

MESCBN Platform for Connected Supply Chain

Build your connected and collaborative apps with ease

Collaborate. Authenticate. Digitalize

Proteus

Blockchain driven Supply Chain Metaverse

Supply Chain Metaverse

Private, Permissioned Blockchain

No-Code Platform

Cognitive Document Digitisation

Multi-Party Collaboration

With a highly configurable platform like **Proteus**, there is extreme flexibility to convert any multi-party business process or legal agreement (governed by rules, flows, events, identities, roles, and permissions) into a smart contract using a private, permissioned blockchain. The underlying tamper-evident distributed ledger accompanied by the smart contract would ensure global compliance for any enterprise in the context of their business process involving inter-enterprise collaborations.

With a network-driven solution strategy spanning the entire Extended Supply Chain, Proteus opens up the possibility for this Metaverse of solutions and players to eventually tile this domain space paving the way for rapid digitalization. The enterprises that get onboarded in the context of their partners would eventually benefit from the network. The industry product standardisations we have made enable seamless onboarding, pilots and adoption with the least change management. Today we have solutions spanning cross-border trade and contract manufacturing in the supply chain space!



Why Proteus?

100%

- Data Security
- Data Privacy
- Data Ownership
- Process Transparency
- Customizable Workflow

01 Distributed Trust Rooted in Compliance

- Manage Risk Compliance by operating in "your" Trust Boundary (Enterprise Context)
- All Business Transactions are P2P (Peer-to-Peer) and Governed by Business SLAs (enforced intelligently via Smart Contracts)
- Manage Data Anonymity & Privacy through Zero-Knowledge Proofs (Cryptographic Hashes)

04 Reduced Change Management, & (TCO)

- Connect the missing dots ONLY (systems, processes, parties & associated data)
- Complement existing systems (including Enterprise Resource Planning, Trade Management, Risk Management, Business Process Management, Document Management etc.)
- Leverage Business Process familiarity through an efficient translation of Business Contracts to Smart Contracts

02 Single Source of Credible Truth

- Digital Identities for all Participants/Parties providing Tamper Evidence for all transactions
- Distributed Ledger act as the Data bus that provides near real-time data availability for all parties
- Data-backed SLA Tracking and Insights at all stages of the digitised business process

05 Seamless & Frictionless Collaboration

- A Network solution model with Trusted Parties increases Adoptability, Accessibility & Reachability for Business Partners.
- KYC for Business Partners, Business Policy-driven Authorisations and ease of Partner Onboarding /Management promotes trusted interactions
- Platform API ecosystem aids systems Integration (ERP, IAM & other Core Enterprise Systems)

- Trusted Data
- Reliable Insights
- Auditability
- SLA Visibility
- Auto Compliance

03 Business Compliance

- "Turing Equivalent" Smart Contracts (Digital Twin) for your Business/Service Agreements (ensuring Process, Regulatory and Statutory compliance).
- Multi-Party Consensus via Smart Contracts with Near-Realtime Auto Reconciliation of data at all steps in the process
- Transparent & Immutable Audit Trail for all transactions

06 Digital Transformation

- No-Code platform aiding Transformation and Innovation at speed/scale with Ease of Solution Design, Deployment & IT Governance
- Experimenting (Concept, Pilot and Adoption) with "Industry inclusive" consortia-driven models collaboratively on a strong SME and partner network
- Easy leverage of key exponential technologies, including AI-ML, Web 3.0 (Blockchain) and complementing Industry 4.0 initiatives



Business Domain Modelling

Steps

- A Identify and Define domain entities (and their relationships).
- B Identify and Define domain entity validation constraints (like min and max length).
- C Identify and Define specific attribute inheritance behaviour (like inheriting value from another domain entity) from one or more related domain entity (entities) defined in the Business Domain model

⊘ Outcomes

The platform ingests these configurations and dynamically renders forms for user interaction.

02

Business Process Modelling

Steps

- A Identify and Define the business processes that help realise business SLAs.
- B Identify and Define the business states that the domain entity may go through as part of the process.
- C Identify and Define the business actions (and associated events) that trigger the various state transitions.
- D Identify and Define the set of business rules (guards) to be checked in the context of an entity state transition.
- E Identify and Define the business roles that can perform a business action.

Outcomes

The platform ingests these configurations and dynamically renders forms for user interaction.

03

Business Events & Permissions Modelling

- Steps
- A Identify and Define permission sets from business actions identified in step 2.c
- **B** Identify and Define pre-defined roles against the permissions

Outcomes

The platform facilitates Organisation Management & IT Governance (Roles, Users, Entitlements)

04

Business Entity- Driven Data

Transformer Definitions

Steps

A Convert the inter-entity relationship identified in step 1.c to a transformation definition

Outcomes

>> The platform ingests these configurations and dynamically renders forms for user interaction.

05

Business Entity- Driven UI

Configuration

- Steps
- A Identify and Define the UI configuration elements that further customizes the dynamic forms generated from the entity definitions identified in business domain modelling step 1.a.

⊘ Outcomes

- >> The platform provides Rich User Experience with intuitive and structured data flows.
- The platform facilitates Flexible customer-centric UI customizations.

Business Entity- Driven Document Template Definitions

Steps

A Identify and Define Business document templates for your business entity (Eg: Digital form Contracts, Purchase Orders, Invoices, Letter Of Credits etc. is needed to be exported to an organisation specific template)

Outcomes

- The platform reduces friction in adoption through familiarity (with less change management)
- The platform supports customer-centric document templates.

07

QA Certification

Steps

- A Identify and Define Automation Test Case Scenarios from product configurations
- B Identify and Define Test Data for various business entities and associated flows

Outcomes

- >> The platform validates the Product functionality (configurations) through Test Automation
- >> The platform self-certifies the product releases through the Test Automation framework.
- The platform assures High-Quality (Predictability, Consistency and Reliability) Products for customers.

08

Product Release & Certification

(with Release Notes)

Steps

- A Identify and Define Test, Certification Plans against Bi-Weekly Product Release Roadmaps
- B Identify and Define Product Release Notes against QA Certified Features & Changes.

Outcomes

- The platform provides the auditability and versioning of software assets (including release packages).
- >> The platform provides feature transparency through release notes.



Value Proposition

Platform

The platform layer is responsible for creating products (via the configuration builder), manifesting products (via the virtual machine), and providing auxiliary services, including document digitisation (via CDA), document management (via DFC) and integration management (via BCLink).

Product

The product layer is responsible for the standard product definitions (domain-specific), including business types, rules, flows, events, identities, roles and permissions.

Solution

The solution layer is responsible for the customised product definitions in the context of a customer.



Platform Technical Components



01

Dynamic View Management

This platform component helps automate view (data entry forms) generations to capture the key attributes of a business entity participating in a business process/workflow.It does this by providing a View/Form Designer that helps:

- Identify the key (influencing) attributes in the document
- Map these attributes to entities in the domain model
- Configure the view (form) templates using pre-defined standard layout definitions
- Associate template elements to the mapped attributes
- Author/Define the validation rules against the mapped attributes

02

Workflow Management

This platform component helps create/configure the workflows associated with a business process. It does this by providing a Workflow Designer and Workflow Engine that helps:

- Configure Flows & Sub-Flows (State Machines)
- Configure Actions & Role Entitlements associated with flows above
- Configure Inter-Flow & Intra-Flow Transitions/Connections
- Configure Transition Guards/Rules
- Execute & Orchestrate the above configurations via the Workflow Engine
- Track Workflow progress using the Visualizer

03

Static View Management

This platform component helps create Custom Dashboards and Reports. It does this by:

- Providing a standard set of Dashboard Widgets
- Configuration of custom Reports & Dashboards
- Creating appropriate preset Data APIs
- Smart Query Builder Interface

-

04

Management

This platform component helps create Custom Forms. It does this by:

- Providing Form templates definitions
- Providing Form template data attribute mapping
- Providing Forms Generator Factory



05

Jore Middleware

This platform component helps define and represent the domain model, which forms the basis of user interactions in the context of a use-case scenario. It does this by:

- Defining/Modeling the domain entities, attributes, and their relationships
- Defining State Machines for domain entities to mirror the business agreements or processes.
- Providing suitable abstractions layers for data transfer and persistence

06

Rules Administration

This platform component helps enforce business rules for Process Compliance and Data Consistency atop the domain

- Providing suitable
 Domain Specific
 Languages (DSL)
- Providing options for encoding/defining these rules in simple language grammar defined by the DSL

07

Communication Management

This platform component helps seamless multi-party collaborations. It does this by:

- Providing messaging channels
- Providing alerts and notification channels

80

Interface Management (BC Link)

This platform component helps Seamless Integration with external systems and API Enablement. It does this by:

- Defining secure APIs through which data can flow inward and outward
- Providing Adaptors and Connectors to 3rd party systems (including ERP)

09

Cache Management

This platform component helps seamless multi-party collaborations. It does this by:

- Providing messaging channels
- Providing alerts and notification channels

Data Management

10

This platform component helps with data storage infrastructure. It does this by:

A combination of RDBMS and Document DB data stores

Blockchain

11

This integral platform component helps preserve data integrity with multi-party consensus. It does this by

- Providing a distributed immutable ledger based on Blockchain
- System-level consensus using industry-standard consensus protocols backed by an immutable smart contract

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Digital File Cabinet (DFC)

This platform component helps with Secure Document Storage, Document Life Cycle Management, Document Fingerprinting and Versioning. It does this by:

Providing a Secure Document Storage (with the flexibility to leverage suitable PAAS services, including MS SharePoint and Azure Blob Storage)

13

DNB

This platform component helps configure the end-to-end product and solution layer. It does this by:

Providing the configuration workbench/interface /tools for product and development teams

14

Security Management

This platform component helps enforce security with Identity Management, Access Management and Document security. It does this by:

- Giving the flexibility to leverage industry-standard Identity Access Management (IAM) practices and security compliances (UMA, OIDC, etc.)
- Giving the flexibility to configure access permissions using Rules Based Access Control (RBAC)
- Giving the flexibility to access the document via Secure Access Tokens securely.

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Availability Management

This platform component helps ensure system availability with Detailed System Logs, Monitoring, Notifications, Proactive Maintenance and SOPs for standard system maintenance. It does this by:

- Giving the flexibility to Configure 3rd party monitoring services
- Giving rich dashboards with insights for SOC personnel
- Integration with an external Incident Management System

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Cognitive Document Automation (CDA)

This platform component helps with Document Digitization. It does this by:

- OCR for all Documents, including PDF and Image
- Content extraction for Unstructured Documents using Deep Learning and Neural Networks
- Content extraction for Structured Document Types and Document Formats using Parsing Rules



Design Considerations for Enterprise Blockchain Applications

These considerations have been carefully hand-picked to facilitate quality solution enablement with high flexibility, quality, and reduced time to market.

01 Design for Adaptation

Ability to create solutions for diverse domain contexts

We have Blockchain driven multi-party solutions in Commodity Trade, Trade Finance, Sustainability, Supply Chain Provenance, Logistics, Automotive, and Manufacturing.

02 Design for Extensibility

Enabling others to use, configure and extend the current functionalities and features

We have factory-enabled the whole development process, thereby leveraging the strengths of teams, including Product Management, Customer Support, Trade Operations, and Engineering. We have the means to bring in ecosystem players, including System Integrators, Researchers, R&D Teams, and other Service Providers (FinTechs, Technology Partners) to build solutions on our platform. We have segregated the software factory assembly line across 3 Layers to aid extensibility. They include Platform, Product, and Solution. The platform would be maintained and enhanced solely by #dltledgers and supporting technology partners. Ecosystem players would help co-create products and solutions for our customers.

03 Design for Composability

Breaking the design of a system into many atomic, independent, and reusable components/APIs

We have created a No-Code platform (code-named Proteus) that enables rich feature compositions through configurations. These configurations help encode any business domain into Smart Contracts through a simplified process. We have a Proteus Virtual Machine (PVM) at the core that can consume this Smart Contract, encoded as configurations, to enable a contextual solution without compromising the user experience. Proteus is conceived as a Universal Turing Machine (UTM), which helps create domain-specific products and solutions (Turing Machines). This is an integral component that constitutes the IP of **#dltlegers!**

04 Design for Replaceability

Ability to enhance/refactor components/APIs with minimal impact on the rest of the system

Proteus is designed with deep consideration for change at its core. It is quite modular and flexible when it comes to provisioning technical capabilities, including Distributed Ledger, Smart Contracts, Configuration Management, Configuration Builder, Identity Management, Access Management, Secure Document Storage, Document Digitization, Subscription Management, Tenant Administration, Pricing Models, Transaction Logging, Transaction Monitoring, Rule Engine and 3rd Party Integrations (ERP, Payment Systems, Core Banking, Logistics). The platform layer consideration and associated architecture facilitate seamless pluggability for these modules by isolating these core technical components from the product/solution layer.

10

05 Design for Interoperability through Specifications

Ability to integrate with heterogeneous systems via APIs, industry standards, and open protocols

Seamless Interoperability and Integration is a core feature of the platform in the context of enabling collaborations, data insights, and decision-driven automation. This empowers the system to work in an integrated and holistic manner to enable digitalization for the enterprise. We have adopted open specifications, open protocols, and industry standards for many core features, including Identity Management & SSO (with OAuth), Data Security (with PKI encryption schemes), Digital Identity with Public Key Certificates (X509), Cryptographic Hashing (SHA 256), REST (over SSL), BAPI interfaces (SAP), ISO (for Master Data), SWIFT (for instruments like Documentary Credit), DCSA (for trade processes and artefacts), UCP (for trade finance compliance) and Open Banking (for bank driven payments and other interactions). We have a dedicated component named BCLink (Blockchain Connect Link) as part of Proteus that facilitates seamless 3rd party integrations.

06 Design for Scalability

>> Ability to scale at a service/component level

This is, again, a major consideration in the platform architecture and deployment model. For maximizing compliance concerning data security and privacy, a private and permission-driven network is leveraged for collaboration in various contexts with a Distributed Ledger (backed by Smart Contracts) to regulate data flow across parties securely. The network is designed to scale and grow as more parties join the network. This network with #dltledgers as the Network Operator/Admin will have multiple groups to auto-govern solutions across parties in various functional domains. The groups facilitate accessibility and visibility for parties in the context of their operational space. This offers flexibility and isolation for enterprises and financial institutions (FI) to have closed groups of business partners. This truly helps to create innovative business collaboration models on the same Network, yet have fine degrees of control by the network and group admins.

07 Design for Auditability

Every interaction and event would be recorded for statutory and fiduciary compliance.

Every interaction in the system is subject to a legal business agreement between parties. We have this consideration deep-rooted in our platform. We maintain an immutable trail of interactions in a distributed and tamper-evident ledger. The entire software assets (including configuration, code, system data, documentation, and release notes), bundled with the distributed platform, would be digitally signed by #dltledgers. These fingerprinted and versioned assets guarantee auditable and behavioural consistency against the various feature releases made per our Platform/Product Roadmap and Service SLA/SLOs. In addition to this, every aspect of the application lifecycle management (ALM) and development operations (DevOps) are process-driven and automated with standard operating procedures (SOP). Thus complete provenance of the software assets that enable business for the customer is maintained.

08 Design for Resilience

Everything fails! Build resilience in every component/layer.

We understand the criticality of our customer business and associated continuity. We have brought high stability to the platform by making it predictable and consistent. The boilerplate code is abstracted in the core platform framework, isolating key design decisions from the developer as in conventional application development. The platform code assets are solely maintained by the core Architecture team at #dltledgers. There is little or no room for error based on developer skill variability. The architecture is guite modular to suit the decentralized context, and the platform is equipped to handle different levels of failure. Business exceptions and Technical exceptions are gracefully handled by the platform giving recovery options (both manual and automatic) for the user to maintain **Business Continuity.**

09 Design for Privacy & Security

>>> Fundamental distributed architecture considerations for data Compliance.

Aligning with the philosophy of Blockchain and Distributed Ledger Technology (DLT), we have adopted a path of decentralization for the core of our platform, where our customers are sole custodians of their processes, data, and associated governance. They get to choose their data boundaries (both at a geographical and network level) regarding data storage and distribution. There is an absolute distinction between off-ledger (intra-enterprise) and on-ledger (inter-enterprise) processes and data. This is governed by enterprise-level access privileges on a shared private ledger. Data at rest is secured using 256-bit AES Encryption (FIPS 140-2 compliant). Data in motion/transit leverage protected network channels with SSL/HTTPS over TLS. Customers can choose the infrastructure (on public cloud, private cloud, and data centres). These security and privacy standards are then applied and enforced as part of customer node provisioning in the network.

11 Design for Heterogeneity

>>> Design as a heterogeneous system with the flexibility to leverage evolving technologies and stacks

#dltledgers understands the relevance of evolving technologies, stacks, and their role in shaping business solutions. We have factored a great deal of layering in the architecture to reap the benefit of these over time. This key consideration hedges any risk of our value proposition (platform) to stay relevant and competitive. With the advent of key technologies and platforms, we may need to revise our considerations for various technology components, including Distributed Ledger, Data Stores, ORM, Cache, Enterprise Application Integration (EAI), Rule Engine, UI, Digital File Cabinet (DFC), and Cognitive Document Automation (CDA). Today we leverage R3 Corda for the Distributed Ledger, many Open Source (OS), and Platform As A Service (PAAS) components on the MS Azure cloud. We have designed the platform to have high degrees of substitutability and interoperability for these components concerning any evolving stacks.

10 Design for Trust

Increase trust through blockchain, digital signatures, consensus, and smart contracts

Trust will form the backbone of our platform-driven value proposition to our customers. As outlined, the business domain model is going to be decomposed into tangible configuration tenets (including domain model, rules, flows, events, identities, roles, and permissions) that constitute the Smart Contract (immutable and signed code), making it the perfect enforcer of the legal business agreement between parties/stakeholders. Thus there is absolute transparency and system-driven automatic consensus provided by the platform, eliminating room for human/system error concerning SLA adherence in business operations. The platform simplifies the process of onboarding and validating these smart contracts for the users. In addition, the platform would provide a suitable incentive for customers to do KYC as part of their onboarding process. This fosters additional trust in the network for more parties to join and collaborate globally.



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www.dlt.sg



Collaborate. Authenticate. Digitalize

#dltledgers is an integrated digital solution that delivers transparency, visibility & adequate risk-monitoring in real-time is the need of the hour to address financing disequilibria. An extended solution with regulatory participation will close the loop, significantly improving the ability to detect & prevent double financing & other fraudulent activities.