DGT

TECHNICAL DEEP DIVE

platform architecture, technology stack and
implementation features

PLATFORM

DGT

Multifunctional Digital Platform for creating a unified informational space between distributed data sources
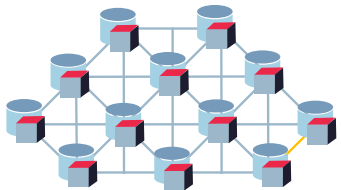
DGT allows for the creation of a decentralized distributed network and for a seamless exchange of data with full compliance to security and confidentiality requirements

Centralized network: one node responsible for all actions
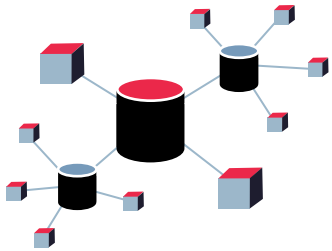
Distributed network: nodes distribute work through other nodes

Decentralized network: all nodes participate in exchanging and storing data

Core functions of the platform:

☐ **Collection** of data from distributed sources;

☐ **Storage** of data in a single immutable registry;

☐ **Exchange** of data in real time among various information systems;
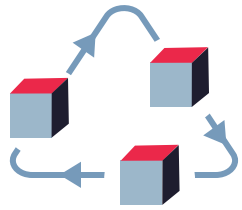
☐ **Analysis** of data quality, clearing, standardization, calculation of data metrics;

☐ **Visualization** and data flow analysis

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Distributed registry technologies aim at solving the task of simultaneously processing data by a few (or many) nodes. Sub-tasks to be solved including unauthorized data altering, conflict among various inputs, and actualization of data on all nodes.
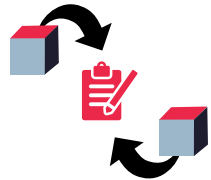
Blockchain is one of the instances of the distributed registry technology. Blockchain stores data as a chain of blocks that synchronizes among various nodes. One of the most famous examples is the Bitcoin network. The total blockchain market is estimated to grow to 16 billion dollars by 2024.
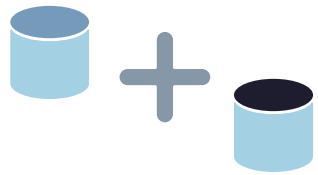
A special **consensus mechanism** is used to synchronize data. The consensus is a mathematically-backed algorithm. The core task of the consensus is to eliminate conflicts and ensure the integrity of data. There are many different types of Consensus models: Proof-of-Work (PoW), Proof-Of-Stake (PoS), Delegated Proof of Stake (DPos), Practical Byzantine Fault Tolerant (PBFT). DGT uses the stable and rapid **F-BFT Consensus (Federated Byzantine Fault Tolerance)**.

DGT – is the distributed registry technology of a third generation. It is more than just blockchain.

- Support for complex network topologies and dynamic configuration (software defined networking);
- Bleeding edge consensus methods (green, low energy consumption);
- Advanced data storage system (based on DAG – Directed Acyclic Graph);
- Fully secure transactions (guaranteed confidentiality);
- Post-quantum cryptography (quantum resistance)

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1 Nodes (agents) form a **federative network:** closed or open; like a **consortium**;

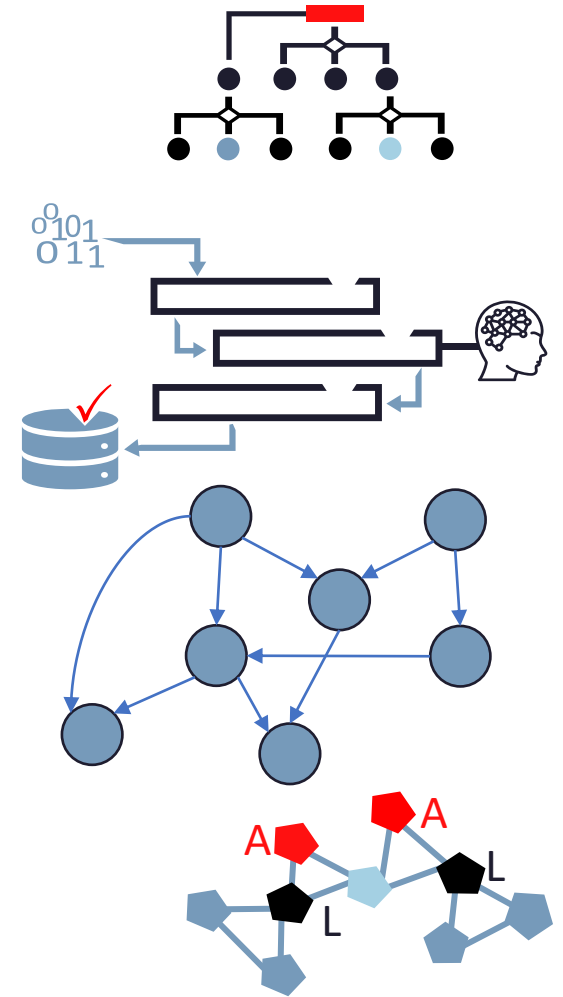**2** Verification mechanism with the use of **Artificial Intelligence**;

3 Storage in the form of a **directed graph** (DAG), that allows for storage of not only informational objects, but of their connection as well;

4 Consensus using a secure **arbitration mechanism** protected from Byzantine attacks.

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1) Several organizations are interacting. Each organization has its own **node (agent)** that is connected to legacy systems.

2) The data is sourced from corporate information systems, each of which is connected to its own node. When data is added, it is checked and distributed by other nodes (**CONSENSUS**). Data unification is done in a strictly defined form.

NODE 1

NODE 2

NODE 3
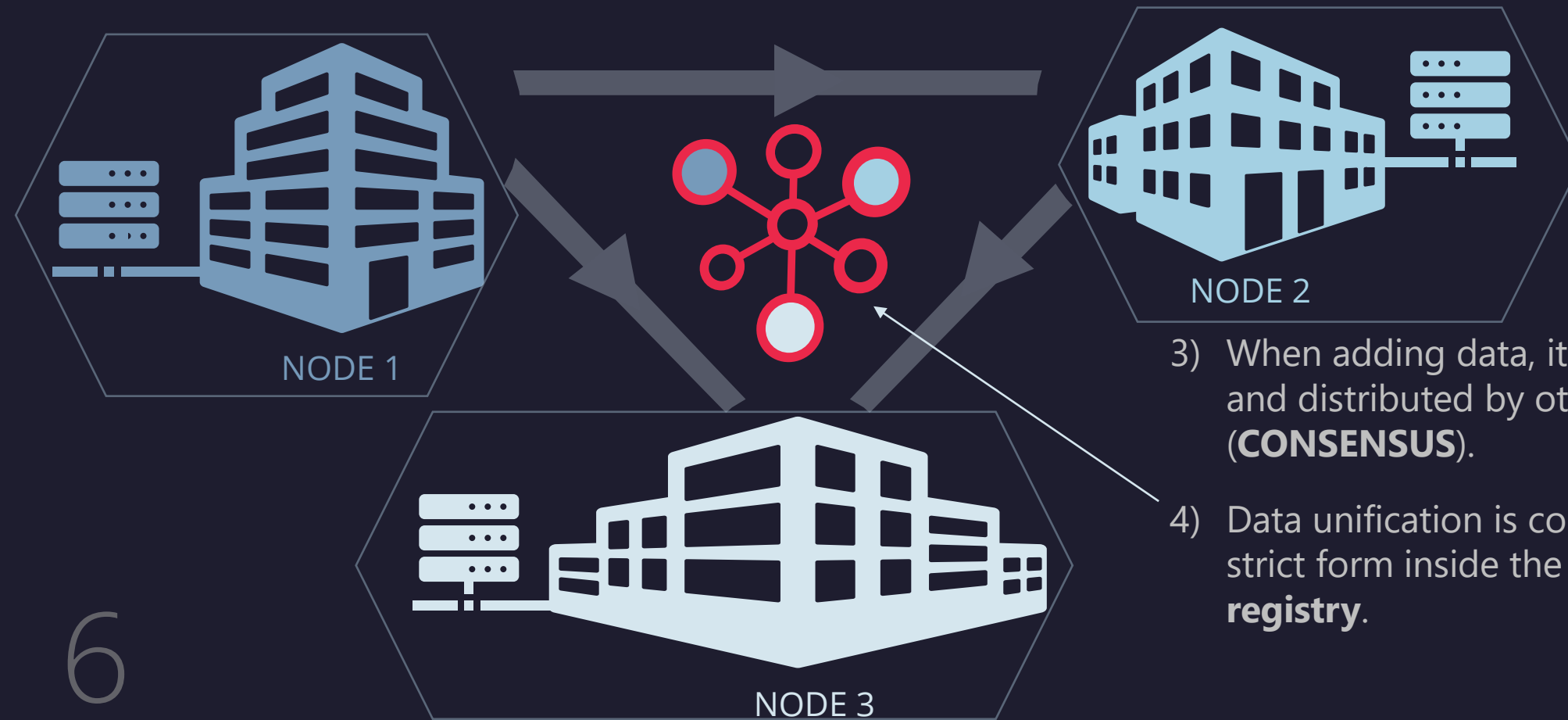
3) When adding data, it is checked and distributed by other nodes (**CONSENSUS**).
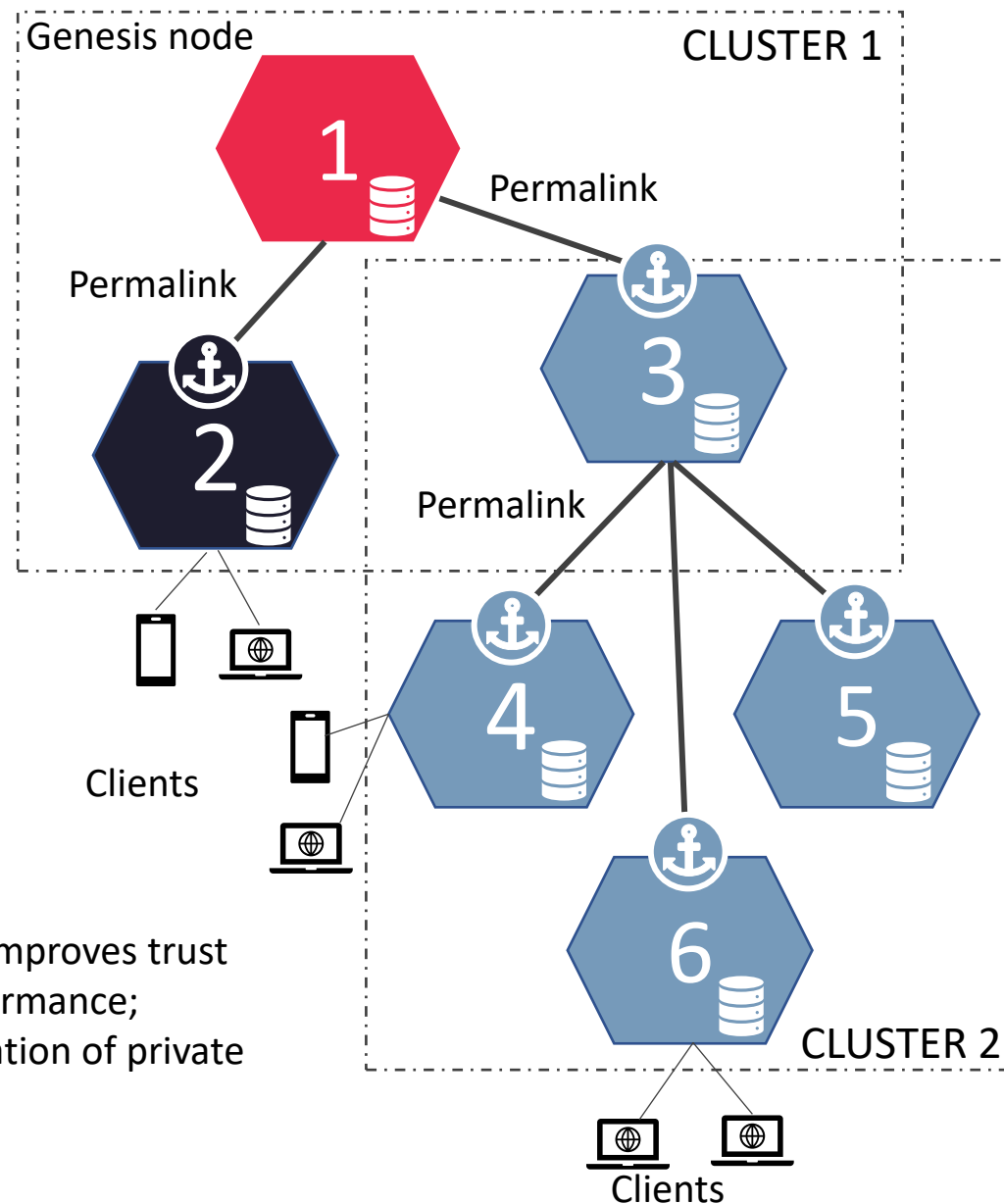
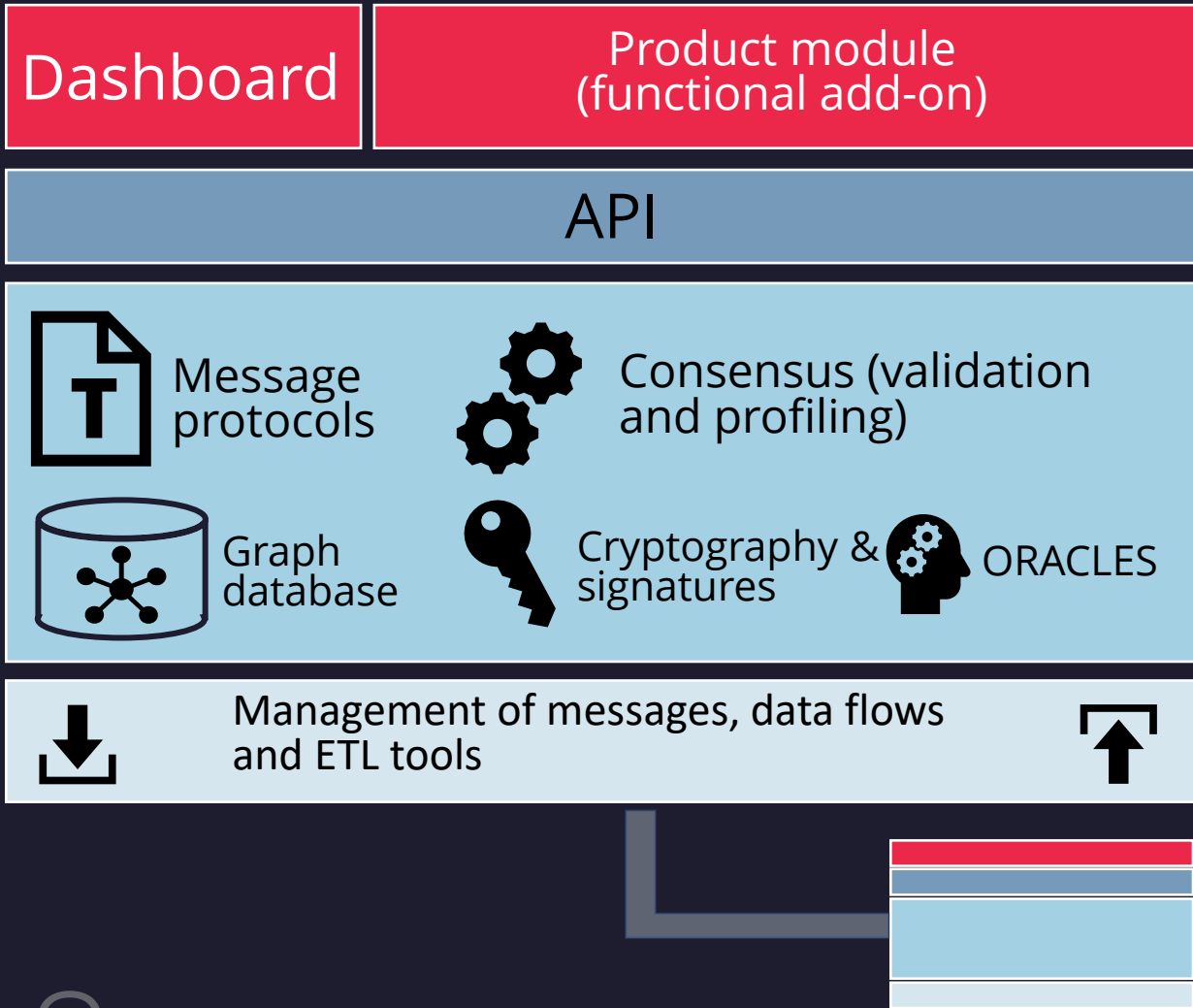4) Data unification is conducted in a strict form inside the **distributed registry**.

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DGT Network is constructed based on a cluster topology. A "cluster" is a group of nodes that perform the primary round of voting. Clusters can form complex structures.

- The size of the cluster and the joining process of new nodes is defined by the topology processor, which is a separate family of transactions;
- A variable leader is defined within each cluster, which changes after several rounds of voting. If the current leader is irresponsive to a request for a certain duration of time – a new leader is selected;
- Voting is initially carried out in the cluster and then an outside arbitrator is selected according to a special algorithm;
- F-BFT prevents double spending attacks due to the difference in "voting" time within the cluster and the characteristic DAG (state) synchronization time carried out through permalinks;

Clustering presents the following advantages:

- the formation of "topologically similar" group of nodes, which improves trust between nodes (reduces the risk of attacks) and improves performance;
- the possibility of "sharding" of the network, including the formation of private DAG branches;
- improvement of the network's horizonal scalability.

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Dashboard

Product module (functional add-on)

API

Message protocols

Consensus (validation and profiling)

Graph database

Cryptography & signatures

ORACLES

Management of messages, data flows and ETL tools

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The transaction is initialized by the client; the system works asynchronously and requires repeated requests for the "check".

The full F-BFT implements 2-phase transaction voting with a randomly chosen arbitrator from a given ring.

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CLIENT — Client launches a transaction

Client verified the transaction is received

INITIATOR — An initiator verifies it and performs initial validation

Transaction returned to initial node as part of DAG

LEADER — Voting round

CLUSTER NODE

ARBITRATORS — Arbitrage

ENTIRE NETWORK — Synchronizing across network

DGT
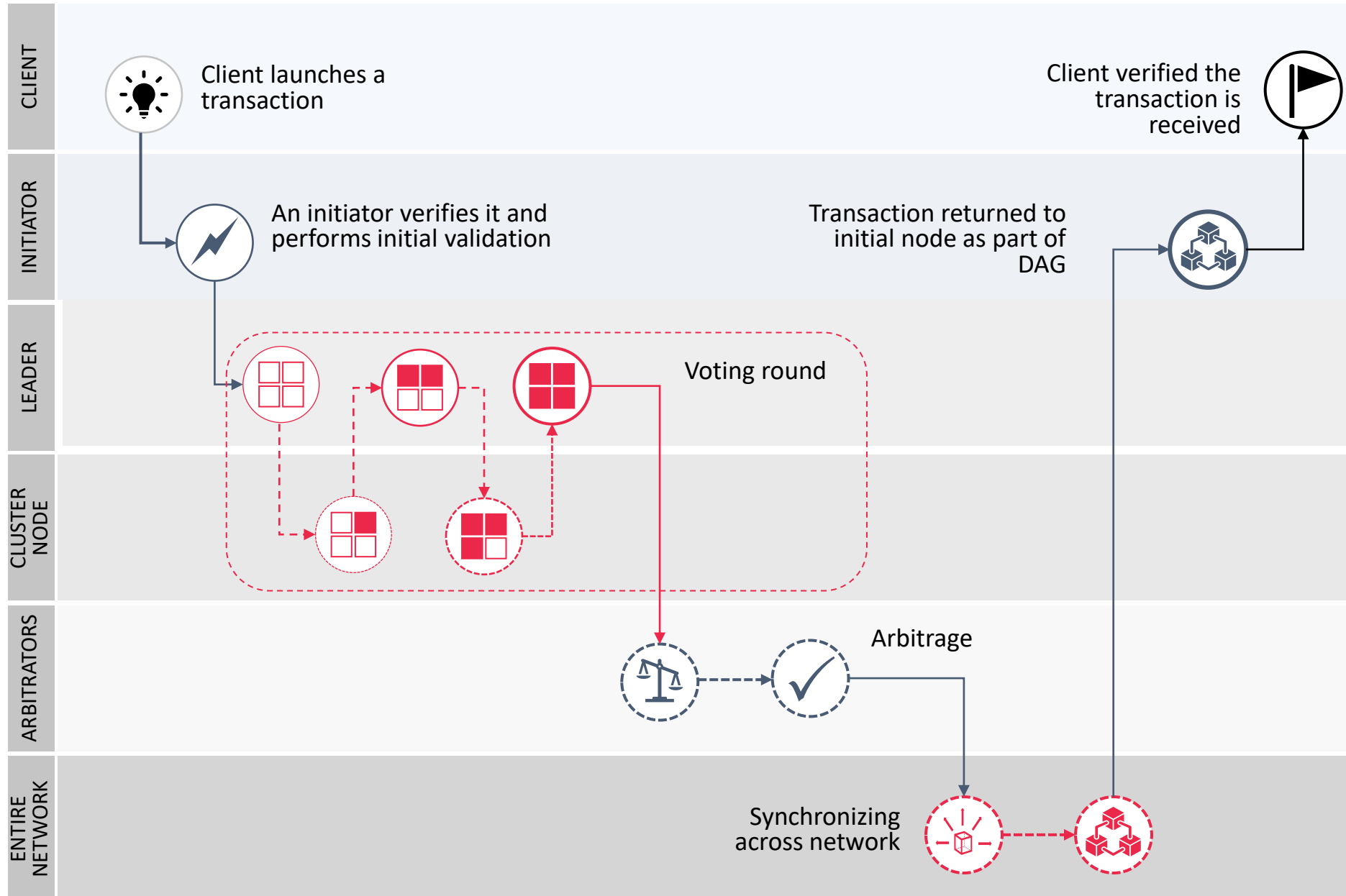
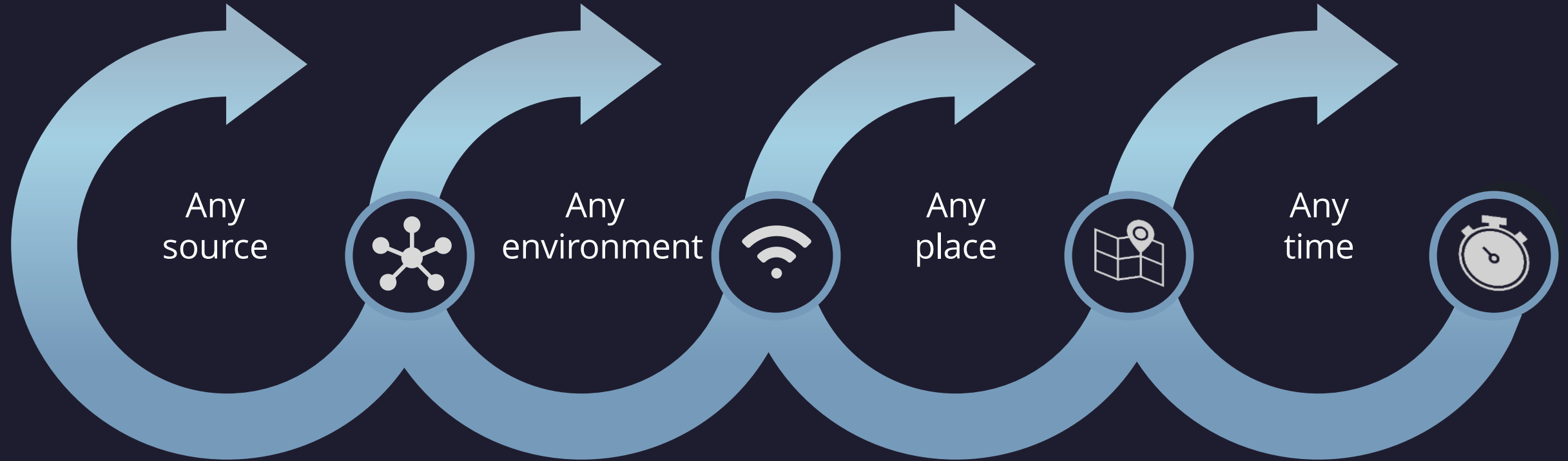Each node has a typical architecture that support interaction and scalability.

Built on the Hyperledger Sawtooth platform, DGT provides fast support from developers through standardized technologies.

FRONT-END LAYER

Analytics

Web Apps

Business Apps

Mobile Apps

SECURITY & ADMINISTRATION

Key wallet Module

Admin Console

Fraud Detection Module

Attack Prevention

KNOWLEDGE PROCESSING

Neural Network

Fuzzy Controller

Oracle Manager

Master Data Management

API Manager

INTEGRATION LAYER

Consensus Management service

Ledger Storage / service
Graph DB / DAG

Event Stream Manager

Smart Contract Processor

Token Emission Engine

External Service Gateways

TRANSACTION LAYER

Networking / message queue service
ZeroMQ

Peer Connections / Topology
PERMALINK

Transaction Processor
Transaction Families

Storage Queues

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LEGACY SYSTEMS

DG NETWORK

EXTERNAL WEB SERVICES

12) Corresponds to Blockchain Solution Reference Architecture (BSRA).

Any source

Any environment

Any place

Any time

DGT is a complex solution that provides access to data in real time without expensive ETL-reloading of databases

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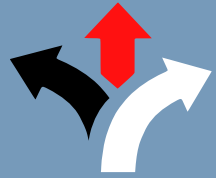
Frictionless business: headache-free, competent, affordable technology

Digital edge: world-leading tech with real business impact

Rethinking costs: optimized and cost-effective process

Leading capabilities: strong relationships and cross-ecosystem expertise

DGT Network Inc. offers resources and infrastructure as an extension of your organization's capabilities

The divergent architecture of the network allows for any data, value, tokenization, ecosystem use case to be implemented effectively

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