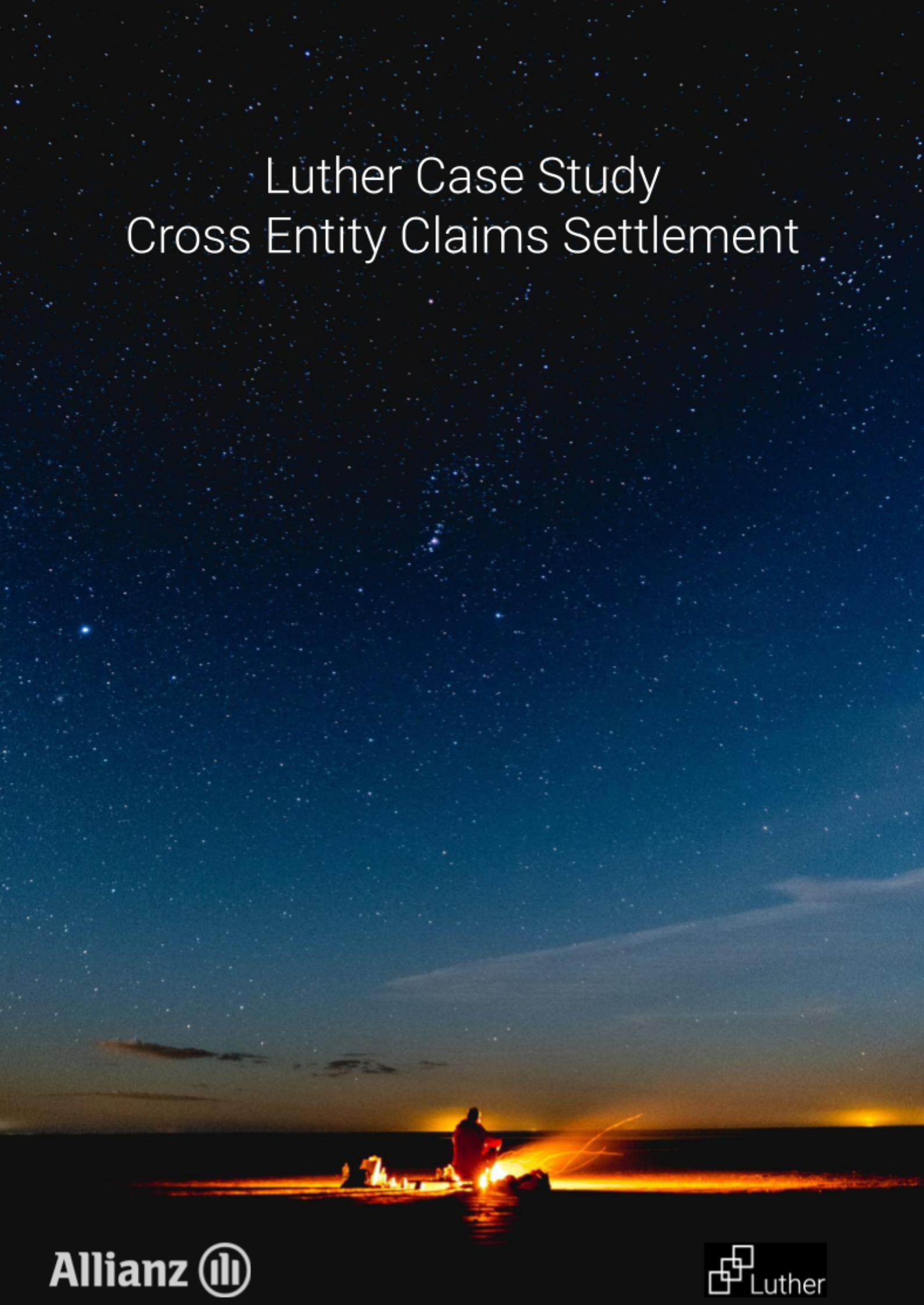
Luther Case Study
Cross Entity Claims Settlement



Allianz

Luther

1. Introduction

As a world's leading insurance company, and a market leader in motor insurance, Allianz has the potential to use its global reach to provide an unrivalled customer experience. A claim by an Allianz customer could be handled seamlessly anywhere across the Allianz network. With 40,000 cross-border claims submitted annually, amounting to €500m, this should be a competitive advantage. However, this had become a difficult to manage set of largely manual processes that were different in every entity across the Allianz network. The absence of standardization made settling international claims expensive and prone to error and rework. What should have taken days was taking months and as a result, the customer experience fell short of Allianz's aspiration to provide customers with a fast and simple experience.

Allianz partnered with Luther Systems to develop a new International Claims Settlement (ICS) product that would redefine the cross-border settlement process, by combining Allianz deep industry knowledge with modern technology. The partners had for objectives to:

- Provide a fast and simple experience for the customer, who only has to deal with the local Allianz entity, that is better equipped to handle the claim
- Facilitate communications between any pair of operating entities involved in settling a claim via a simple, transparent and automated system
- Automate the complex end-to-end claim settlement process from creation of a case to cross-entity payments to drive efficiencies and release mounting debts

In order to achieve this, Allianz and Luther developed the ICS using Luther's Deep Process Automation LEIA platform as the back-end engine on which to build their automated process. Claims handlers across 23 Allianz entities are now able to collaboratively create, review and close international cases directly inside the product, off-the-back of which Finance teams can automate cross-entity billing and settlement processes.
The results have been staggering, demonstrating that international claims can be handled cheaper, more efficiently and faster, driving benefits for both Allianz internal teams and the end customer.

75% operating cost reduction	**90%** less debt backlog	**90%** less processing time	**14X** estimated ROI

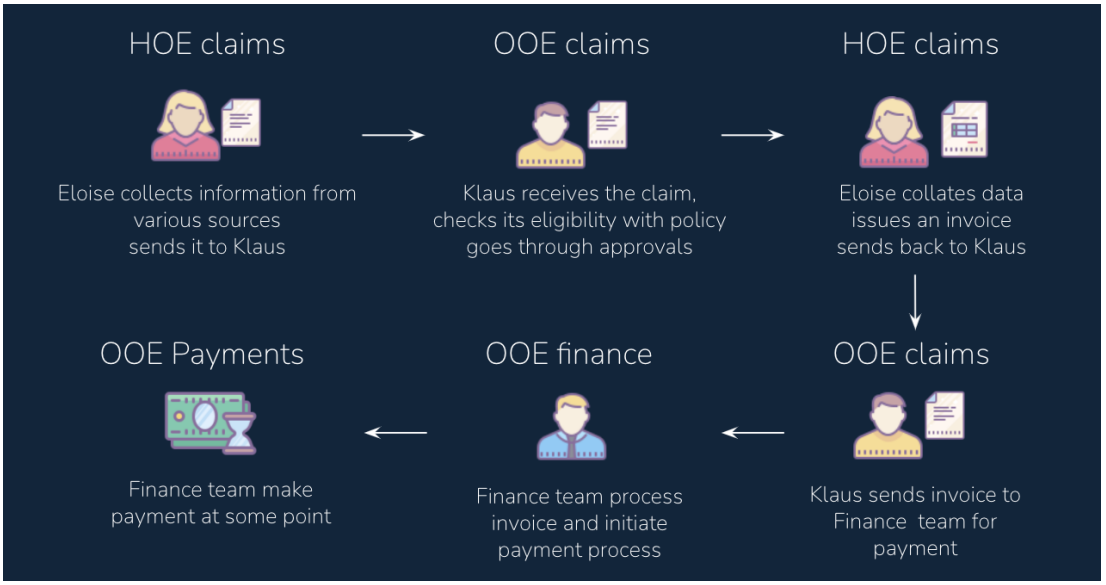
2. International Claims Settlement Process

Allianz provides vehicle insurance policies for its EU customers, which provides coverage for any accidents across Europe. These policies are usually sold by an individual Operational Entity which covers the customers for any incidents as they travel across the Allianz network (to other regions covered by other entities). Below we describe the process between 2 specific entities.

This process can happen between any 2 of the entities across the 23 entities:

- **HOE captures and handles the claim:**
  - Once an accident occurs the claimant contacts the claims team of the local entity that provides coverage service in their region, referred to as Handling Operating Entity (HOE)
  - The local entity proceeds to handle the claim since they are better equipped to deal with the local requirements and services
- **OOE reviews the claim:**
  - Once the initial processing of the claim is completed, the local entity communicates with the entity that sold the policy to the customer where the claimant is a plan member, referred to as Owning Operating Entity (OOE), to retrieve any incurred costs
  - The HOE sends the claim processing documents to the OOE
  - The OOE reviews and validates documents and may ask the HOE for clarification and completion of documents

- **HOE submits the bill:**
    - Once the claim processing is completed by the OOE, the HOE issues a bill to the OOE for their services and claim payout
- **OOE Claims team approves the bill:**
    - OOE receives, reviews and approves the invoice
    - The OOE's claims team then sends the invoice to the OOE's finance team
- **OOE Finance team processes the bill:**
    - The OOE's finance team receives, reviews and approves the invoice
    - The OOE's finance team then sends the invoice to the OOE's payments team
- **OOE Pays:**
    - Finally the HOE receives the payment



3. Problem

The process involves numerous people working on each step for several weeks. This involves bespoke documents as there are multiple data formats and documents in place between the various countries. These teams spend a considerable portion of their time performing manual tasks on these documents.

These problems are amplified by the fact that there are operating entities across 23 countries in the enterprise, each with their own documents and formats, which form a web of multiple manual bilateral interactions between the different pairs of European entities. This complicates and prolongs the settlement process, ultimately leading to high costs and high outstanding debts.

Process Problems

- Fragmented & complex process
- No standard way of processing claims
- No standardised data exchange
- Involvement of **4** teams
- Multiple sources of data & documents
- Manual & bespoke processing

Process Complexity

- Bills processed by **5** separate participants
- **100** process tasks
- **150** process rules
- **27** operating entities

Business Problems

- **Millions** in operational costs
- **3** months delay in payments
- **10s** millions in debt tracking
- Disregard for SLAs
- **500,000,000€** annual claims value
- **Hundreds** of FTE involved in execution
- **20%** defective bills
- Lower Capital Leverage
- **40,000** claims

4. Objectives

Make Allianz "one company" across 23 entities. The objective is to create a single claims process across its entities which is fast, standardised, simple and low cost to operate. This requires:

- Standardising data, documents and processes across multiple Allianz entities all of which were originally different and bespoke
- Claims to be handled using local expertise but with all data visible to and connected with the owning entity
- Simple settlement between entities with error-free claims paid substantially faster

5. Solution

5.1. Solution overview

Deep Process Automation using "smart contracts" on the Luther LEIA Platform.

To build the world's best international claims process, best for customers and best for Allianz, required automation that could handle the inherent complexity of a multi-entity process involving hundreds of Allianz people. It was equally important that the new process could be built by Allianz's own developers and changed easily when regulation changed in any of Allianz's markets or when Allianz expanded into new markets.

This was far beyond the scope of traditional workflow automation technology which provides process automation for workflows with tens of tasks and one or two separate operational participants. Furthermore, connecting and coordinating multiple instances of workflow automation presents a number of challenges, including much longer development time, far less efficient code, limited permissioning for different users, limited visibility, and maintenance overhead. This was further far beyond the scope of Robotic Process Automation which is effective when processes only have a few steps and involve very few participants.

This is why Allianz has partnered with Luther Systems to utilise its unique Deep Process Automation technology to build the next generation ICS system and to automate the execution of the complex ICS enterprise process on Luther's platform. Deep Process Automation is a new automation technology for automating complex enterprise processes with multiple separate participants involving hundreds to thousands of tasks and logical rules. This does not mean that Luther's technology is itself complex. What instead applies to Allianz is the Luther Platform which makes the complex simple and is used by Alianz developers with only a few weeks of training.

Luther's LEIA platform provided Allianz with the operating system to run the process while providing the rails for orchestrating, executing and monitoring their complex workflows. It also gave them the development tools to achieve rapid development times.

Together Allianz & Luther developed a new product that uses Deep Process Automation to:

- Bring together all the components of the international claims settlement process into one unchangeable 'record of events'
- Express claims settlement journey in one business process script (smart contract)
- Incorporate business and compliance rules at each step of the workflow
- Connect multiple legacy systems to a common platform & script (smart contract)

With this new platform, claims handlers across 23 operating entities can collaboratively create, review and close international cases directly inside the product. Their respective Finance teams can then automate cross-entity billing and settlement such that the processing time and accumulated debt is brought down to a minimum.

5.2. Demo

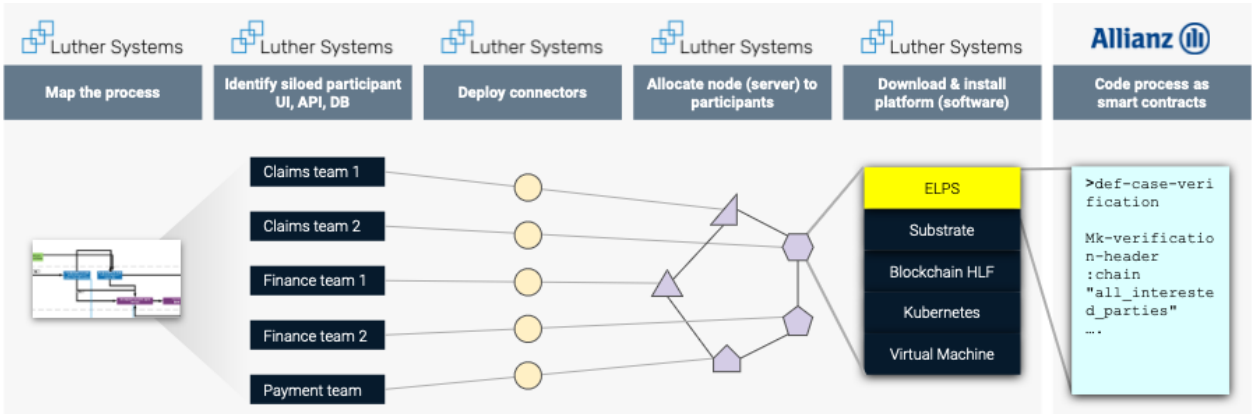
Please find a demo of the solution here.

5.3. ICS Network overview

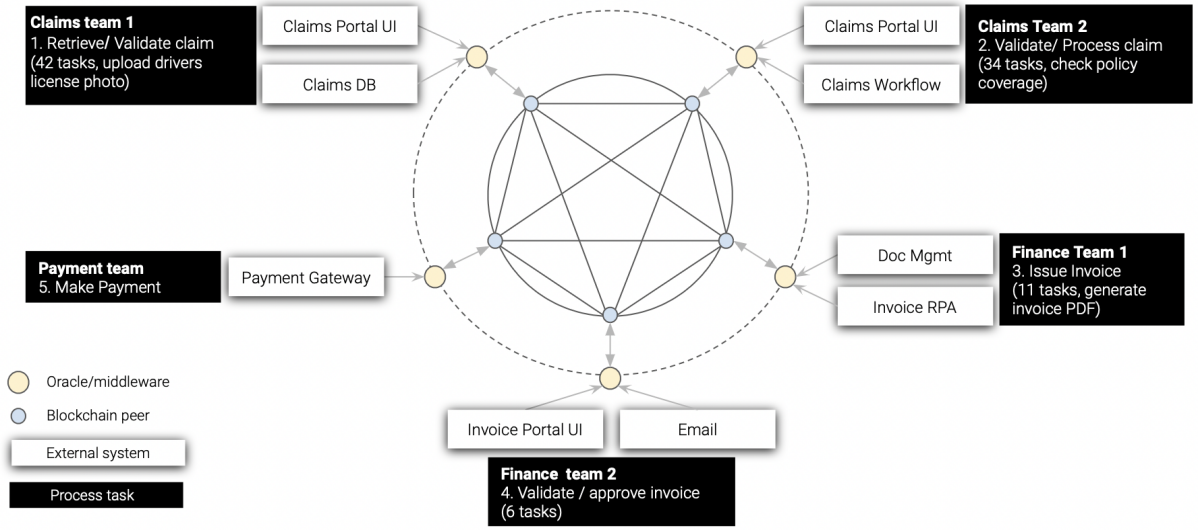
In order the describe the required functionalities of the product, Luther worked with Allianz subject matters experts to develop detailed process maps and identify all the participants involved:

- 23 Allianz entities, any pair of which must be able to involve the following teams
- Claims handling team
- Finance team
- Payment team

Each of these participants plays a specific role in the end-to-end claims settlement process which can be seen as a series of logical steps, each of which includes a number of tasks and business rules. The participants continue to use their local systems (e.g. Claims management system, Finance system) which are connected to the common network via APIs and Oracles.



While every participant remains free to shape their respective operations (e.g. local customer service) and to decide how to best perform their duties, the ICS product ensures that all participants share a common set of scripts (smart contracts) running on a network of blockchain peers for critical interdependent process steps. These scripts act as guardrails for the operations while leaving a transparent and tamper-proof trail for auditability.



5.4. Blockchain architecture benefits

The choice of a blockchain based architecture sets the platform on a strong footing for the future:

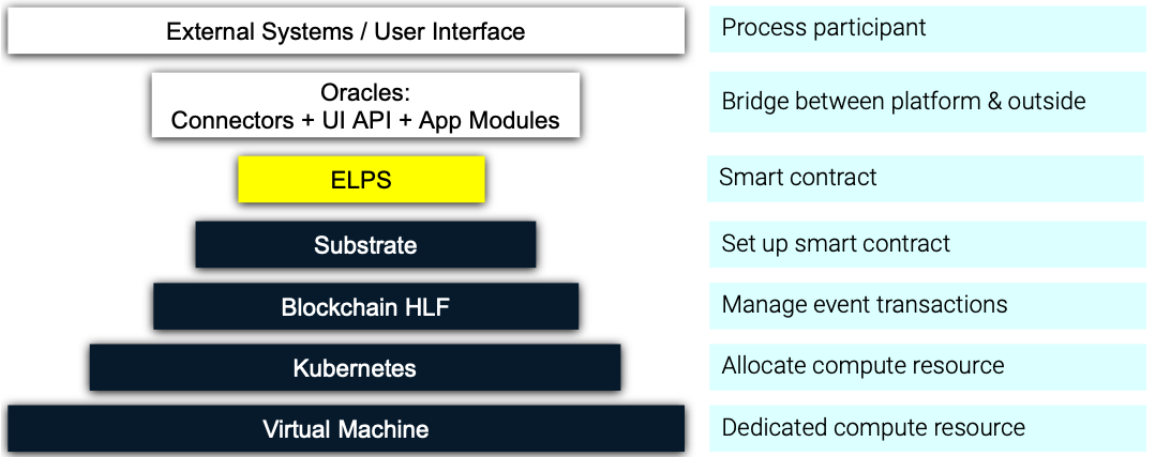
- Enables cross-organisation automation with process execution certainty
- Provides real-time event-based architecture with multi-organisation support
- Allows each OE to have their own independent technology stack with a complete copy of the all processing history, events, and transactions for their claims
- Participants specify their data storage and model requirement according to which all the network operates
- Enforces strong integrity protection of each OE's data
- Enforces data dissemination policies to meet compliance rules through Private Data Collections
- A federated architecture allows each OE to operate independently (operations and technology) while participating in the execution of the ICS process
- New participants can be added over time while preserving process and data integrity, fast scalability and data privacy.

6. Technology Insights

The network developed with Allianz is a collection of Virtual machines, running on kubernetes in AWS Cloud. The network uses Hyperledger Fabric to establish a distributed ledger, which manages transactions. Luther's platform runs the business logic held within smart contracts which orchestrate and execute the claims settlement process.

6.1. Luther technical stack

Below is a closer look at the technical components that make up this Hyperledger Fabric network starting with an overview of the software stack.



6.2. Platform & technical specifications

The modern ICS system is built on a modern architecture, combining technologies including enterprise Blockchain Technology and microservices. Luther's platform provides Allianz with:

- The environment setup, infrastructure, platform & integrations with existing systems
- The tools for Allianz developers to focus exclusively on the rapid development of the ICS application logic
- The operating system (script) to orchestrate and execute ICS automated operations

1 URL for entire application

56 nodes

350GB data migration

375 containers

400 microservices

For the ICS product, 56 blockchain nodes were deployed along with 400 microservices under 1 URL for the entire application.

6.3. Kubernetes to manage compute resources

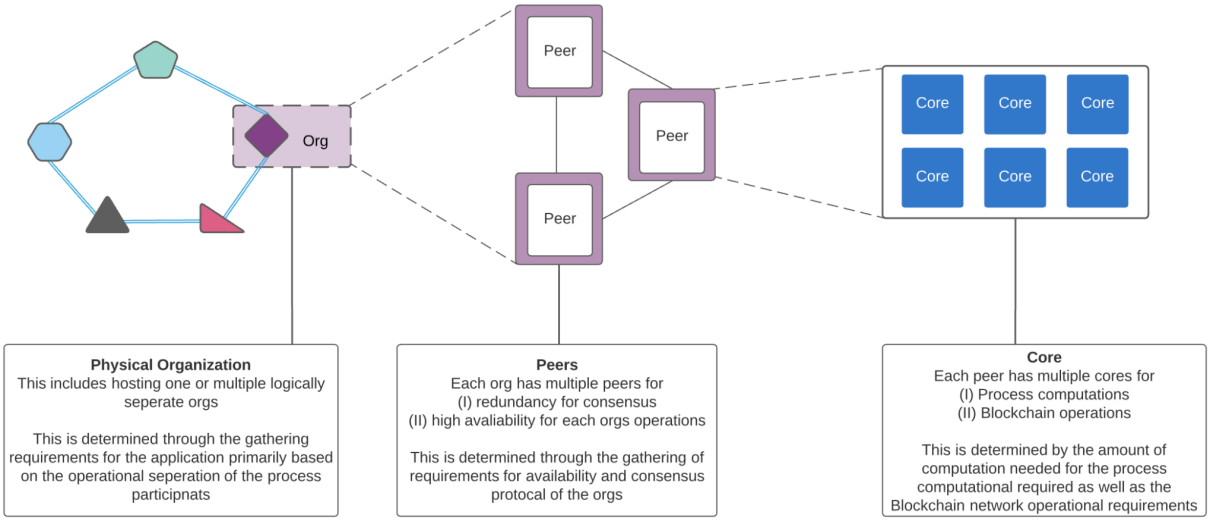
Kubernetes, used here, is the standard cloud-native container orchestration platform.
The network runs on the managed Kubernetes offering by AWS, Elastic Kubernetes Service (EKS) driving the following benefits:

- Resilient and scalable container (docker) execution
- Seamless integration with AWS services including EC2, API gateway, and EBS
- Low maintenance effort to stay up to date with latest kubernetes releases

6.4. Blockchain to manage process execution events (transactions)

- Organisation:
  - Across the network each Operating Entity is a fabric organization
  - There are a total of 27 fabric organisations covering 23 countries
- Peers
  - Each organization has at least 1 fabric peer, large OEs with more claims traffic run 2 peers

- There are a total of 56 peers.



The Blockchain network has 2 parts: (i) network operations, (ii) Smart contracts

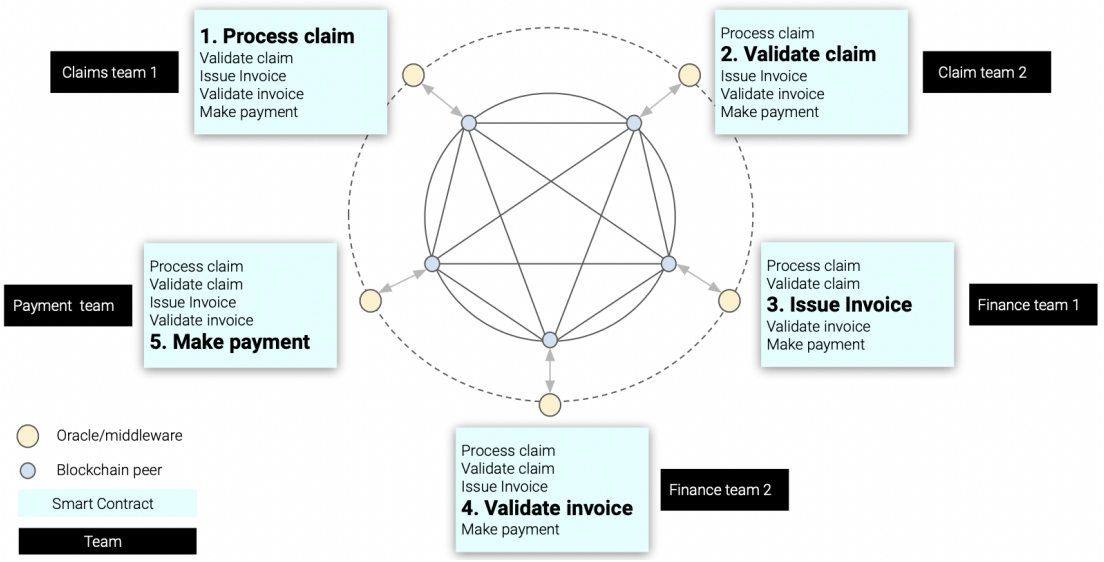
- Network operations
  - Creating, sharing, validating events as transactions across the distributed network, and storing the events (transactions) on the distributed ledger
  - The network uses private data collections (PDCs) to ensure only orgs relevant to a transaction can see the associated data
  - Ordering organisation uses a Raft consensus
  - The Distributed Ledger Technology (DLT) provides a standardised process execution & data sharing layer across a network of OEs
  - There is a standardised data sharing layer across a network of OEs
- Smart contract
  - Standardised orchestration, execution and validation of the process steps.

6.5. Smart Contracts to orchestrate and execute process steps as events

The process of claims validation and billing settlement between two OEs is a series of steps, each of which includes a number of tasks and business rules.
In the solution, process steps are referred to as events and every event is executed and stored as a transaction on the blockchain network.

The smart contract is the script that:

- Captures the orchestration and execution events (steps) along the entire process of claims validation and billing settlement
- Enforces the authorization & permission logic for updating the ICS data
- Maintains the source of truth for the ICS data that remains common to all parties on the network
- Enforces a standardised & common data model and common process logic across the entire network
- Enforces the business logic rules to ensure these processes are executed accurately



The smart contracts developed for this product cover 3 domains: Claims, Worklist, and Billing

Claims smart contracts include local reference numbers, coverage details, liability, and accident details. They keep each OE's internal systems in sync with each other, by establishing a common source of truth.

The Worklist domain tracks issues and manages tasks that are assigned to claims handlers to ensure specific actions are performed on a claim.

Finally, Billing includes multiple payments for each claim and manages cut-through workflows for small bills and bill batching.

6.6. Oracles to manage interactions with external participants

Every OE uses off-chain Oracles (middleware) to interact with other OEs, user interfaces and local systems. The Oracles are set-up such that they are separated by OE and by Domain (Claims, Worklist, Billing).
The Oracles use a REST/JSON API to a front-end 'Single Page App' (SPA) to provide a User Interface (UI) for end-users (Claims Handlers and Administrators)

The Oracles also use clients (SDKs) to communicate with external systems and achieve a set of functions such as:

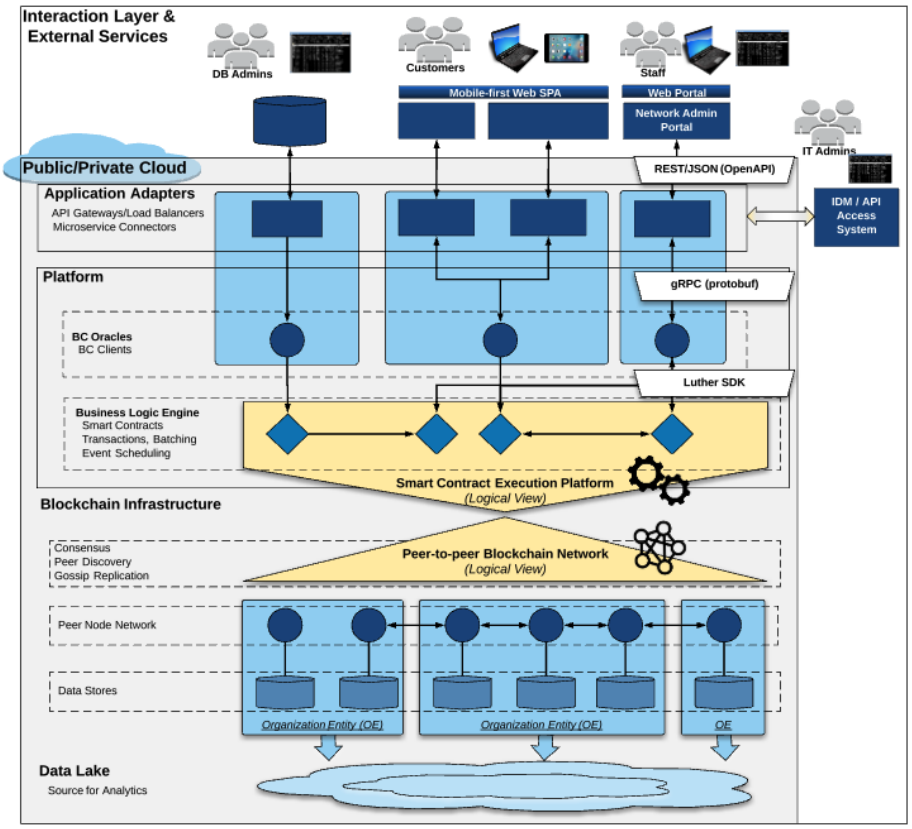
- Retrieve data from SOAP/XML claims services
- Trigger payments
- Connect to a local identity management system to authenticate users

Finally, the oracles include a DLT client (SDK) to initiate transactions that read and write data from the ledger. This allows:

- Provision of data from external systems into the blockchain network for subsequent smart contract processing
- Response to events triggered by the blockchain network in response to smart contract processing, including payment triggers

6.7. Technical Architecture overview

The new product consists of a layered design where modules between layers communicate using APIs. It is built on the Luther Enterprise Infrastructure Architecture (LEIA). LEIA is a layered-microservice architecture that is built from the ground up on blockchain infrastructure. Multiple nodes owned by separate teams connect directly using permissioned blockchain protocols to form a decentralized blockchain network. In this way, processes spanning multiple teams and companies interconnect using blockchain as the underlying orchestration and data sharing infrastructure. Please refer to Luther's offerings and website for more information on the LEIA platform.



6.8. Microservice Architecture

The application is broken down into individual components based on function. These components are then packaged into containers and provide REST/API microservices. The microservices make up a total of 375 containers across all OEs and domains and cover claims, worklist items, billing, users, organisations, document generation (CSV, PDF), query view maintainers, search, reporting and more.

Each microservice API:

- Is defined using OpenAPI specification.
- Is deployed and managed via extensive automation and infrastructure as code
- Has a fully automated CI/CD pipelines for automatic deployment to the integration environment

The entire ensemble of microservices is deployed using pipelines for fully versioned deployments to staging and production. Search and Reporting Microservices - CQRS (Command Query Responsibility Segregation) - have also been developed to perform three broad functions:

- Real-time even streaming to off-chain databases for search services and reporting
- Replayable event streaming with push and pull flows to ensure reliable in-order delivery of every event to downstream consumers
    - Push flow uses RabbitMQ message broker for immediate event processing
    - Pull flow uses DLT events for reliable event processing and failover
- On-chain event generation per transaction, with off-chain consumer microservices for off-chain population of relational databases enabling fast off-chain indexing for search and reporting

6.9. Discussions on Technical Architecture

6.9.1. Why not use event streaming technologies like Kafka?

Event-streaming technologies including Kafka do not provide key features necessary to meet the ICS application requirements.

- Single org only:
    - Kafka uses a conventional consensus (zookeeper) and file system technology
    - Although these technologies are distributed for performance and availability purposes, they are centralised in that they are operated by a single administrative team
    - Kafka does not provide an architecture where multiple independent teams participate with their own infrastructure (i.e. it is not federated)
    - Additional services are necessary to reconcile data across multiple organisations e.g. Hyperledger Fabric with Kafka consensus
- No logic execution capability:
    - Kafka is ultimately a publish/subscribe system
    - It reliably and efficiently delivers unprocessed messages from a single publisher to one or more subscribers
    - Any business logic or data transformation code is executed outside of the Kafka cluster, and done directly within an application
- No data compliance capability to control data placement:
    - Global applications have data residency requirements where data must not leave certain regions and organisations
    - Kafka messages are stored in topics. Topics are divided into partitions where each node (broker) hosts partitions
    - No out-of-the-box mechanism to restrict messages on topic to specific regions or otherwise restrict to specific nodes while maintaining message order.

Since these key features are missing, it requires developers to build additional ad-hoc services on top of Kafka. Leading to the following conclusions:

- This is bespoke, expensive, error prone, and time consuming
- The bespoke architecture developed will have considerable overlap with Blockchain architecture

- Blockchain technology (hyperledger fabric) is compatible with Kafka (fabric orderer)

6.9.2. Why HyperLedger Fabric over Corda

Corda uses a Unspent Transaction Output (UTXO) architecture which is well suited to financial transactions with small amounts of business logic and data.
It is suited to high transaction volume, low transaction logic complexity and participants enforce validation rules on per-transaction basis (corDapp).

On the other hand, HyperLedger Fabric (HLF) uses an Execute Order Validate (EOV) architecture which is well suited for general execution of standardised business logic across a network.
It is good for medium transaction volume with high transaction logic complexity where the Fabric network enforces standard validation rules across all transactions via smart contracts.

We therefore selected HLF for its architectural benefits that are well suited for automating complex processes using smart contracts.

6.9.3. Scalability

The Luther platform and infrastructure is managed entirely using Infrastructure as Code (IaC), for rapid scaling of resources. It provides full container orchestration via Kubernetes, allowing automated and low-friction scaling of compute and storage resources across nearly 400 microservices.
Moreover, gossip protocols are tuned for unique network configuration to readily support 56 peers.

As a result, the solution achieves real-time processing of transactions within <100ms within a production scale network which already includes 400,000 claims and 1.2 million of imported work items.

6.9.4. Best technology fit for the use case

The Allianz team provided considerable experience with microservice architectures and DevOps, which aligned perfectly with Luther's technology to enable a rapid scalable delivery.
Luther has considerable experience building and operating large scale DLT networks in production - with backgrounds from bleeding edge Silicon Valley companies (Tesla, Apple, Palantir, Akamai).

Luther's platform was a perfect fit for the distributed nature of the ICS: a distributed problem that requires a distributed solution. HLF as an underlying DLT was the right technology for standardising the complex process across all 23 organisations, and enforcing strong standards.
Finally, Luther's modules and accelerators enabled a rapid on-boarding of 7 team members, without requiring DLT experience and to quickly automate complex flows across the 23 organisation network.

7. Results

The partners have rapidly developed a world-leading claims settlement product which now provides the operating system for Allianz's international claims business. Thanks to this transformative initiative, claims are settled faster and cheaper with a sharp increase in customer satisfaction.

The team has enabled Allianz to tackle the mounting intercompany debt as a result of existing processes being cumbersome and unstandardised, such that intercompany debt is now negligible. Allianz's potential competitive advantage of operating across numerous markets has become a reality.

- **3 months** development to production
- **£7.5** million saved per year
- **80%** decrease in processing time
- **90%** less debt backlog
- **14X** ROI

The modern ICS architecture is estimated to deliver £7.5m of savings every year thanks to operational automation, reduced average claim processing time and increased capital leverage due to faster claim settlement. The modern ICS network allows for autonomous and separate operation of the Operating Entities while providing standardised operations and processing of claims as well as billing settlement between the 23 operating entities with documentless sharing of data and information.

7.1. Automated ICS Product - Commercial performance and results

The project has been a commercial success for Allianz and their customers.

From an operational standpoint, the operating costs incurred as part of the international claims settlement process have reduced by 90% thanks to a faster and automated process. In addition, the increased speed at which claims can be settled have driven the debt backlog down by 90%, to a point where it becomes negligible. Finally, an 80% reduction in processing time has directly improved the customer experience with faster responses and resolution of claims.

With the above benefits, the product ROI has been estimated at well over 14X.

After	*Before*
90% reduction in operating costs	**Hundred** FTEs **Millions** of Euros
90% reduction in debt backlog cross entities	**10s** Millions of Euros Lower leverage due to slower access to capital
80% reduction in processing time	**3 months** delays in bill processing & payment
80% reduction bill errors	**20%** defective bills
Compliance with process rules	Disregard for SLAs
Transaction based pricing for entities	Fixed pricing for entities
ROI estimated at **14X**	

7.2. Automated ICS Product - Product results

The team developed a network to standardise separate processes, data and documents. The standardisation has unified data across entities with every change being recorded in an auditable, immutable manner. This subsequently led to the development of an international car insurance claims system that demonstrates breakthrough characteristics that could not have been achieved with centralised architectures.

Automated Operations
Create and standardize the billing process and data
Enable cross organization automation
Single point of truth for decisions
Speed up the process
Fewer human interventions
Far less errors
Execution visibility, verifiability & auditability across process

7.3. Automated ICS Product - Technical results & benefits

The LEIA platform has enabled the delivery of future-proof technology demonstrating the following technical characteristics:

Auditability	Credibility and integrity of data for API calls
Scalability	Network effect provides ecosystem with opportunities for expansion
Efficiency	Process automation reduces manual steps and data reconciliation
Security	No proxy - API calls are made directly between participants
Tamper-proof	Removes risk of duplicate entry or data tampering

Moreover, the application is supported by unique infrastructure such as:

- Over-the-Air updates
- Rapid scalability & inclusion of new participants
- Stable & resilient service
- Cloud native application
- Fully automated CI/CD pipeline

Critically, after the initial Allianz team was on-boarded by Luther Systems, they quickly became self-sufficient, onboarding and training additional subject matter experts independently to expand applications.

8. Expansion

Think of multiple similar processes running on the same platform. We need to make fragmentation across complex processes a thing of the past. It is like building a railroad network where we have just built the first railtrack.

And once we do this, there are multiple applications we can build on top of this network. These include offering car sales and insurance in one package from two separate entities, processing accidents, claims and repairs in the same package from three separate entities. We know the car manufacturer and the details of the components, the car's utilisation history, the accident details, the insurance policy, the drivers account details, as well as what needs to be fixed, and by which supplier. Each of these steps is a complex process, each operated with friction. Each siloed! We need to get each of these processes automated, then connected.

Allianz are considering expanding the reach of the ICS product by extending the product to include more steps in the claims processing life cycle, offering it to other insurers as a standalone product, and ultimately creating an ecosystem connecting claims processing and settlements for the wider insurance industry.

Luther's platform can be applied to numerous complex enterprise processes across Allianz, the insurance industry at large, and is extended to other industries.

Insurance from A-Z

9. Allianz Company & Offerings

The Allianz Group is one of the world's leading insurers and asset managers with more than 100 million private and corporate customers in more than 70 countries.

Allianz customers benefit from a broad range of personal and corporate insurance services, ranging from property, life and health insurance to assistance services to credit insurance and global business insurance.
Allianz is one of the world's largest investors, managing around 793 billion euros on behalf of its insurance customers. Furthermore, our asset managers PIMCO and Allianz Global Investors (AllianzGI) manage more than 1.8 trillion euros of third-party assets.

Thanks to our systematic integration of ecological and social criteria in our business processes and investment decisions, we are amongst the leaders in the insurance industry in the Dow Jones Sustainability Index.

In 2020, over 150,000 employees achieved total revenues of 140 billion euros and an operating profit of 10.8 billion euros for the group.

Accelerating the advent of the automated enterprise

10. Luther Company & Offerings

10.1. Who we are

Luther Systems is a software company and a pioneer in Deep Process Automation: the business of automating, orchestrating and managing complex enterprise processes.

At Luther we build the next generation of enterprise computation technology for use by organisations with processes that have remained out of reach for prior automation platforms.

Through our platform, we enable organisations to reimagine the way they operate and unlock unparalleled levels of automation in a world where collaboration and flexibility across disparate organisations, geographies, regulations or standards are more important than ever.

10.2. Luther's platform for automation

At Luther we recognise that enterprise processes of today are complex and challenging to automate. They require orchestration across multiple participants, hundreds to thousands of tasks as well as non-standard systems and datasets. Their execution is filled with reconciliation, rework, delays and costs that have been unavoidable until now.

Luther's unique proposition lies in its ability to take on this complexity through a distributed technology architecture: a distributed solution for a distributed problem.

With our proprietary LEIA platform, we provide our customers with:

- Enterprise developers tools to automate their applications rapidly
- The operating system to orchestrate and execute their automated processes

Reports from the field have been staggering, validating our vision for the future of enterprise computing. Our customers span multiple industries and use our platform today to orchestrate complex processes such as Claims Settlement, Mortgage Sourcing, Asset Issuance or Customer 360 Views. Their execution cuts across siloed functions, teams or even organisations performing thousands of independent steps across UIs, APIs, databases, applications, workflows and Robotic Process Automations (RPA).

2.5X faster application development

10X Total Cost of Ownership reduction

7X process execution

10X ROI

Fully automated compliance by design

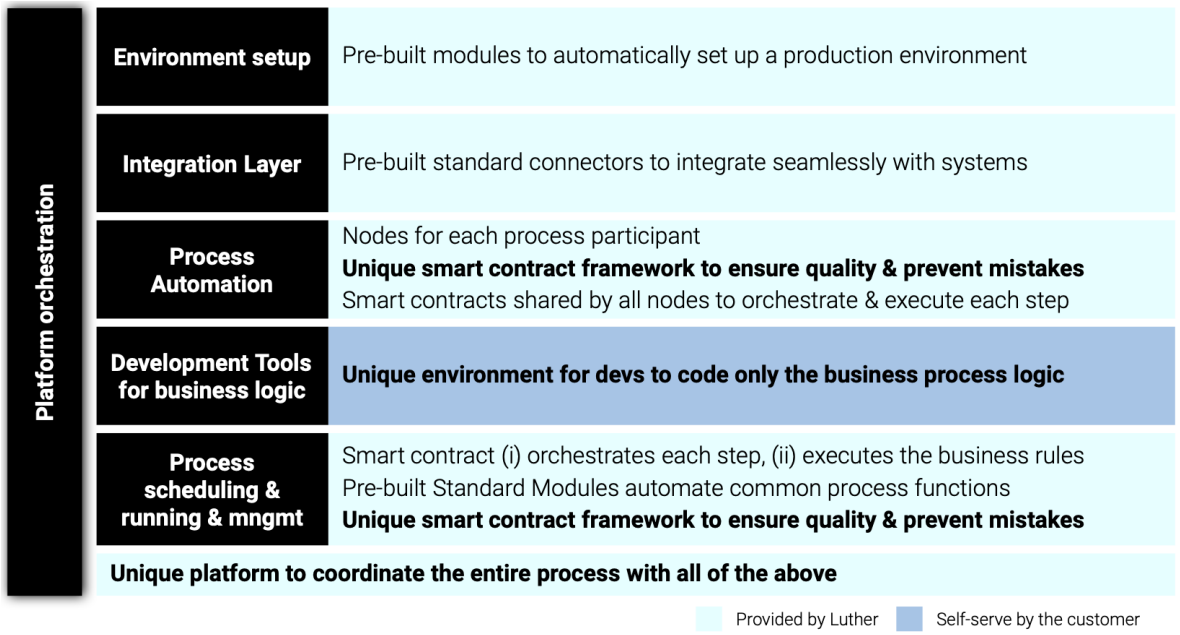
Highly scalable

Improved customer experience

10.3. Luther's offerings

Luther's unique architecture combines and coordinates multiple layers of technology which enables enterprises to (i) develop enterprise grade automated processes and (ii) orchestrate & execute the automated processes in production.

Below is an overview of Luther's stack. Luther's LEIA platform automates and provides the majority of this stack so that enterprise developers can exclusively focus on developing their business process logic.



The Luther Platform is built around Luther's breakthrough insight that virtually all complex processes can be seen as a set of "smart contracts" between steps or participants in a process. Smart contracts are the rails over which the Luther Platform orchestrates, executes and monitors processes in real-time. With the LEIA platform, our customers are

able to ensure that multiple steps across the entire process are executed and orchestrated in a way that follows a predefined & agreed upon business logic. This enables the Luther Platform to easily automate complex processes that were previously highly manual and non-standardised.

Luther's distributed platform also provides developers with the tools to achieve rapid development times and keep them in total control of the automation process. The LEIA Platform is designed to make the complex simple and can be used by developers with only a few weeks of training.

Luther's platform can be applied to numerous complex enterprise processes across industries.

For more information about Luther’s platform please visit our website.