The Future of Post-Trade Processing: A Blockchain Hub

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The Challenge

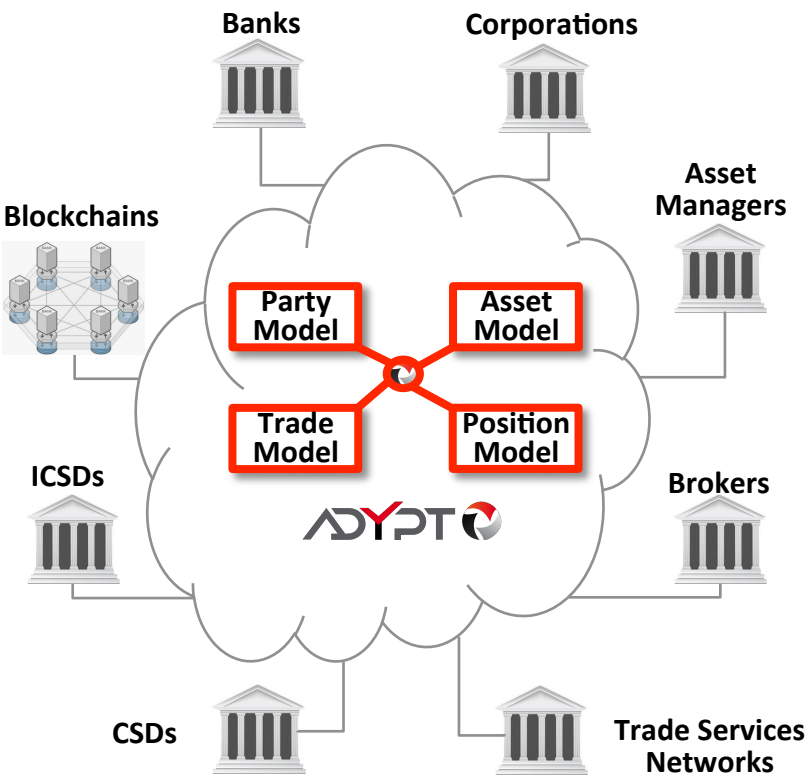
Consumers now expect immediate service and more than half of internet traffic now originates from mobile devices.

This change in consumer expectation has happened over the last ten years since the invention of the smartphone. The financial services industry has been slow to respond to this change because market practices and internal processes have evolved over more than 50 years.

New practices like smart contracts and new technologies like distributed ledger technology (blockchains) will enable the industry to satisfy this consumer demand.

Furthermore, using blockchains will provide dramatic improvements in operational efficiency.

The challenge facing the financial services industry is to migrate to this brave new world recognizing that the existing market infrastructure and processes will need to coexist with blockchains for several years.



"We should think about the blockchain as another class of thing like the Internet — a comprehensive information technology with tiered technical levels and multiple classes of applications for any form of asset registry, inventory, and exchange, including every area of finance, economics, and money; hard assets (physical property, homes, cars); and intangible assets (votes, ideas, reputation, intention, health data, information, etc.). But the blockchain concept is even more; it is a new organizing paradigm for the discovery, valuation, and transfer of all quanta (discrete units) of anything, and potentially for the coordination of all human activity at a much larger scale than has been possible before."

Blockchain
Blueprint for a New Economy
Melanie Swan

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A Blockchain Hub

The financial services industry will need Blockchain Hubs to interact with many different blockchains.

Blockchain Hubs must automate business processes that surround blockchains such as customer onboarding, transaction approval, process control and transaction reporting.

To support these business processes Blockchain Hubs must:

- **Automate complex workflows** with lifetimes of a few milliseconds to several hours, days or years (page 3)
- **Manage customer information** including digital identities (page 4)
- **Process all instruments** including digital assets (page 5)
- Process multiple business entities and time zones
- Support multiple languages.

Traditional **clearing mechanisms and blockchains** (page 6) will coexist and need to inter-operate for several years so a Blockchain Hub will need to integrate not only with blockchains but also with existing market mechanisms such as:

- Trade services networks e.g. DTCC and SWIFT
- Central Securities Depositories (CSDs) e.g. Clearstream and Euroclear
- Currency clearing organisations e.g. the Continuous Linked Settlement (CLS) Bank

Furthermore, a Blockchain Hub must have an **architecture** (page 7) which has the following **technical characteristics** (page 8):

- Real time processing
- Security
- Continuous availability
- Linear scalability
- Complete auditability

> "The future belongs to a network of interoperable blockchains, built on different distributed-ledger technologies and carrying different digital currencies, which can be federated to handle different aspects of distributed applications."
>
> *Vitalik Buterin*

ADYPT CLOUD Automates Complex Workflows

ADYPT CLOUD uses *Xtreme Modelling*™ to process a wide variety of business processes but is particularly well suited to those we encounter in financial services, with lifetimes of a few milliseconds to several hours, days or years, and with many complex interactions involving other processes, systems, and users

ADYPT CLOUD provides the highest levels of flexibility and business support. ADYPT CLOUD's design makes the system changes necessary to expand into new business areas quick and straightforward to achieve. With *Xtreme Modelling* processes and data are adapted using user-defined rules and graphical displays instead of traditional programming.

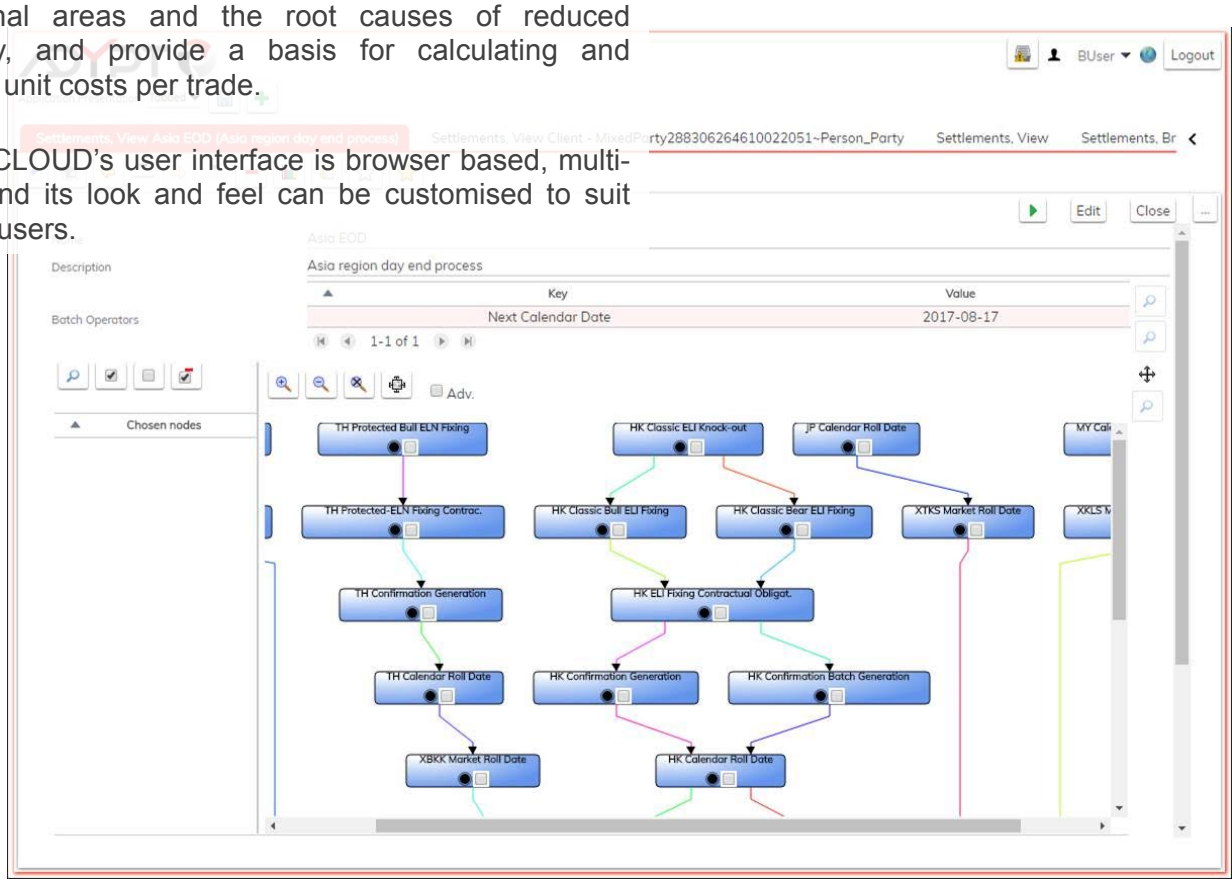
If unforeseen trade process breaks occur, ADYPT CLOUD alerts users to take actions to meet cut-off times.

ADYPT CLOUD provides full transparency of change history, presenting the data as it was each time a change has taken place.

Metrics and management statistics highlight and pinpoint operational areas and the root causes of reduced efficiency, and provide a basis for calculating and reducing unit costs per trade.

ADYPT CLOUD's user interface is browser based, multi-lingual and its look and feel can be customised to suit different users.

- Enables real transformation of operations, improving customer service, and STP rates
- Supports blockchain enabled reductions in settlement times
- Defines, refines, redefines workflows spanning multiple blockchains
- Adds flexibility, efficiency, capacity, security and auditability to operations
- Support corporate actions and asset registers including those published on blockchains
- Serves multiple business units 24*7
- Complies with regional reporting requirements with greater control



ADYPT CLOUD Manages Customer Information

ADYPT CLOUD's Customer Management capability automates the setting up and maintenance of customer account data as an audited primary reference data source. It communicates that information to subscribers both inside the institution and, if required for self-service assisted onboarding, also outside the institution.

ADYPT CLOUD provides a single data entry point for account request data for both external customers and internal users and can incorporate blockchain-based certification of identities and roles (e.g. Professional Investor).

Onboarding processes, driven by the workflow, raise real time exception-based alerts to users only when the customer-defined workflow necessitates their interaction. Alerts may use ADYPT CLOUD's internal workbasket or email.

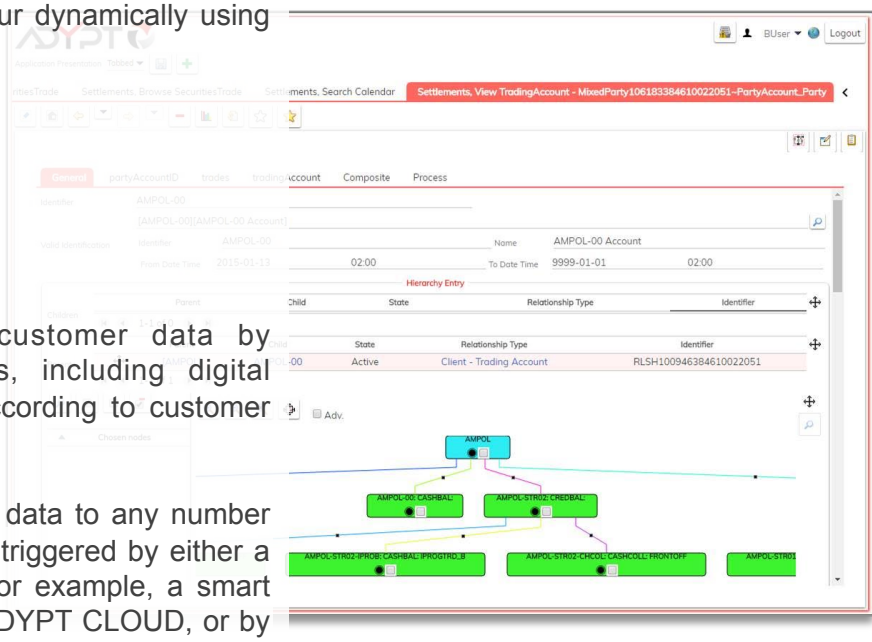
Graphical views of the customer's account structure are employed to give users a clear view of the relationships between customer accounts.

- Reduces customer onboarding turnaround time and costs with a fast, automated, single point of data entry
- Identifies, classifies and certifies client KYC documentation
- Facilitates domestic, FACTA and CRS regulatory reporting
- Removes data inconsistency through a single point of entry for customer requests
- Supports self-service models through real-time setup of processes incorporating blockchain-based certification of identities, roles and funding
- Reduces operational risk by decreasing data dispersion and by comprehensive audit trails

Submit Application → Review Application → Process Application → Setup Account

ADYPT CLOUD configures behaviour dynamically using rules for:

- Authorisation
- Data validation & enrichment
- Customer and account structures
- Data cleansing
- Permissible state changes.



ADYPT CLOUD enriches the customer data by accessing external data sources, including digital identities stored on blockchains, according to customer defined enrichment rules.

ADYPT CLOUD provides reference data to any number of external systems or blockchains, triggered by either a request to ADYPT CLOUD (from, for example, a smart contract), or from an action within ADYPT CLOUD, or by a timed process.

ADYPT CLOUD

Processes All Instruments

Xtreme Modelling defines all instruments with clear graphical workflows and simple and understandable English rules.

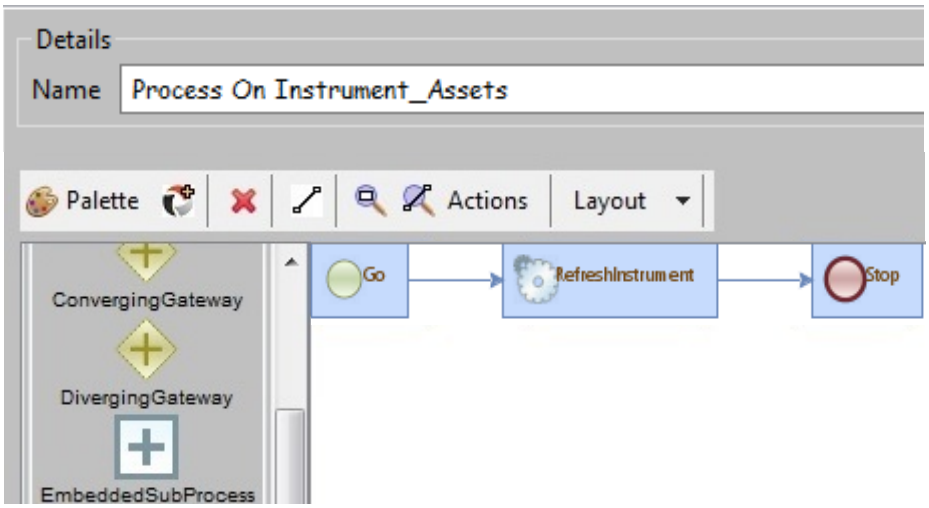
All asset and trade types differ only in their use of data. For example, an equities trade, a repo with multiple interest payments, and a 20 year swap in ADYPT CLOUD each has different units but uses an identical approach to composing their elements. This allows agile adoption of new structures and processing on an 'ad hoc' basis.

For example, equity trades that are composed using one configuration:

… can be adapted to create interest bearing equity trades, by adding a reusable component, interest, with its associated process:

With *Xtreme Modelling*, modellers assemble components to create the desired features and behaviour of parties, assets, trades and positions. In this way ADYPT CLOUD can dynamically model and process asset and trade types that may not exist today, i.e. digital assets.

- Assembles reusable components to create desired behaviour
- Crypto and fiat currencies, modelled in the same way
- Dynamically models and captures new transaction types, whether in the market, B2B or smart contracts on a blockchain
- Makes dynamic changes simply and safely, using diagrams and user defined rules – not coding – even in real time
- Promotes business growth as processes are extensible to support new initiatives



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Clearing Mechanisms and Blockchains

Blockchain technologies are evolving around two philosophies – permissionless and permissioned.

Permissionless blockchains are open to any participants and have decentralised ledgers, storage, file systems, smart contracts, applications (dApps) and organisations (DAOs).

Permissioned blockchains have restricted participants, centralised organisations and additional features like reversibility.

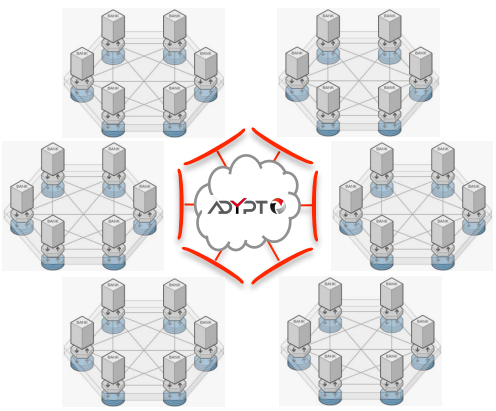
The two leading consortiums developing permissioned blockchain frameworks are:

- Linux Foundation's Hyperledger (160 members): on 12 July 2017 production-ready Hyperledger Fabric 1.0 was announced
- Ethereum Enterprise Alliance (150 members): this newer organisation is working on a private version of the Ethereum blockchain customised for its members and has yet to release its full specifications.

ADYPT CLOUD supports both traditional clearing mechanisms and blockchains for clearing and settlement.

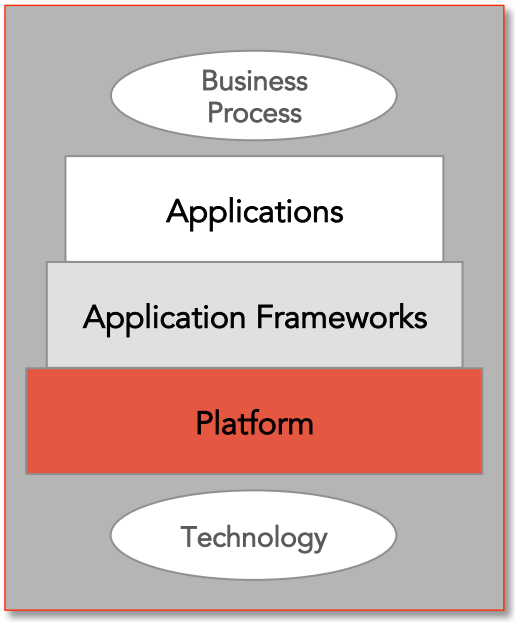
Integration with Cloud-based or traditional venue-based destinations is set up in ADYPT CLOUD using *Xtreme Modelling* tools to export, transform and load (ETL) incoming and outgoing messages.

Clearing and settling transactions are processed and stored in ADYPT CLOUD in the same way, whether on permissionless or permissioned blockchains, or on traditional exchanges as T+3, or as OTC transactions with lifecycles of years.



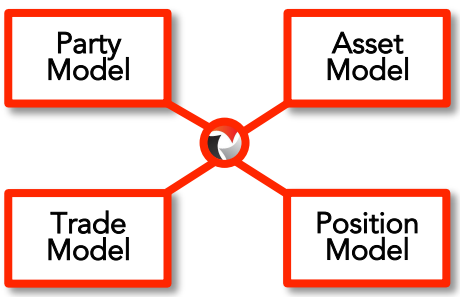
- Integrates with traditional centralised market venues
- Integrates with both permissioned and permissionless blockchains
- Processes cross-chain and intra-chain transactions
- Supports processes defined in smart contracts
- Out-of-the-box ETL components for *Xtreme Modelling*
- Consolidates customer portfolios across traditional instruments, fiat currencies, crypto assets and wallets

ADYPT CLOUD Architecture



ADYPT CLOUD's overall architecture of Applications, Application Frameworks and Platform decouples *Business Process* changes (e.g. adding a new product, workflows or business unit) from *Technology* changes (e.g. program code or database).

The Application Frameworks include a comprehensive library of standard, extensible and dynamic models which describe standard processes in financial services. These are the foundational units for the *Xtreme Modelling* of applications and enable rapid definition, implementation and modification of customer specific workflows and processing rules. The main Application Frameworks are:



ADYPT CLOUD's business benefits

Supports Innovation:

- Built for the Cloud
- Enables workflows and processes surrounding blockchain clearing

Provides Cost Efficiency:

- Processes all financial instruments whether crypto or fiat
- Enables the lowest cost of operations
- Supports the lowest cost of changes

Provides Agility:

- Supports the fastest implementation
- Scalable to the volumes of global banks

Control and Compliance:

- Provides high security
- Enables all activities to be audited in real time and in context
- Uses open standards throughout

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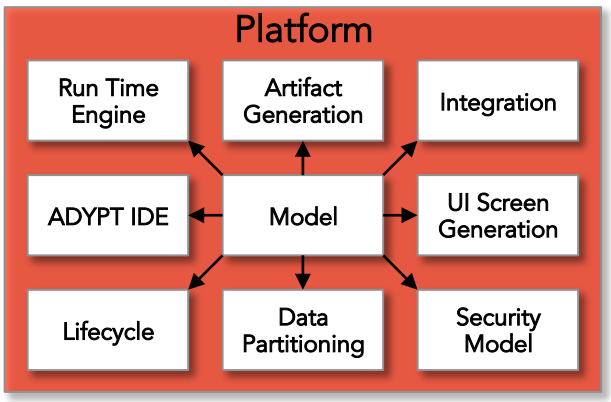
Technical Characteristics

The ADYPT CLOUD Platform provides the interface between the Application Frameworks and the underlying technologies to deliver:

- Real time processing
- Security
- Continuous availability
- Linear scalability
- Complete auditability
- Process multiple business entities and time zones
- Support multiple languages.

ADYPT CLOUD has exceptionally high levels of security and control built into the Platform. Every change to every attribute of every field is journalled for full and transparent auditing of use and performance metrics.

The ADYPT CLOUD Platform comprises various services, some of which are depicted below.



With *Xtreme Modelling*:

- the application itself is modelled
- the application's interactions with the Platform services are modelled
- the services and dependencies within the Platform are themselves modelled.

ADYPT CLOUD is thereby fully positioned to assimilate new technologies and present these as new modelling features to the Application Frameworks.

- Ensures applications are independent of technology
- Protects investments in applications from technology obsolescence
- Enables rapid adoption of innovations such as blockchain clearing
- Models and deploy gateways to other systems with ease
- Maintains exceptionally high levels of built in security
- Audits processes and transactions transparently in their context
- Enables technology to evolve independently of applications

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