

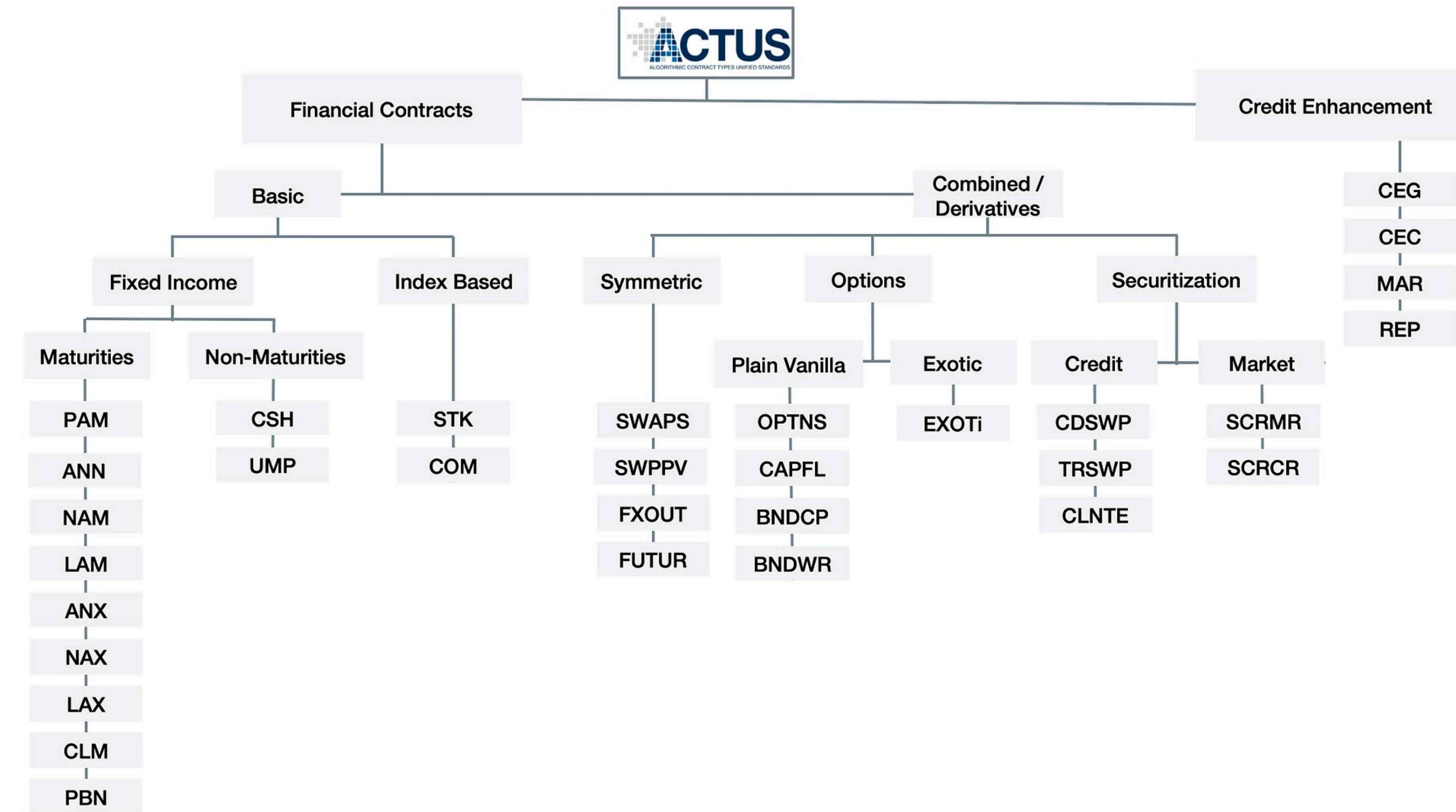
# Uphold Webinar

**ZK-ACTUS**  
**Verifiable Financial Contracts**

# **Part 1: ACTUS**

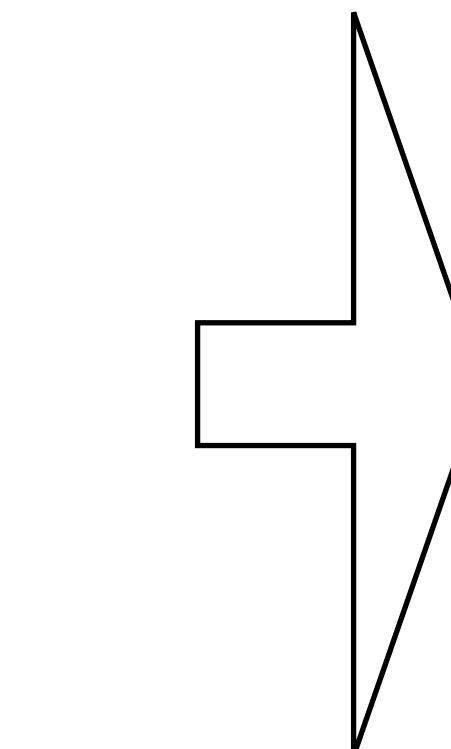
## **An Emerging Financial Standard**

**actusfrf.org**



```
{  
    "contractType": "ANN",  
    "contractID": "ann01",  
    "contractRole": "RPA",  
    "contractDealDate": "2012-12-28T00:00:00",  
    "initialExchangeDate": "2013-01-01T00:00:00",  
    "statusDate": "2012-12-30T00:00:00",  
    "notionalPrincipal": " 5000",  
    "cycleAnchorDateOfPrincipalRedemption": "2013-02-01T00:00:00",  
    "nextPrincipalRedemptionPayment": "434.866594118346",  
    "dayCountConvention": "A365",  
    "nominalInterestRate": "0.08",  
    "currency": "USD",  
    "cycleOfPrincipalRedemption": "P1ML0",  
    "maturityDate": "2014-01-01T00:00:00",  
    "rateMultiplier": "1.0",  
    "rateSpread": "0.0",  
    "fixingDays": "P0D",  
    "cycleAnchorDateOfInterestPayment": "2013-02-01T00:00:00",  
    "cycleOfInterestPayment": "P1ML0"  
}
```

Term Set (ANN)



Algorithm

```
{  
    "eventDate": "2013-01-01T00:00",  
    "eventType": "IED",  
    "payoff": "-5000.0",  
    "currency": "USD",  
    "notionalPrincipal": "5000.0",  
    "nominalInterestRate": "0.08",  
    "accruedInterest": "0.0"  
,  
    "eventDate": "2013-02-01T00:00",  
    "eventType": "PR",  
    "payoff": "400.8939913786",  
    "currency": "USD",  
    "notionalPrincipal": "4599.1060086213",  
    "nominalInterestRate": "0.08",  
    "accruedInterest": "33.9726027397"  
,  
    ...etc  
}
```

Event Sequence

## Algorithms

- **Inputs**
  - Machine readable
  - Composable
  - Heterogeneous
- **Output**
  - Event Sequence
  - Cash Flows +
  - Homogeneous
- **Types**
  - Utility Functions
  - State Transition Functions
  - Payoff Functions

**Dictionary**

**Taxonomy**

**Contract**

**Term Set**

**Term**

**Applicability**

**Enum**

**Scalar Type**

**Function Type**

**JAVA**

**RUST**

(WIP)

**HASKELL**

**PYTHON**  
(WIP)

**TYPESCRIPT**  
(WIP)

**SOLIDITY**

## ACTUS Challenges

- **Technical Specification**  
*Somewhat fuzzy*
- **Floating Point Arithmetic**  
*Money & Time*
- **Reference Implementation**  
*Unsuitable for general purpose DLT*
- **Foundation**  
*Endowment*

# **Part 2: ACTUS + ZK + DLT**

## **Verifiable Financial Contracts**

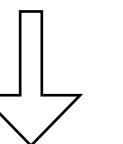
**VFC  
Integrity**

**VFC  
Tokenisation**

**VFC  
Payments**

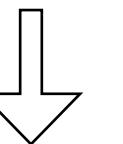
## ACTUS

(Counter Parties, Term Set, Algorithm, Cash Flows)



## Cryptographic Proofs

(Signatures, ZK-Attestations, Fingerprints, ZK-Proofs)

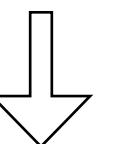


## DLT

(Smart Contract)

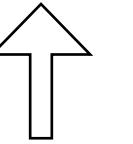
## Issuance

(Portfolio(s), Identifier, Direction, Counter Parties, Units, Metadata)



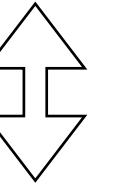
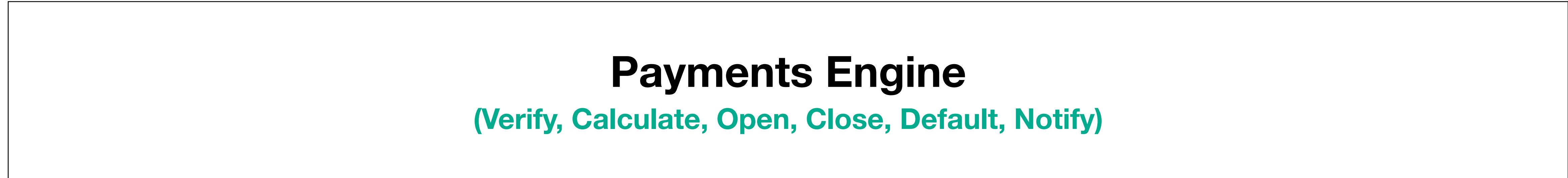
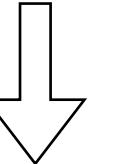
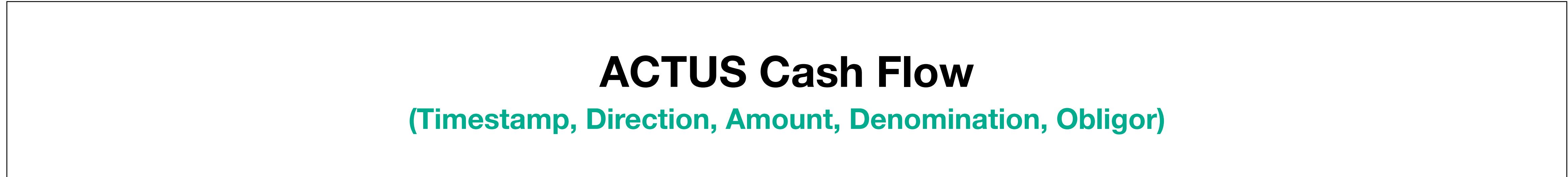
## DLT

(Smart Contract)



## Servicing

(Auditors, Rating, Regulators, Markets)



# ACTUS + ZK + DLT

# VFC Gateway

**API Gateway**

**ZK Provers**

**Data Availability**

**DLT Contracts**

## VFC Principles

- **Occams Razor**  
**As Little As Possible, As Much As Necessary**
- **Chain Agnostic**  
**Standard Smart Contracts**
- **Privacy Preserving**  
**Who, What, When, Why**
- **Trust But Verify**  
**Cryptographic Proofs Everywhere**

## VFC Challenges

- **Regulatory Certitude**  
Robust. Nuanced. Adaptive.
- **Counter-Party Risk**  
Identity -> KYC/AML. Defaults -> ???
- **Post Quantum Security**  
Cryptography equivalent to Y2K
- **Jurisdictional Anchoring**  
Smart Legal Contracts
- **Technological Flux**  
Multi-Decadal Platforms

# Part 3: Coalesce

A decentralised micro-finance platform

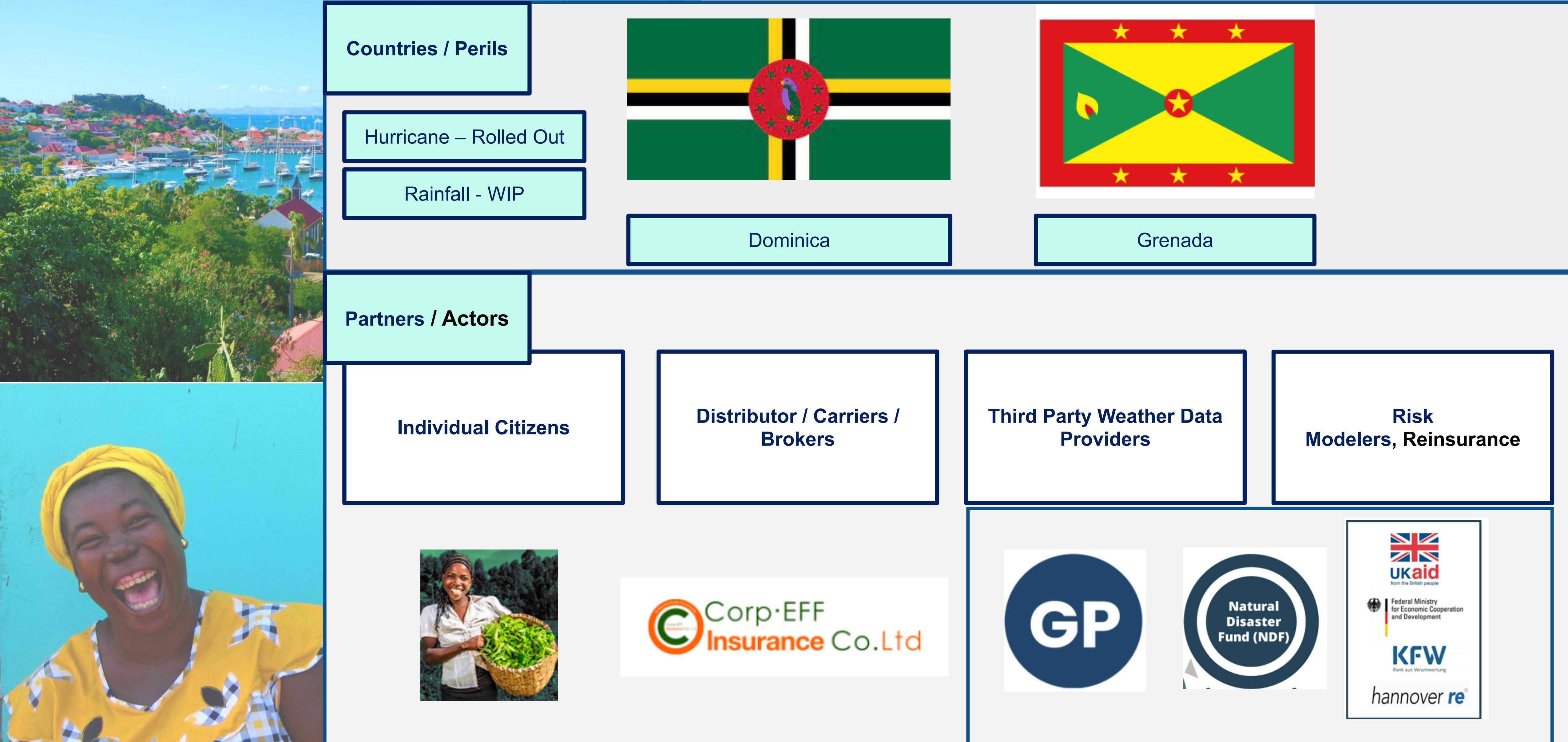


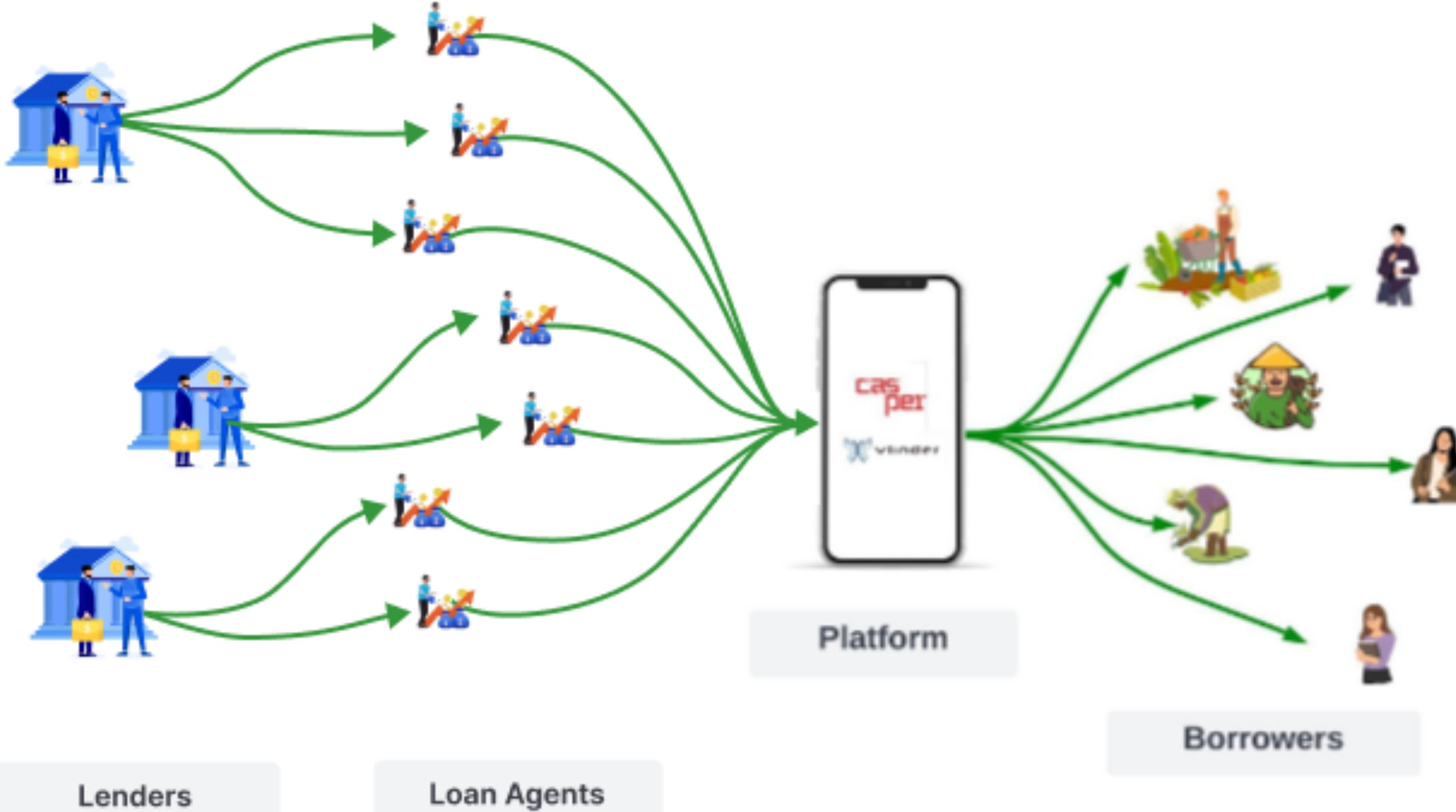
**ACTUS**  
ALGORITHMIC CONTRACT TYPES UNIFIED STANDARDS

**casper**

 **vlinder**

# Financial Inclusion – Parametric Insurance Roll Out





## Coalesce Actors

### Lenders

- Micro Entrepreneurs
- Financial Institution

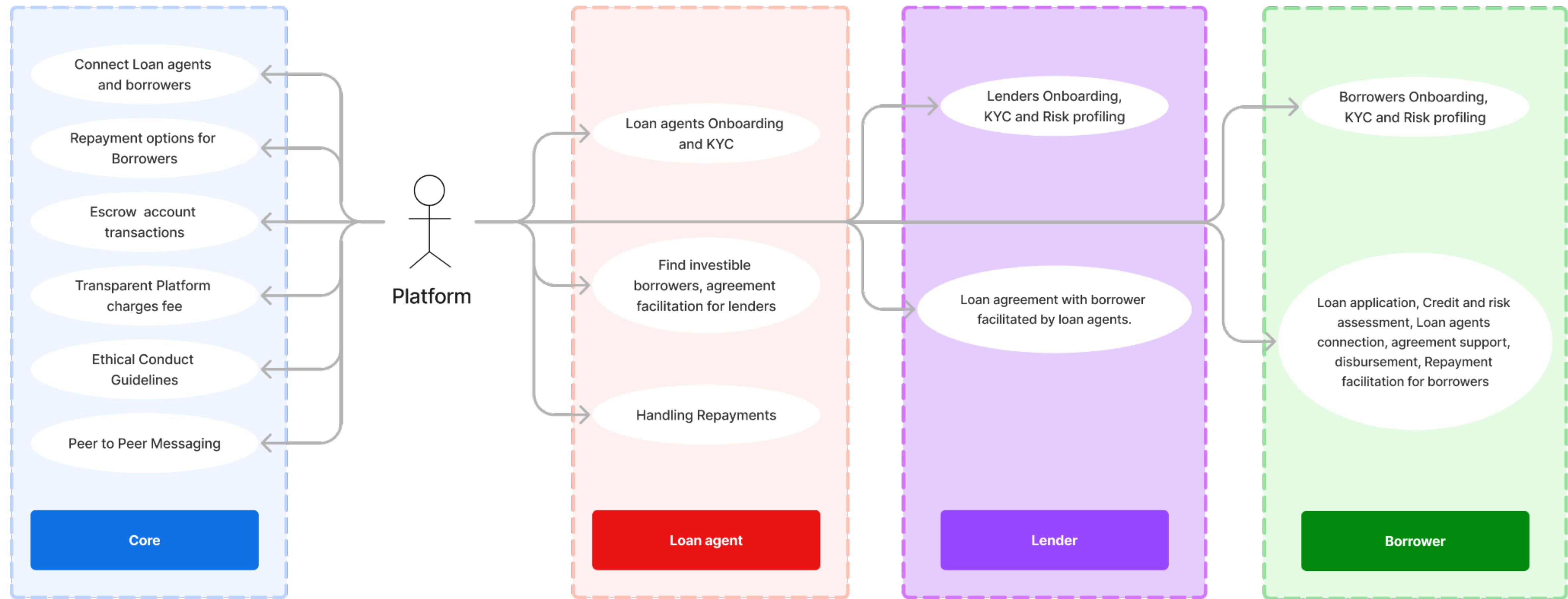
### Loan Agents

- Local NGOs
- Loan Officers

### Borrowers

- Farmers
- Low Income Community

# Coalesce Interaction Flow



# Coalesce – Lender View I

The screenshot shows the APP LOANS mobile application interface for a lender named Katie Pena. The top navigation bar includes the APP LOANS logo, a bell icon, and Katie Pena's profile picture with the title "Lender". The main dashboard features a welcome message "Hi Katie Pena" and a "Welcome back to Apploans dashboard". Key performance metrics are displayed in four boxes: Dispersed Amount (\$15,439), Amount Earned (\$12,389), Available to Lend (\$12,389), and Amount of Missed Payments (\$1,230). A "Loan Analytics" section contains a grouped bar chart showing monthly loan activity across three categories: Active (purple), Completed (blue), and Overdue (light blue). Below the chart are sections for "My Loan Agents", "New Loan Requests", and "Overdue Payments", each with a "View All" button. The left sidebar lists navigation options: Explore, Dashboard (selected), My Loan Agents, Lend Now, Listed Loans, Loans Dispersed, Transactions, Estimated Repayments, and Message (with a red notification badge showing 8).

APP LOANS

Katie Pena  
Lender

Explore

Dashboard

My Loan Agents

Lend Now

Listed Loans

Loans Dispersed

Transactions

Estimated Repayments

Message 8

Hi Katie Pena

Welcome back to Apploans dashboard

\$15,439 Dispersed Amount

\$12,389 Amount Earned

\$12,389 Available to Lend

\$1,230 Amount of Missed Payments

Loan Analytics

Select

Active

Completed

Overdue

500

400

300

200

100

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

My Loan Agents View All

New Loan Requests View All

Overdue Payments View All

Eleanor Pena →

Eleanor Pena →

Ronald Richards 2 months →

# Coalesce – Lender View II

The screenshot displays the APP LOANS mobile application interface, specifically the 'Explore' screen for a lender named Katie Pena.

**Header:** APP LOANS logo, Katie Pena (Lender) profile picture, notification bell icon.

**Left Sidebar (Dashboard):**

- Explore (selected)
- Dashboard
- My Loan Agents
- Lend Now
- Listed Loans
- Loans Dispersed
- Transactions
- Estimated Repayments
- Message (8 notifications)

**Top Bar:** Sort By (Location dropdown), Location dropdown.

**Explore Screen Content:**

The 'Explore' screen lists six loan opportunities, each represented by a card:

Borrower Name	Location	Description	Your Returns	Tenure	Rating
Kerry Sanford	Jamaica	...dipiscing elit, sed do eiusmod idu...	6.0%	12 Months	4.2 ★
Kerry Sanford	Jamaica	...dipiscing elit, sed do eiusmod idu...	6.0%	12 Months	4.2 ★
Kerry Sanford	Jamaica	...dipiscing elit, sed do eiusmod idu...	6.0%	12 Months	4.2 ★
Kerry Sanford	Jamaica	...dipiscing elit, sed do eiusmod idu...	6.0%	12 Months	4.2 ★
Kerry Sanford	Jamaica	...dipiscing elit, sed do eiusmod idu...	6.0%	12 Months	4.2 ★
Kerry Sanford	Jamaica	...dipiscing elit, sed do eiusmod idu...	6.0%	12 Months	4.2 ★

Each card includes a 'View Borrower →' button.

# Coalesce – Borrower View I

The screenshot shows the APP LOANS Borrower View interface. At the top, there's a dark blue header with the APP LOANS logo, a "Get Verified" button, a notification bell icon, and a profile picture for Katie Pena, labeled "Borrower". Below the header is a navigation bar with links: Explore, Your Loans, List New Loans, Calculate Loans, Repay, Loans Received, and Dashboard (which is highlighted). A welcome message "Hi Katie Pena" and a "Welcome back to Apploans dashboard" message follow. Four summary cards are displayed: "Amount Received" (\$123.00), "Amount to Pay" (\$22,880), "Loans Signed" (05), and "Missed Payments" (02). Below these is a "Loan Analytics" section with a chart showing transaction volumes over time. The chart has three data series: Active (purple bars), Completed (dark blue bars), and Overdue (light blue bars). The Y-axis ranges from 200 to 500. The X-axis shows monthly intervals. The legend indicates: Active (purple dot), Completed (dark blue dot), and Overdue (light blue dot).

APP LOANS

Get Verified

Katie Pena  
Borrower

Explore Your Loans List New Loans Calculate Loans Repay Loans Received Dashboard

Hi Katie Pena

Welcome back to Apploans dashboard

\$123.00 Amount Received

\$22,880 Amount to Pay

05 Loans Signed

02 Missed Payments

Loan Analytics Month

● Active ● Completed ● Overdue

500

400

300

200

100

0

Month

● Active ● Completed ● Overdue

# Coalesce – Borrower View |



# APP LOANS

[Get Verified](#)

Katie Pena  
Borrower

[Explore](#)

[Your Loans](#)

[List New Loans](#)

[Calculate Loans](#)

[Repay](#)

[Loans Received](#)

[Dashboard](#)

## Explore

### Search

Search for Name, Email, etc....

Search

**Personal Loans** 4.2

32759 Applied

**\$5,000**  
Amount

**5.99%**  
Interest

[View Loan →](#)

**Personal Loans** 4.2

32759 Applied

**\$5,000**  
Amount

**5.99%**  
Interest

[View Loan →](#)

**Personal Loans** 4.2

32759 Applied

**\$5,000**  
Amount

**5.99%**  
Interest

[View Loan →](#)

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**\$5,000**  
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**5.99%**  
Interest

[View Loan →](#)

**Personal Loans** 4.2

32759 Applied

**\$5,000**  
Amount

**5.99%**  
Interest

[View Loan →](#)

**Personal Loans** 4.2

32759 Applied

**\$5,000**  
Amount

**5.99%**  
Interest

[View Loan →](#)



**Thank you**

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**Verifiable Financial Contracts**