National College of Ireland
Project Submission Sheet

Student Name:	Mohd Nizam Mohd Nasir Shaikh
Student ID:	24198170
Programme:	Master of Science in FinTech MSCFTD1 **Year:** 2025-2026
Module:	Blockchain Technologies
Lecturer:	Prof. Sean Heeney
Submission Due Date:	30/November/2025
Word Count:	2843

I hereby certify that the information contained in this (my submission) is information pertaining to research I conducted for this project. All information other than my own contribution will be fully referenced and listed in the relevant bibliography section at the rear of the project.
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Signature: Mohd Nizam

Date: 30/11/2025

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1. Please attach a completed copy of this sheet to each project (including multiple copies).
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4. You must ensure that all projects are submitted to your Programme Coordinator on or before the required submission date. **Late submissions will incur penalties.**
5. All projects must be submitted and passed in order to successfully complete the year. **Any project/assignment not submitted will be marked as a failure.**

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AI Acknowledgement Supplement:

Module: Blockchain Technologies (MSCFTD1)

Your Name/Student Number	Course	Date
Mohd Nizam Shaikh / 24198170	Master of Science in FinTech	30/11/2025

This section is a supplement to the main assignment, to be used if AI was used in any capacity in the creation of your assignment; if you have queries about how to do this, please contact your lecturer. For an example of how to fill these sections out, please click here.

AI Acknowledgment:

This section acknowledges the AI tools that were utilized in the process of completing this assignment.

Tool Name	Brief Description	Link to tool
N/A	N/A	N/A

Description of AI Usage:

This section provides a more detailed description of how the AI tools were used in the assignment. It includes information about the prompts given to the AI tool, the responses received, and how these responses were utilized or modified in the assignment. **One table should be used for each tool used**.

Evidence of AI Usage:

This section includes evidence of significant prompts and responses used or generated through the AI tool. It should provide a clear understanding of the extent to which the AI tool was used in the assignment. Evidence may be attached via screenshots or text.

Additional Evidence:

[N/A]

Academic Honesty Declaration

I declare the following to be true for this submission:

- I have completed the task during the designated time window and declare it to be exclusively my own work.
- I have not received, or attempted to receive assistance in preparing this response from any other person during the assessment window.
- I have not provided, or offered to provide, assistance to any other student by any means during the assessment window.
- I have read and understand the National College of Ireland guidelines of Plagiarism.

AGENDA

I.	PRESENTATION	URL (Link)
II.	POWERPOINT PPT	URL (Link)
III.	ERC20	ETHEREUM REQUEST FOR COMMENT 20 – TOKENIZATION
IV.	ERC721	ETHEREUM REQUEST FOR COMMENT 721 – NON-FUNGIBLE TOKENS
V.	CASE STUDIES	FOUR DOMAINS as [A, B, C, D]
V.A	FINANCIAL REALM	NASDAQ LINQ
V.B	CYBERSECURITY DOMAIN	IBM TRADE
V.C	MANUFACTURING INDUSTRY	WALMART's IBM FOOD TRUST
V.D	AGRICULTURAL SECTOR	AGRI-DIGITAL
V.E	REFERENCES	4 DOMAINS REFERECING

BLOCKCHAIN TECHNOLOGY

I. PRESENTATION URL – https://studentncirl-my.sharepoint.com/:v:/g/personal/x24198170_student_ncirl_ie/ERIPAtkPfldBknZabO2ZwOkBEZJctdNXLryM0qxb4LZ0tg?email=Sean.Heeney%40ncirl.ie&e=UnKvGp&nav=eyJyZWZlcnJhbEluZm8iOnsicmVmZXJyYWxBcHAiOiJTdHJlYW1XZWJBcHAiLCJyZWZlcnJhbFZpZXciOiJTaGFyZURpYWxvZy1MaW5rIiwicmVmZXJyYWxBcHBQbGF0Zm9ybSI6IldlYiIsInJlZmVycmFsTW9kZSI6InZpZXcifX0%3D

II. POWERPOINT PPT URL - https://docs.google.com/presentation/d/1gMRMkZQHwMY7RpFhyqn_upFYVabpZXJK/edit?usp=sharing&ouid=111490828299032735772&rtpof=true&sd=true

III. ETHEREUM REQUEST FOR COMMENT 20 – TOKENIZATION (ERC20)

ERC20 is a common technical standard nowadays to create and manage tokens on Ethereum Blockchain. It provides clear rules to adhere that all tokens must need to follow for exchanging, tracking and accessing data by users. We have utilized Etherscan that is a search engine for blockchain in which it provides access to Sepolia testnet where ERC20 tokens works better with wallets such as an example of MetaMask. It may contain multiple token creations which is valid with other tokens as without changing the system it has assisted in deploying digital assets.

Fig 1. Illustration of snip for compiled smart contract and deployed the contract of ERC20 in Remix by creating 200 tokens for MetaMask Main project wallet.

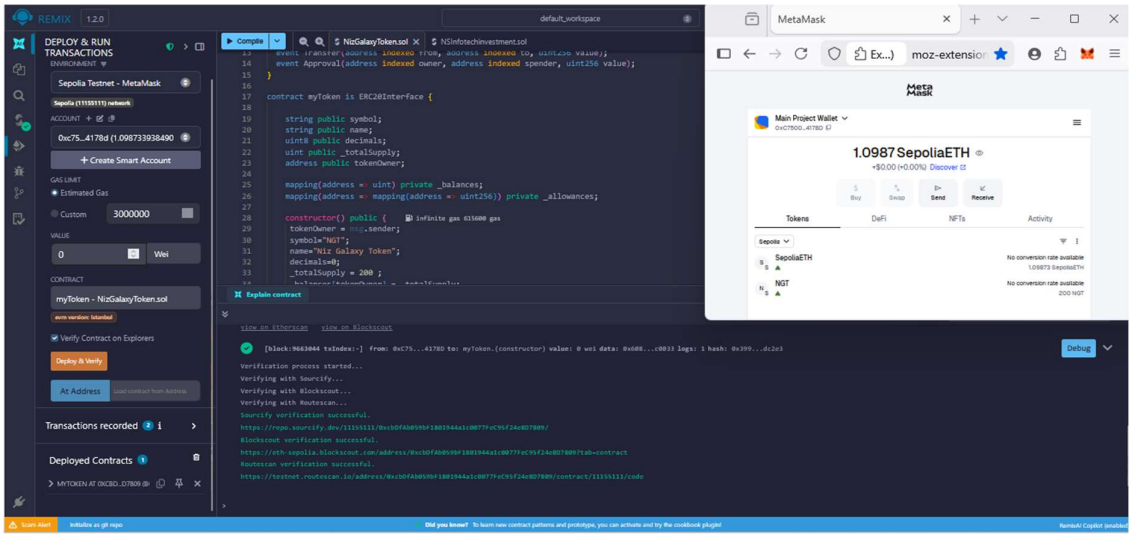
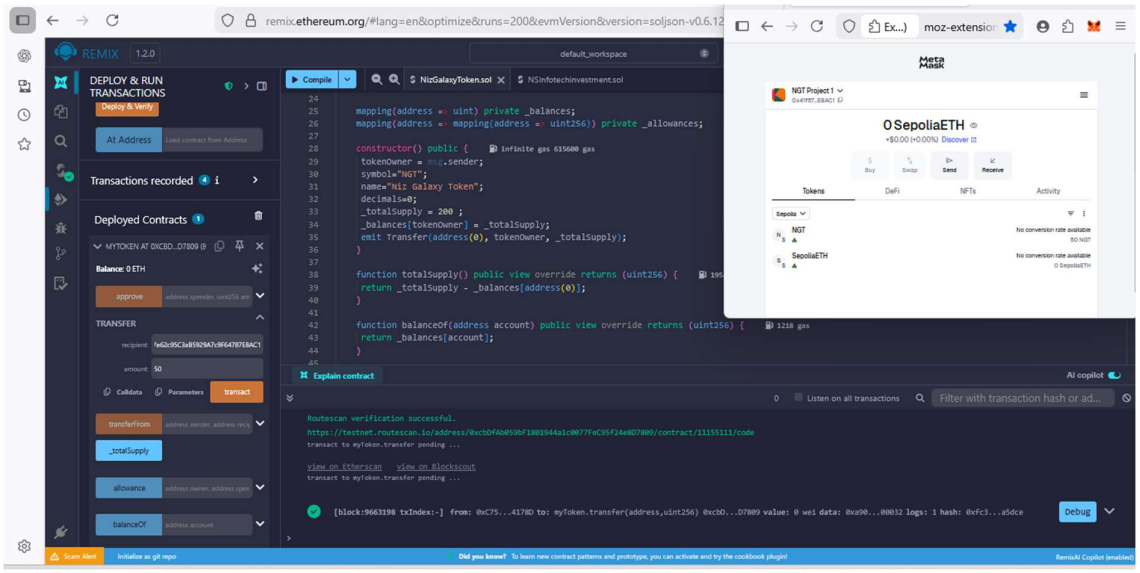
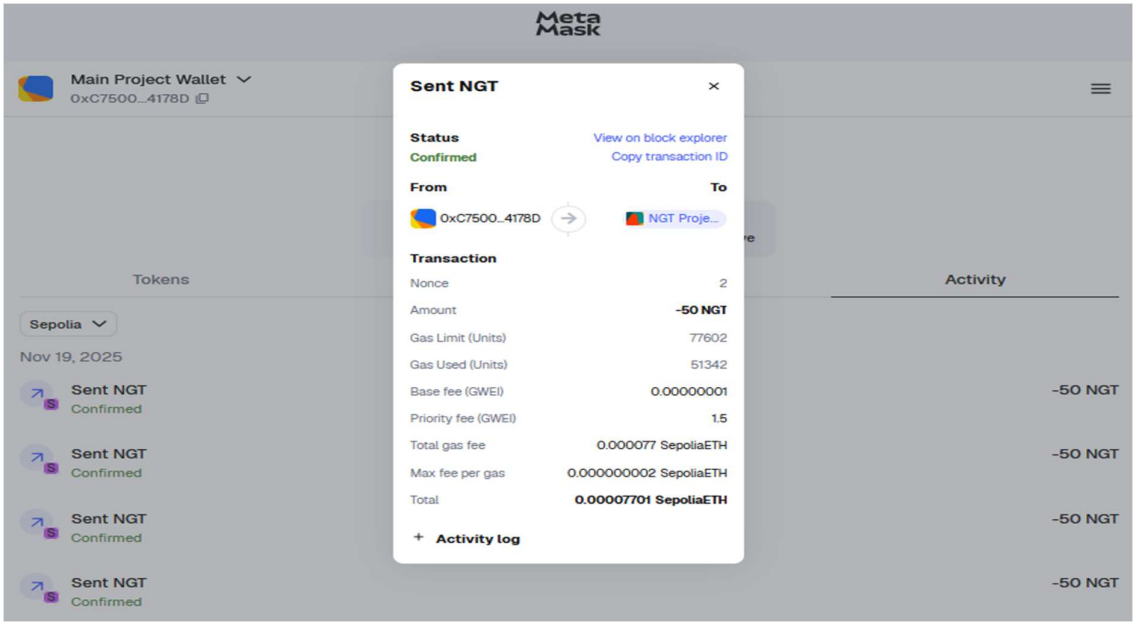


Fig 2. Shows creation of new Sepolia account as NGT project 1 wallet to transfer 50 tokens through remix platform on MetaMask wallet



Note: I sent remaining 150 tokens to each wallet by 50 tokens to other 3 NGT Project 2, 3, 4 wallets through MetaMask token transferring service.

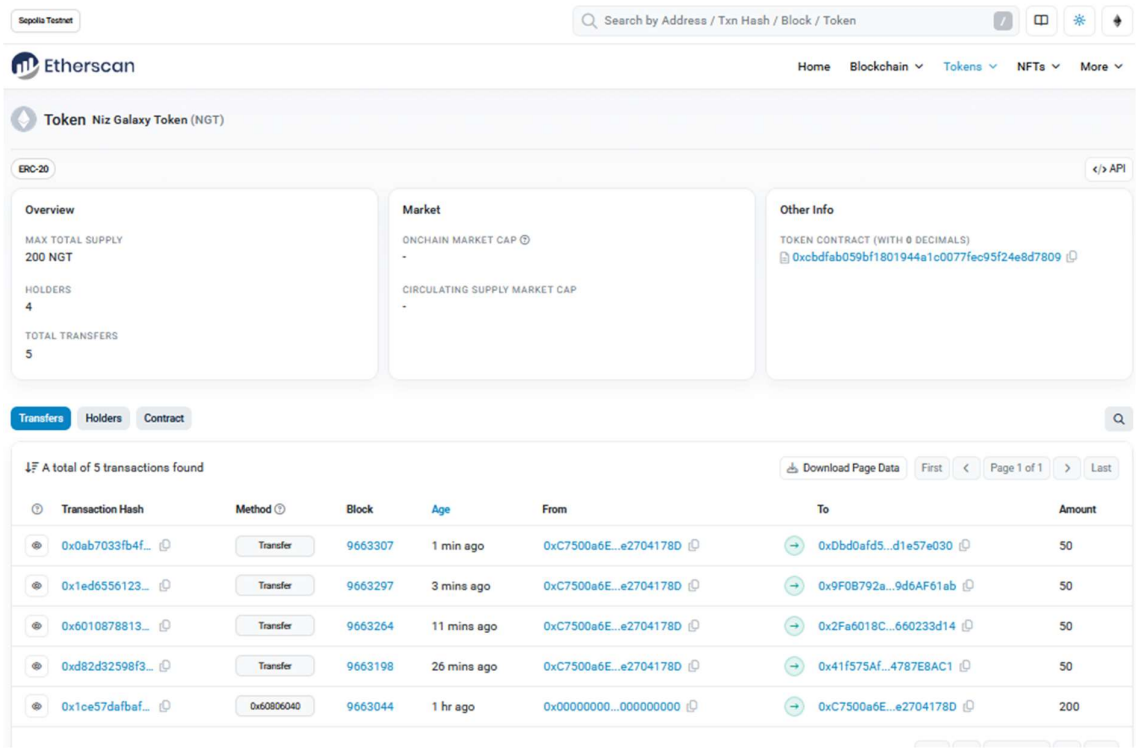
Fig 3. Shows transaction details of NGT wallet 2 and besides all of the other history as this is an alternative way to transact through meta mask instead of Remix.



Contract address of Niz Galaxy Token - 0xcbdfab059bf1801944a1c0077fec95f24e8d7809.

Fig 4. Entire history of NGT Tokens from deployment to sending 50 tokens to each via ERC20 smart contract on EtherScan.

URL - https://sepolia.etherscan.io/token/0xcbdfab059bf1801944a1c0077fec95f24e8d7809



IV. ETHEREUM REQUEST FOR COMMENT 721 – NON-FUNGIBLE TOKENS (ERC721)

Ethereum Blockchain uses ERC721 process to generate digital tokens which is known as NFT, by contrary it won't be exchange 1 to 1 because it is immutable as ERC20. They represent virtual art which can be traded in desired platforms based on the value of art when it gains popularity it can worth like huge amount such as Bored Ape uniqueness. As to showcase the use of modern technology I have uploaded some of the unique NFT's to showcase true nature of ERC20.

Fig 1. Uploaded NFT's picture of Four Elements of World as AIR, EARTH, FIRE, WATER & JSON which was inserted by title, description & links of the 4 NFT's in Pinata

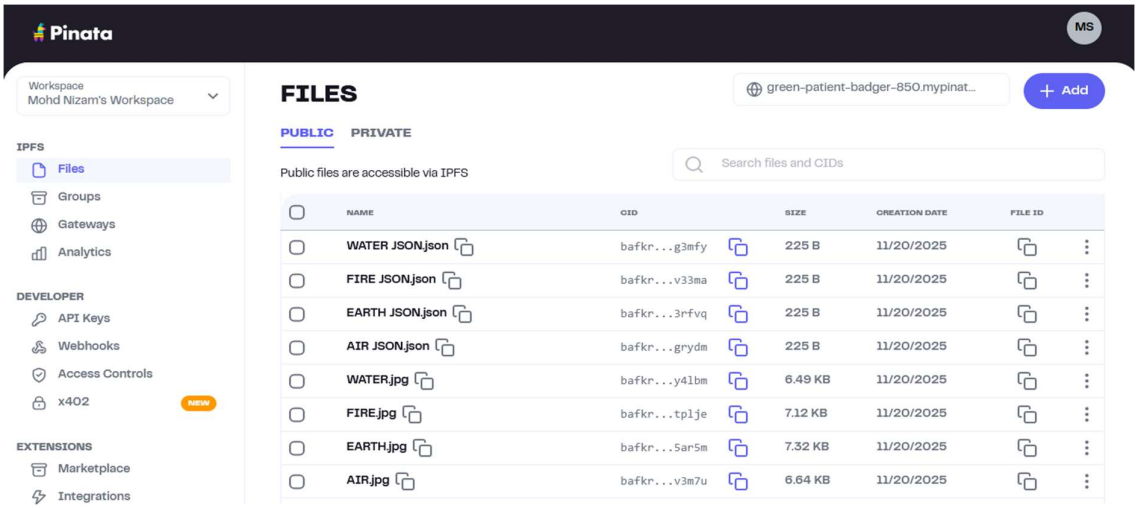


Fig 2. Demonstrates proof of compiled smart contract and deployed the contract of ERC721 as Elements – ELMT for NFT in Remix

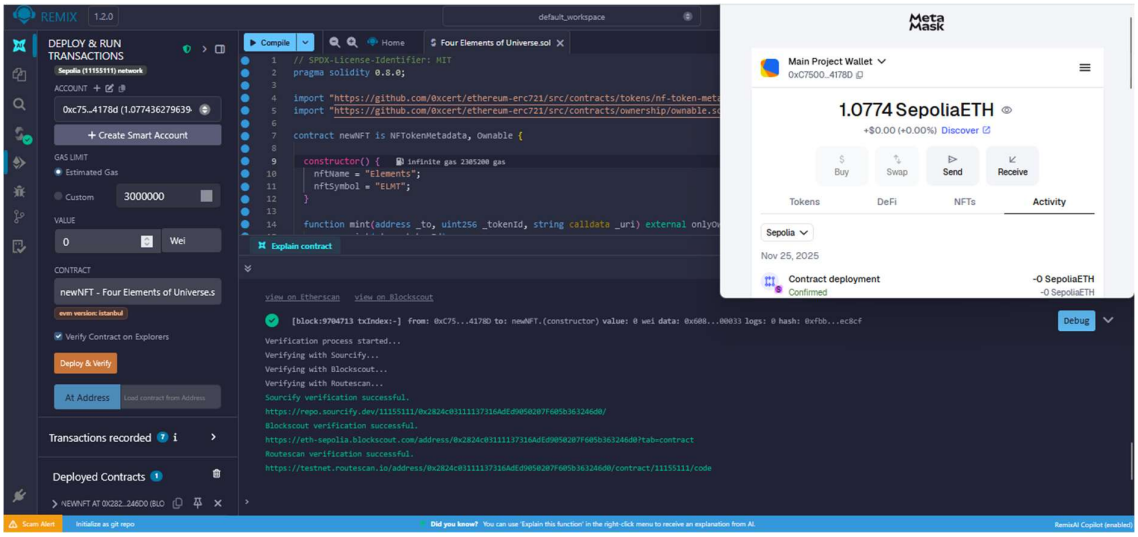
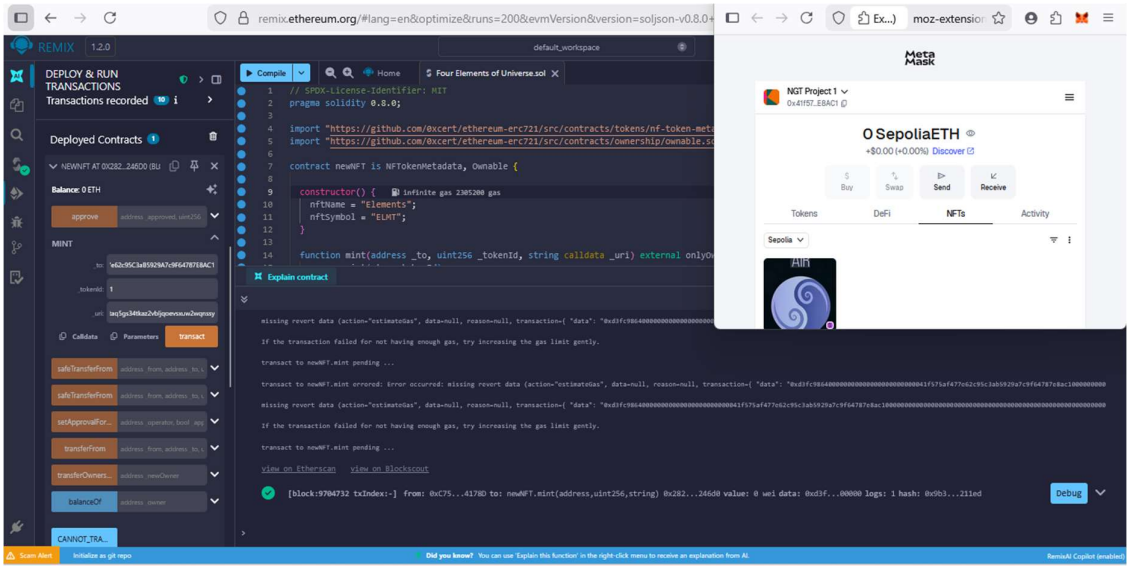


Fig 3. Shows tokenizing NFT's through Remix via NGT mail wallet by minting which required all 4 NGT wallet address, Token No such as 1, 2, 3, 4 and NFT's URL from JSON through Pinata.



Contract address - 0x2824c03111137316AdEd9050207F605b363246d0

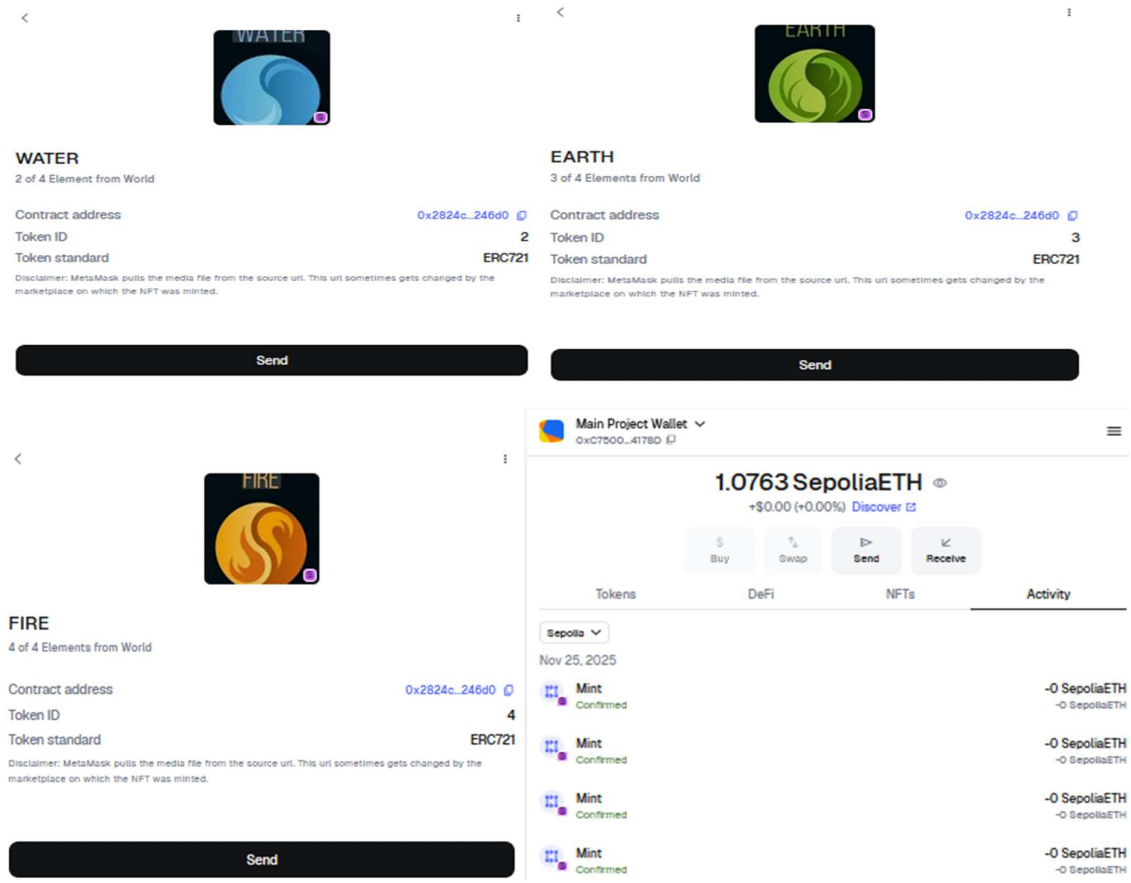
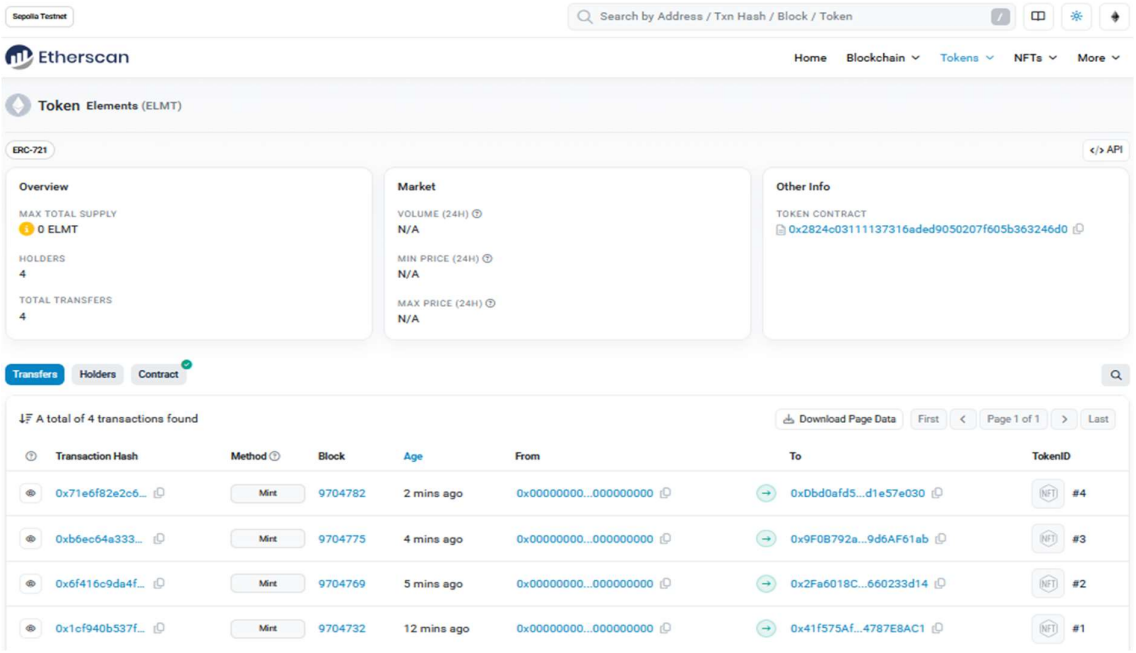


Fig 4. Illustration of all 4 NFT's history to each 4 of NGT wallet via ERC721 smart contract on EtherScan.

URL - https://sepolia.etherscan.io/token/0x2824c03111137316aded9050207f605b363246d0



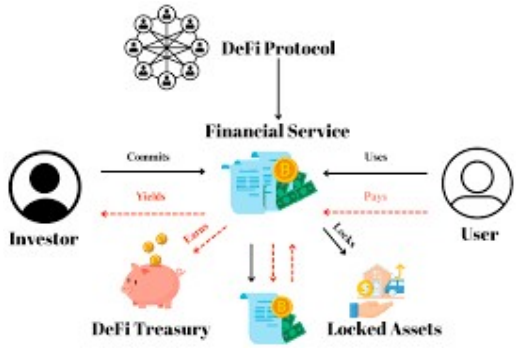
V. FOUR CASE STUDIES

A. FINANCIAL REALM – "NASDAQ Ling"

Blockchain and smart contracts are changing financial companies work rapidly as it clearly advises how smart contracts let firms create assets and automate their business processes by using decentralized systems (Taherdoost 2023). This technology showcases finance operations transparent and efficient because it utilizes a system where multiple computers verify transactions instead of just single authority (Oriekhoe et al. 2024).

How blockchain works in financial systems as they identified this technology generates permanent records that are immutable, significantly alters how firms work. However, there is also possibilities that getting everyone to use blockchain is surely a challenging task because its bit expensive to set-up plus involves collaboration among many different organizations.

It explains both benefits and drawbacks of using blockchain while it creates immutable records and makes transaction tracking easier as firms faces significant barriers to usage. The major issue is that blockchain works best when many people work and uses it simultaneously, but convincing businesses to quit their current systems is extremely difficult. It also requires a large number of members to be profitable resulting in hybrid situation in which corporations will not join until & unless found out others are already using as well.



NASDAQ Linq platform launched in 2015, indicates real blockchain capabilities in capital markets for private business shares which will be highlighting below in detail as follows (Nasdaq, 2015):

- *Faster Settlement* – Stock transactions typically take upto 3 business days to be placed, while NASDAQ blockchain completes process around in 10 minutes eliminating long waiting time and providing prompt transaction responses. When they had completed their 1st ever project with Chain.com by transferring shares in minutes rather than taking long days.
- *Lower Risk* – Blockchain reduces settlement risk as the banks often keep large inactive funds as backup during the 3 days settlement time. With blockchain settling in minutes, banks require fewer backup funds, allowing those resources for loans or other investments purpose while making the financial system efficient.
- *Less Paperwork & Low Cost* – NASDAQ Linq enabled digital ownership data while replacing paper stock certificates as previously traditional securities need a lot of human labor for printing certificates and securely storing. Transferring documents which requires lawyers and custodian.
- *Efficient Auditing* – Offer permanent transparent transaction histories available any time in addition previous market distributes ownership records to multiple databases makes auditing time-consuming. NASDAQ linq deliver encrypted records which allows for real-time monitoring, reporting and verification of holdings.

Despite benefits, blockchain faces major hurdles as BTC processes 7 transaction per second and ETH 30 compared to Visa's 1000 (Taherdoost 2023). As usage rises networks jammed and expenses climbed. Putting blockchain in existing system requires major investment because decades-old systems cannot quickly alter. Blockchain's decentralized design clashes with centralized regulations and liability plus compliance issue remain complex (Oriekhoe et al. 2024).

Platforms require many participants to deliver valuable outcomes while firms prefer unique solutions causing co-ordination issues. Hackers exploit smart contract weakness which results loss in billions. Furthermore, blockchain challenges well-established firms by automating operations that required special middlemen.

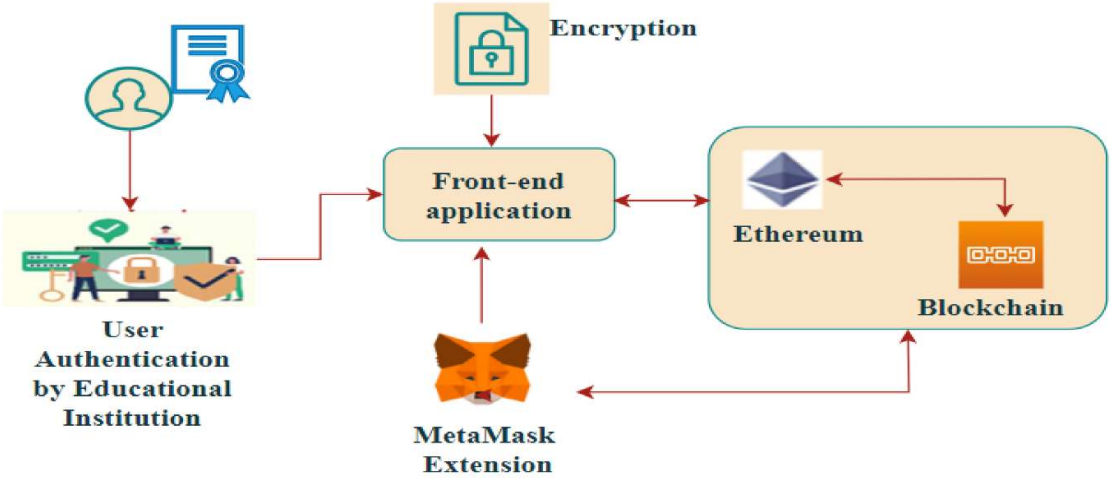
Blockchain illustrates actual potential through projects such as NASDAQ Linq which shorten settlements times, lower risk, cheaper costs increased transparency. Clear laws, industry collaboration and maintaining security standards. However, huge application demands dealing

with technical, regulatory and coordination challenges. Success is based on developing scaled system, setting clear laws and getting industries engagement.

B. CYBERSECURITY DOMAIN – "IBM Trade"

In Cybersecurity, blockchain and smart contracts are strongly being used because they give simple benefits by effectively protect data and systems through avoiding various jargons and malfunctions. We will be talking more about this in brief as research found by that theft-resistant features provide promising solutions for managing and sharing sensitive threat intelligence data (Chatziamanetoglou and Rantos, 2024). Their study focused widely on how DLT enables enterprises to securely share cyber threat intelligence while supporting quality assurance and trust-worthy systems (Venčkauskas et al., 2024).

At blockchain based models for cyber threat intelligence sharing and discovered that firms are still afraid to share threat data due to risk of disclosing private information. Their research suggests using reputation perks to encourage participation while maintaining trust deploying blockchain smart contracts.



However, studies reveal significant concerns while blockchain creates immutable auditing, obtaining widely usage faces major coordination obstacles. Organizations tend to consume threat intelligence rather than sharing their own experiences which results in free -rider issues.

IBM's Trade platform illustrates useful blockchain applications for exchanging cyber threat intelligence (IBM Security, 2019). Trade which is built on IBM's Hyperledger infrastructure describes 4 important reasons for cybersecurity firms to use this technology:

- *Data Exchange* – IBM's Trade platform uses permission for blockchain while keeping threat data separate from the chain. Organizations can set sharing policies based on rating and sector involvement ensuring that threat data reaches trusted partners without possessing risk.
- *Reputation Systems* – Trade utilizes blockchain for reputation scoring those tracks contributions without connecting weakness to specific firms, encouraging participation by removing reputational risks while ensuring accountability.

- *Reward Processes* – Enables rewarded system to solve unfair competition issues. Access to premium threat intelligence is prohibited for organizations that just consumes but companies with higher reputation scores are able to access that service.
- *Decentralized Trust* – IBM's Trade spread trust among various network participants and nodes are run by each organization removing dependency on any one entity.

Although blockchain cybersecurity has many disadvantages despite of its advantages, since platforms needs a huge number of participants to give value yet corporations are unwilling to share security infrastructure and thus it leads to coordination issues (Venčkauskas et al., 2024). Therefore, attackers can take advantage of flaws in smart contracts, resulting in losses of billion, existing cybersecurity business models in which vendors make money from centralized threat intelligence reports which is disrupted by blockchain (Chatziamanetoglou and Rantos, 2024).

To sum up, applications such as IBM Trade which offers enhancement in monitored exchange, confidentiality and decentralized trust for cyber threat intelligence basically highlights blockchain's real potential. However, resolving connectivity issues and fixing smart contract bugs are necessary for future use.

C. MANUFACTURING INDUSTRY – "WALMART's IBM Food Trust"

Blockchain technology is revolutionizing manufacturing and supply chain operations as shown by recent academic research. It explains that blockchain decreases communication problems by allowing all parties to access same data at all time. According to their research, spending minimum time on data confirmation allows more time to craft quality products at minimum costs (Kumar and Anusha 2023).

According to an analysis of blockchain use in supply chains promotes visibility, security and transparency by blockchain's decentralized storage and immutability. On the other hand, important difficulties such as flexibility limitations, interaction problems, high values and privacy concerns are recognized by their research (Li et al., 2024).

A Blockchain is a Distributed ledger technology in which new transactions are recorded in blocks in which as hash are stores to identifies each blocks core. Its nearly to impossible to alter or change the data from hash and even after someone tries to alter any transaction details it creates a different hash ended up making tampering difficult.

Each research reveals positive and negative outcomes while blockchain improves tracking and produces unalterable data but there are coordination difficulties in businesses to start using it. Free running issues arises because organizations would rather prefer consuming data than sharing it.

The Walmart's IBM Food Trust installed by Walmart sets an example of blockchain technology can be used in multiple manufacturing supply chain organizations like Nestle and Unilever (Walmart, 2019). There are multiple key benefits but we will be looking at some few of the reasons why firms need to adopt this technology are as follows:

Prompt Product Tracking – Classical manufacturing food supply chains need minimum a week to trace product supplier throughout safety events. After applying Blockchain Tech tracking period minimized from 7 days to maximum 5 seconds.

Enhanced Food Safety – Digital records keep measuring temperature, humidity and movement during transportation for each product allowing real time supervision and management.

Supply Chain Transparency – Info-segmentation is a problem for classic supply chains as the issue arises where the horsemeat crisis of 2013 illustrates the problem where allocating blame took months. Every stakeholder has access to verified information which is via Walmart blockchain.

Cost Reduction – With the support of blockchain it reduces cost by removing unnecessary data verification and entries. The food trust saves millions of dollars via from specific recalls rather than removing all items.

However, it has some drawbacks despite of looking only on the benefits, although Walmart's food trust must deal with "Oracle problem" in which it is unable to confirm the accurate data such as garbage in-garbage out issue (Li et al., 2024). Due to lack of digital connectivity and participant skills small suppliers face challenges in technology. Also, globalization made more difficulties by various food safety protocol and data privacy rules by many countries. The whole system relies on beneficial technologies such as GPS tracking and IOT sensors in which device breakdown affect tracing ability chain (Kumar and Anusha 2023).

To conclude this, Walmart Food Trust serves an example of blockchain's real potential benefits in monitoring, security, transparency and cost saving yet it demands resolving the coordination process, integrating issues and achieving its fullest form of confidentiality.

D. AGRICULTURAL SECTOR – "AGRI-DIGITAL"

In the realm of blockchain era, agriculture markets are adapting with the technology and are valued 285 million above which was recorded in the year 2022 and is expecting to do huge growth by exceeding 40% to surpass 7 billion in USD by 2030. Talking about from initial stage where "AgriDigital" an Australian startup in 2016 who adapts Blockchain smart contracts and Distributed Ledger system (DLT) was implemented to their 1st ever live HUB to market for improved grain deliveries, transferring ownerships and payment between farmers, buyers,

warehouses and lenders. Also record of immutable entries were kept over a computer network to reduce delays, minimizing risk by having records of grain delivery and upon confirmation of quality it will quickly release funds for orders (Kamilaris, Fonts and Prenafeta-Boldú, 2019), (Kumarathunga, Calheiros and Ginige, 2022).

This is where the it will be beneficial for agricultural industries to using blockchain which includes secured settlements, efficient visibility and low cost. This had brought advantages to farmers as they receive payments quickly because buyers or agents are able to easily identify the items. However, technology is still under development which marks questions to data accuracy, since it ensures the security of recorded data but it does not guarantee accuracy as it still required effective governance, training and trustworthy sensors.

Although, there are several real-world implementations by AgriDigital HUB but we will be focusing on the major effectives illustration which will be as followed in below:

- *Sustainable Management* – AgriDigital environmental measurement can trace blockchain technology via Carbon footprints, water and pesticide usage are such examples which connects data to each batch of grain giving agencies and customers proof of compliance (Mavilia and Pisani, 2019).
- *Tokenized Labels* – Ownership transfers are recorded on ledger as making changes will be visible to all though physical grains shipment are shown in digital records.
- *Consumer & Farm Trust* – AgriDigital makes it easy to connect farmers with buyers using blockchain records to provide the true nature of product as information via QR code about grain farming location available (Yiannas, 2024).
- *Climate Risk Stability* – Blockchain supports risk dispensation insurance through DLT where certain climate fluctuation condition is met such as flood drought via smart contracts as it may automatically pay farmers to avoid delay & conflicts during claims. (Alndiwee et al., 2025)

Blockchain in agriculture may disadvantages too as small farmers lack rural farmers lack for digital equipment or necessary experience and sensor data can be tampered also climate relation transactions needs to regulate with nation laws. Also, it is difficult to migrating trust from older registration, audits and insurance through with modern technology facilities. Generally, enterprises at initial period needs to adapt risks for long term basis by sacrificing performance.

In conclusion, its impact on agriculture through automating payments to transferring ownerships which reduces the need for central authorities as it minimizes expenses but effects many traditional businesses and swifts from institutional trust to modern technology. If,

Farmers and buyers will adjust to this system the sector will only need to manage with risk, responsibilities and rules plus regulations.

E. REFERENCES

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