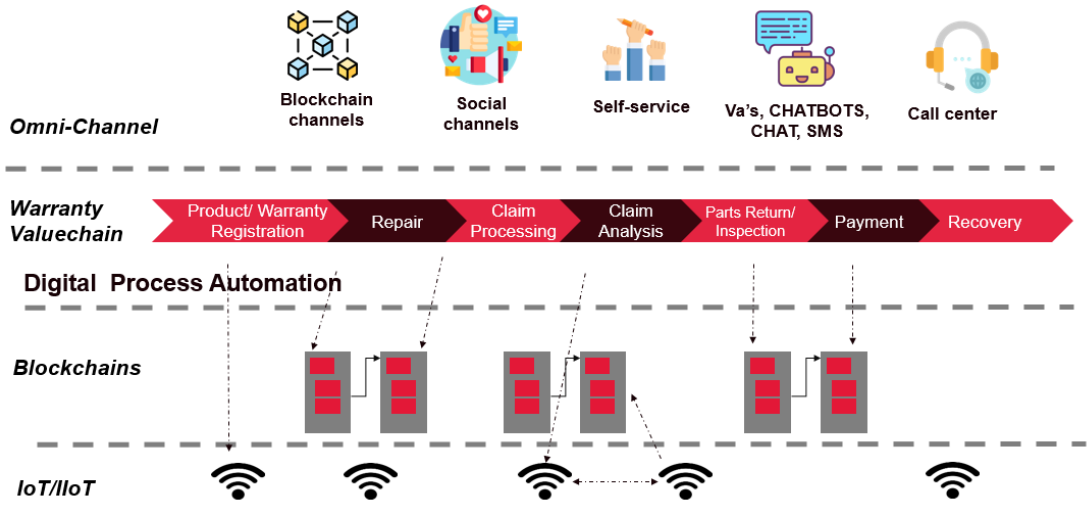
As explained above, blockchain is a promising backbone for security and connectivity for the overall warranty value chain. DPA automates the value chain of warranty operations for increased efficiency and zero-touch processing. Blockchain can be leveraged for warranty asset tracking and asset contracting - all necessary when multiple organizations are involved often across geographical boundaries.

The warranty value chain, when enabled with a combination of DPA + blockchain, leverages all the efficiencies mentioned above. It could involve simple transations or contracts between warranty participants or there could be multiple transactions and smart contracts involved for

a specific warranty business objective delivering value end-to-end. By encapsulating the claim transactions in DPA with the warranty and part information from the blockchain ledgers, we are able to automate and improve visibility and trust across the warranty chain.

The warranty value chain itself is modeled, digitalized, and automated through a digital transformation platform that supports digital process automation.

The following reference architecture for value chains provides a top-down business value approach while leveraging the tremendous potential of DPA, blockchain and IoT/IIoT.

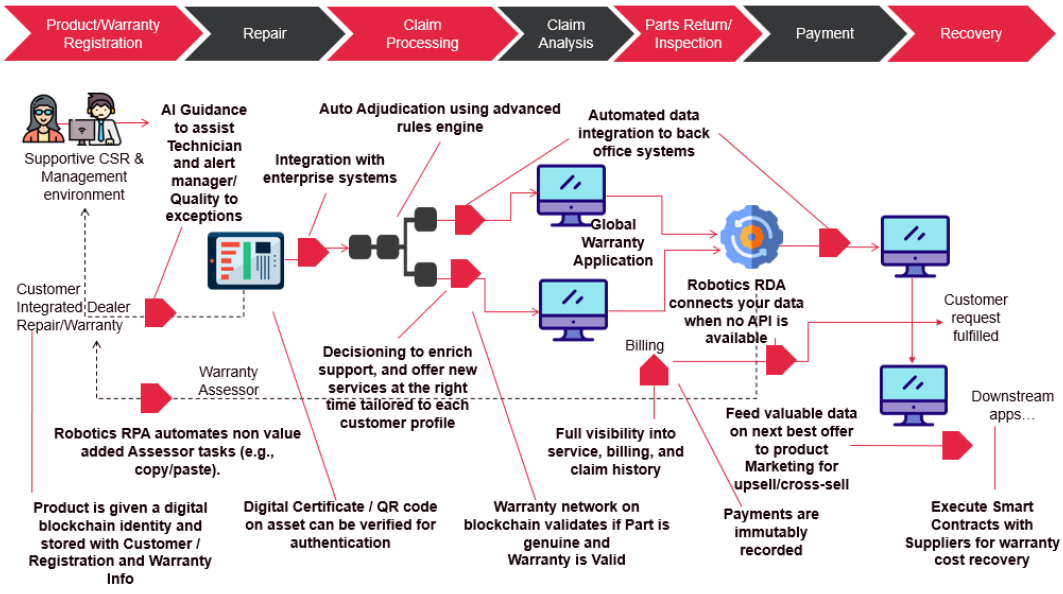


- **Value Chain Orchestration Layer:** At the top, you have the end-to-end value chain that orchestrates and sequences tasks involving people, automated devices, and enterprise applications (aka systems of record) and trading partners. In warranty, these will be the manufacturer, third parties such as dealers or field service technicians, suppliers and the customer. The DPA platform supporting the modeling, automation and exception management of value chains can be deployed on the cloud, on-premise (for enterprises) or hybrids. At various steps, tasks or milestones within the value chain, blockchain-enabled transactions can be leveraged for either smart contract rules or exchange of cryptocurrencies.

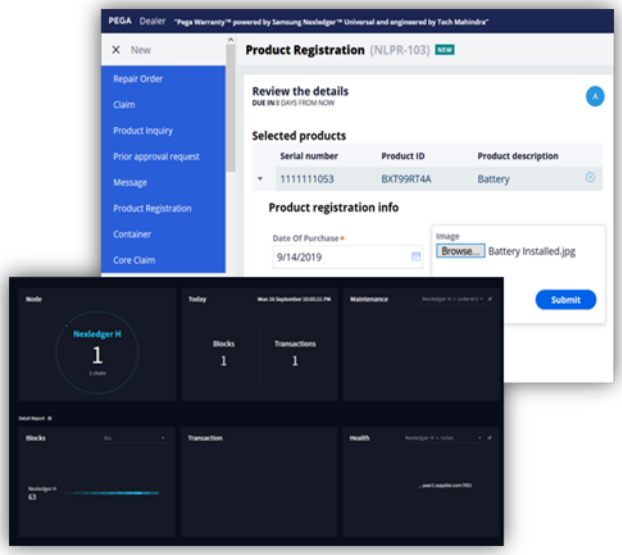
- **Blockchain Layer:** The middle layer of the three-tier architecture is the blockchain layer. The blockchains will execute either smart contract rules for warranty, or exchange value (cryptocurrencies or fiat) for payments or both. The tasks or milestones of the end-to-end value chain will leverage blockchain in specific steps in teh warranty value chain: to realize, for instance, a service level smart contract obligation between parties; or pay a field service technician for fixing an asset under warranty. Each of these micro-transactions (micro journeys) provides value. Both warranty value chain layer as well as the lower IoT/IIoT layer will be leveraging the blockchain layer.

- **IoT/IIoT Connected Device Layer:** The lowest layer will be the IoT/IIoT connectivity layer. Physical and increasingly connected devices are becoming part of the end-to-end value streams. With blockchain as well as IoT/IIoT edge computing an added advantage is pushing the execution and the transactions to the edges. This means devices can potentially carry out autonomous or semi-autonomous transactions. At this layer, the overall value chain is managed and automated at the top layer, with IoT/IIoT edge computing transactions delegated to the connected devices - that can leverage blockchain as needed.

Leveraging the operational efficiencies of DPA + Blockchain, the following illustrates the optimizations that could be achieved in the warranty value chain:



Considering, for example, the operational efficiencies of the warranty registration and coverage claim verfication tasks, the DPA + blockchain warranty solutions provides a 360 degree view of the customer, the product, and availability of the coverage. Through intelligent forms, the DPA solution can easily capture product registration information online and digitalize your warranty documents. The warranty data of products, services, and policies for claims are aggregated into a single

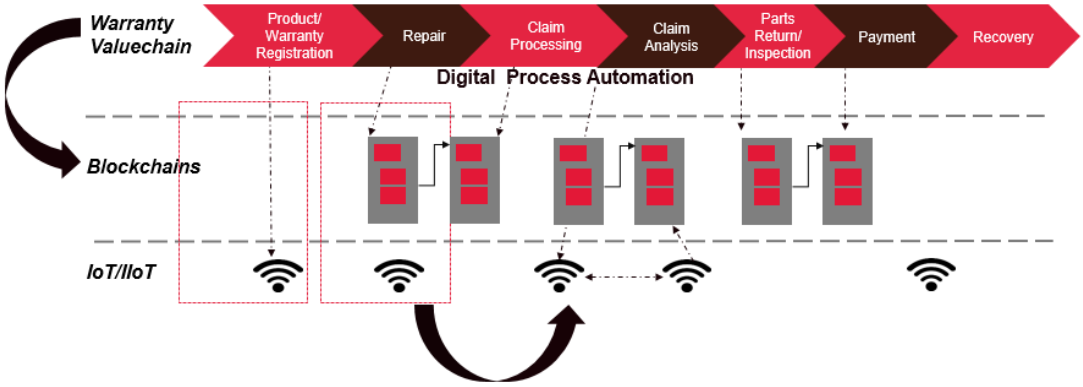


system. Exceptions based on region, regulation, products or parts can be rapidly digitalized and become a part of the case. Various participants can easily add additional claim information, such as images or texts, in the context of the end-to-end warranty process. All relevant information from repair costs to customer demographics to extended warranty are leveraged in processing the claim. Most importantly, the overall end-to-end process from submission to payment is monitored, optimized, controlled and immutable.

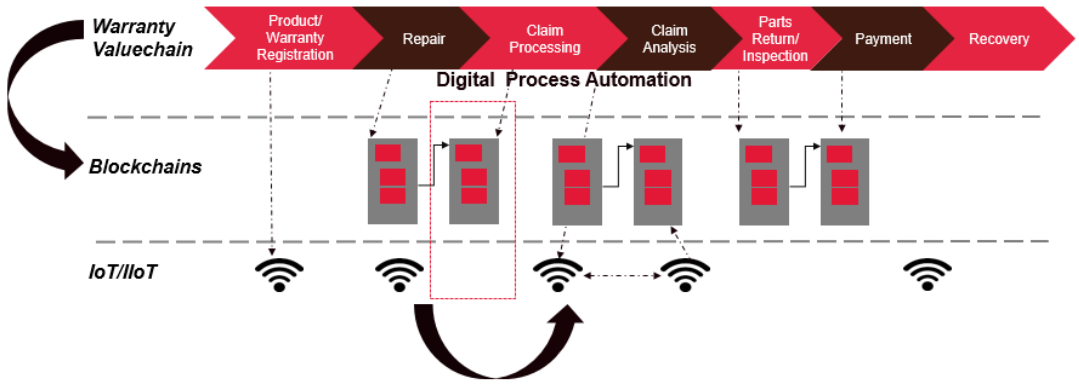
How to Implement

How does an organization on a legacy system transition to the next generation value chain platform? There is no one-size-fits-all program plan. A due diligence activity and study of current state operations would yield the exact tailored approach.

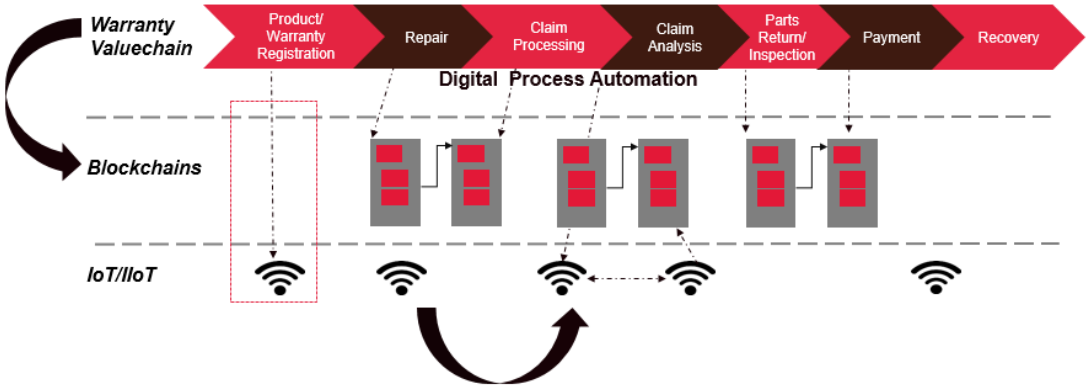
For organizations who have already completed their warranty transformation journey, the implementation roadmap is more simple and faster, and the blockchain layer can be segmented and added incrementally.



Organizations currently in the midst of their development journey benefit by tweaking the roadmap and backlog wherever they are to include the blockchain network features and requirements to avoid rework and optimize the implementation costs.



A de-risked suggestion for companies still pondering their next steps would be to start with the value chain from L-R. Release a minimum viable product of the DPA + blockchain-enabled warranty registration process. Iterate to add the further steps of the warranty value chain.



Benefits / Business Case

As noted, there are multiple participants both within a complex enterprise with often siloed business units and inter-organizational transactions that involve various trading partners and the consumer. The DPA + blockchain advantages are spot-on for the overall warranty value chain:

- **Enhancing Product Lifecycle:** When an asset, component or an aggregate product such as an automobile is manufactured, the manufacturer can record the product, its unique identifier as well as relevant meta-data on the blockchain.

- **Enhancing Warranty Traceability:** Warranty value chains involve assets (aka "parts" in smart manufacturing) that need to be serviced, recalled or replaced. All the participants in teh warranty value chain can have an indisputable identical cop of the warrantied product information, the warranty contract, the customer and all the participants on the blockchain.

- **Enhancing Warranty Contract Execution:** Optimizing the best of off-chain and on-chain business logic and execution of smart contracts on the blockchain can dramatically reduce paperwork. The warranty payment policies as well as policies pertaining to supplier recovery can also be executed on the blockchain via smart contracts.

- **Enhancing Warranty Auditability:** Unique assets (e.g. warrantied products or components such as automobiles) track every product from the manufacturer to the consumer. The warrantied assets can be tied to the unique ID of the aggregate product, such as the VIN for automobiles. All the transactions involving specific assets and products are recorded on the blockchain and could be audited. As product moves through the warranty value

chain, it is verified/recorded immutably at each touchpoint: manufacturer, wholesaler, supplier, dealer and eventually the customer.

- **Avoiding Warranty Fraud:** With blockchain, various warranty assets will be uniquely identified using serial number/tamper-proof cryptographic seals. Warranty fraud can be perpetrated by anybody in the service value chain, whether they be dealerships, suppliers or customers. Blockchain enables the manufacturer or the third party that is supporting the warranty to check the record to see if there is a proven path from the manufacturer to the consumer.

- **Enhancing Warranty Supplier Recovery:** In addition to the manufacturer and third parties such as dealers or field technicians, there are tremendous benefits in supplier recovery and tracking of supplier provisions on the blockchain. Today, recovery rates average around 15% and involve lengthy dispute and settlement processes. Blockchain guarantees the security of the supply chain with indisputable product identities registered to blockchain. Potential supplier warranty resolutions can be automated, transacted with minimal disputes and processed in seconds.

- **Enhancing Warranty Claim Processing and Payments:** The most important transactions recorded on the warranty value chain pertain to the warranty claim and payments processing. All transactions of the warranty value chain from the consumer who submits the claim all the way to resolution and payment are immutably recorded on the warranty value chain. Business processes for claim management can then access the blockchain either for the uniquely identified assets that are under warranty or the transactions that while fixing the problems or replacing the asset.

- **Enhancing Warranty of Connected Products (IoT/IIoT):** There is a close affinity between blockchain and IoT/IIoT. The potential of increasingly intelligent connected devices exchanging value (that includes information about the state of the asset itself) peer-to-peer either autonomously or semi-autonomously is huge. This is especially relevant for warranty value chain of increasingly connected assets. IoT sensors and actuators can communicate the warranty instantiated status or fixes on the blockchain - as an immutable record for the connected asset under warranty. In addition, blockchain helps securely deliver software over the air updates (OTA) removing the hassle and cost (~$100/recall/car) of requiring a visit to the dealership to fix software related fixes.

These are some of the opportunities for optimizing warranty value chains with blockchain. In addition, payments to third parties such as the dealer or service technicians as well as potential compensation to the customer are recorded on the blockchain and can even leverage cryptocurrency transactions for immediate disintermediated financial transactions.

In conclusion, the integration of DPA and blockchain helps deliver end-to-end automated, trusted, immutable, distributed and decentralized warranty value chains.

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About the Authors

Dr. Setrag Khoshafian is a recognized expert in digital enterprises, especially digital transformation through Digital Process Automoation (DPA), Internet of Things (IoT), blockchain, and CRM. He has been a senior executive in the software industry for the past 25 years, where he has invented, architected, and steered the production of several enterprise software products and solutions, especially in intelligent and emerging business process and database technologies.

Currently, he is Pega's Chief Evangelist and VP of BPM Technology, involved in numerous technologies, thought leadership, marketing, alliance, and customer initiatives.

Dr. Khoshafian is a frequent speaker and presenter at international workshops and conferences. He is the lead author of more than 10 books and hundreds of publications in various industry and academic journals.

Kapi Attawar is spearheading the blockchain initiative at Samsung SDS America, leading enterprise blockchain alliance initiatives for Samsung SDS in the North America region. Samsung SDS, an IT solutions and services company, has acquired more than 110 enterprise blockchain customers globally over the last four years.

Kapi is developing a blockchain ecosystem of partners comprising system integrators, technology companies and developers. An active member of the global block-chain community, he has been involved in blockchain industry vertical special interest groups around topics like identity, telecom, and industrial IoT. He is also a frequent speaker at blockchain and industry events, primarily focused on the enterprise space.

Prior to joining Samsung SDS, Kapi has led consulting, strategy, marketing and business development efforts for blue chip organizations worldwide including HP and Oracle as well as a number of technology startups. Kap is originally from Malawi, and currently resides in San Jose, California. He holds an MBA as well as a Master's degree in Production Engineering and a Bachelor of Technology in Mechanical Engineering from Loughborough University, UK.

Aarthi Ravichandran is a part of the Pegasystems competency at Tech Mahindra with expertise in large-scale warranty transformation projects. She helps design and develop futureproof enterprise solutions for after-sales service, leveraging process automation, decisionmaking, and analytics capabilities of technology platforms such as Pega.

As a lead business architect, she helps launch and rollout complex warranty transformations across the globe for leading Fortune 500 OEMs. Currently, she is also involved

with the WarrantEAZE initiative at Tech Mahindra with the aim of replicating best practices and learnings for customers and help drive the roadmap and requirements for new age digital solutions. She has been with Tech Mahindra since 2011 and is an alumnus of Texas A&M University.

Jayakumar Pankajakshan (Jay) is a digital transformation leader who helps organizations define and execute their digital strategies. he comes with 22 years of work experience designing and implementing solutions around enterprise applications for manufacturing and retail industries. He has worked extensively in business domains like aftersales, warranty, OTD and supply chain across various industries.

He is currently with Tech Mahindra and in his role as a Manufacturing Domain Consultant, he is involved in thought leadership with customers, conceptualizing and design solutions in numerous technologies like blockchain, IoT, AI/ML etc. for the manufacturing industry.

Jay is widely recognized for his ability to create smart business functions and processes by leveraging new age digital technologies.

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