DTD powered by ACTUS
An innovative RegTech approach to financial risk reporting

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The disruptive entry of new comers in the city and... the returning power of global regulation

1 Digital impacts and disrupts service business models

- The accelerated diffusion of Knowledge-Intensive Business Services in the finance
  - FinTech, RegTech, digital money (cryptocurrencies and fedcoin) etc.
- It is all about opportunities to accelerate innovation, process automation and disintermediation in the financial sector
- The blockchain technological trajectory leads the path for change...

2 Big Data helps economic policy for stability

- Regulation and oversight of the global financial system is becoming increasingly stricter through the G20 initiatives for financial stability
- Focus on closing policy-relevant data shortcomings and gaps which have become apparent during the crisis of 2007-8
  - Verify FI’s compliance and identify/fix financial failures through a global systematic process of data collection, storage in local Trade Repositories (TRs), dissemination and analysis...
Combine Big Data-enabled policy opportunities with e-service innovation to design a novel, RegTech cum approach for financial transactions and financial risk reporting that is based on cutting-edge distributed computing and decentralized data management technologies:

- Distributed Ledger (DLT) and Distributed Storage (DST) Technologies
- Algorithmic Financial Contract Standards
- Automated Legal Text
- Document Engineering methods and techniques

Our approach assumes complex standard-setting processes and various diffusion rates of adoption, slower of faster, for the main FinTech innovations (i.e. contract digitization and process automation) and for smart financial trade and digital currency technologies…

However, it might be possible to create, on top of this thriving FinTech fluidity:

- A global standard data facility for financial risk reporting (i.e. a RegTech bearer service)
- … a layer of algorithmic regulation functionality that spans over existing financial technology systems, processes and data formats
‘Cost of Compliance’ estimates for regulatory initiatives are based on high level estimates due to lack of precise data at the Financial Institutions (FI’s) and Regulators...

- Costs occur across all parts of the trade lifecycle and risk management process... Weaknesses are still evident in FI’s risk data systems, legacy information technology and regulators overall technological capabilities.
- Big Data, distributed systems and algorithmic finance technologies can have a significant impact on the avoidance of legacy systems drag, can drive important insights for microprudential and macroprudential supervision, should allow FI’s to manage risk and data more effectively. This can help regulators level the playing field with FI’s when it comes data driven insights.
- Industry collaboration, the creation of shared utilities (industry/regulators/technology firms) and global agreements on standards are key to progress and cost optimization across the financial system.
- Regulators and Governments should, based on sound technical advice, be more visionary in terms of how they want to see the industry developing – presently that lack of overall vision forces the focus on micro detail for certain initiatives.

Transparency and disclosure emerge as a key requirements for financial risk management policies. Ongoing regulatory initiatives focus on:

- Strengthening prudential oversight of capital, liquidity and risk management
- Enhancing transparency for reliable valuations
- Improving financial Information and risk disclosure

... + Transparency is a more generic trend in the economy (Panama papers)
RegTech | Financial Reporting
bearer service

Lessons learnt from the Internet

The Internet bearer service hourglass

RegTech services
RegTech apps
RegTech bearer service
Dynamic Transaction Document DTD

FinTech

The RegTech bearer service hourglass
The bearer service, as proposed here, generates and maintains a "digital doppelgänger" for every financial contract, i.e. a Dynamic Transaction Document (DTD).

- DTD is a standardized “data facility” that instantly and automatically transfers important contract data from the transaction counterparties to competent regulation authorities and their authorized partners (and, more generally, to the representative organizations of the ‘society at large’).

- RegTech is the space we envision to create by storing and processing DTD financial risk e-reports.

We propose to transform the expanding, very “hierarchical” infrastructure of Trade Repositories (TRs) and Central Security Repositories into a RegTech infrastructure.

- An ultra-distributed document management and storage system that virtually penetrates the current in-house IT systems of Financial Institutions (Fis)…
RegTech | Financial Reporting: the design choice of using DLT technologies and Smart Contracts

DLT benefits
Immutability “by design”, instant update, automated review and compliance verification, accountability and transparency...

... and pitfalls
Information privacy, Scalability issues...

Design constraints
1. permissioned-DL with public nodes, 2. Keep Big Data off-chain, 3. distributed Access Policy

RegTech - DLT Benefits
① Improves reporting efficiency
② Reduces transaction costs (compliance and reporting management costs) and
③ (potentially) Supports deeper regulatory oversight in the future and transparency

Implications for FIs and RAs
- Executing reporting activities through smart contracts can facilitate the automated creation of aggregated reports (reports on-demand)
- RegTech can seamlessly execute and automate compliance tasks (via specific smart contracts monitoring compliance)
- Automated monitoring of financial activities will make faster and more efficient enforcement of regulation rules

Implications for the Society

KSBSGBBD [2016]: DTD powered by ACTUS
permissioned Distributed Ledger over distributed storage

Regulation Authorities | RA @ private nodes
Banks and Financial Institutions @ private / public nodes (with operation privileges - “write” & “limited read”)
Third Parties | Miners (authorized by RAs) @ private nodes (with operation privileges - only “validate”)
Social Sector (NGOs & Citizens) @ public nodes (with only “limited read” access privilege)
The main construct:
Dynamic Transaction Document (DTD) in detail

KSBSGBBD [2016]: DTD powered by ACTUS

API (on top of User Accounts)

Smart Contract DTD
- contract metadata
- state info
- functions
- path to deep DTD

Deep DTD
- M/FID/EMIR standards
- FSB based document model

DTD 2 components

- Regulation Authorities (RAs)
- Financial Institutions
- Third Party Miners
- Users

Smart Contract
- transaction validation
- access control

Private Node
- off-chain distributed storage
- connector

Distributed Storage Infrastructure (clustering)
A document model for DTD

**ACTUS** standards based interface

**DL account**

**API**

**Bank**

**Financial Institutions**

**DTD document model**

**types of components**

**C4: market data**

**C1: Contract Identity Data**
(Date, Instrument Identification Code, etc)

**C2: Counter-parties Identity Data**
(essentially LEIs)

**C3: Contract Financial Data**
(Price, Currency, initialDate, maturityDate, cycleOfInterest Payment etc)

**C5: Standard Input for FinAnalysis**

**states of evolution**

**Raw results, in particular cash flows**

accounting

regulation

economic analysis (liquidity, value, income, risk)
The ACTUS standard:

1. Provides, in a standardized way, the core elements of the financial analytics intelligence needed for understanding the health of financial institutions and markets.
2. Works in real time mode and simulation mode.
3. In simulation mode, separates the known (contract information) from the unknown (future state of the economic-financial environment represented as risk factors).
4. Covers about 90% of outstanding financial volume with 18 Contract Types (CTs); when completed, will cover 98+% with 32 CTs.

ACTUS is supported by two non-for-profit organizations:
- ACTUS Financial Research Foundation
- ACTUS Users Association
ACTUS modeling logic

Inputs

Contract Events

Expected Cash-Flows

Analytical Results

Market Risk

Counterparty Risk

Contracts

Behavior Risk

DTD dynamics

- DTD
  - static data (from contract)
  - obtained from external resources
  - expected financial events (via ACTUS)
  - DTD states (Smart Contract DTD)
- Cash flows (via ACTUS) provided input for financial analysis

- C1: Contract Identity Data
- C2: Counter-parties Identity Data
- C3: Contract Financial Data
- C4: Market Data

- S0, Si1, Si2, Sik-1, Sik, Sin, SiN
- t0, e1, e2, ek-1, ek, en, tEND

- Related even code - date - affected state variables
- Non-intended states Sni1, ..., K

- C4
- cfl1, cfl2, cfl(k-1), cfl(k), cfl(m), cflN
DTD and Risk Assessment: a toy example

Stress Scenario:

- Bank B gains
- Bank C loses
- Bank A and Bank B **jointly** report a financial transaction made through their connected IT systems.
- That means: Banks A and B **jointly sign the report** by using their DL accounts and **transfer access rights** to the competent Regulation Authority(ies).
- (*) Part of the reported information will become instantly public according to the reporting rules.
- The signed transaction is **broadcast to the DL** to be **validated** and **recorded** in the next update.

**Process next steps** (in detail) in the following slide...
(via Client App) The Representatives of the “Society at Large” receive cryptographic information

(via Client App) Regulator RA can:
- Obtain a list of all the addresses of all SC-DTD contracts in the system (automatically, through LEI Manager)
- Receive the list of States and related Variable for each SC-DTD

SC-DTD configuration (C1-C5)
- List of intended states
- State Numbering
- Related Event
- Event Code
- Date of Occurrence
- Affected Variables
- Complete List of Variables

UPDATE SC-DTD

bank A
1. Downloads SC-DTD template (based on ACTUS Contract Types (CTs))
2. Fills-in contract input
3. Pays related costs (e.g. ether)
4. Deploys
5. Registers the address of the newly created SC-DTD in Company’s FI manager
6. Requests approval from counter-parties

Create SC-DTD

bank B
1. Receives notification from SC-DTD approval (via LEI manager and its own FI manager)
2. Selects SC-DTD
3. Fill-ins Input
4. Approves/Disapproves (cancel*)

FI | banks

prior actions

(via Client App) PA3: Registers the address of FI Manager to LEI Manager
(via Client App) PA2: Creates and Deploys Company’s FI manager
(via Client App) PA1: Every FI creates a DLT User Account
We propose a new construct, a financial risk e-report portrayed as the *digital doppelganger* for every financial contract made under law.

We standardize and embed it into a Smart Contract Layer architecture that also integrates algorithmic financial functionality as provided by ACTUS software.

We employ a permissioned Distributed Ledger to store and manage such a smart contract in the objective to:

- Ensure information imitability, instant update, automatic compliance control and transparency
- Support system wide, transparent, consistent and near time risk assessment
- Effectively organize access control and assign permission rights

We complete the architectural design by adding a layer of off-chain distributed storage for the essential data included in a financial risk e-report.

We currently design a research project that can produce a prototype of this multi-layer network structure, focusing in particular on the following “problems to be solved”:

- What should be the equilibrium between distributed ledger and distributed storage resources that maintains system scalability and create system efficiency?
- What transaction validation mechanism(s) are specifically needed?
- What is the appropriate (distributed) privacy policy?
- How can we use secure multiparty computation techniques from cryptography to preserve data privacy?
- How can we develop a formal framework for reasoning about smart contracts?