# BUILDING BLOCKS HUMANITARIAN BLOCKCHAIN NETWORK IMPACT FRAMEWORK

*A three-layer, community-grounded impact measurement model for equitable humanitarian assistance coordination*

The Building Blocks initiative by the World Food Programme (WFP) represents a transformative approach to humanitarian assistance delivery through blockchain technology. Deployed across Jordan, Bangladesh, Ukraine, Lebanon, and Palestine, it has reached over 6 million people and transferred more than USD 760 million in assistance. This framework operationalizes impact measurement for Building Blocks using a “triple-proof verification model” (on-chain data + off-chain documentation + community narratives) across three measurement layers (Output / Outcome / Impact) and four impact domains (Environmental, Social, Economic, Governance (ESEG).

The framework is designed to:
- Measure tangible humanitarian outcomes (duplication prevention, cost savings, reach),
- Verify impact credibly through multiple evidence streams,
- Embed beneficiary voice in evaluation and governance,
- Enable outcome-based funding and institutional trust,
- Maintain privacy and protection of vulnerable populations.

| **Problem statement** |
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| Humanitarian operations face multilayer coordination failures, including extreme fragmentation where over 600 organizations delivered assistance simultaneously in Ukraine alone, creating duplication, gaps, and inefficiency; duplication of aid without unified tracking, resulting in some beneficiaries receiving multiple payments while others are excluded entirely; information silos that prevent agencies from safely sharing beneficiary assistance data, hindering coordinated responses; slow verification through traditional paper-based retrospective audits that create months of lag between delivery and accountability; high transaction costs from banking intermediaries charging 5-10% fees on cash transfers, reducing funds reaching beneficiaries; beneficiary exclusion due to the lack of portable identity solutions, leaving vulnerable populations unable to access services across borders or after displacement; and donor fatigue stemming from persistent institutional trust gaps that block scalable funding for proven solutions. |

| **Purpose of this framework** |
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| To create a credible, verifiable, community-grounded impact measurement system that:<br>1. Demonstrates Building Blocks' contribution to SDGs,<br>2. Enables rigorous evidence for outcome-based funding,<br>3. Centers beneficiary voice and accountability, |

4. Prevents misuse while protecting privacy,
5. Allows cross-agency comparison and learning,
6. Operationalizes decolonial and participatory principles in humanitarian evaluation.
This framework is not premised on blockchain being inherently beneficial. It is premised on identifying, testing, and validating the conditions under which blockchain infrastructure demonstrably adds public value in humanitarian contexts—without introducing new forms of harm, exclusion, or extractive data practices.

## 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

Humanitarian agencies coordinating through Building Blocks achieve faster response, reduced duplication, and proven impact with beneficiaries maintaining dignity, privacy, and agency through community-validated outcome measurement that shifts the sector from proposal-based to evidence-based funding.

## Theory of Change

**Building Process (Project-Level Theory of Change)**
**If** a shared humanitarian blockchain network (Building Blocks) is designed with triple-proof impact measurement and multi-stakeholder governance, **then** humanitarian agencies have a neutral, decentralized platform to coordinate assistance safely, efficiently, and accountably.

| Inputs | Outputs | Outcomes | Impacts | Key Assumptions |
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| / WFP blockchain infrastructure (Ethereum-based private network)<br>/ Multi-agency partnerships (UNICEF, UNHCR, UN Women, WFP, local NGOs)<br>/ Community co-design in pilot countries<br>/ Privacy-by-design technical architecture<br>/ Governance frameworks & DAO model<br>/ Impact measurement templates | / Building Blocks platform operational in 5+ countries<br>/ 1M+ beneficiaries with digital wallets<br>/ Permissioned network with 30+ member organizations<br>/ Smart contracts for assistance coordination<br>/ Privacy audit certification<br>/ Impact measurement dashboard | / Humanitarian agencies have real-time visibility on beneficiary assistance levels<br>/ Duplication prevented through cross-agency verification<br>/ Response time reduced from weeks to days<br>/ Transaction costs eliminated<br>/ Beneficiaries access multiple assistance types in one interface | / Humanitarian coordination becomes the norm, not exception<br>/ $1B+ annual inefficiency savings redirected to more beneficiaries<br>/ Institutional trust in blockchain increases<br>/ Outcomes-based funding becomes standard<br>/ Communities participate meaningfully in aid evaluation | / Organizations will prioritize coordination over competitive advantage<br>/ Privacy-preserving technology functions reliably in field conditions<br>/ Beneficiaries accept digital identity solutions<br>/ Donors value verified outcomes over proposals |
| **Implementation Mechanism (Impact Framework Theory of Change)**<br>**If** impact is measured credibly through **triple-proof verification** and **community participation**, **then** development institutions shift from proposal-based to outcome-based funding, redirecting resources toward long-term value creation. | | | | |
| **Measure** | **Verify** | **Reward** | **Adopt** | **Scale** |
| Build layered measurement:<br>/ Layer 1: Outputs (transactions, reach, efficiency metrics)<br>/ Layer 2: Outcomes (fraud prevention, duplication reduction, access)<br>/ Layer 3: Impact (SDG progress, poverty reduction, systemic coordination) | Triple Proof Convergence:<br>/ On-chain: Transaction data, smart contract logs, deduplication flags<br>/ Off-chain: Audit reports, program data, vendor verification<br>/ Narrative: Beneficiary testimonies, community witness validation | Unlock Retroactive Funding:<br>/ Projects demonstrating verified impact receive outcome-based rewards<br>/ Community co-decides priority areas<br>/ Privacy-preserving verification protects sensitive populations<br>/ Incentive shift: long-term value > proposal drafting | Institutional Adoption:<br>/ Agencies receive credible, comparable impact data<br>/ Collaboration replaces transactional relationships<br>/ Blockchain use moves from pilot to production<br>/ Staff trained to interpret on-chain evidence | Decentralized Impact Funding:<br>/ Retroactive, outcome-based funding becomes development standard<br>/ Community structural influence increases<br>/ Resource flows become more equitable and transparent<br>/ Governance proves resistant to capture |

| Decentralised, bottom-up impact principles | | | | | | |
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| **Local narrative sovereignty** | **Avoid extractivism** | **Contextual metrics** | **Community-led verification** | **Power-aware design** | **Participatory governance** | **Ethical risk mitigation** |
| - Beneficiaries are evaluators and storytellers, not data points<br>- Communities articulate which metrics matter to them<br>- Impact narratives in beneficiary language are first-class evidence | - Data collection requires explicit, ongoing consent<br>- No forced participation or surveillance<br>- No use of biometric data for scoring or ranking people<br>- ZK-proofs protect sensitive data; only use for verification, never for profiling<br>- Data deletion protocols ensure communities aren't tracked indefinitely<br>- Measurement: Consent rate monitoring; privacy audits; data deletion verification | - Reject universal, Western-centric templates<br>- Metrics adapted to linguistic, cultural, and ecological contexts<br>- Communities define what "success" and "impact" mean<br>- Thresholds set locally (not globally imposed) | - Local ambassadors validate impact claims<br>- Cross-community reviewers balance individual bias<br>- Beneficiaries participate in audit and evaluation<br>- Independent third-party audits alongside community verification<br>- Conflict-of-interest declarations for all participants<br>- Measurement: Community participation rates in verification; audit quality assessments | - Acknowledge institutional bias, funding pressure, hierarchical decision-making<br>- Design mechanisms to detect and mitigate power capture<br>- Regular governance stress tests<br>- Independent ethics and human rights reviews<br>- Measure participation equity (do certain groups dominate decisions?) | - Affected communities help define "impact worth funding"<br>- Co-governance through DAOs or multi-stakeholder committees<br>- Real authority, not tokenistic representation<br>- Communities can fork the system if it's captured<br>- Measurement: Governance participation equity; decision-making influence analysis | - Aligned with humanitarian protection principles and UN data responsibility standards<br>- Privacy safeguards: zero-knowledge proofs, data minimization, consent-based collection<br>- Avoid harm to vulnerable populations (sensitivity testing)<br>- Exit protocols: if data is misused, beneficiaries can withdraw consent<br>- Measurement: Privacy audits; human rights assessments; safeguarding incident logs |

| Impact domains & ESEG measurement framework | | |
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| Building Blocks impact is organized across three measurement layers: | | |
| **Layer 1: Outputs (Activities & Service Delivery)** | **Layer 2: Outcomes (Behavioral & Efficiency Change)** | **Layer 3: Impact (Long-Term SDG Contribution)** |
| Measures the volume and scope of transactions, reach, and operational efficiency - the operational foundation of the platform. | Measures the changes in how humanitarian coordination functions - duplication prevention, cost savings, fraud reduction, access improvements, and operational coordination. | Measures systemic changes in humanitarian systems, poverty reduction, beneficiary dignity, and contribution to specific UN SDG targets. |

| ESEG Metrics & Measurement | | | |
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| **Output metrics** | **Outcome metrics** | **Impact metrics** | **Validation** |
| **Domain Level Indicator: Environmental** (Climate, natural resources, sustainable infrastructure (SDG 13)) | | | |
| / Number of climate-adaptation assistance transactions recorded<br>/ Carbon emissions from aid logistics (baseline vs. post-BB)<br>/ Climate resilience funds transferred (USD volume)<br>/ Disaster response deployment time | / Logistics emissions reduced (% vs. traditional systems)<br>/ Climate financing efficiency (cost per beneficiary)<br>/ Speed to deploy emergency response<br>/ Supply chain waste reduction | / Communities implement climate adaptation strategies<br>/ Greenhouse gas reductions achieved<br>/ Resilient infrastructure established in fragile contexts | ON-CHAIN: Energy usage per transaction, response deployment logs<br>OFF-CHAIN: Logistics audits, emissions certifications<br>NARRATIVE: "This platform helped us respond to the drought in 48 hours instead of weeks” |
| **Domain Level Indicator: Social** (SDGs 1, 2, 5, 10: Poverty, Hunger, Gender Equality, Reduced Inequality) | | | |
| / Beneficiary reach (disaggregated by gender, age, vulnerability status, displacement type)<br>/ Digital identities issued and active (deduplication rate) | / Duplication prevention: % reduction in unintended overlaps<br>/ Financial inclusion rate: unbanked - active wallet transitions | / Poverty headcount reduction in service areas<br>/ Food security improvement (dietary diversity, caloric intake) | ON-CHAIN: Beneficiary IDs, deduplication flags, assistance transaction logs<br>OFF-CHAIN: Household surveys, food security assessments, gender audits |

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| / Cash transfers processed (volume, average size, demographic breakdown)<br>/ Assistance types offered (food, cash, hygiene, education)<br>/ Multi-agency assistance coordination touchpoints | / Privacy adoption: % using ZK-proofs for identity verification<br>/ Assistance accuracy: % reaching intended beneficiaries<br>/ Gender equity in program design: % women decision-makers in household | / Gender empowerment: women's control over household resources<br>/ Reduced inequality: aid distribution becomes more equitable<br>/ Dignity preservation: beneficiaries report choice and agency in aid access | NARRATIVE: "I can prove I'm me without officials controlling my documents" + "We finally got help" (after being excluded previously) |
| **Domain Level Indicator: Economic** (SDGs 8, 9, 12: Decent Work, Infrastructure, Responsible Consumption) | | | |
| / Total assistance volume transferred (USD/local currency)<br>/ Number of vendors/merchants integrated<br>/ Loan disbursements (microfinance linked to BB)<br>/ Job opportunities posted through platform<br>/ Business transactions recorded (vendor payments, costs) | / Cost savings: % reduction in transaction fees (target: 5-10% saved)<br>/ Aid efficiency: % reaching beneficiaries vs. lost to intermediaries<br>/ Transaction speed: avg. time from disbursement to redemption (target: <24 hours)<br>/ Vendor ecosystem: # merchants trained, active participation<br>/ Income uplift: % change in household income for recipients | / Sustainable livelihoods established (job retention >2 years)<br>/ SME ecosystem strengthened (vendor survival rate, revenue growth)<br>/ Economic multiplier: local spending generated per assistance dollar<br>/ Equitable market access: smaller vendors integrated | ON-CHAIN: Transfer volumes, transaction costs, merchant adoption<br>OFF-CHAIN: Income surveys, vendor financial records, cost audits<br>NARRATIVE: "I run a shop now and don't lose 30% to middlemen anymore" + "We save 40% on cash delivery costs" |
| **Domain Level Indicator: Governance** (SDGs 16, 17: Peace & Justice, Partnership for Goals) | | | |
| / Compliance audit trail: % of transactions with full audit log<br>/ Anti-fraud detections: # flagged, prevented, resolution time<br>/ Governance participation: voting rights active, participation rate<br>/ Data shared across agencies: coordination touchpoints<br>/ Smart contract deployments: # forks/replications (code reuse) | / Diverse participation: demographic diversity in governance + program participation<br>/ Fraud prevention effectiveness: $ value prevented, prosecution rate<br>/ Institutional coordination: response time to humanitarian crisis, data sharing velocity<br>/ Beneficiary complaints resolved: # and avg. resolution time | / Corruption reduction: transparency index improvement<br>/ Inter-agency collaboration becomes structural (standard protocols)<br>/ Communities have meaningful power in decisions<br>/ Institutional trust in blockchain approaches increases<br>/ Accountability mechanisms are beneficiary-centered | ON-CHAIN: Fraud detection logs, governance votes, audit trails<br>OFF-CHAIN: Agency audits, coordination protocols adopted<br>NARRATIVE: "We can see where every dollar goes, so communities trust us" + "We're finally coordinating instead of competing" |

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| | / Deduplication rate: cross-agency coordination preventing overlaps | | |

## Expected Impacts

By End of Year 2 (Short-Term)
/ 6M+ beneficiaries reached with coordinated assistance
/ USD 270M+ in duplication prevented (Ukraine example)
/ USD 3.5M+ in transaction fees saved (reinvested in more aid)
/ 99.9% uptime of BB platform (production-grade reliability)
/ 100% of agencies report improved coordination
/ 80%+ of beneficiaries report satisfaction with assistance access

By End of Year 5 (Medium-Term)
/ 15M+ beneficiaries across 15+ countries
/ USD 1B+ in humanitarian inefficiency savings redirected to beneficiaries
/ 50+ UN agencies and NGOs as network members
/ Outcome-based funding standard for 3+ major donors
/ Decolonial measurement framework adopted by other UN initiatives (beyond Building Blocks)
/ Community participation in governance exceeds 30% of decision-making influence

Long-Term Vision (10 Years)
/ Humanitarian blockchain coordination becomes institutional norm (not pilot)
/ SDG 16 (Peace & Justice) targets on transparency and accountability advanced
/ Decentralized finance for humanitarian response at scale
/ Beneficiary voice structurally embedded in development funding allocation globally
/ Privacy-preserving verification becomes gold standard in international development

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## Monitoring & Learning Cycle

Real-Time Monitoring (Monthly)
- Transaction volume and reach (on-chain)
- Cost savings and efficiency gains
- Fraud detection and resolution
- Beneficiary complaints and resolution rate
- Governance participation and voting

Quarterly Learning Workshops
**Participants**: Implementing partners, beneficiary representatives, donors, data analysts
- Review dashboard findings (what's working, what's not)
- Community testimony and narrative review
- Adaptive management: adjust approach
- Cross-site learning (what worked in Jordan that we can try in Bangladesh?)

Annual Evaluation Cycle
- Assess progress on Outcome Metrics (duplication prevention, cost savings, inclusion)
- Analyze convergence of triple-proof evidence
- Update impact narratives (qualitative case studies)
- Identify risks to success (governance capture? Privacy drift? Beneficiary burnout?)

Mid-Term & End-of-Program Evaluation
- Rigorous assessment of long-term change (poverty reduction, SDG progress)
- Contribution analysis: what did Building Blocks contribute to observed changes?
- Cost-effectiveness analysis (cost per beneficiary, cost per $1 of duplication prevented)
- Institutional learning: what would make this work at scale?

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## Risk Mitigation

| Risk | Likelihood | Impact | Mitigation |
|---|---|---|---|
| One agency dominates governance | Medium | High | / Equal voting weight in DAO; consensus-based decisions |

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| | | | / Regular conflict-of-interest audits<br>/ Community veto power on major decisions<br>/ Annual governance stress tests |
| Beneficiary data exposed on-chain | Low | Very-high | / Mandatory privacy audits (annual)<br>/ ZK-proof mandatory for identity<br>/ Data minimization enforcement<br>/ Beneficiary consent withdrawal rights<br>/ Incident response protocol |
| Agencies misreport data to inflate impact | Medium | High | / Random data audits (10% of transactions)<br>/ Community verification cross-checks<br>/ Independent auditor involvement<br>/ Consequences for data fraud (transparent public records) |
| Too many surveys; communities disengage | Medium | High | / Limit survey frequency (max 1 per beneficiary per quarter)<br>/ Embed M&E in program delivery (not separate)<br>/ Compensation for beneficiary time<br>/ Community decides acceptable data collection intensity |
| BB network downtime during crisis | Low | Very-high | / Redundant network infrastructure<br>/ Offline-capable fallback mechanisms<br>/ Regular disaster recovery drills<br>/ SLA (99.9% uptime target)<br>/ Community notification protocols |
| Donors pressure manipulation of metrics | Medium | Medium | / Independent Impact Verification Council (not donor-controlled)<br>/ Transparent metric definitions (public)<br>/ Community input on metric interpretation<br>/ Annual public audit of donor influence |
| Women, minorities, disabled people underrepresented in governance | High | High | / Deliberate recruitment of underrepresented groups<br>/ Accessible meeting formats (language interpretation, mobility access)<br>/ Compensation for participation time<br>/ Regular equity audits of governance participation |

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## 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** |
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| *Building Blocks uses triple-proof validation: on-chain transaction logs, off-chain audits/surveys, and community narratives ensuring credible impact measurement across all evidence streams* | *Zero-knowledge proofs enable identity verification without exposing personal data; strict minimization, revocable consent, and annual audits protect vulnerable populations per UN standards.* | *Local Community Evaluation Committees (beneficiaries + partners) adapt metrics, validate findings, and veto mismatched results, embedding decolonial power in evaluation.* | *Funds release only after triple-proof convergence (e.g., USD 270M duplication prevented), shifting to outcome-based rewards via community scoring, cutting evaluation costs 40-60%.* | *DAO-like equal voting, open-source contracts, rotating leadership, and forkable protocols ensure neutrality and interoperability without single-entity dominance.* |

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## Conclusion

The Building Blocks Impact Framework operationalizes a new model for humanitarian impact measurement: credible, verifiable, community-grounded, and resistant to power capture. By combining on-chain transparency, off-chain rigor, and narrative authenticity, it enables both accountability to beneficiaries and evidence for outcome-based funding.

Most importantly, it embeds a simple truth: those most affected by humanitarian response are the best judges of whether it's working. This framework ensures their voices are not just heard, but structurally empowered in shaping the future of aid delivery.