ACTUS: The Smart Contract Standard for Regulatory Oversight of Financial Risk

FinTech Wholesale Working Group, FDIC
Washington, DC
January 11, 2017

Jefferson Braswell
ACTUS Financial Research Foundation
Today’s Presentation

- Uniqueness of Financial Contracts
- Smart Financial Contracts
- Use Case for Smart Financial Contracts

- The ACTUS Open Source Smart Contract Standard

Annex:
- Using the ACTUS Standard (Examples)
- Legacy Data with the ACTUS Standard
The ACTUS
Open Source Smart Contract Standard
Algorithmic Contract Types
Unified Standard

• The ACTUS Financial Research Foundation is building a data standard specifically designed to enable the full range of financial analyses needed for risk management and financial regulation

• ACTUS consists of
  1. A Data Dictionary which defines all contract terms required for financial analysis
  2. A set of Contract Types (CT) which are computable algorithms (smart contracts) that are able to precisely generate state-contingent cash flows at the individual contract level

  ▪ To our knowledge, there is no other current effort that aspires to create a data standard with this capability
ACTUS Contract Types

ACTUS Contract Types

Basic
- Maturities
  - PAM
  - ANN
  - NAM
  - LAM
  - ANX
  - NAX
  - LAX
  - CLM
  - PBN
- Non-Maturities
  - CSH
  - UMP
  - STK
  - COM
- Credit Enhancements
  - CEG
  - CEC

Combined
- Symmetric
  - SWAPS
  - SWPPV
  - FXOUT
  - FUTUR
- Options
  - OPTNS
  - CAPFL
  - BNDCP
  - BNDWR
  - CFXOP
  - IRXOP
  - STXOP
  - CMXOP
  - FXXOP
- Credit Derivatives
  - CDSWP
  - TRSWP
  - CLNTE
- Securitization
  - SCRMR
  - SCRCR
The ACTUS Approach

The Analysis Assembly Line:

State of the Risk Factors → Contract Terms → Expected State Contingent Cash Flows → Financial Analysis Results
Contracts, Algorithms and Cash Flow Patterns

Financial contracts are the deterministic component of financial markets:

• The algorithms are realized in software modules that reflect the logical and mathematical representation of legal financial agreements

• The number of cash flow patterns is limited: Despite the large number of different financial products, many differences fall away when the focus is on cash flow

• Analysis: With a consistent, tested and validated algorithmic representation of financial contracts, analysts are free to bring any analytical approach/model to bear
The Model

Risk Factors

Credit Risk Factors

Market Risk Factors

Behavior Risk Factors

Financial Contracts (Data + Algorithms)

e₁ e₂ e₃ .... eₙ₋₁ eₙ

t

cfl₁ cfl₂ .... cflₙ

t

Contract Inputs

Contract Events

Expected Cash-Flows

Analytical Results

Liquidity Income Value
Business Rationale: “The Problem”
Business Process and Infrastructure

- **Economic Data** → Executive Management → Reporting
  - Balance Sheet
  - Income Statement
  - Quarterly Reports
  - Regulatory Filings

- **Market Data** → Business Line Management

  - Business Staff
  - Business Analytics
  - Counterparty Data

- **Transactions** → Operational Systems → Operational Systems → Operational Systems
  - Information Technology
Supervision of Financial Service Entities
Business Rationale: “The Solution”
Financial Product Contracts

- Commercial Loans
- Market Securities
- Deposits
- Credit Cards
- Commodities and Futures
- Derivatives
- Mortgages
Financial Contract Data Model: Business Requirements and Objectives

- Cover the complete spectrum of financial products of full-service financial institutions with an adaptable and extensible model
- Minimize implementation risk and cost with a “non-invasive”, read-only data extraction strategy
- Maximize data accuracy and quality with metadata management and code-generation productivity tools
- Include all contract-level terms required for transaction processing and forward-looking cash flow analysis
- Provide a tunable aggregation and data compression methodology with goodness-of-fit metrics
- Establish a risk analysis results data repository for big data analytics and flexible regulatory reporting capabilities.
Financial Contract Operational Model
Necessary, Sufficient and Electable

EXTRACT, TRANSFORM, LOAD

PRODUCTION SYSTEMS
(Algorithmic Contract Type Unified Standards)
ACTUS-enabled Risk Analysis

RESULTS DATA SETS

ACCESS TO STANDARDIZED ACTUS DATA

Extract, Transform, Load

Production Systems

© Copyright ACTUS 2013

Date: 4/4/19
Static Versus Dynamic Analysis
Static Analysis
Liquidation View

- **Assets**
  - Existing Business

- **Liabilities**
  - Existing Business

- **Yield**
  - Volatility in $t_0$ ($\sigma$)

- **Time to Maturity**

- **Time**

- **$\Delta NPV$**
Dynamic Analysis
Going Concern View

- New volume /reinvestment
- Type of new business
- Pricing

Assets

Liabilities

Existing Business

New Business

Time

Spread

Yield curve t₀

Yield curve t₁

Yield curve t₂

Time to Maturity

Liquidity

© Copyright ACTUS 2013

Date: 4/4/19
Flexible Analytical Results

- Because ACTUS-based analysis starts at the level of the individual financial contract, there is maximum flexibility with respect to levels and types of aggregation of the analytical results that are possible.
- Any selection and combination of contract-level elements can be used as the parameters for aggregation and classification.
- This flexibility insures that analyses are not constrained by prior assumptions as to what aggregation criteria to use.
ACTUS Financial Research Foundation is building a set of 33 smart financial contracts

The ACTUS *Contract Types* (CTs):

- Cover the overwhelming majority of financial market instruments
- Generate contract-specific, precise forward-looking cash flows
- Are *open source* and available to all *without charge* from the not-for-profit ACTUS Foundation

ACTUS Financial Research Foundation has benefited from the financial support of:

- The Alfred P. Sloan foundation
- Deloitte Consulting
- Stevens Institute of Technology
- Zurich University of Applied Sciences
www.actusfrf.org

For inquiries, please contact:

Jefferson Braswell

- CEO and Founding Partner of Tahoe Blue, a data standards and risk management advisory.
- Member of the Board of Directors of the Global LEI Foundation (GLEIF)
- Chair of the ACTUS Financial Research Foundation Board of Governors
- Email: LJB@TahoeBlue.com