Final Year Project Showcase Batch-2021
For the Year 2025

Department of Computer And Information Systems Engineering
Name of Programme: BE Computer And Information Systems Engineering

1	**Project Idea**	Project Title: Next-Gen Philanthropy: Blockchain-Enhanced Tracking and Reporting for Charitable Organizations Project Idea: TrustAid is a decentralized charity platform built on Ethereum blockchain. It ensures full transparency in donation distribution, enabling donors to track the utilization of funds by beneficiaries in real-time through smart contracts and IPFS-based evidence submission. The platform targets reducing fraud, increasing donor trust, and ensuring that each rupee reaches the right hands at the right time.
2	**Process**	The methodology for the "Next-Gen Philanthropy" project is systematically structured to build a secure, transparent, and traceable donation management platform using blockchain technology. The project is led by a focused team with expertise in frontend and backend development, smart contracts, blockchain integration, UI/UX design, and decentralized storage systems. **a) Requirement Gathering** The project began with identifying core stakeholders: donors, beneficiaries, and charitable organizations. Requirements were gathered through discussions with mentors, studying real-world donation flaws, and reviewing the manual fund disbursement process. Key functional and non-functional requirements were documented, such as secure login, role-based workflows, document verification, proof-based fund release, and traceable donation history. **b) Research and Planning** An in-depth study of blockchain use cases in philanthropy, smart contract best practices, and fund misuse scenarios helped refine the project's goals. The team analyzed technical solutions like Ethereum, IPFS, and role-based models to structure the overall design and functionality. **c) System Design and Architecture** Technologies like **Next.js, Solidity, Node.js, IPFS, Hardhat, and Vercel** were selected. The system was architected to include wallet-based authentication, document storage with on-chain verification, beneficiary approval, donor dashboards, admin and beneficiary dashboards and a modular smart contract flow. **d) Development and Integration** Frontend components were built using **Next.js and Tailwind CSS**. Smart contracts were written in **Solidity** and deployed on **Sepolia Testnet**. IPFS handled off-chain storage, and contract interactions were facilitated through

		Ethers.js/Web3.js, integrating the backend and blockchain layers smoothly. **e) Testing, Evaluation, and Security Measures** The system underwent rigorous testing across all layers. Smart contracts were tested using Hardhat, with unit tests written in Chai and Mocha, and additional verification performed in the Remix Ethereum IDE to validate individual functions. The frontend was tested using Jest and React Testing Library to ensure component behavior, user interaction flows, and UI reliability. For the backend, testing was carried out using Mocha, Chai, and Sinon to validate API endpoints, logic, and error handling. Manual testing for all user roles—donor, beneficiary, and organization—was also performed to ensure end-to-end functionality and system integrity. **f) Deployment and Documentation** The platform was deployed with smart contracts live on Sepolia and frontend and backend hosted via Vercel. Documentation covered the full architecture, contract functions, wallet flows, and usage guidelines.
3	**Outcome**	The project delivers a complete blockchain-based donation tracking and reporting platform that enhances transparency, accountability, and donor engagement for charitable organizations. Key outcomes include: **1. Blockchain Donation Tracking System:** A decentralized platform using Ethereum, Solidity, and Hardhat, enabling secure, immutable, and real-time tracking of donations from donors to beneficiaries. The platform is deployed on the Ethereum Sepolia testnet, with transactions viewable on Sepolia Etherscan for added transparency. **2. Smart Contract Automation:** Smart contracts automate donation processes, enforce fund usage rules, and reduce fraud and mismanagement risks. **3. NFT Reward System:** An integrated NFT module that automatically awards unique NFTs to the top three donors each month, recognizing their contributions and increasing donor motivation and retention. Metadata for NFTs is stored on IPFS to ensure tamper-proof and decentralized access. **4. User-Friendly Interface:** A responsive frontend developed using Next.js , hosted on Vercel, providing donors and charities with intuitive dashboards, donation history, and automated reporting. **5. Data, IPFS, and Backend Integration:** The backend uses Node.js and MongoDB to manage data. IPFS is used to store user-submitted documents such as identity proofs and bills, as well as the metadata of NFTs. Only the Content Identifiers (CIDs) are stored on the blockchain for permanent and verifiable reference, ensuring secure, decentralized, and tamper-proof data handling. **6. MetaMask Integration, ETH Acquisition, and Real-World Conversion:**Our platform is fully integrated with MetaMask, a secure crypto

		wallet that allows seamless interaction with the Ethereum blockchain. Users can connect their wallets to the application with a single click, eliminating the need for traditional login systems and ensuring secure, non-custodial access to platform features. MetaMask also displays gas fees, transaction history, and real-time status, providing a transparent and user-friendly experience. **7. Etherscan Integration:** All on-chain transactions are verifiable through Etherscan, providing transparency and public auditability for donors.
4	**Evidence (Theoretical Basis)**	The goal of this project was to develop a decentralized, blockchain-based charity platform that ensures transparency, traceability, and accountability in the donation process. By leveraging smart contracts and distributed ledger technology, the platform automates milestone-based fund release, reduces fraud, and increases donor trust. It empowers beneficiaries to receive aid in a structured, verifiable manner and allows donors to track their impact in real time. **Key Components:** **Blockchain & Smart Contracts**:Engineered using Solidity and deployed on the Ethereum Sepolia Testnet, the smart contracts govern donation flows with milestone-based logic, ensuring funds are released only after verifiable proof of use is submitted and approved. Each transaction is transparently logged on the blockchain, creating a tamper-proof ledger of all donations and disbursements that can be independently verified through Etherscan. The contract also intelligently manages donation excess handling, beneficiary bans, and multi-stage aid requests, introducing real-world logic to decentralized automation. **Decentralized Storage (IPFS):**All supporting documents and proofs (e.g., medical records, receipts) are uploaded to IPFS (InterPlanetary File System) for immutable, tamper-proof storage. IPFS hashes are stored on-chain as part of the smart contract, ensuring document authenticity, guaranteeing that data cannot be altered or censored after submission. **Frontend with Web3 Integration:**The frontend, built using Next.js, delivers a blazing-fast user experience with dynamic routing, SSR support, and exceptional SEO optimization. Integrated MetaMask authentication enables users to connect their wallets securely, while Ethers.js handles seamless smart contract interactions (e.g., donating, uploading proof, releasing funds). A responsive and role-driven UI provides dedicated dashboards for donors, beneficiaries, and administrators, each reflecting real-time blockchain data. **Robust Backend & MongoDB Integration:**The backend is powered by

		Node.js/Express, handling non-sensitive off-chain operations such as user registration, beneficiary applications, and NFT display data. JWT-based authentication and role-based access control (RBAC) ensure that only authorized users can interact with sensitive application functions. MongoDB is utilized to manage user metadata, application form records, breakdown tracking, and a reflection of blockchain events such as NFT issuance to top donors. **Deployment on Vercel:**The frontend and backend seamlessly deployed via Vercel, offering global edge-network delivery, auto-scaling, and continuous deployment through Git integration. This setup ensures high availability, near-zero downtime, and blazing-fast performance across geographies. Outcome: The project successfully delivered a working prototype that simulates real-world charity workflows in a decentralized and transparent manner. Ethereum smart contracts were thoroughly tested on the Sepolia Testnet, with real-time donation flows recorded on-chain for full traceability. Donors could clearly track the progress of each beneficiary's prioritized needs, and funds were only released upon verified milestone completion. To boost engagement, NFT rewards were introduced for top contributors, adding a layer of gamification and donor recognition. Additionally, the platform introduces several cost reduction strategies: manual administrative processes were replaced with automated smart contracts, reducing overhead; IPFS integration minimized storage expenses by offloading documents off-chain; and a planned relayer system, supported by a dedicated donation campaign, will cover network (gas) fees on behalf of the organization—ensuring sustainability without compromising transparency. Together, these elements demonstrate a scalable, secure, and cost-efficient solution for trust-based charitable giving, firmly rooted in the principles of blockchain and distributed computing.
5	**Competitive Advantage or Unique Selling Proposition**	
a	**Cost reduction of existing Product**	**Reduced Administrative and Verification Costs:** **1-Smart Contract Automation**: The use of Ethereum smart contracts automates processes like beneficiary approval, fund disbursement, proof verification, and refund handling. This eliminates the need for manual intervention at every step, significantly reducing the administrative burden and associated human resource costs. **2-Tamper-Proof Record Keeping**: All transactions and document references are recorded immutably on the blockchain. This reduces the need for third-party auditors or manual reconciliation efforts, lowering ongoing compliance and fraud-prevention

		costs. **Lower Operational Costs**: **1-Decentralized Storage via IPFS**: Using IPFS for off-chain document storage avoids the cost of building and maintaining centralized databases or cloud storage. Since only lightweight file hashes are stored on-chain, blockchain gas fees are also minimized. **2-Donor Self-Service Dashboard**: Donors can track the lifecycle of their donation independently through a real-time dashboard. This reduces support and communication overhead from organizations that otherwise need to manually update donors. **Improved Resource Efficiency:** **1-Role-Based Access**: Streamlining user flows for donors, beneficiaries, and the organization through role-specific dashboards minimizes complexity, reducing time spent on training, onboarding, and support. **2-Public Network Utilization**: By building on public blockchain infrastructure (Ethereum), the system avoids the high costs of setting up and maintaining private blockchain networks or centralized servers.
b	**Process Improvement which leads to superior product or cost reduction, efficiency improvement of the whole process**	• **How:** The platform automates key processes in the charity workflow, including fund distribution, beneficiary verification, donation tracking, and proof of fund usage validation. By leveraging ***smart contracts***, these steps no longer require manual intervention from intermediaries or administrators. The platform ensures that donations are only released when verified proof is submitted and approved on-chain, significantly reducing administrative overhead. • **Why:** Traditional charity systems suffer from fraud, opacity, and delays due to manual verifications and lack of accountability. Automating the process through decentralized protocols introduces transparency, trust, and auditability, allowing donors to track every wei they contribute and ensuring beneficiaries receive aid only after meeting conditions. This improves confidence among stakeholders and ensures that funds are used responsibly. • **When:** In an era of increasing donor skepticism and frequent reports of misused funds, the need for **transparent and traceable giving mechanisms** is more urgent than ever. As digital transformation reshapes the nonprofit sector, blockchain offers the perfect foundation to rebuild trust in charitable giving, especially in underdeveloped or unregulated regions. • **What:** The platform's decentralized automation transforms the charity

		ecosystem by creating a **secure, fraud-resistant, and scalable infrastructure**. It replaces subjective decision-making with **smart contract logic**, eliminates the need for trust in a centralized authority, and provides real-time updates to all parties involved. This improvement not only streamlines internal operations but also empowers the public with **unprecedented visibility and assurance** in how charitable funds are handled
c	**Attainment of any SDG**	**SDG 1** – No Poverty **SDG 9** – Industry, Innovation & Infrastructure **SDG 16** – Peace, Justice, and Strong Institutions **How it is Achieved**:Decentralized Aid Distribution:TrustAid ensures that funds directly reach verified, approved beneficiaries without any intermediaries. This reduces overhead and ensures targeted support for those in need. Document-Backed Validation:Beneficiaries are required to upload proof of fund usage, such as images and receipts, to IPFS. Admins verify this proof before additional funds are released, enforcing responsible usage. Eliminating Corruption and Bias:All approvals, donations, and fund releases are recorded on-chain— immutable and public. This ensures that organizations and admins cannot alter outcomes unfairly. Global Accessibility: TrustAid supports MetaMask integration, making it usable across borders and enabling global donors to contribute securely with ETH — bridging financial support gaps in underserved regions. **Why it is Necessary for the Region**: Many developing regions, including South Asia, face deep-rooted issues in charitable transparency, where donors lose trust due to fund mismanagement. TrustAid addresses this by giving donors verifiable confidence in how their money is used, while empowering organizations to operate with credibility. It builds trust in local charity ecosystems, encourages recurring donations, and boosts sustainable development initiatives.
d	**Expanding of Market share**	**Current Market Problems:** **1. Lack of Transparency in Charitable Donations** Problem: Many charitable organizations struggle to provide verifiable transparency regarding how donations are used. Donors often lose trust due to vague reporting, lack of proof of fund utilization, and fear of

mismanagement or fraud.

2. Centralized and Manual Tracking Systems

Problem: Most current donation tracking systems are centralized, prone to data tampering, and involve manual processing. These systems lack automation, making it difficult to provide real-time visibility and efficient reporting.

3. Low Donor Engagement and Retention

Problem: Donors have limited incentives to remain engaged beyond a single donation. Traditional platforms fail to build ongoing relationships with donors or provide interactive experiences that motivate continued participation.

4. High Operational Costs and Inefficiencies

Problem: Managing and auditing donations manually or through fragmented software increases overhead costs and reduces operational efficiency, limiting the scalability of many nonprofit organizations.

Expanding Market Share with Proposed Solutions:

1. Blockchain-Enabled Transparency and Trust

Expansion Strategy: The platform introduces decentralized, tamper-proof donation tracking through Ethereum blockchain and smart contracts. This ensures end-to-end transparency, allowing donors to trace their contributions in real time.

Impact: This transparency attracts socially conscious donors and large institutional contributors seeking accountability, thus expanding market share across both individual and organizational donors.

2. Decentralized Document Storage with IPFS

Expansion Strategy: By integrating IPFS to store user documents and NFT metadata securely and off-chain, the platform ensures data integrity while reducing on-chain storage costs.

Impact: The system appeals to international aid organizations and compliance-focused charities that require secure and verifiable storage of sensitive documentation.

3. NFT-Based Donor Engagement Model

Expansion Strategy: The platform rewards the top three donors each month with unique NFTs, creating a gamified experience that promotes recurring donations and donor loyalty.

		Impact: This innovative incentive model captures a new segment of tech-savvy and younger donors, expanding market share into niche crypto-native communities. **4. User-Friendly Interface and Low-Cost Integration** Expansion Strategy: With a modern frontend built on Next.js and cost-effective backend infrastructure, the platform is easy to adopt and integrate, even for small or local NGOs. Impact: Lower technical barriers allow small- to mid-sized nonprofits to adopt the platform, expanding the market into previously underserved sectors. **5. Real-Time Reporting and Automation** Expansion Strategy: The smart contract system automates fund allocation and generates real-time reports, reducing manual work and improving operational efficiency. Impact: Enhanced efficiency and accountability make the platform attractive to larger organizations and grant providers looking for scalable solutions. **6. Remote Access and Global Applicability** Expansion Strategy: Deployed on the Ethereum testnet and hosted on scalable platforms like Vercel, the system supports global access and remote transparency. Impact: This allows the platform to serve NGOs, donors, and beneficiaries across borders, capturing international markets, especially in disaster relief and international aid.
e	**Capture new market**	**1. Decentralized Charity for the Unbanked and Digitally Underserved** Problem**:** In many developing regions, millions of individuals and small community-driven causes are excluded from mainstream charity systems due to lack of access to bank accounts, centralized institutions, or administrative documentation. These causes are often underfunded, overlooked, or mistrusted due to lack of verification mechanisms. Opportunity: TrustAid captures this untapped market by enabling any verified beneficiary — even those without traditional banking access — to launch and manage a blockchain-backed fundraising campaign using just a MetaMask wallet and basic digital documentation. Smart contracts ensure staged fund

disbursement, reducing the risk of misuse and increasing trust.

2. Rising Demand from the Global, Impact-Driven Donor Segment

Problem:

Today's donors especially young, digital-native generations and global diasporas demand transparency, accountability, and real-time tracking of how their funds are used. Traditional charity models offer limited visibility, leading to disengagement and reduced donor retention.

Opportunity:

TrustAid meets this need with end-to-end visibility of transactions, IPFS-stored proof of fund usage, and public records on Etherscan. It empowers donors to support causes with evidence-backed confidence, attracting a new generation of philanthropists seeking impact they can verify, not just hope for.

3. Empowering Small NGOs and Community Organizations

Problem:

Small and medium-sized NGOs often lack the technical infrastructure, compliance capacity, or branding to access international funding or establish donor trust. They remain limited in reach, despite working closely with vulnerable communities.

Opportunity:

TrustAid provides these organizations with a turnkey solution to raise, manage, and disburse funds transparently using Web3 infrastructure. The platform offers smart contract automation, proof validation, and fraud protection— all without the need for expensive IT or admin teams.

Go-to-Market Strategies for Expansion

Localized Awareness & Blockchain Literacy

Strategy: Conduct on-ground workshops, translated user guides, and mobile-first onboarding for low-tech regions.

Impact: Makes decentralized giving accessible and understandable to the most disconnected users.

Partnerships with Social Impact Networks

Strategy:Collaborate with NGOs, social workers, and blockchain advocacy groups to extend reach.

Impact:Builds trust and accelerates adoption in markets where on-chain trust

		systems are new. **Why TrustAid is a Market Game-Changer** TrustAid doesn't just improve existing charity systems — it creates an entirely new market for decentralized, trust-based giving. It transforms how small communities ask for help and how global donors respond. First-mover advantage in Web3 charity space in underserved regions Cost-effective model with zero intermediaries and smart automation Trust and proof-first design, not reputation-based charity Appeals to Gen Z, crypto-donors, grassroots NGOs, and diaspora communities
f	**Any Environmental Aspect**	**Energy Efficiency:** **Decentralized Cloud Operations:** By leveraging IPFS and blockchain networks instead of centralized servers, TrustAid benefits from the peer-to-peer nature of Web 3.0 — reducing the load on central data centers. **Gas-Optimized Smart Contracts:** Our Solidity contracts are gas-efficient by design, using minimal writes and optimized logic to reduce computational cost and energy consumption during transactions. **Carbon Reduction:** **Paperless Workflow:** Traditional charities involve heavy paperwork — from donation receipts to physical proof. TrustAid replaces this with IPFS-hosted digital proofs, reducing deforestation and printing waste. **Remote-Friendly Platform:** As TrustAid supports remote approvals, donations, and proof uploads, it eliminates unnecessary travel for verification or audits — minimizing carbon emissions associated with transportation. **Why Industry Should Invest in TrustAid:** TrustAid presents a paradigm shiftin how the world manages and views charitable giving. It offers: Cost savings through automation Transparency and public auditability via blockchain Global scalability through Web 3.0 infrastructure Fraud-resistant workflows that can be deployed by NGOs worldwide This makes TrustAid not only a technologically innovative solution but a

		socially impactful and investment-worthy platform perfect for government institutions, international donors, aid agencies, and blockchain investors focused on social good.
6	**Target Market**	1. **NGOs and Non-Profit Organizations** Groups: Local and international charitable organizations Details: These organizations use the platform to manage donations transparently, automate fund distribution, and store verification documents securely via IPFS. The blockchain system builds trust and improves operational accountability. 2. **Donors and Philanthropists** Groups: Individual donors, philanthropists, crypto users Details: Donors benefit from transparency, traceability, and NFT-based monthly rewards for top contributors. The platform fosters trust by ensuring their donations reach verified causes. 3. **Aid Receivers (Individuals, Families, Students)** Groups: People seeking financial help for health, education, or emergencies Details: Beneficiaries submit required documents through IPFS and their eligibility is verified on-chain. This ensures a fair, secure, and transparent aid process. 4. **Top Donors and Regular Contributors** Groups: High-value and repeat donors Details: The platform ranks and rewards top donors monthly with NFTs stored on IPFS, encouraging continued engagement and recognition. 5. **Government and Regulatory Bodies** Groups: Government departments and oversight agencies Details: Transparent blockchain records and real-time reporting help in compliance monitoring, policy support, and public fund auditing. 6. **Educational and Research Institutions** Groups: Universities, tech labs, blockchain research groups Details: Institutions can explore the platform for academic research, pilot projects, and social impact studies. 7. **Small and Community-Based Charities** Groups: Grassroots and local non-profits Details: The platform offers low-cost scalable tools to help small charities digitize operations, attract donors, and maintain transparency with ease.
7	**Team Members** **(Names & Roll No.)**	Maha Zubair CS-21116 Yusra CS-21120 Hadia Mahmood CS-21122 HafizaWarisha Aftab CS-21124
8	**Supervisor Name**	Dr. Syed ZaffarQasim
9	**Supervisor Email Address**	**zafarqas@cloud.neduet.edu.pk**
10	**Videos (If any)**	https://drive.google.com/drive/folders/1sa46ahf-5YMEcCMbSWUnfMu-jNgyWR32?usp=sharing
11	**Pictures (If any)**	Attached below

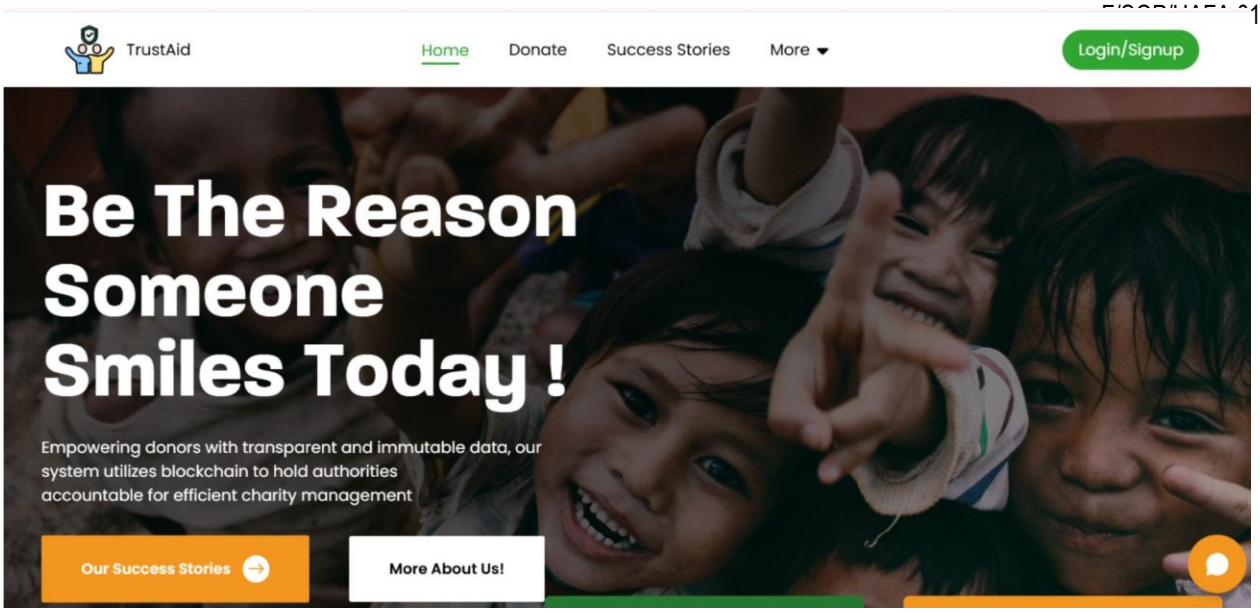


Figure 1/ home page

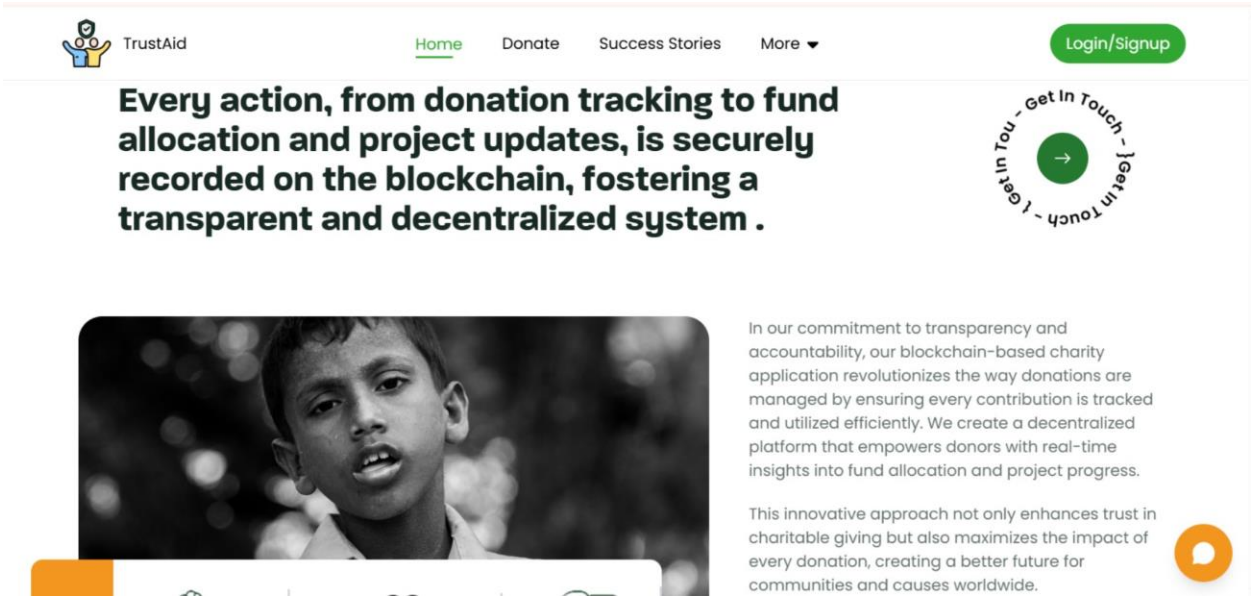


Figure 2/ home page

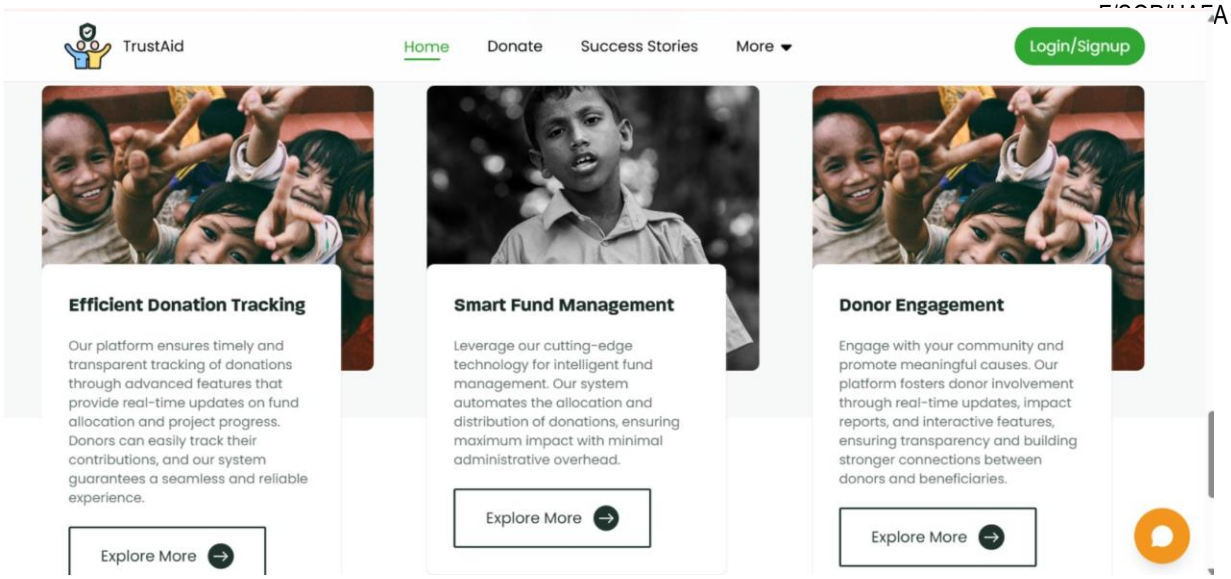


Figure 3/home page

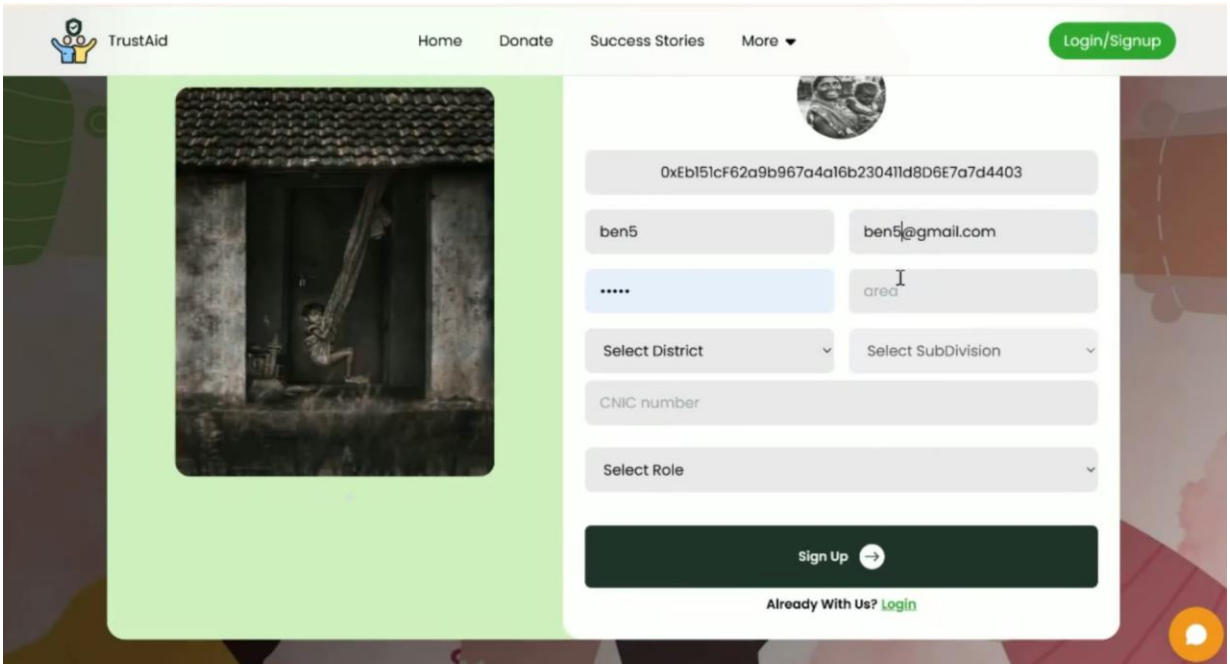


Figure 4/beneficiary login page

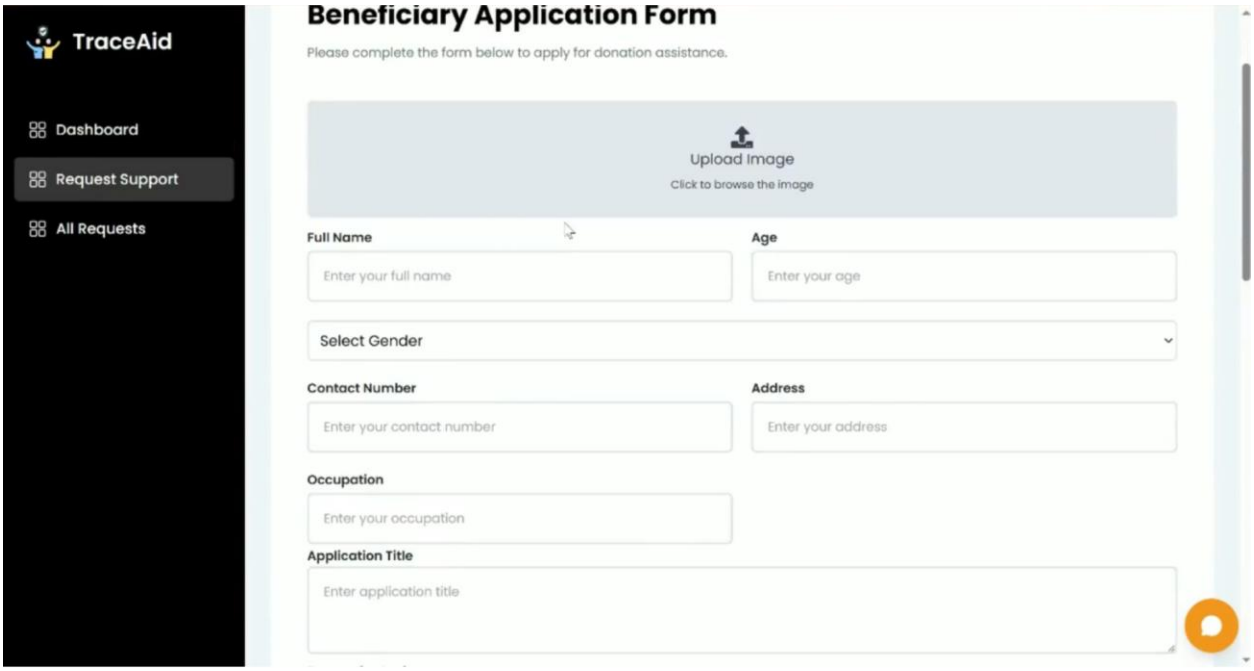


Figure 5/beneficiary application form

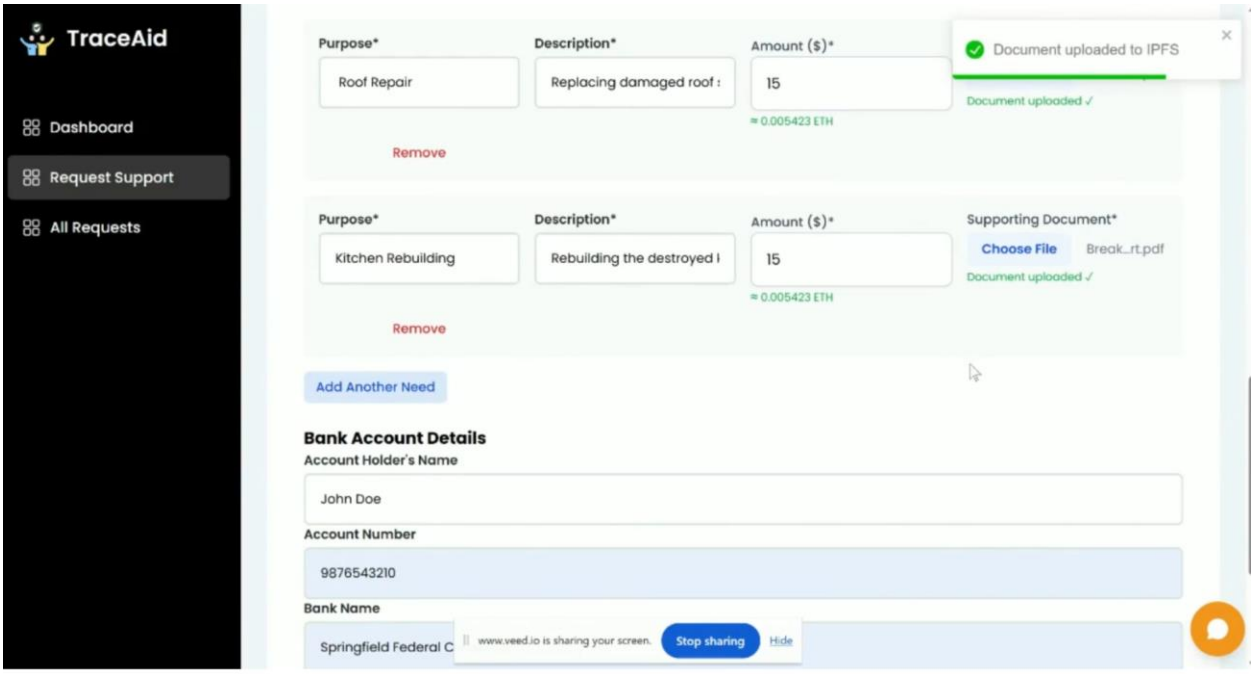


Figure 6/beneficiary document uploaded to IPFS

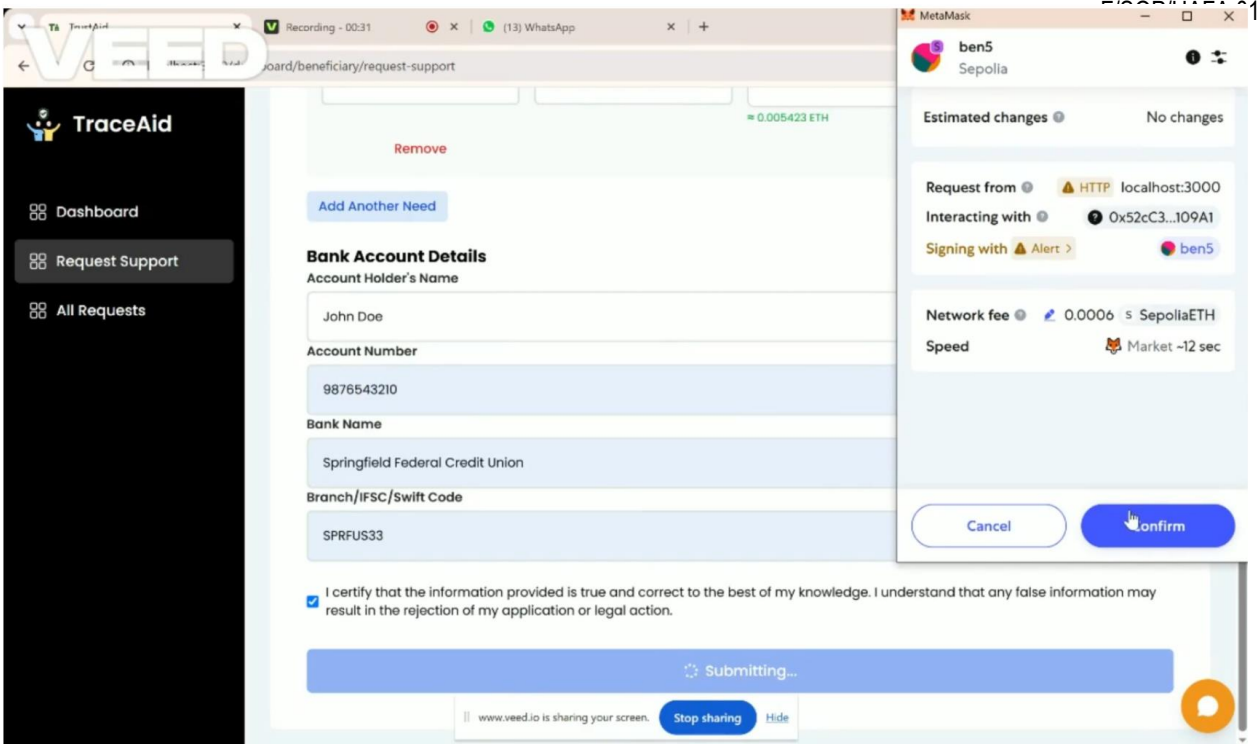


Figure 7/metamask transaction

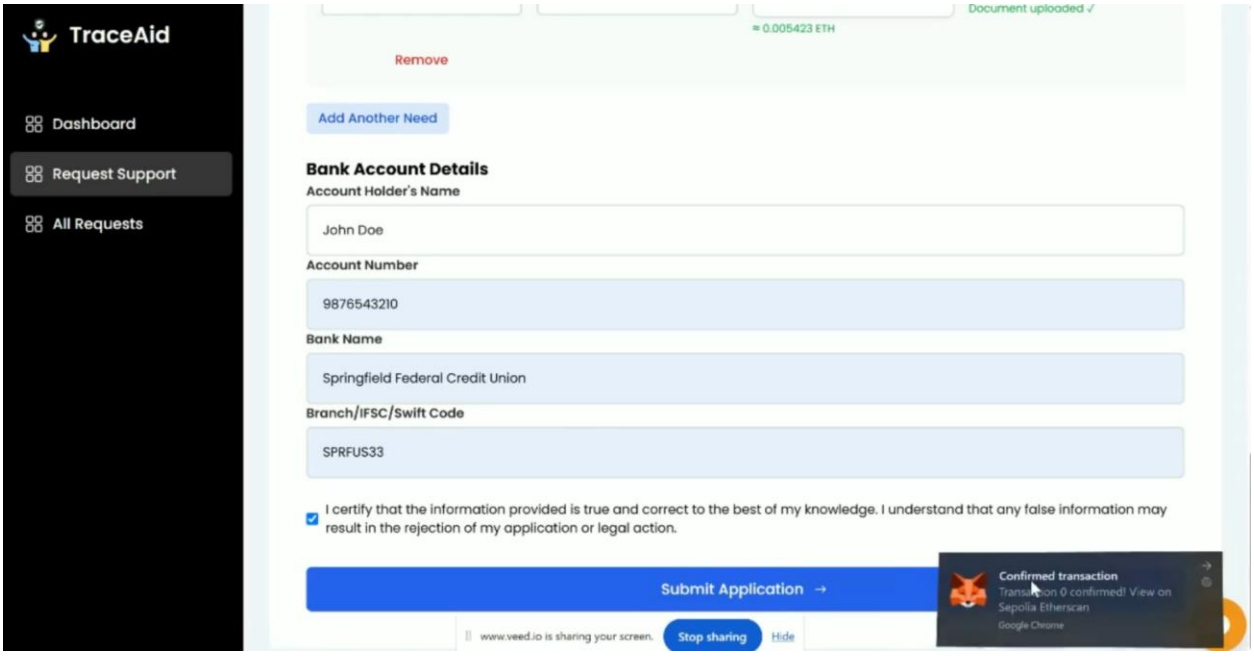


Figure 8/metamask popup

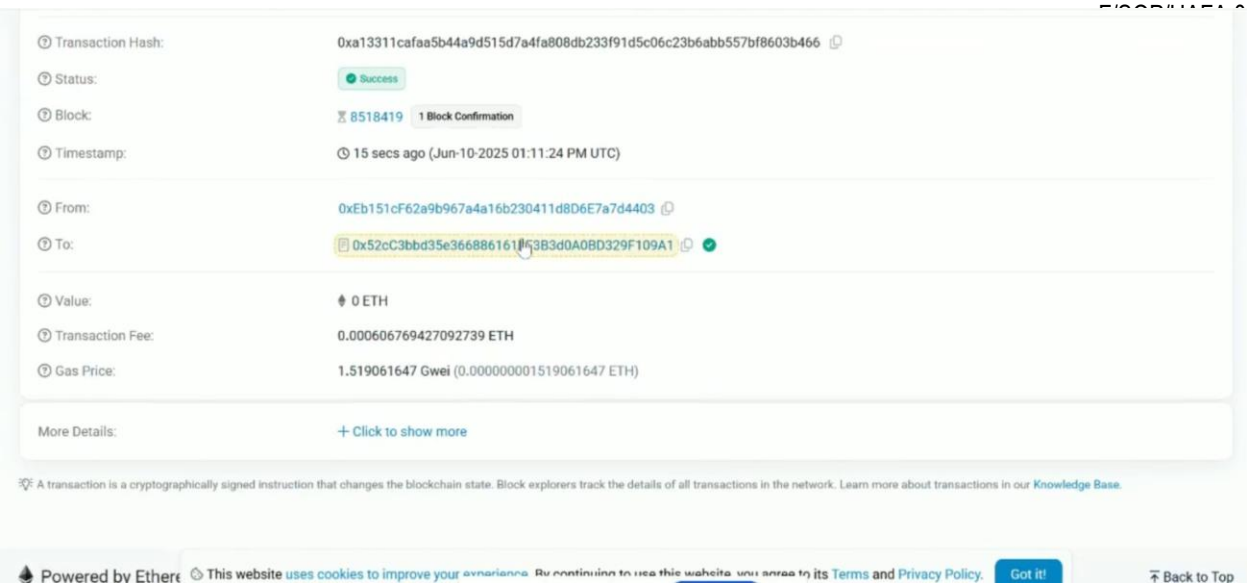


Figure 9/etherscan integration

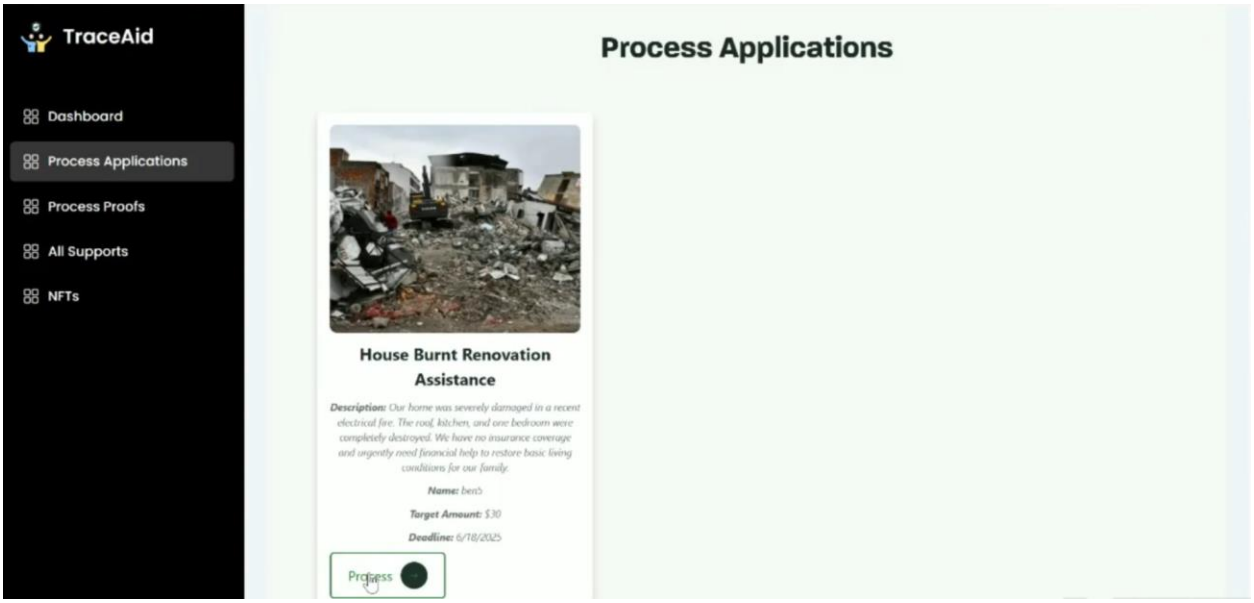


Figure 10/ organization checks application for eligibility

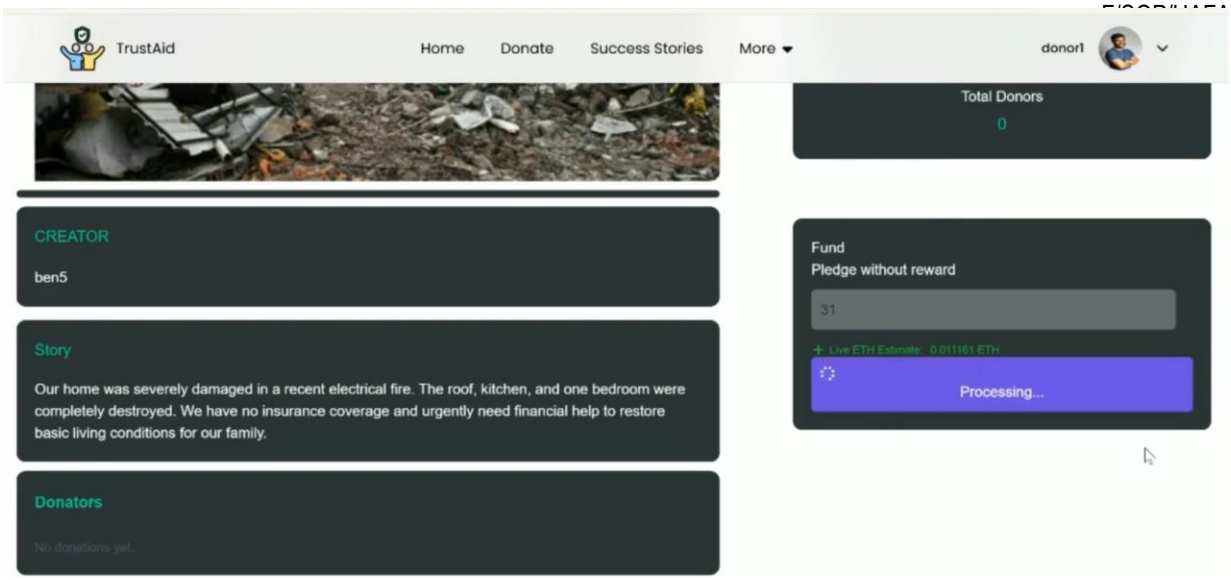


Figure 11/ donor donates

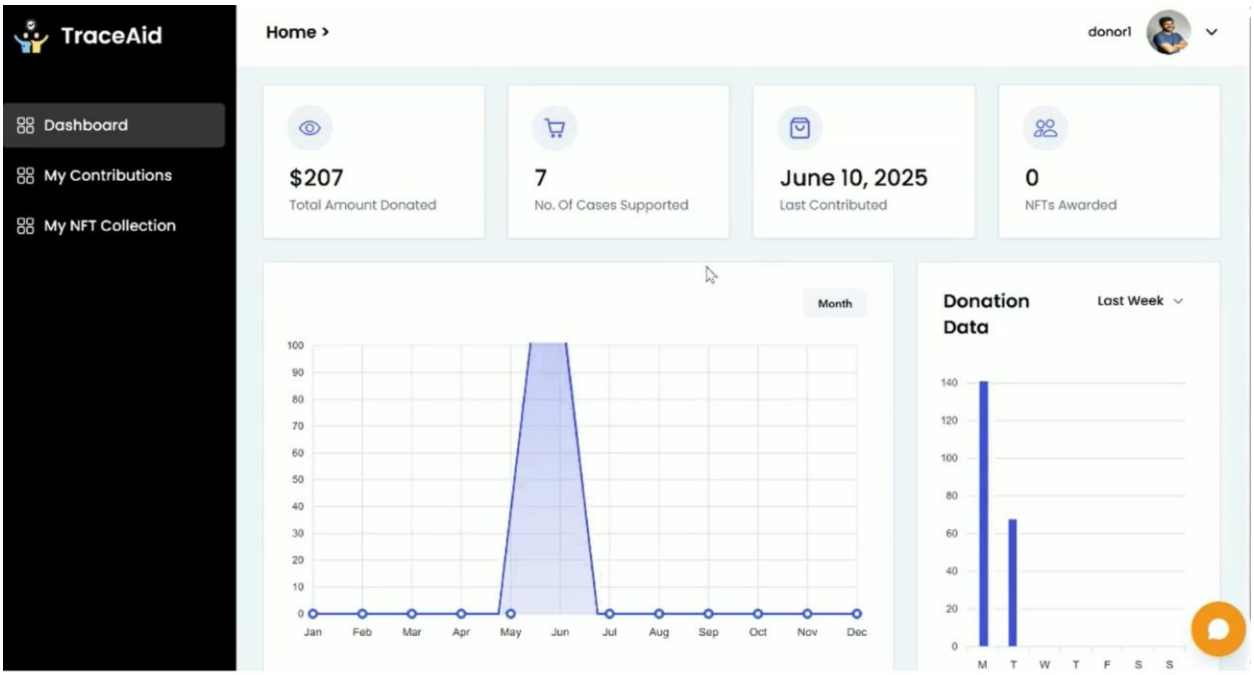


Figure 12/donor dashboard

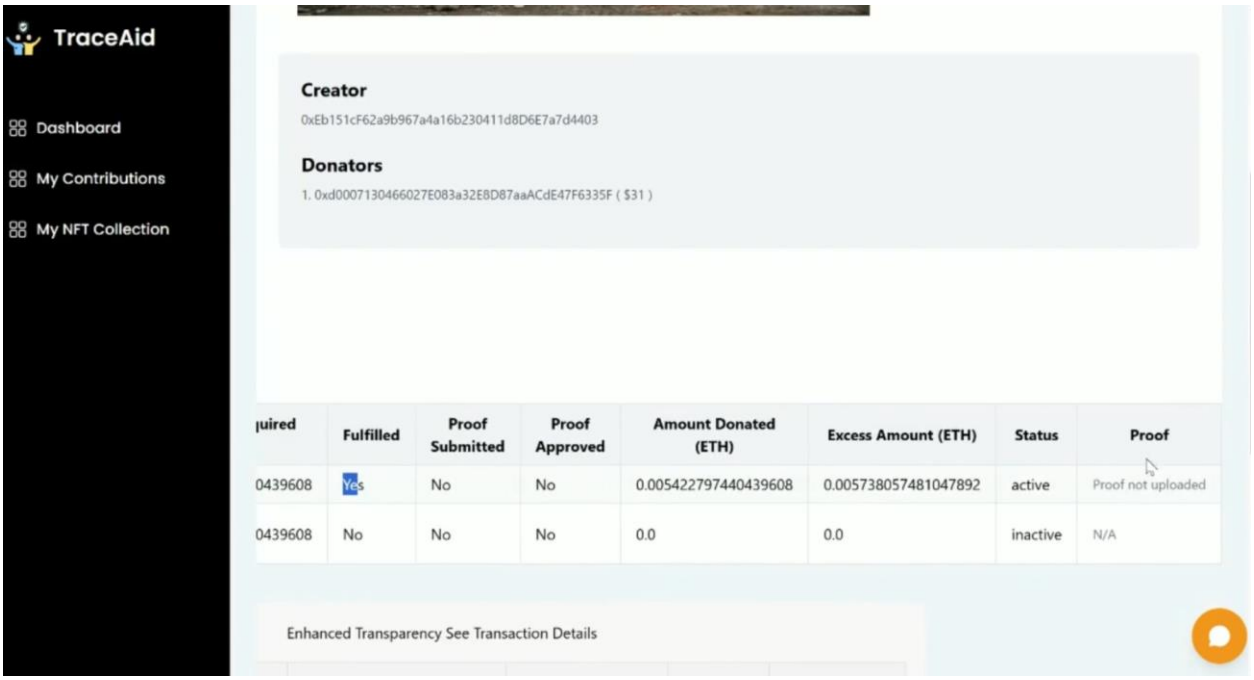


Figure 13/ A report generated for the donor who contributed to the application. Providing application detail and status

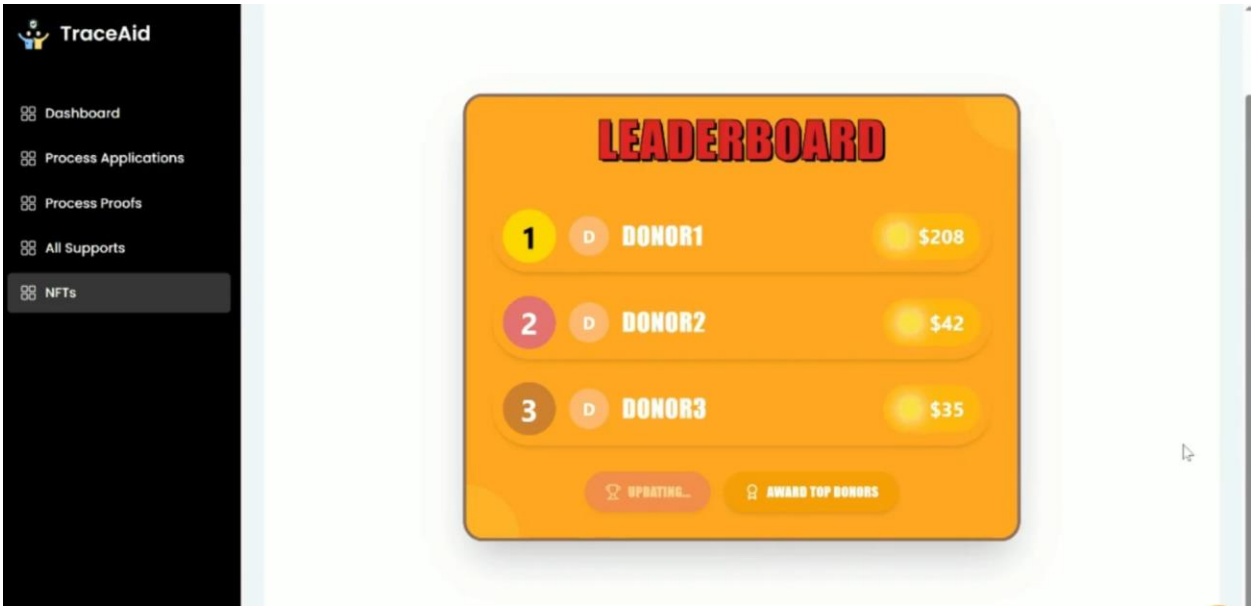


Figure 14/ organization rewards top donors

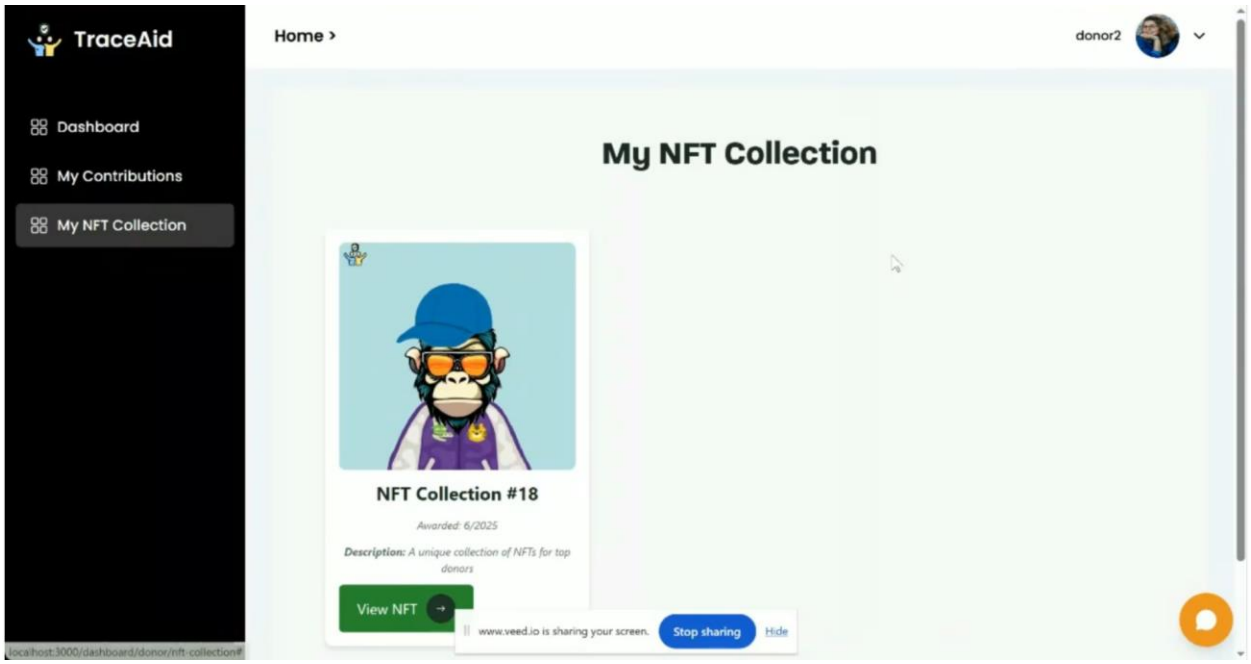


Figure 15/ donor receives NFT

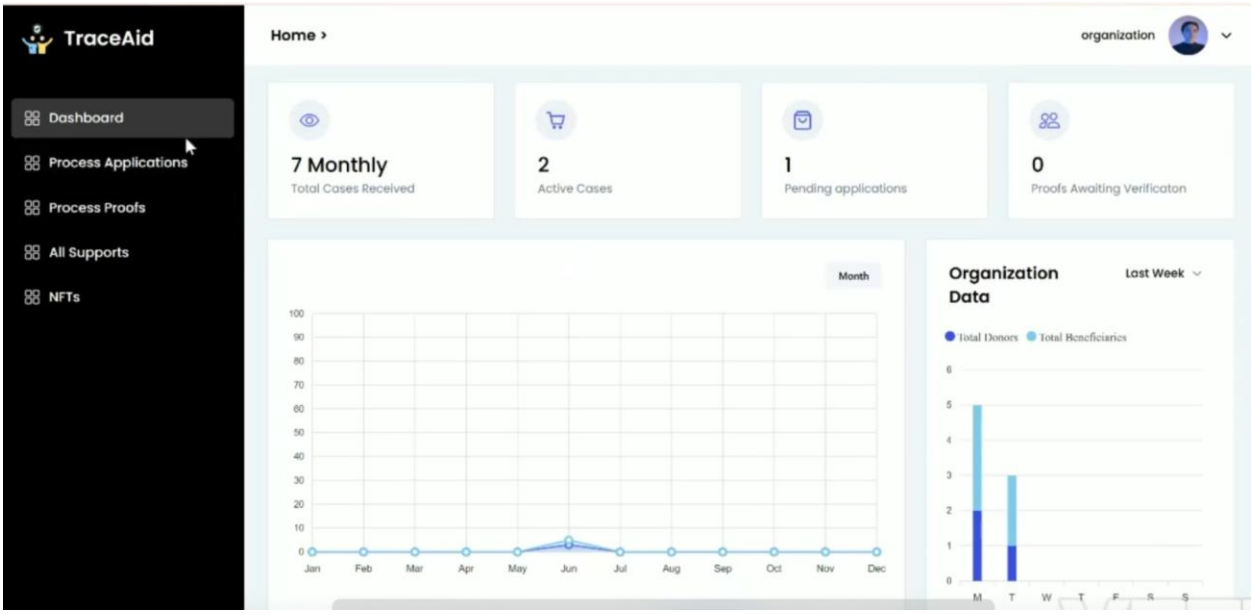


Figure 16/ Organization Dashboard

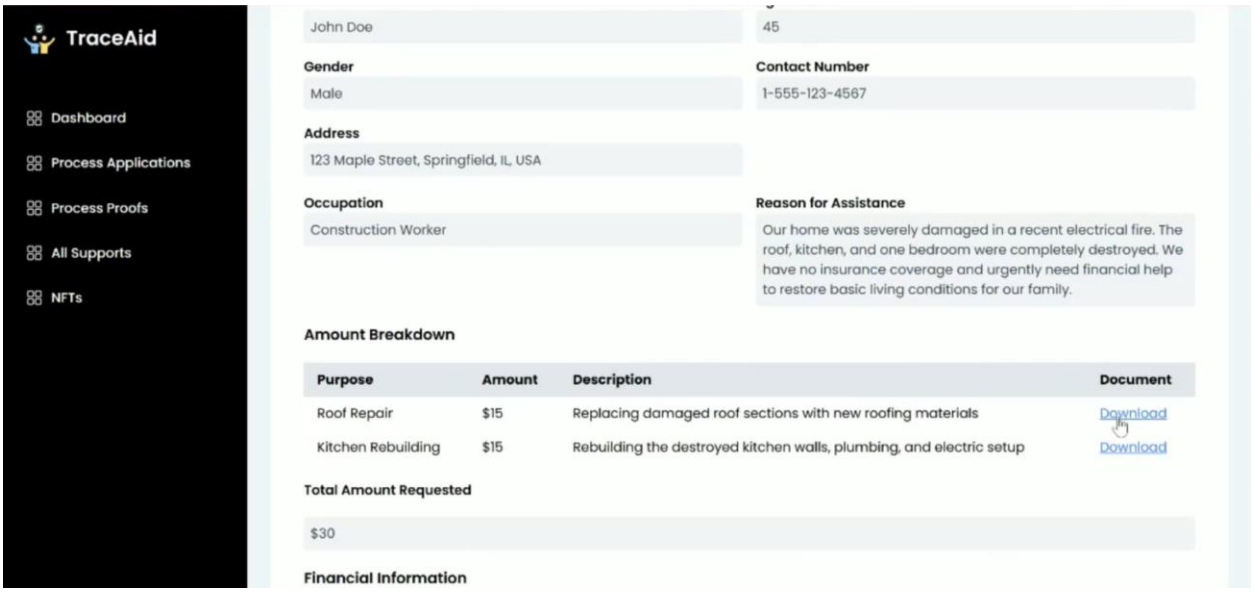


Figure 17/ The organization views the application report and downloads proof.

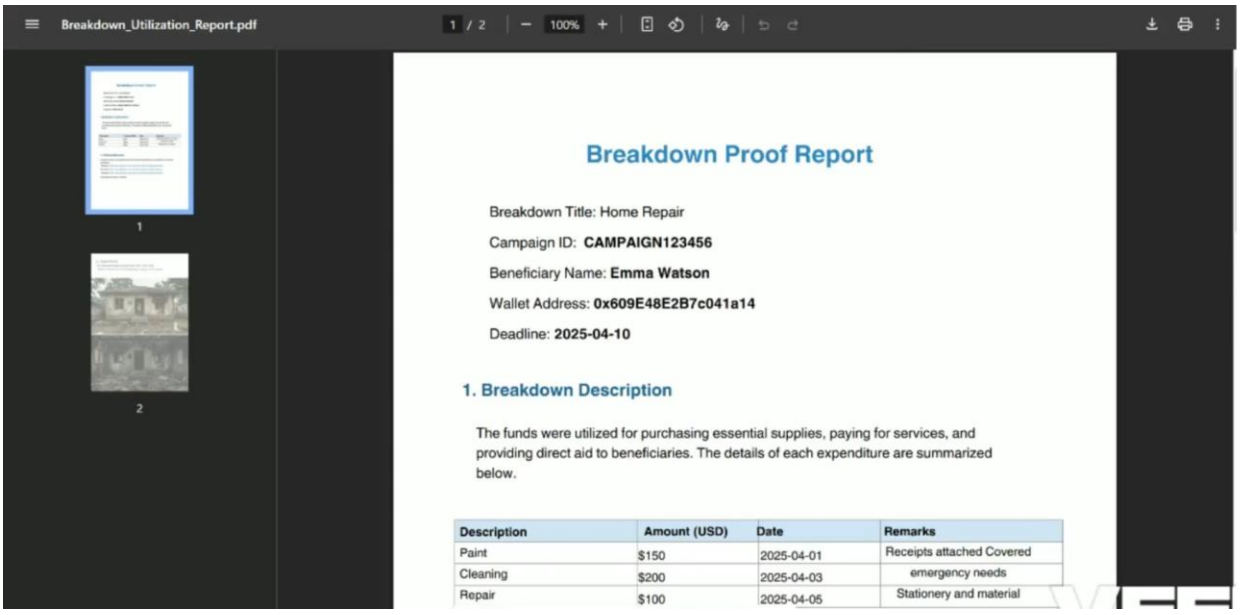
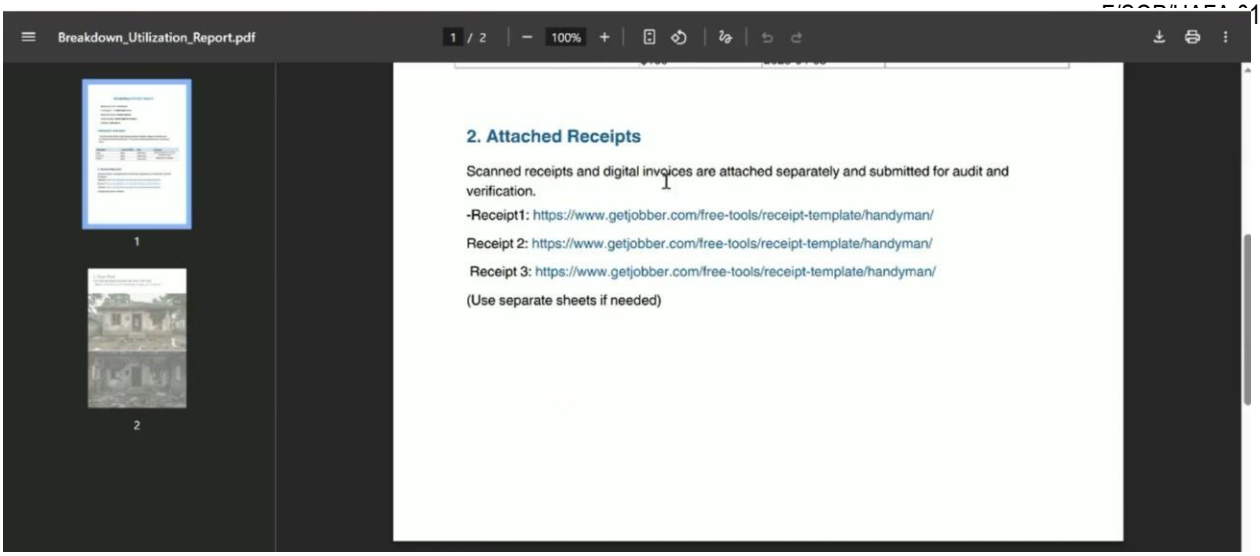


Figure 18/ beneficiary application eligibility proof



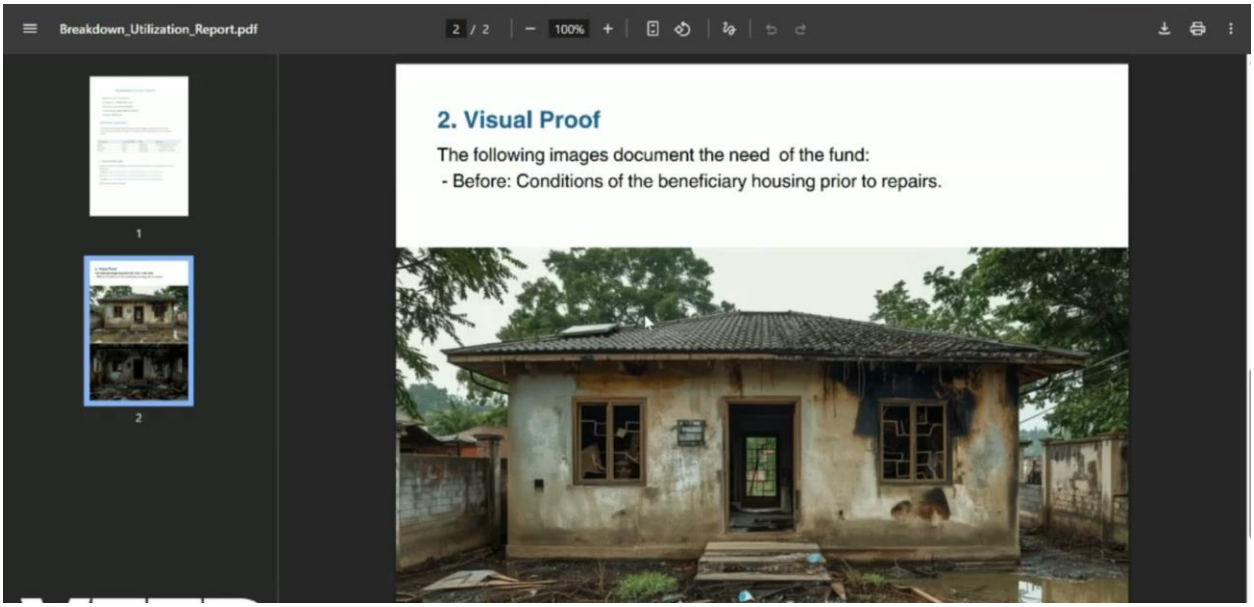


Figure 19/ visual proof submitted by beneficiary