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12-Month MVP Roadmap:

Decentralized Peer-Reviewed Publishing on Cardano

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Introduction and Objectives

Academic peer review today faces well-documented challenges: a small minority of scholars shoulder most review work (leading to burnout), reviewers get little credit or reward, and the process is often slow, opaque, and frustrating for authors. Our goal is to build a **decentralized peer-review publishing platform on Cardano** that directly addresses these pain points. Based on extensive research and user interviews, this 12-month roadmap focuses on an MVP (Minimum Viable Product) phase that emphasizes **transparency, incentive alignment, and seamless integration with existing academic workflows**. We incorporate insights from literature analysis, industry surveys, and academic stakeholders to ensure the roadmap meets real user needs and avoids past pitfalls in Web3 publishing.

Key MVP Objectives:

- **Transparency & Trust:** Every manuscript submission, peer review, and decision will be recorded on an immutable ledger to eliminate the opacity of traditional peer review. Open peer review (making reviewer reports visible) will be introduced to shine light on decision-making, fostering accountability while maintaining any necessary anonymity for reviewers.

- **Incentives & Recognition:** The MVP will implement a reward system (using ADA cryptocurrency micropayments) and a reputation mechanism to **recognize and motivate reviewers**, addressing the historic lack of extrinsic motivation for peer review. Reviewers who deliver high-quality, timely reviews will earn tangible rewards and build a public credibility score, encouraging broader participation.

- **Integration & Usability:** To drive adoption, the platform will **meet researchers where they are** by integrating with familiar tools. Academics can log in via ORCID (a standard researcher ID) and link their profiles, ensuring they get career credit for reviews in a way their institutions recognize. Published papers in the MVP will receive DOIs (Digital Object Identifiers) or equivalent identifiers for discoverability and citation. The user experience will minimize blockchain jargon and friction – following best practices of successful Web3 platforms that hide complexity (e.g. auto-generating wallets or covering transaction fees). In short, **the MVP will feel like a natural extension of current academic publishing, not a foreign Web3 silo**.

By focusing on a lean feature set that directly targets transparency issues, incentive problems, and workflow friction, this 12-month MVP will demonstrate a working decentralized journal system on the Cardano testnet. The roadmap below outlines the phased plan, ensuring each phase ties back to specific needs identified in our research (lack of trust, poor incentives, workflow inefficiencies, etc.) and lays the groundwork for long-term evolution (future scaling and governance will be handled after the MVP phase).

Roadmap Overview (Phased Implementation)

The MVP development is divided into clear phases over 12 months, each with specific deliverables and research-driven rationale. The table below summarizes the phases:

Below, we describe each phase in detail, linking the planned work to the insights from our milestone research reports.

Phase (Months)	Key Focus & Activities	Goals (Addressing Identified Needs)
Phase 1 (Months 1–3)	Planning & Design: Finalize requirements, architecture design, set up blockchain & storage infrastructure, user flow prototypes.	**Foundation for Transparency & Integration:** Align features with user needs (transparent review records, reviewer rewards). Ensure design supports ORCID/DOI integration to fit academic norms.
Phase 2 (Months 4–6)	Core Development: Implement on-chain submission logging, ORCID login system, manuscript submission workflow, IPFS off-chain storage, basic front-end UI.	**Core Platform (Transparency in Action):** First end-to-end submission on Cardano testnet with immutable record and off-chain content. Seamless user onboarding via ORCID (reducing friction).
Phase 3 (Months 7–9)	Beta Features & Testing: Enable peer review workflow, reviewer assignment, open peer review display, reward distribution (ADA micropayments), reputation tracking. Conduct closed beta with academics.	**Incentives & Accountability:** Test the reviewer reward and reputation systems in practice (motivate participation and build trust through visible reviewer profiles). Gather feedback on usability and openness (ensuring transparency without compromising quality).
Phase 4 (Months 10–12)	Pilot Launch & Refinement: Onboard a pilot user group, publish first papers with open reviews and DOIs, gather feedback, refine UI/UX, ensure security and scalability. Prepare documentation and a go-live plan.	**MVP Validation & Readiness:** Real-world demonstration of a decentralized journal: at least one scholarly article reviewed and published with transparent reviews on-chain. Incorporate user feedback to polish the system, proving that the MVP addresses key pain points (speed, transparency, credit distribution) and is ready for broader adoption.

Phase 1 (Months 1–3): Foundation – Research Integration & System Design

Activities: In the first 3 months, the focus is on translating research findings into a concrete project plan and technical design. The team will review the "pain points" identified in our studies and define how each will be addressed in the product requirements. Key tasks include:

- **Requirement Finalization:** We map specific user needs from the literature and interviews to features in the MVP. For example, to combat the opacity of traditional peer review, we require an **immutable, time-stamped ledger of peer review events**. To tackle poor reviewer incentives, we design a **token-free reward mechanism** using ADA (Cardano's native cryptocurrency) for simplicity. Each major insight – lack of transparency, slow process, lack of recognition – is linked to a planned feature (e.g. open review publishing, automated reward for timely reviews, and a reputation score for reviewers). The **"Innovations in Peer Review"** literature analysis highlighted the need for transparent records and reviewer rewards, which become foundational requirements in our MVP scope.

- **Architecture & Tech Design:** We draft the system architecture with a **hybrid decentralized approach**, heeding industry lessons about gradual decentralization. The design specifies which

components will be on-chain vs. off-chain. For instance, *on-chain smart contracts* or transactions will record hashes and metadata of submissions/reviews (ensuring tamper-proof provenance), while the full content (manuscripts, review reports) will live off-chain on a distributed storage network (IPFS) for scalability. This hybrid model provides decentralization and security for critical data without clogging the blockchain, aligning with our research recommendation to prioritize high-impact on-chain operations like timestamps and payments. We also design the initial data schema to include standard identifiers (ORCID for user IDs, DOI for papers) so the platform can plug into existing academic infrastructure from day one.

- **Infrastructure Setup:** Early in this phase, we set up the development environments: spinning up a Cardano testnet instance or connecting to an available testnet, and configuring IPFS or an equivalent decentralized storage node. Security and privacy considerations are taken into account – for example, deciding how to handle private vs. public data (reviews might be anonymous publicly but still verifiably linked to an internal identity). By the end of Month 3, we aim to have a clear system design document and a working **proof-of-concept for a simple on-chain record** (e.g., the team might execute a test transaction on Cardano representing a dummy submission to verify the tooling). We will have also designed the user flow on paper or wireframes: from **"Login with ORCID"** → "Submit manuscript" → "Assign reviewers" (for editors) → "Record review and reward" → "Publish article with reviews". This ensures that when development starts, it remains focused on an intuitive process flow that resonates with academic users (keeping the workflow familiar was a key success factor noted in other platforms).

Research Links: Phase 1 is guided by understanding the problem-space deeply. The literature review report underscored that peer review, at its core, is a decentralized consensus mechanism that isn't *broken* but needs scaling and incentive fixes. Thus, our design doesn't throw away proven practices (e.g. we keep the concept of editorial oversight to maintain quality), but enhances them with technology. User interviews likewise stressed that any new system must **"be carefully designed with academia's norms in mind"** or risk rejection. Therefore, in this foundational phase we balance **innovation with integration**: every new decentralized feature is checked against questions like "Will researchers find this credible and easy to use?" and "How does this improve upon the status quo as identified in our studies?". By the end of Phase 1, we have a blueprint ensuring that the project's scope is realistic (avoiding scope creep as warned by prior failed projects) and laser-focused on the core needs of transparency, efficiency, and recognition.

Phase 2 (Months 4–6): Core Development – Building the MVP Platform

Activities: Phase 2 entails implementing the core components of the platform according to the design. This is where the abstract ideas take shape as a functional prototype on the Cardano blockchain and web interface. Key deliverables in this phase:

- **User Identity & Login (ORCID Integration):** We will implement a simple and familiar login system by integrating ORCID OAuth. Academics can sign in with their ORCID credentials, and the platform will create a linked profile for them. This approach leverages a widely adopted academic identity system, immediately lowering the barrier to entry. Importantly, ORCID integration allows us to later push recognition back to traditional channels – for example, we can help users export or report their peer review contributions to their ORCID profile or university, addressing the need for formal credit for reviewing. From a development standpoint, by mid-Q2 (around Month 4-5) we expect to have the **"Log in with ORCID"** feature working end-to-end (redirect to ORCID, authenticate, and create a local user entry). This directly tackles the workflow friction issue: unlike previous decentralized

platforms that forced new crypto accounts, we follow the recommendation to *"seamlessly integrate with established ecosystems"*. Users won't need to manage a crypto wallet at sign-up; if needed, the system will create one for them behind the scenes, so they can start using the platform without grappling with blockchain technicalities.

Step	What happens under the hood	User sees
Sign-up with ORCID	Back-end generates a lightweight Cardano keypair or a custody account tagged to the user ID. Keys sit in secure server storage.	"Account created. Start submitting papers." No seed phrase, no browser extension.
Activity & rewards	Submission / review hashes are still written on-chain; review rewards accrue to that temporary address.	Dashboard shows an ADA balance labeled "Claimable when you connect a wallet."
Claim / upgrade	At any time the user clicks "Connect wallet & claim rewards." We ask them to link a CIP-30 browser wallet (e.g., Lace, Eternl). The back-end then pushes all accumulated ADA to the user-controlled address and deletes the custodial key.	User signs one normal transaction; after that the platform no longer holds their funds.

To keep onboarding effortless for scholars unfamiliar with crypto, the MVP will abstract away wallet creation. When a user logs in with ORCID, the back-end quietly generates a lightweight Cardano address and tracks any earned ADA in an internal ledger. Users simply see a dashboard and a "claimable ADA" counter—no seed phrase or browser extension required. When they are ready, they can click **"Connect wallet & claim"** *to link a standard CIP-30 browser wallet (e.g., Lace, Eternl); we'll rely on those wallets' intuitive setup flows and could provide a brief quick-start guide for anyone new. The platform then pushes all accumulated rewards in one transaction and deletes the temporary key, letting users benefit from on-chain incentives without wallet complexity until they opt in.*

During the test-net pilot we can keep it ultra-simple: store "credits" off-chain, pay out only when a real wallet is connected.
For mainnet we can switch to the above custodial-until-claim model or skip custody entirely and require a wallet to receive mainnet ADA.

- **Submission & On-Chain Record Logging:** The heart of Phase 2 is developing the manuscript submission workflow and connecting it to the Cardano blockchain. When an author submits a paper (uploading a PDF or text), the system will: (1) save the file to IPFS or a similar decentralized storage, (2) calculate a cryptographic hash of the file, and (3) write a transaction on Cardano containing that hash plus metadata (such as a submission ID, timestamp, and the author's ORCID). This design ensures that **each submission has an immutable, verifiable record** anchoring it, while the full content is retrievable off-chain via the IPFS hash. By the end of Phase 2, we aim to have a basic front-end where a user can fill in submission info, upload a file, and receive confirmation that "Your manuscript has been submitted and recorded." We'll verify on a Cardano block explorer that the transaction is indeed on-chain (e.g. containing the hash and metadata) – a first tangible demo of **transparency in action**. This feature directly addresses the literature's call for **tamper-proof, transparent records in peer review**. In the traditional system, an author might worry that a submission was lost or mishandled; here, the blockchain provides public proof-of-submission and timeline.

- **Initial Front-End and Workflow UI:** Alongside back-end work, we develop the front-end pages for core interactions. This includes a submission form page and a basic dashboard where users can see their submissions or assignments. We keep the design simple and intuitive, mirroring familiar journal systems. For instance, an author's dashboard might list "My Papers" with statuses (submitted, under review, accepted, etc.), and a reviewer's dashboard might list "Reviews Assigned to Me." During these months we also implement the role logic (author, reviewer, editor roles) and set up an initial **editorial interface**. The editor or moderator role is crucial to maintain quality: our research noted that decentralized models still benefit from editorial oversight to uphold standards. So, we create a way for an editor to invite or assign reviewers to a submission (at first, this could be a manual selection from registered users). This ensures the MVP doesn't devolve into a free-for-all; instead it preserves a controlled review assignment, similar to traditional journals but with improved transparency about the process.

- **Off-Chain Storage & Performance:** By the end of Phase 2, the integration with IPFS (or an alternative like Arweave) will be operational. We will test retrieving a paper and review content from IPFS via its hash to confirm that off-chain storage works reliably. This approach follows the example of prior platforms (e.g., Orvium and others) that combined blockchain with decentralized storage for efficiency. It addresses the need for **content permanence and author ownership** – authors retain a persistent copy of their work on a decentralized network, guarding against journal censorship or loss. We also implement basic safeguards like file size limits or content validation to avoid performance issues on-chain. Cardano's design (eUTxO model) and metadata capabilities allow us to store necessary information without smart contract complexity at this stage, which keeps development straightforward and aligned with the MVP ethos (no over-engineering).

By the conclusion of Phase 2 (Month 6), we expect to have a **back-end "alpha"** of the platform: the core smart contract or transaction logic for recording submissions and reviews should be complete and tested in isolation. In parallel, a rudimentary front-end will allow internal team testing of the full cycle (e.g., we can simulate an author submitting a paper and see the record on-chain). This sets the stage for layering on the peer review-specific features in the next phase. Importantly, every feature built in Phase 2 ties back to user needs – for example, the ORCID login and simple UI directly respond to the finding that complex onboarding hindered past projects, and the on-chain ledger addresses the cry for transparency in peer review decisions.

Phase 3 (Months 7–9): Beta Launch – Incentives, Open Review, and Pilot Testing

Activities: In Phase 3, the MVP evolves from an internal prototype to a usable beta platform. This phase introduces the **novel features that distinguish a decentralized peer review system** – namely, the incentive and reputation mechanisms and the open peer review publishing – and puts the system to the test with real users in a controlled pilot. Key initiatives include:

- **Reviewer Workflow & Open Peer Review:** We implement the end-to-end peer review workflow this quarter. This means when a submission is in, an editor can assign it to one or more reviewers (selected from registered users). The chosen reviewers will receive a notification or see the assignment on their dashboard. They can then submit their review via the platform (uploading comments or a review form, which again gets hashed and stored on IPFS, with the hash recorded on-chain as proof of review completion). Crucially, **we enable open peer review display:** once an article is accepted and published, the reviews (and optionally the identities or pseudonyms of reviewers) will be published alongside the article for readers to see. This addresses the long-standing issue of opaque decision-making in journals – readers and authors gain insight into

the evaluation process, increasing trust. During Phase 3, we design how these reviews will be presented on the article page (e.g., as collapsible sections showing each reviewer's comments and possibly their name/ORCID if they agreed to reveal it). The system might allow **anonymous or attributed reviews** depending on reviewer preference, but even if reviewer names are hidden, the content of the reviews is open. Our research noted that transparency doesn't necessarily require sacrificing anonymity – one can have signed or unsigned open reviews – so the MVP will support anonymity as needed to encourage honest critiques while still sharing the substance of the feedback.

- **Incentive Mechanism – ADA Rewards:** A major focus of this phase is deploying the incentive structure to reward reviewers. Based on the MVP scope, we opt for **direct ADA micropayments** to reviewers for each completed review that meets the acceptance criteria (e.g., submitted on time and deemed satisfactory by the editor). For example, we might decide that each review is rewarded with a small amount of ADA (funded from our project's Catalyst budget for now). We implement a simple smart contract or automated script that holds a pool of ADA and disburses a payment to a reviewer's wallet once the editor marks the review as "approved" in the system. This could be done via a multi-sig transaction or a programmatic trigger on our back-end when certain conditions are met. By using ADA (instead of introducing a new token), we keep things straightforward and avoid the complexity that hurt some previous projects. ADA has real value and familiarity within the Cardano community, so reviewers will actually receive a meaningful reward they can use, without speculation. By the end of Month 9, we plan to have tested that when a reviewer in our test submits a review, their Cardano testnet wallet receives the reward automatically. This will validate the whole incentive loop. This feature directly responds to the pervasive problem of unpaid, undervalued review labor – by **"putting your money where your mouth is,"** the platform shows it genuinely values reviewers' time. Even if the micropayment is modest, combined with public recognition, it sends a strong signal that reviewers are not just volunteering into a void but are part of a community with fair rewards.

- **Reviewer Reputation System:** In tandem with rewards, we introduce a basic reputation or credit system for reviewers. Each reviewer will accumulate points or badges for their contributions. For MVP simplicity, this could be an off-chain counter in our database or an on-chain non-transferrable token (a kind of "badge NFT") updated each time a review is completed. The goal is to create a **visible history of contributions** – for instance, a profile might show "Reviewer Level 2 – 5 reviews completed". This reputation score can later influence governance or be shown to authors/editors to help choose reviewers (a high score could indicate an experienced, reliable reviewer). Our literature review emphasized developing **reviewer reputation profiles to signal credibility**, and interviewees mentioned formal recognition in hiring/promotion as a motivator. While our MVP's reputation is informal, it lays the groundwork for future integration (e.g., universities could one day consider these records in evaluations, especially if linked via ORCID). Technically, by late Q3 we will display reviewer reputation on the platform (for example, next to a reviewer's name it might show a star rating or just a count of reviews done). We will ensure this system doesn't become a vanity metric without quality context – to maintain **quality control**, the editor's role in approving reviews before reward (and thus reputation credit) is crucial. If a review is subpar, an editor can flag it and potentially withhold reward/credit, which encourages meaningful reviews over spam.

- **Closed Beta Testing (Pilot with Academics):** With these features implemented, Phase 3 culminates in a **closed beta or pilot test** with a small group of real academic users (perhaps 5–10 people: a mix of authors, reviewers, and an editor). This is an essential step to validate the platform in a real-world scenario and gather feedback. We will onboard the pilot participants in Month 8 or 9, guiding them through account creation (using ORCID login) and possibly providing them with pre-configured wallets or testnet ADA so that the crypto aspects remain painless. We then simulate

a mini journal issue: a couple of volunteer authors submit papers, the editor assigns our volunteer reviewers, and they go through the review process on the platform. The aim is to have at least one paper move through the full cycle by the end of Phase 3 – *submission → review → decision → publication with open reviews*. During this pilot, we pay close attention to user experience: Are the academics comfortable using the system? Do they understand the notifications and interface? Are there any confusing steps or technical glitches? Their feedback is collected through surveys or interviews. For example, we might learn that the concept of an on-chain transaction is still abstract to them – if so, we might hide technical details even more (perhaps by phrasing things in non-crypto terms like "Your review is recorded and verified" rather than "Your transaction succeeded"). We also measure whether incentives have an effect: do reviewers submit faster or more enthusiastically knowing there's an ADA reward? This pilot aligns with the recommendation to **"engage with niche, mission-aligned communities and showcase early successes"**. By demonstrating the MVP with a small circle of academics (perhaps those already interested in open science or blockchain), we create case studies and champions who can help drive broader adoption later. It also reflects our strategy of gradual rollout – similar to how some Web3 projects start with an invite-only beta to iron out issues before public launch, which is especially important given academia's skepticism of unproven tools.

By the end of Phase 3 (Month 9), we expect to have a **feature-complete MVP on Cardano testnet, at beta level**, and at least one real scholarly article processed on the platform as a proof of concept. This phase validates that the core hypotheses behind the project work: *Does recording reviews on-chain actually increase transparency and trust? Will scholars use a blockchain-based system? Do incentives improve reviewer engagement without compromising quality?* The outcomes and lessons from Phase 3 will directly inform final adjustments in Phase 4, ensuring the MVP truly meets its goals.

Phase 4 (Months 10–12): Pilot Completion – Refinement, Integration, and MVP Delivery

Activities: The final phase is all about **polishing the MVP, demonstrating it in action, and delivering a validated product** ready for the next steps (whether that's a larger pilot on mainnet or additional features in a subsequent fund). We focus on incorporating feedback, tightening any loose ends, and integrating the MVP with the broader academic ecosystem for credibility. Key components of Phase 4 include:

- **Feedback Integration & UX Refinement:** After the pilot test, we will have a list of improvements and pain points noted by users. In early Month 10, the team will triage this feedback and implement high-priority fixes. Typical refinements might be: simplifying certain UI elements, adding tooltips or instructions where testers got confused, improving the speed of loading content from IPFS, or adjusting the notification system (for example, ensuring that reviewers get timely emails or alerts when a paper is assigned, since academics may not constantly check the platform). We stay focused on the MVP scope, addressing only those changes that significantly improve usability or trust. For instance, if pilot users report that claiming ADA rewards was confusing, we might build a simple *"My Wallet"* page showing their earned ADA and instructions on how to use it, or even consider switching to an off-chain credit for MVP if crypto proves too daunting (while still distributing the actual ADA in the background). The goal is that by the end of Month 11, the platform feels **intuitive and reliable** even to non-technical users – fulfilling our promise that it be accessible to a non-technical academic audience. This resonates with our research insight that complex token mechanics or clunky onboarding will deter users, so we ensure by this stage that the experience is as smooth as any conventional web application.

- **Academic Integration (DOIs & Discovery):** To legitimize the content published through our MVP, we integrate with academic indexing systems to the extent possible in an MVP. One key step is assigning **DOIs to published articles**, which we plan in Phase 4. We may use a service like Crossref or DataCite (depending on feasibility) to register a DOI for any article that successfully passes peer review on our platform. This means that even though the article is hosted on a decentralized platform, it can be referenced and cited just like any other journal article. The DOI, along with metadata (title, author, etc.), could resolve either to our platform's article page or an archive copy. Additionally, we ensure the metadata of published work is Google Scholar friendly or can be exported, so that authors (and their institutions) view the MVP output as **academically credible**. Our survey of decentralized publishing efforts emphasized bridging to existing systems or matching their standards – *"provide equivalent prestige"* as traditional journals. While an MVP can't magically confer impact factor, having DOIs and ORCID integration means our platform's outputs can be recognized in CVs and repositories. Phase 4 also involves finalizing how we handle **indexing and search** on the platform itself: e.g., implementing a basic search or filtering for content, and ensuring that content licensing is clear (likely defaulting to open-access licenses to align with the open science ethos). These steps address the *siloed publishing* problem – rather than existing in a blockchain bubble, the MVP content is **interoperable with the wider academic knowledge base**.

- **Governance and Moderation Planning:** While the MVP does not implement a full decentralized autonomous organization (DAO) or community governance for decision-making (to avoid over-engineering in the first year), Phase 4 is a time to outline how governance and moderation will scale in the future. We document the roles and permissions used in the MVP (for example, the pilot had our team act as editors and moderators). We also draft a proposal for a more decentralized governance model to be explored post-MVP – this could involve elected community editors or a voting system for accepting papers, drawing on our research recommendations like using reputation-based voting to ensure fairness. Additionally, we ensure **moderation tools** are in place for the MVP's scope: if any conflicts or disputes arose during the pilot (say an author contests a review or a reviewer claims unfair treatment), we have a process to resolve it, even if it's as simple as an admin manually intervening. This preparation is important because it shows stakeholders (like Catalyst or future users) that we have considered not just the "happy path" but also how to maintain quality and ethics. Interviewees in our research highlighted that *speed means nothing if rigor is lost*, so by Phase 4 we double-check that our system hasn't introduced any loopholes that could be abused (e.g., we verify that all reviews were indeed completed by the assigned person, all transactions are secure, no sensitive data is leaking on-chain, etc.). The platform should have basic safeguards by now, with an eye toward more community-driven policing in later versions.

- **Documentation and Reporting:** In Month 12, the team will compile comprehensive documentation as a deliverable of the Fund 13 project. This includes a user guide (so any new user or future pilot participant can easily follow the submission and review process), technical documentation (open-sourced code repositories, smart contract specs, etc., to align with Cardano's open community standards), and a **final report of the MVP pilot results**. That report will detail what was achieved in the 12-month period – for example, "X submissions and Y reviews were recorded on-chain during the pilot, with an average review turnaround of Z days, demonstrating an X% improvement in speed over typical journals" (if our small sample allows such a comparison). It will also discuss any challenges encountered (e.g., "academics were hesitant about crypto until we simplified step ABC") and how we solved or plan to solve them. This transparent reporting is not only a Catalyst requirement but also builds trust with the academic community: by openly evaluating the experiment, we show that the platform's development is itself peer-reviewed and accountable.

- **MVP Launch & Next-Step Preparation:** Finally, we prepare for life after the 12-month MVP. If all has gone well, we will be ready to deploy the platform beyond the testnet. Phase 4 might include deploying the smart contracts to the Cardano **mainnet** in a limited capacity (perhaps for a public demo or for a second pilot with live data). We ensure any regulatory considerations are checked – for instance, if we pay real ADA to users globally, we consider tax or legal implications (though the amounts are small, it's good practice to document these points). We will likely not launch widely to all users yet (that would be beyond MVP scope), but we want to be "mainnet-ready" so that the next phase can focus on scaling up users and adding advanced features (like more decentralized governance or AI-assisted review matching). The roadmap for **post-MVP** (not detailed here) will take into account the stretch goals and ideas we intentionally set aside to avoid scope creep, such as full tokenization of reputation or a DAO model for journal governance. By concluding the MVP with a clear path forward, we make sure the momentum continues. As one of our industry analyses noted, many promising projects failed by trying to do too much at once or by not planning for adoption properly. We avoid that by delivering a solid, usable core product and a blueprint for gradually expanding it (e.g., **"gradual decentralization"** as per recommendations – starting with a semi-centralized pilot and moving towards greater community control in phases).

Outcomes: At the end of Phase 4 (Month 12), we will have a **real-world MVP demonstration** of decentralized peer-reviewed publishing. Concretely, this means at least one academic article will have been submitted, peer-reviewed, and published on a Cardano-based platform with all the hallmark features: an immutable audit trail of the review process, open access to the reviews, rewarded reviewers, and integration points to existing academic systems (ORCID, DOI) for legitimacy. The platform will be user-tested and refined, ready to onboard more users in the next phase. We will also have delivered the necessary roadmap documentation to Catalyst as a formal project deliverable. Perhaps most importantly, we'll have shown that it's possible to **realign incentives and increase transparency in academic publishing using blockchain** – not by replacing the system overnight, but by **incrementally improving it in ways that researchers find useful and intuitive**. This 12-month MVP is a crucial first step, demonstrating the feasibility of a decentralized peer review model that addresses the community's long-standing concerns (lack of transparency, lack of recognition, slow and clunky processes) with concrete solutions derived from our research.

With the MVP in hand, the project can confidently move into future phases (beyond this roadmap's scope) such as expanding to more users, establishing a governance token or DAO if appropriate, integrating more advanced features (like AI for reviewer suggestions or cross-journal interoperability), and ultimately working toward a decentralized, community-driven scholarly publishing ecosystem. But as emphasized, those are beyond the 12-month horizon – our immediate achievement will be delivering a working platform that proves out the concept in practice. The roadmap outlined above ensures that each step of the way is grounded in real needs and evidence, setting the MVP – and its users – up for success.

Conclusion

This phased 12-month roadmap provides a clear pathway to a real-world MVP for a Cardano-based decentralized publishing platform. Each phase builds on research-driven insights: from **addressing misaligned incentives and opacity in Phase 1**, through **implementing immutable records and easing adoption in Phase 2**, to **rewarding reviewers and opening up the process in Phase 3**, and finally **validating the solution with real users and integrating with academia's fabric in Phase 4**.

While the MVP ships with a transparent, editor-assigned pre-publication workflow, our underlying data model—*submission→review event→decision/publication*—**is intentionally generi**c. That means the same smart-contract hooks could also drive **post-publication commenting, fully open crowd review, or**

classic double-blind workflows simply by changing who can create "review events" and when they become public. The research in our milestone reports highlights growing interest in these **hybrid and alternative models**; by decoupling visibility and reward logic from the core ledger, the platform can adopt or run multiple peer-review styles in parallel once the MVP is proven, giving journals and communities freedom to experiment without a redesign.

By focusing on a lean but impactful feature set, we avoid the common traps of web3 projects (excessive tokenization, complicated onboarding) and instead deliver a platform that academics can actually use and trust from day one. The roadmap is designed to be understandable to non-technical stakeholders, demonstrating how blockchain and decentralized principles can pragmatically solve specific problems in peer review rather than being buzzwords.

In summary, the MVP will create a foundation of **transparent, incentivized, and interoperable** peer review on Cardano, within 12 months. This sets the stage for broader transformation in scholarly communication in the long run, while ensuring near-term deliverables that the community can evaluate and build upon. Each milestone in the roadmap is not just a technical step, but a solution to a problem identified in our studies – making the development process purpose-driven and aligned with the needs of researchers, reviewers, and editors who seek a better peer review system. The successful execution of this roadmap will result in a formal Fund 13 project deliverable: a clear, pilot-tested MVP roadmap and platform that can be proudly presented to both the Cardano community and the academic world as a blueprint for innovation in scientific publishing.

APPENDIX

Functional Requirements Document – Decentralized Peer Review Platform (MVP)

Identity and Access Management

- **FR-1:** The system shall allow users (authors, reviewers, editors) to authenticate via their ORCID accounts, linking each user's ORCID iD to their platform profile for single sign-on.

- **FR-2:** The system shall enable users to connect a Cardano wallet to their profile (e.g., through a Cardano wallet connector) so they can sign necessary transactions and receive payments on the platform.

- **FR-3:** The system shall implement role-based access control, supporting distinct user roles (e.g., Author, Reviewer, Editor/Moderator, Administrator) and ensuring each role can only perform authorized actions (for example, only Editors can assign reviewers or make publication decisions).

- **FR-4:** The system shall retrieve basic profile information from a user's ORCID (such as name and affiliation) upon login, with consent, to auto-populate the user's profile and credit their contributions under a verified identity.

Manuscript Submission and Storage

- **FR-5:** The system shall provide an interface for authors to submit manuscripts, allowing them to upload the manuscript file and enter relevant metadata (e.g., title, abstract, keywords).

- **FR-6:** The system shall store each submitted manuscript in a decentralized content storage network (e.g., IPFS), obtaining a unique content hash (CID) that serves as a permanent reference to the file.

- **FR-7:** The system shall record an immutable submission entry on the Cardano blockchain for each manuscript, including a timestamp, the content hash, and the submitting author's identifier, to serve as a tamper-proof proof of submission.

- **FR-8:** The system shall allow authors to track the status of their manuscript (e.g., "under review," "revision requested," "accepted," "rejected") via their dashboard, reflecting the current stage of the peer review process.

- **FR-9:** The system shall support the submission of revised manuscripts when an editor requests revisions, linking each revision to the original submission record for traceability. In such cases, a new content hash will be generated and logged (while maintaining reference to the prior version) to preserve an audit trail of changes.

Review Workflow

- **FR-10:** The system shall enable editors to assign one or more qualified reviewers to a submitted manuscript, inviting them to review. Upon assignment, the platform will notify the selected reviewers

of the new review request.

- **FR-11:** The system shall allow an invited reviewer to accept or decline a review assignment. If the reviewer accepts, the manuscript is added to their queue; if declined, the editor is notified so they can select an alternate reviewer.

- **FR-12:** The system shall provide an interface for reviewers to submit their peer review reports, enabling them to enter structured feedback, attach files (if needed), and provide a recommendation (e.g., accept, minor revisions, reject) for the manuscript.

- **FR-13:** The system shall store each completed peer review off-chain and log a corresponding review record on-chain. Specifically, the full review content will be saved in decentralized storage (e.g., IPFS), and a cryptographic hash (along with metadata like the review ID and associated manuscript ID) will be recorded on the Cardano blockchain to timestamp the review and prove its integrity.

- **FR-14:** The system shall keep the content of reviews confidential during the active review process. Only the assigned reviewers and the editors/moderators of a manuscript shall have access to a manuscript under review and its submitted reviews, until an editorial decision is finalized. Once a final decision is made, the system shall release the relevant peer review reports to the author (and later to the public if the work is published) so that authors receive feedback at the decision stage.

- **FR-15:** The system shall allow a reviewer to specify their desired level of anonymity when submitting a review. If a reviewer opts to remain anonymous in public forums, the system shall record their identity internally (for credit and accountability) but will display the review under a pseudonym or label (e.g., "Reviewer A") in any published context.

Incentives and Rewards

- **FR-16:** The system shall implement a rewards mechanism to incentivize reviewers, using ADA cryptocurrency micropayments as the reward. Upon the successful completion of a peer review (e.g., the review is submitted on time and deemed satisfactory by the editor), the system shall automatically trigger a predefined ADA payment to that reviewer's account.

- **FR-17:** The system shall transparently record each reward disbursement. Every ADA reward transaction to a reviewer shall be linked to the specific review it corresponds to (e.g., via transaction metadata or an internal record tying the transaction ID to the review ID) so that the community and administrators can verify that rewards were distributed correctly.

- **FR-18:** The system shall notify reviewers when they have earned a reward for a completed review and provide instructions or prompts for accessing the reward. For example, if the reviewer has a wallet connected, they may be informed of the incoming ADA transfer; if not, the system will prompt the reviewer to connect a wallet or create one to claim the reward.

Reputation System

- **FR-19:** The system shall maintain a reviewer reputation score or similar metric for each user performing peer reviews, which reflects their contributions over time. This reputation score shall be

incremented or updated each time the reviewer completes a review (especially for reviews that meet quality standards), and key reputation data will be stored in a tamper-proof manner (e.g., written to the blockchain as an aggregate score or embedded in the reviewer's on-chain profile).

- **FR-20:** The system shall provide each reviewer with a public profile displaying their reputation information, including the number of reviews they have completed and any reputation score or level they have achieved. Authors and editors viewing a reviewer's profile shall be able to see these reputation indicators as a measure of the reviewer's track record and credibility.

Editorial Functions and Moderation

- **FR-21:** The system shall provide editors (or designated moderators) with the ability to review each submitted peer review for quality and compliance with guidelines. Editors can mark a review as **approved** (if it meets standards of constructiveness and completeness) or send it back for revision/clarification if it is inadequate, before considering it in the final decision or releasing a reward.

- **FR-22:** The system shall allow editors to render a final decision on each manuscript after the peer review process. An editor (or editorial committee) can set the manuscript's decision status to **Accepted (Publish)**, **Rejected**, or **Revise and Resubmit**, based on the content of the reviews and the manuscript's merit.

- **FR-23:** The system shall create an immutable record for each editorial decision on the blockchain, linking the decision to the manuscript and timestamping it. This on-chain decision record will include the outcome (e.g., accepted or rejected) and any relevant metadata, providing a transparent audit trail of editorial actions.

- **FR-24:** The system shall include a mechanism for authors to appeal or request reconsideration of an editorial decision. If an author believes a decision was unjust or wants a second review, they can file an appeal through the platform; the system will then notify the designated moderators or an advisory board member, and allow them to review the case and record the outcome of the appeal process.

- **FR-25:** The system shall enable moderators to enforce community guidelines and maintain academic standards on the platform. This includes the ability for editors/moderators to flag or remove inappropriate content (such as a manuscript or review containing offensive or non-academic material) and to disqualify or redact peer review comments that violate guidelines. All such moderation actions will be logged for accountability (either on-chain or in an admin audit log) to ensure transparency in how content policy is enforced.

Publishing and Citability

- **FR-26:** The system shall support the publication of accepted manuscripts as open-access scholarly articles on the platform. Once a paper is accepted, the platform will allow the final version to be marked as "published," making it publicly accessible to readers along with its metadata and reviews.

This marks the completion of the submission's cycle from submission to peer-reviewed publication.

- **FR-27:** The system shall assign a **Digital Object Identifier (DOI)** to each published article to ensure it is citable in academic literature and easily discoverable. This will be accomplished by integrating with an external DOI registration service (such as Crossref or DataCite) via API or manual process, to register a DOI when a manuscript is accepted. The assigned DOI shall be stored in the article's metadata and displayed on the article's public page.

- **FR-28:** The system shall support open peer review for published works by **publishing the peer review reports** alongside the article. For each article that is published, all associated peer review reports will be made available to readers on the article's page. The system shall display the identity of reviewers who have opted in to be named, or display an anonymous identifier for those who chose to remain anonymous, thereby giving reviewers credit while respecting privacy choices.

- **FR-29:** The system shall ensure long-term **persistency and accessibility** of published articles and reviews via decentralized storage. All published content (the article PDF/HTML and the peer review texts) will be stored in the decentralized storage network (e.g., IPFS) so that even if the platform's web interface is down, the content can be retrieved using its content hash. This design guarantees that once published, an article and its reviews cannot be lost or censored, and anyone can access them directly via the content hashes.

- **FR-30:** The system shall provide a clear reference to the blockchain records for transparency. On each published article's page (and/or in the author/reviewer dashboard), the system will show links or transaction IDs for the on-chain entries of the manuscript submission and the peer reviews. For example, it might display a message like "Submission recorded on Cardano at transaction XYZ on [date]" with a hyperlink to a Cardano explorer. This allows any user to independently verify the existence and timestamp of the submission and review records in the Cardano blockchain.

Administration and Security

- **FR-31:** The system shall enforce strict access controls to uphold confidentiality and role permissions. For example, only assigned reviewers and editors can access a manuscript under review (preventing unauthorized viewers), only editors can see author identities (if using blind review), and only administrators or editors can assign roles or alter submission states. These controls ensure users only access the information and functions pertinent to their role.

- **FR-32:** The system shall preserve user privacy by minimizing exposure of personal identifying information and supporting pseudonymity where appropriate. Real user identities (e.g., ORCID profile information) will not be placed on the public blockchain; instead, cryptographic identifiers or hashes will be used. Furthermore, if a reviewer opts to remain anonymous publicly, the system will hide their name in public outputs while still internally associating their ORCID and identity for record-keeping.

- **FR-33:** The system shall use a hybrid on-chain/off-chain design to protect data and ensure scalability. Only essential metadata and hashes are stored on-chain (to provide proof-of-existence and integrity), while all large or sensitive content (manuscript files, full review texts, user profiles) are kept off-chain. This approach not only keeps blockchain transactions lightweight and cost-effective, but also avoids exposing the full content of manuscripts or reviews on a public ledger.

- **FR-34:** The system shall provide administrative interfaces or tools for platform administrators to configure key settings and manage user roles. Administrators (or authorized personnel) will be able to add or remove editors/moderators, adjust reward parameters (such as the ADA amount per review), and update integration settings (such as DOI service credentials) as needed. Certain platform parameters and lists (e.g., the list of active moderators) may also be stored on-chain in a configurable manner to facilitate future decentralization of governance.

- **FR-35:** The system shall maintain any earned reviewer rewards in a **claimable balance** if a reviewer has not yet linked a personal wallet to the platform. In such cases, the reward will be recorded internally for that user. The user can later claim their accumulated ADA rewards by connecting a Cardano wallet, at which point the system will transfer the owed funds to that wallet. This ensures reviewers don't lose rewards even if they set up their wallet at a later time, while keeping the process secure and user-friendly.