Project Closeout Report

A. Name of project and Project URL on Ideascale/Fund

BlockMargin https://milestones.projectcatalyst.io/projects/1100040

B. Name of project manager: Dmitry Shibaev

C. Date project started: 11-Mar-2024

D. Date project completed: 22-Sep-2025

E. List of challenge KPIs and how the project addressed them:

The campaign brief:

- The Cardano Use Cases: Concept category is aimed towards projects seeking to develop early stage ideas that will deliver proof of concept, design research and basic prototyping for innovative Cardano-based products, services, and business models.
- Projects must be prototyping the lowest level of fidelity or functionality necessary to get the research and design feedback required before making expensive and time consuming development activities.
- Project must explore opportunities and ideas that first focus on making discoveries early in the product design process and produce specifications and a pathway that requires more significant technical development and feasibility testing

This proposal addressed the campaign brief by developing a prototype for trading Interest Rate Forward Rate Agreements (FRAs), which are closely related to Interest Rate Futures. To the best of our knowledge, this is a completely new product on Cardano—and likely across other blockchains—as such instruments have not been released for mass use anywhere due to the complexity of their pricing and risk management.

At the outset, we planned to use the Marlowe language as extensively as possible. However, we discovered that it was no longer being actively maintained, making it unsuitable for our needs. As a result, we pivoted to Aiken, which ultimately proved to be a viable solution for our project.

The following were the key innovations achieved during the project

- Smart Contract and Transaction design to handle lifecycle events of Interest Rate Derivatives:
    - Trade Initiation by Counterparty A
    - Trade acceptance by Counterparty B
    - Posting and Withdrawing of Margin
    - Trade cancellation by Counterparty A before being accepted by Counterparty B
    - Settlement of Matured Trades
    - Liquidation of Margin in case of default (the market moves beyond a threshold and counterparty fails to post additional margin)
    - Recovery of any remaining margin by the defaulted counterparty

- An oracle that is based on an Interest Rate Curve with different maturities.

- A daemon running as a service that updates the oracle on an hourly basis. We discussed the oracle design with Charlie3 team and concluded that they would be able to handle the update to the oracle if and when the application gets released on the Mainnet.
- A decentralized orderbook. When orders are initiated by a counterparty (e.g. buy side) then the other side of the trade gets posted onto an order book that others can take (e.g. the sell side). Once the other side is taken then the trade is considered live. This order book is a smart contract on-chain - which greatly reduces the reliance of the application on the web2 infrastructure
- Chained transactions to execute a cascade of FRA trades to emulate an Interest Rate Swap. This used quite a technique on Cardano where multiple transactions can be built sequentially where the UTXO output from one is used as an input to the next transaction. This lets the user submit multiple FRAs as a package and therefore construct more complex products using FRAs as the building block.

The prototype gives us the ability to have meaningful conversations with enterprises, financial institutions, brokers and regulators on how Interest Rate Derivatives can be margined and settled on a UTXO based blockchain.

F. List of project KPIs and how the project addressed them:

A functioning application is running on the Cardano Preview testnet and can be accessed by think link: https://blockmargin.app/trade

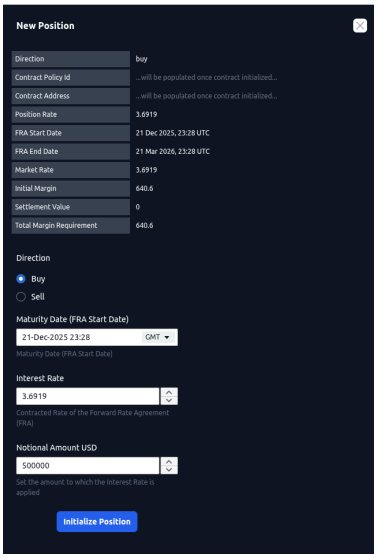
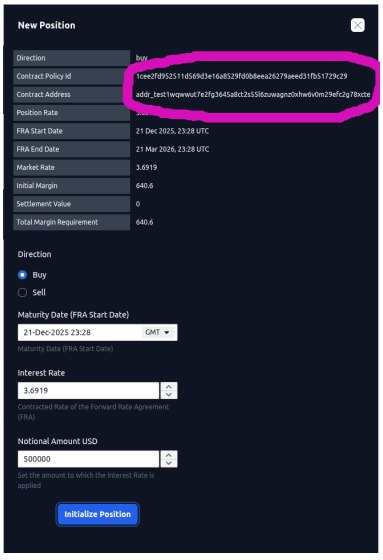
The list of deliverables for each milestone and how we addressed them is described in the table below. We have had to make adjustments as we progressed through the milestones which are also noted below

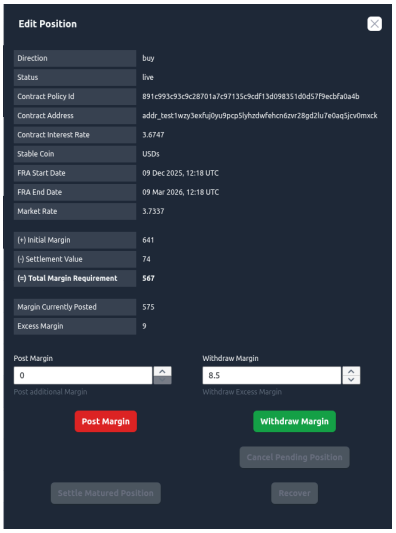
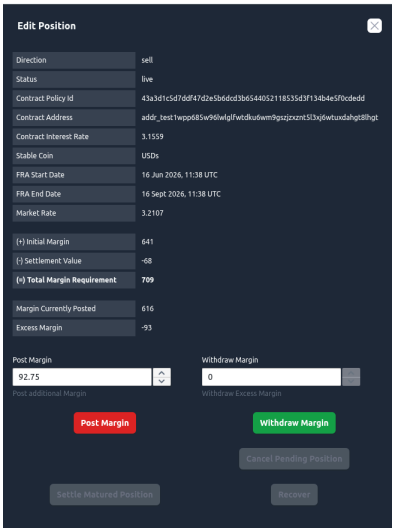
<table>
<tr><th>KPI Deliverable</th><th>Output</th></tr>
<tr><td colspan="2">MIlestone 1</td></tr>
<tr><td>A Linux server environment is operational, a Cardano node is running and connected to the Cardano Preview Testnet, a DBSync and Graphql services are running</td><td rowspan="5">The video walkthrough evidences the set-up of a dev environment and the different services running on our server.

https://www.youtube.com/watch?v=0ph2HXHaxHk

The exception is the Marlowe environment that we realised was not being updated for Cardano hardforks at the time and for that reason we had to pivot to using Aiken for our smart contracts</td></tr>
<tr><td>A Marlowe deployment is running on the server</td></tr>
<tr><td>A local environment used by the developer is available</td></tr>
<tr><td>A NodeJS is running on a Linux server and MongoDB service to which the developer can connect remotely</td></tr>
<tr><td>Accounts have been created with Blockfrost and Maestro</td></tr>
<tr><td colspan="2">MIlestone 2</td></tr>
<tr><td>3m SOFR futures prices are published once a day to the Cardano Preview Testnet</td><td rowspan="3">The video evidencing completion of these KPIs is here https://youtu.be/W9nqh79T0KQ

During the project we decided to build the prototype for FRAs rather than for Futures for being very similar and yet more interesting for the Financial services industry and enterprises. Futures already trade on organized exchanges and the exchange of margin is streamlined. FRAs on the other hand are traded Over the Counter (OTC) and much less standardized than Futures. FRAs are also the building blocks for Interest Rate Swaps which would let us build out once we finish with FRAs</td></tr>
<tr><td>An API endpoint that accepts trade characteristics and returns a Price</td></tr>
<tr><td>An API endpoint that accepts a price and trade characteristics and returns an estimate of how high and and how low the value of the trade can go in 2 days</td></tr>
</table>

	The API endpoints were created to demonstrate the functionality, in the final product these endpoints are used by the platform to determine prices and amount of margin that should be posted
MIlestone 3	
The smart contract can be generated by a user from the front end user interface and a new trade initiated. This is done by connecting with a Cardano compatible web wallet to the front end.	We created a parametrized smart contract that gets parametrized when a user initiates a trade. This is visible when creating a new positions, the Contracts PolicyId and Address are only populated once the user chooses to initialise the position Before Initializing  After Initilializing  Video evidencing completion of the milestone: https://youtu.be/UJGiRjXxdBc
The front end shows the initiated smart contract and the outstanding actions. Collateral can be posted and redeemed using the dashboard	Posting and Withdrawing events have been implemented. Here are the printscreens from the platform and can be trialed on the platform directly

	Withdraw Margin  Post Margin: 
Milestone 4	
Tests are executed, and the platform behaves as expected. The expected behaviour is described in the Output section above	A separate testing report has been prepared for this section: https://github.com/dynamicstrategies/blockmargin_public/blob/main/BlockMargin_Testing_Report.pdf
A closeout video and a closeout report with a platform walkthrough, summary of test results, lessons learned and next steps	Closeout video: https://youtu.be/hjBPcXapVOY Platform walkthrough video: https://youtu.be/7iRLQnwxNUo
A front end with a dashboard is made available for the community to test trades independently	https://blockmargin.app/trade X post with call to action: https://x.com/dynamic_io/status/1968799845998641352

Use of the Marlowe DSL:

The original project plan envisioned extensive use of the Marlowe language within the platform. However, soon after development began, the Marlowe team was significantly downsized, and IOG's support was greatly reduced. The remaining developers were only able to contribute on a best-efforts basis.

We attempted to launch a local blockchain indexer, but discovered it had not been updated for the latest Cardano hard fork. Updating the code to be compatible with the current Cardano node would have caused substantial delays.

As a result, we explored alternatives, including the Aiken codebase, and tested several models for building transactions and validators to support the financial logic of FRAs. Given Marlowe's lagging development, we pivoted to Aiken for our smart contract needs, where we plan to continue investing going forward.

We note that Marlowe received Catalyst funding for the first phase of its relaunch. However, the final milestone of that effort is past due as of this report. Consequently, BlockMargin has no current plans to use Marlowe.

G. Key achievements (in particular around collaboration and engagement):

We successfully built a prototype of a platform for settling and margining Interest Rate Derivatives on the Cardano blockchain.

- Designed the trade lifecycle of an Interest Rate Derivative trade for a UTXO based blockchain. The logic had to adapt to minting tokens / locking assets in validators.

- Designed Smart Contract and Transaction builder to handle lifecycle events of Interest Rate Derivatives:
    - Trade Initiation by Counterparty A
    - Trade acceptance by Counterparty B
    - Posting and Withdrawing of Margin
    - Trade cancellation by Counterparty A before being accepted by Counterparty B
    - Settlement of Matured Trades
    - Liquidation of Margin in case of default (the market moves beyond a threshold and counterparty fails to post additional margin)
    - Recovery of any remaining margin by the defaulted counterparty

- Created an automated Oracle that is based on an Interest Rate Curve with different maturities. Built a daemon running as a service that updates the Oracle on an hourly basis. We discussed the oracle design with Charlie3 team and concluded that they would be able to handle the update to the oracle if and when the application gets released on the Mainnet. Also identified 3 data providers (two of which are large interbank brokers) to supply data into the Oracle.

- Built a Decentralized Orderbook. When orders are initiated by a counterparty (e.g. buy side) then the other side of the trade gets posted onto an order book that others can take (e.g. the sell side). Once the other side is taken then the trade is considered live. This order book is a smart contract on-chain - which greatly reduces the reliance of the application on the web2 infrastructure

- Designed Chained transactions to execute a cascade of FRA trades to emulate an Interest Rate Swap. This used quite a novel technique on Cardano where multiple transactions can be built sequentially where the UTXO output from one is used as an input to the next transaction. This lets the user submit multiple FRAs as a package and therefore construct more complex products using FRAs as the building block.

- Built a Pricer for FRAs using Aiken in the smart contract that uses inputs from an Oracle and trade details to determine the value of FRA

- Built and Calibrated a Risk Engine that is also built into an Aiken Smart Contract that determines the minimum amount of margin that needs to be posted when initiating a trade.

The prototype gives us the ability to have meaningful conversations with enterprises, financial institutions, brokers and regulators on how Interest Rate Derivatives can be margined and settled on a UTXO based blockchain.

H. Key learnings

Key takeaways:

- The UTXO models is capable of handling the trade lifecycle events common to Interest Rate Derivatives
- Oracle design that uses Inline Datums is capable of handling the market data in the curve format (e.g. interest rate curves) in addition to the mode traditional prices (e.g. ADAUSD rates)
- The financial industry is open to having conversations about real world assets on the blockchain and is cautiously optimistic about working with blockchain technologies in the future

I. Next steps for the product or service developed

The prototype gives us the ability to have meaningful conversations with enterprises, financial institutions, brokers and regulators on how Interest Rate Derivatives can be margined and settled on a UTXO based blockchain. We have ongoing conversations and leads with:

- Employees at large financial institutions who have been able to give us constructive feedback on the platform and areas for improvement
- Two large interbank brokers
- A UK based TradFi exchange

With the prototype running on the Testnet, we are seeking regulatory clarity on releasing it to the Mainnet for US based participants. Our preliminary analysis indicates that

- FRAs are considered as Swaps and regulated by the CFTC in the US
- The platform would need to be registered as a SEF (Swaps Execution Facility) for Swap Dealer to use it for their BAU trading
- Transaction reporting needs to be provided to a Swap Data Repository (SDR)
- FRAs are not mandatory to be traded on SEFs and can still be traded OTC
- FRAs must be limited to Eligible Contract Participant (ECP) which in board terms are corporations and high net worth individuals
- FRAs can be offered to retail through a DCM such as a Futures exchange

Our next step is to prepare the platform for the Mainnet and identify how to clear the regulatory hurdles listed above and explore partnerships with an established TradFi market maker. The most direct route is to:

- Partner with a TRadFi to provide market making of FRAs
- Offer the FRAs as OTC to ECPs
- Build out the mandatory reporting from the blockchain

Follow up on banking conversation and adoption:

Building the platform has enabled us to engage in meaningful discussions with our contacts in traditional banking and trading. Throughout development, we conducted demos, gathered feedback, and incorporated suggested improvements

into our design. Now that the platform is live on testnet, we are preparing the next round of demos and conversations. As we make material progress on these discussions and adoption, we will share updates on:

- Our company's linkedin page: https://www.linkedin.com/company/dynamicstrategies/

- Our X account: https://x.com/dynamic_io

J. Final thoughts/comments

BlockMargin is a significant step forward in demonstrating how complex financial instruments, such as Interest Rate Forward Rate Agreements (FRAs), can be designed, margined, and settled on a UTXO-based blockchain like Cardano.

Over the course of the project, we successfully built a fully functional prototype that handles the full lifecycle of FRA trades. It integrates critical components such as a decentralized orderbook, a chained transaction system to emulate swaps, an automated oracle, and a risk engine to calculate margin requirements. These innovations collectively provide a practical proof of concept for how derivatives trading could operate in a decentralized, blockchain-native environment, reducing reliance on traditional Web2 infrastructure while maintaining transparency and auditability.

The prototype created a foundation for meaningful conversations with financial institutions, brokers, and regulators about blockchain adoption for derivatives, highlighting both technical feasibility and regulatory considerations. Looking ahead, the next steps focus on Mainnet readiness, regulatory clarity, and strategic partnerships with established market participants to enable compliant OTC trading for Eligible Contract Participants. Overall, BlockMargin has successfully delivered a pioneering platform that bridges traditional finance and blockchain technology, opening the door to further exploration and adoption of on-chain interest rate derivatives.

K. Links to other relevant project sources or documents. Please also include a link to your video here.

The Closeout video includes an introduction, a walkthrough of the platform and lessons learned.

- Walk through each section "Order Book", "Portfolio", "Products", "Liquidations", "Market Data" and "Settings"
- Connect to a Cardano Wallet and get some USDs stablecoins
- Initiate a new "buy" position
- Go to Market Data and initiate a new "sell" position from one of the standardised points on the curve
- Go to Products and "buy" a 1y hedge
- Switch to another wallet, go to the order book and take all the positions
- Wait for the market to move and then post additional margin and withdraw any excess margin

Link to the Closeout Video: https://youtu.be/hjBPcXapVOY

Link to the platform walkthrough Video: https://youtu.be/7iRLQnwxNUo

Website:

Testnet website: https://blockmargin.app/trade