

ETHEREUM x UN IMPACT FRAMEWORK

A new architecture for credible, verifiable, and culturally grounded global impact

This framework is a result of the Next Billion Fellowship which focused on designing an impact measurement and management framework tool to deliver verifiable impact: measuring outcomes accurately, allocating resources efficiently, coordinating agencies effectively, and protecting beneficiary dignity.

Ethereum provides the technical foundation. The UN provides institutional legitimacy and global coordination. Decolonial methodologies ensure justice, equity, and narrative sovereignty. Hybrid impact models ensure credibility and comparability. Retrospective incentives build momentum for long-term planetary benefits.

Problem statement

Humanitarian and development ecosystems face multilayer pressures: institutional trust is eroding, cross-border crises are intensifying, \$10B/year funding gap, massive duplication of funds and beneficiary support, beneficiary exclusion, and donor fatigue from endless pilots. Traditional evaluation models struggle to verify impact at scale through paper-based reporting, retrospective audits, and siloed data—creating massive gaps in verification, coordination, and accountability. And finally, Web3 projects lack UN-aligned credible metrics to prove real-world impact to traditional funders, blocking scalable blockchain solutions from institutional capital.

Purpose statement

Ethereum and UN agencies co-create modular standards, metrics, and models to trace verifiable ESEG impact in blockchain projects using hybrid proofs, with privacy-by-design enabling safe, real-world SDG contributions.

Why Ethereum?

Ethereum is an anchor chain for this framework due to:

- / Its mature public goods culture (Optimism, Gitcoin, Retro Funding).
- / The strongest ZK research ecosystem in the world.
- / Proven real-world impact pilots (Giveth, GainForest, EthicHub, UNICEF/UNDP/WFP experiments).
- / Deep alignment with credible neutrality and open governance.
- / A global developer community building for humanitarian, climate, and economic use-cases.

The framework is chain-agnostic in principle, but Ethereum provides a crucial reference implementation because its ethos and tooling strongly match the values of privacy, neutrality, and public-good infrastructure.

Vision statement

Ethereum builders and UN experts design impact-first from Day 1 using simple IMM guidelines and tools that embed triple-proof verification (on-chain transactions, off-chain and on-chain audits, community narratives). This creates a decentralized development and humanitarian commons where impact is credible, verifiable, and culturally grounded—balancing local sovereignty with global comparability. Verified outcomes unlock flexible funding (community-scored retroactive or donor-approved upfront) while technical, governance, and policy mechanisms resist centralization, surveillance, and power capture.

Full Theory of Change of the Framework Building Process

This is the theory of change of our research and development project - the work we did, the inputs/outputs we generated, and how these led to the development of the framework.

Inputs	Outputs	Outcomes	Impact	Key assumptions
<ul style="list-style-type: none"> / Analysis of existing UN frameworks (SDG indicators, RBM, OECD DAC, protection principles) / Analysis of Web3-native approaches (Hypercerts, Optimism Retro Funding, Cardano IMS) / Mapping of active UN blockchain pilots (WFP, UNHCR, UNICEF, UNDP) / Case studies of UN + Web3 projects (Gainforest, EthicHub, etc.) 	<ul style="list-style-type: none"> / Three-layer measurement framework with templates / Implementation guidelines for UN agencies / Open-source verification tools / Community-led impact narration templates / Case studies demonstrating the framework / Registry of UN blockchain initiatives / Recommendations for blockchain impact pathways 	<ul style="list-style-type: none"> / UN agencies have comparable impact data from blockchain initiatives / Blockchain projects adopt rigorous measurement practices / Shift from proposal-based to outcome-based funding / Stronger collaboration between UN and Ethereum ecosystem / Communities meaningfully participate in impact measurement / Institutional trust in blockchain approaches increases 	<ul style="list-style-type: none"> / Ethereum becomes standard infrastructure in humanitarian/development work / Retroactive, impact-aligned funding becomes the norm / UN and blockchain communities operate as an integrated ecosystem / Communities have structural power in measuring development impact / Decolonial principles embedded in how impact is measured globally / Reduced inequality through decentralized resource flows 	<ul style="list-style-type: none"> / Bridging (not replacing) UN and Ethereum institutions creates legitimacy > Institutional rigor + Web3 transparency works better than either alone / Hybrid verification (on-chain + off-chain + narrative) works at scale > Three types of proof = credibility + cultural grounding + technical verifiability / Better data changes institutional behavior > When funders see comparable impact evidence, funding flows shift / Communities can meaningfully define and measure their own impact > Decolonial design is operationalizable in practice

CRITICAL SUCCESS FACTORS: Framework is culturally grounded (not Western-centric) / On-chain data correlates with real beneficiary outcomes / UN agencies and Ethereum builders actually use the framework (not just endorse it) / At least one major donor adopts verifiable outcome-based funding (retroactive or upfront) / Verification stays independent and resistant to gaming / Privacy protections genuinely shield vulnerable populations.

Theory of Change of the Impact Framework /Five-step Mechanism/

This is the theory of change of the conceptual model - what happens when the framework is adopted by others. This mechanism operationalizes the shift from proposal-based funding to outcome-based, verifiable, community-validated development. To strengthen causal clarity and ensure the mechanism is testable rather than aspirational, we explicitly outline the assumptions, risks, and validation strategies underpinning each step (Measure -> Verify -> Reward -> Adopt -> Scale). This aligns the framework with UN, OECD-DAC, and Ethereum public-goods evaluation standards.

If the framework is adopted by stakeholders (UN agencies, implementers, and blockchain projects), then impact becomes measurable, verifiable, community-validated, and aligned with long-term value rather than proposal writing. The five-step mechanism below outlines the causal logic and explicitly states the assumptions and risks that must hold for each step.

Measure	Verify	Reward	Adopt	Scale
Build a three-layer measurement framework: / Layer 1: Outputs (transactions, attestations, service reach) / Layer 2: Outcomes (efficiency, transparency, fraud reduction, access) / Layer 3: Impact (long-term SDG alignment)	Impact is validated through three converging forms of proof: / Quantitative: On-chain data (transparent transactions, attestations) / Documentary: Off-chain records (audits, case files, monitoring reports) / Qualitative: Narrative proofs (community testimonies, lived experiences) This layered, pluralistic approach creates a robust, multi-dimensional evidence base that mitigates	Projects that demonstrate verifiable impact receive retroactive funding, reducing evaluation costs and aligning incentives toward long-term value. Community co-decides on projects retroactive rewards, based on their verifiable impact. Privacy-preserving technology protects sensitive populations.	Development institutions gain access to credible, comparable impact data that strengthens coordination, reduces duplication, and shifts donor-implementer relationships from transactional to collaborative: / UN agencies get credible, comparable impact data / Collaboration replaces transactional donor-implementer relationships / Institutional trust in blockchain approaches grows	With adoption proven, decentralized, impact-aligned funding becomes standard. Communities gain structural influence, impact definitions become locally grounded, and resource flows become more equitable and transparent: / Retroactive funding becomes the development standard / Community participation moves from tokenistic to structural / More equitable, transparent resource flows

	single-source bias and institutional control.			
<p><i>IF a shared three-layer measurement model (Outputs → Outcomes → Impact) is adopted, THEN impact becomes structured, comparable, and traceable.</i></p> <p>Key assumptions:</p> <ul style="list-style-type: none"> / Agencies agree to a common model while allowing contextual adaptation / Metrics remain locally grounded without losing comparability / Communities can contribute narratives safely / On-chain proxies correlate with real-world outcomes <p>Risks:</p> <ul style="list-style-type: none"> / Institutional inertia and reversion to legacy templates / Colonial/universalist metrics override local nuance / Community narratives undervalued in practice / Gaming or misinterpreting on-chain data <p>Testing strategies:</p>	<p><i>IF impact is validated with triple-proof verification (on-chain, off-chain, narrative), THEN credibility increases and reliance on gatekeepers decreases.</i></p> <p>Key assumptions:</p> <ul style="list-style-type: none"> / All three forms of evidence can be safely collected / ZK-proofs and privacy-by-design function in field conditions / Community witnesses can participate without retaliation / Off-chain documentation is accurate <p>Risks:</p> <ul style="list-style-type: none"> / Metadata leakage on-chain / Local elite capture distorting narratives / Document falsification or inconsistency / Over-weighting one form of proof <p>Testing strategies:</p>	<p><i>IF verified outcomes unlock retroactive funding pools, THEN implementers prioritise long-term value over proposal drafting.</i></p> <p>Key assumptions:</p> <ul style="list-style-type: none"> / Retro funding is operationalised and capitalised / Incentive structures are stronger than proposal-based systems / Community voting systems remain fair and representative/ / Gaming can be detected <p>Risks:</p> <ul style="list-style-type: none"> / Gaming retro cycles / Donor political pressure distorting reward criteria / Marginalised voices excluded from co-decision / Funding cycles fail to sustain engagement <p>Testing strategies:</p>	<p><i>IF agencies receive credible, comparable, privacy-safe impact data, THEN coordination improves, duplication reduces, and blockchain moves to production use.</i></p> <p>Key assumptions:</p> <ul style="list-style-type: none"> / Agencies value verified outcomes more than proposals / Data quality materially influences funding decisions / Stakeholders are trained to interpret blockchain-derived evidence <p>Risks:</p> <ul style="list-style-type: none"> / Institutional resistance or political constraints / Misalignment between donor cycles and retro cycles / Misinterpretation of on-chain indicators <p>Testing strategies:</p>	

/ Pilots across 2-3 regions	/ Privacy and ZK audits	attempt gaming	/ Analyst training sessions	
/ Correlation tests (on-chain <-> off-chain audits)	/ Cross-community verification	/ Conflict-of-interest declarations and audits	/ Review of funding decisions before/after verified data availability	
/ Community metric co-design workshops	/ Randomised document checks	/ Equity assessment of community voting patterns		
/ Sensitivity analysis to prevent harm to vulnerable groups	/ Convergence test: do all proofs point in the same direction?	/ External evaluation of pilot retro cycles		

Decentralised, bottom-up impact principles

Decentralised and decolonial philosophies are used here as working principles, not labels, because the goal is to redesign who holds power over defining, measuring, and validating impact. Decentralisation provides the mechanics: narrative sovereignty, community-led verification, contextual metrics, and participatory governance redistribute epistemic authority and decision-making away from institutional centres toward affected communities. Decolonial thinking provides the ethics: avoiding extractivism, foregrounding power-aware design, and embedding ethical risk mitigation ensure that these distributed mechanics do not simply reproduce old hierarchies under new technical language. Together, they offer a pragmatic way to prevent impact systems from repeating historic harms while building measurement practices that are credible, verifiable, and genuinely culturally grounded—serving people first, rather than institutions.

These make the framework justice-oriented, culturally grounded, and aligned with humanitarian ethics and counter extractive, top-down evaluation models:

Local narrative sovereignty	Avoid extractivism	Contextual metrics	Community-led verification	Power-aware design	Participatory governance	Ethical risk mitigation

Beneficiaries are not “data points”; they are storytellers, evaluators, and co-governors. Narratives are collected through safe, culturally grounded channels. Local narratives shape which metrics are relevant.	No forced data capture. No humanitarian surveillance. Indicators are adapted to linguistic, cultural, and ecological contexts; No universal one-size fits all approaches are mandated. ZK-proofs are used for protection, not for scoring or ranking people, ensuring people remain rights-holders (a system that evaluates actions and outcomes, never human beings).	Metrics are adapted to cultural, linguistic, and ecological contexts. We reject universalist, colonial templates. Communities articulate, experts support, governance aligns - and no single actor dictates.	Local ambassadors validate, cross-community reviewers balance bias. Conflict declarations, global independent evaluators. Triangulation: narratives, metrics, third-party signals. Distributed judgment with counterbalances.	Acknowledges institutional bias, funding pressure, and hierarchical decision-making.	Affected communities help define “impact worth funding, they co-govern impact frameworks through DAOs or committees.	Aligned with humanitarian protection principles, UN data responsibility, and Amnesty’s digital rights ethics. Zero-knowledge proofs, data minimization, and consent guard against surveillance and harm.
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Note on decolonial design: Decolonial is not ideological rhetoric; it refers to concrete design choices: / Metrics co-defined with communities rather than imposed externally; / Narrative evidence treated as first-class proof; / Avoiding extractive data capture and forced surveillance; / Ensuring communities hold real governance power, not symbolic roles; These guardrails ensure Ethereum-built impact systems do not replicate historic power imbalances.

Impact domains & ESEG measurement framework

This framework enables UN agencies and blockchain projects to measure impact credibly and comparably. It combines three types of evidence (on-chain data, off-chain documentation, community narratives) across four domains (ESEG - Environmental, Social, Economic, Governance) organized in three measurement layers (Output, Outcome, Impact). All metrics are modular, replicable, chain-agnostic, privacy-first, localized, and aligned with UN reporting standards.

Environmental (SDG 13)

Social (SDGs 1, 2, 5, 10)

Economic (SDGs 8, 9, 12)

Governance (SDGs 16, 17)

<p>Measure energy efficiency, carbon reduction, and waste prevention through blockchain-verified supply chains and climate transactions.</p> <p>/ Outputs: energy usage, provenance tracking, carbon credit transactions</p> <p>/ Outcomes: emissions avoided, waste reduction, renewable adoption</p> <p>/ Impact: ecosystems restored, climate-resilient infrastructure built</p>	<p>Measure financial inclusion, fraud prevention, beneficiary reach, and community empowerment through secure digital identity and transparent aid delivery.</p> <p>/ Outputs: digital IDs, beneficiary reach, cash transfers</p> <p>/ Outcomes: duplication prevention, inclusion, privacy adoption</p> <p>/ Impact: poverty and hunger reduction, gender empowerment, inequality reduction</p>	<p>Measure cost savings, income uplift, job creation, sustainable livelihoods, and blockchain composability through transparent financing and efficient resource flows.</p> <p>/ Outputs: aid volume, loans, business transactions, protocol composability</p> <p>/ Outcomes: cost savings, improved efficiency (intermediaries reduced via composability), income uplift</p> <p>/ Impact: sustainable livelihoods, SME growth, equitable market access</p>	<p>Measure institutional accountability, anti-fraud detection, diverse participation, corruption reduction, and protocol replicability through transparent, decentralized decision-making.</p> <p>/ Outputs: audit trails, fraud detection, voting participation, smart contract forks/deployments (code reuse, # replications), fund/recipient deduplication (cross-agency coordination)</p> <p>/ Outcomes: coordination, trust, diverse governance</p> <p>/ Impact: reduced corruption, structural collaboration, radical transparency</p>
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ESEG Metrics & Measurement

Each ESEG domain is evaluated across three layers (Output, Outcome, Impact). Outputs measure activities, Outcomes measure effects, and Impact measures long-term systemic change. This layering ensures both comparability across UN agencies and contextual adaptation for local relevance.

KEY PRINCIPLES: **Modular** — Pick metrics for your context, don't force all domains; **Replicable** — Forkable contracts and composable protocols work across organizations, geographies, and blockchain platforms; **Chain-agnostic** — Works on Ethereum, Cardano, Solana, or any chain; **Privacy-first** — ZK-proofs and consent-based data collection built in; **Localized** — Thresholds and narratives adapt to local context; UN-aligned — Direct connection to SDG targets and humanitarian standards; **Convergence-based** — Not single metrics, but multiple proofs pointing same direction; **Community-validated** — Beneficiary voice embedded in narrative proofs; **Not accountability theater** — Data leads to action and course correction, not just reporting.

HOW TO USE THIS FRAMEWORK: **Step 1:** Choose your primary domain (Environmental/Social/Economic/Governance); **Step 2:** Choose which layers matter (Output/Outcome/Impact); **Step 3:** Select metrics from the checklist above; **Step 4:** Gather three types of evidence (on-chain + off-chain + narratives); **Step 5:** Check for convergence — do all three proofs point the same direction?

Output metrics	Outcome metrics	Impact metrics	Validation
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Domain Level Indicator: Environmental (Climate, natural resources, sustainable infrastructure (SDG 13))			
/ Energy consumption per transaction (kWh) / Supply chain transactions recorded (provenance verification rate) / Carbon offset/credit transactions processed	/ CO ₂ avoided via improved logistics (compared to baseline) / Supply chain waste reduction (% vs. previous systems) / Renewable energy adoption rate	/ Carbon sequestration targets achieved (tonnes CO ₂) / Ecosystems restored and protected / Climate-resilient infrastructure established	ON-CHAIN: Energy data, transaction volumes OFF-CHAIN: Waste audits, carbon certifications NARRATIVE EXAMPLE: “This blockchain lets us track coffee origin, reducing illegal deforestation”
Domain Level Indicator: Social (Inclusion, human rights, vulnerable populations, community voice (SDGs 1, 2, 5, 10))			
/ Beneficiary reach (disaggregated by gender/age/vulnerability) / Digital identities issued (active, deduplication rate) / Cash transfers processed (number, amount, population) / Community participation rate (demographic diversity)	/ Duplication prevention (% reduction in fraudulent claims) / Financial inclusion (unbanked > wallet/phone access transitions) / Privacy adoption (% using ZK-proofs) / Fraud prevention (% of attempts caught)	/ Poverty reduction (income trajectories, market participation) / Hunger reduction (food security, nutritional outcomes) / Gender equality (women’s decision-making power) / Inequality reduction (wealth distribution changes)	ON-CHAIN: Beneficiary IDs, fraud detection smart contracts, privacy tech adoption OFF-CHAIN: Surveys, school attendance, income data NARRATIVE EXAMPLE: “I can prove I’m me without camp officials controlling my documents” + empowerment narratives across gender/ethnicity/refugee status
Domain Level Indicator: Economic (Financing, wealth creation, market access, sustainable livelihoods (SDGs 8, 9, 12))			
/ Aid transfer volume (total USD/currency processed) / Loan issuance (number, average size, demographics) / Job opportunities posted (number, skill matches) / Business transactions recorded (vendor payments, costs) / Number of people onboarded to DeFi/ on-chain transactions and number of vendors	/ Cost savings (% reduction in fees/administrative overhead) / Aid efficiency (% reaching beneficiaries vs. lost to intermediaries) / Income uplift (average change for recipients) / Business efficiency (transaction speed, intermediaries reduced)	/ Sustainable livelihoods established (job retention over 2+ years) / SME ecosystem strengthened (survival rate, revenue growth) / Transparent development funding becomes standard / Reduced inequality in economic opportunity	ON-CHAIN: Transaction volumes, transfer costs, job matches OFF-CHAIN: Income surveys, business financial records, audit reports NARRATIVE EXAMPLE: “I started a shop with a fair loan—no middleman charging 30%” + “We save 40% on cash delivery costs”

Domain Level Indicator: Governance (Transparency, accountability, institutional coordination, decentralization (SDGs 16, 17))			
/ Compliance & auditability (% of transactions with audit trail) / Anti-fraud detections (number flagged, prevented, resolution time) / Governance participation (voting rights, participation rate) / Data shared across agencies (coordination touchpoints, fund/recipient deduplication rate)	/ Diverse participation (demographic diversity of participants) / Fraud prevention effectiveness (\$ value prevented, prosecution rate) / Institutional coordination (response time, data sharing velocity) / Institutional trust (satisfaction scores, collaboration willingness)	/ Corruption reduced (transparency index changes) / Inter-agency collaboration becomes structural norm / Communities have meaningful power in decisions / Radical transparency (public blockchain records, citizen engagement)	ON-CHAIN: Fraud detections, governance votes, compliance audit trails OFF-CHAIN: Agency audits, coordination protocols, policies adopted NARRATIVE EXAMPLE: "We can see where every dollar goes, so communities trust us" + diverse participation from marginalized groups now included

Governance & Ethics

Governance fundamentally shapes the legitimacy, security, and social value of blockchain-enabled initiatives and their measurement methodologies. The framework integrates governance and ethics as both a design principle and measurable impact domain, drawing on UN norms, digital rights principles, and Web3-native governance models. Innovations including:

Triple-proof verification	Privacy-first humanitarian data	Community co-governed evaluation	Retroactive funding for proven results	Neutral, forkable governance
<i>On-chain evidence + off-chain documentation + narrative testimony</i>	<i>Mandatory ZK-proofs, minimal data, and consent-only collection</i>	<i>Local witnesses and affected populations validate outcomes</i>	<i>Incentives reward long-term value, not proposal writing</i>	<i>DAO-maintained registry with UN input and conflict policies; no single veto; credible neutrality guaranteed by open-source infrastructure</i>

These innovations create a more equitable, verifiable measurement system, with governance embedded in operations: DAO-maintained with UN input and conflict policies, open feedback via proposals and forums, and neutral open-source infrastructure preventing capture .

Blockchain may introduce metadata privacy risks if not carefully designed and power asymmetries between donors and communities must be continually addressed. These limitations underscore the need for ongoing governance, audits, and community oversight.

Principles: Open-source; Privacy as a right (ZK-proofs mandatory); Credible neutrality (no single veto power); Inclusivity (local communities define impact); Decentralization (community can fork if captured); Protection-first (beneficiary protection > measurement); Transparency (decisions published within 48 hours)