AGNOSTICA

Innovations in Academic Peer Review:

Thematic Analysis of the Literature

A research report produced by Agnostica, Ltd

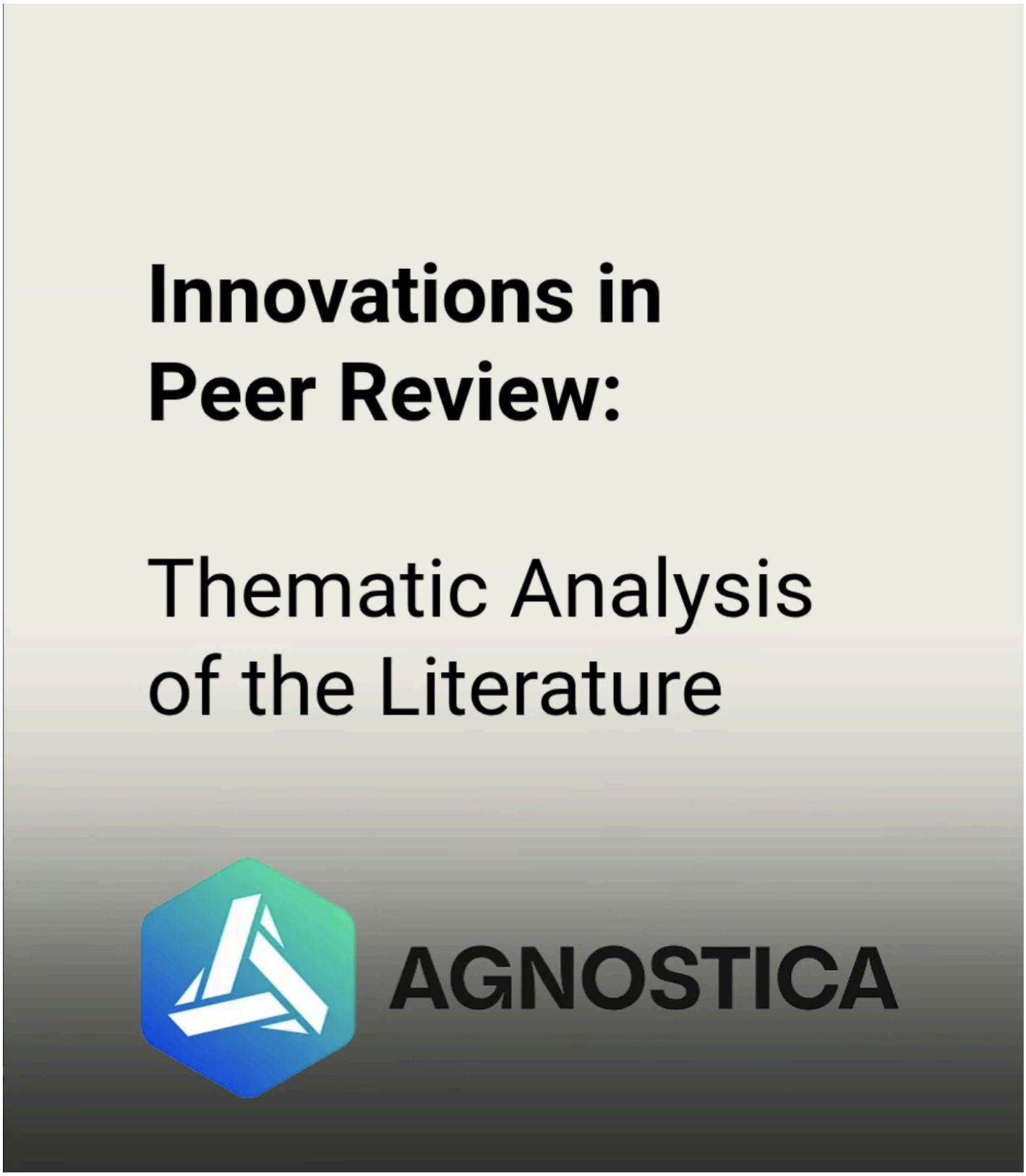
https://agnostica.global

Robert Danielson, PhD
Alex James, MA

April, 2025

Innovations in Academic Peer Review:

Thematic Analysis of the Literature



Please find linked above a summary video of our findings in the report below.

Executive Summary

This report presents the findings from a systematic literature review focused on innovations in academic peer review. An initial search of ~40,000 records across databases such as Google Scholar and Scopus was refined using Boolean logic and strategic keywords, yielding ~500 focused articles. After screening 234 titles and abstracts and assessing 150 full texts, a final sample of approximately 79 articles were included in the qualitative synthesis. Selection was guided by inclusion criteria centered on articles being published in English, discussing peer review models (traditional or new), the peer review process, or philosophical arguments about the state of the field. Notably, articles were excluded if they were simply peer-reviewed articles – to be included articles had to empirically or philosophically examine the process or field or theorize about advancements.

Articles were coded using a structured framework with five predefined themes: (1) incentives to publish, (2) incentives to review, (3) the peer review processes, (4) critiques of peer review, and (5) certification/reputation conferred to the individual based on either the publication or review process. While coding, additional themes and emergent (sub)themes captured innovations such as blockchain-based review, overlay journals, token economies, reviewer recognition platforms, and socio-cultural barriers to transparency. The findings reveal both systemic challenges—such as reviewer bias, delays, and lack of training—and a growing movement toward decentralized, technologically augmented, and incentive-aligned peer review models.

The most frequently identified themes across the literature centered on the misalignment of incentives in both publishing and reviewing. For example, one article identified that while peer review should be shared across all academics, approximately 20% of researchers supply 70-95% of all peer reviews. Regional differences in review workload were observed as well. This is problematic for all involved – this more centralized review process calls into question how decentralized the peer review process currently is, as well as this increasing workload leading to reviewer burnout. Career advancement and prestige remained dominant drivers of publication, while peer reviewers were often overburdened and under-recognized. Critiques of peer review emphasized its opacity, bias, inefficiency, and lack of accountability or training for reviewers. Despite these structural weaknesses, innovative proposals included open peer review, reviewer reputation platforms, token-based incentives, and distributed governance through blockchain and overlay journal systems. These trends reflect an accelerating shift toward models that prioritize transparency, equity, and verifiability.

Across the literature, emerging innovations in peer review consistently revealed tensions aligned with the blockchain trilemma: decentralization, scalability, and security. We argue that traditional academic publishing is akin to Bitcoin – decentralized and secure, but has difficulty scaling. Proposals emphasizing open peer review, community governance, and reviewer autonomy often prioritized decentralization and scalability, but struggled with maintaining review quality and bias control—core aspects of security. Meanwhile, token-based incentives, smart contracts, and AI-assisted workflows aimed to address scalability by increasing throughput and reducing reviewer burden, yet introduced challenges around system integrity and reviewer accountability. Finally, platforms focused on reputation systems and formalized identity improved security and trust, but often relied on centralized gatekeeping or opaque metrics, undermining decentralization. These patterns suggest that many current reforms optimize for one or two pillars of the trilemma, but rarely achieve all three simultaneously—highlighting a core design challenge for future decentralized peer review systems.

Actionable Insights

Taking these trends into account, we suggest that developers focus on solving the following problems:

First and foremost, traditional peer review is not “broken” just as the bitcoin network is not broken - at its core, we argue that the peer review process is attempting to be a decentralized consensus mechanism. Models that can build out what the process does well, like how Cardano expanded the UTXO model to the eUTXO model, will scale and process while maintaining its core identity. We offer the following ten insights, and expand on them further in the document. While none of these should be considered a panacea, we offer the following insights such that developers might consider these issues, and how to address them, when moving forward.

1. **Transparent and Immutable Review Records**
   The platform should record every submission, review, and decision in a tamper-proof, time-stamped ledger. This ensures that no part of the review process can be altered or hidden, promoting transparency and trust.
2. **Open Peer Review with Accountability**
   Reviews should be made publicly available (potentially anonymously) alongside published articles (immediately or after a delay), allowing readers to see how decisions were made and fostering openness.
3. **Robust Reviewer Incentive System**
   Reviewers should be rewarded—potentially with tokens or credits—for submitting high-quality, timely reviews, encouraging active and consistent participation.
4. **Reviewer Reputation and Accountability**
   A public reviewer profile system should track contributions over time, including review quality, frequency, and timeliness, to build trust and signal credibility.
5. **Quality Control Mechanisms**
   Despite decentralization, strong safeguards such as multi-layered or secondary review rounds are needed to uphold scientific rigor and publication quality.
6. **Dispute Resolution and Appeals**
   A formal mechanism should exist for handling disagreements or misconduct during review, similar to how authors or reviewers might escalate concerns to journal editors.
7. **Decentralized Governance and Community Oversight**
   The platform should allow stakeholders (e.g., authors, reviewers) to participate in governance, such as through a DAO where voting rights are tied to reputation or contribution. This can take the form of voting on the focus or exclusion of the journal (for example, a journal focusing on a specific set of methods or approaches).
8. **Verified Identities and Reputation Protection**
   Reviewer identities should be verified through tools like ORCID or institutional login, while still allowing for pseudonymity on public records to preserve privacy.
9. **Scalability and Performance Optimization**
   To enable widespread adoption, the platform should minimize on-chain operations and optimize performance to avoid high transaction costs or delays.
10. **Interoperability and Integration with Existing Systems**
    The system should integrate with traditional publishing infrastructure (e.g., assigning DOIs to reviews and manuscripts) to support adoption and academic legitimacy.

Introduction

The peer-review process is the backbone of science. Academics around the world rely on peer-reviewed manuscripts to archive the collective progression of science as well as for guidance on future scientific studies. Because this peer-review process is the gold-standard for science, Cardano likewise values peer-review for documenting its progress. However, the peer-review process is not without its flaws – there are few to no rewards for reviewing (most professors view it as “service”), there are groups that are less-well represented (with a few universities supplying most reviewers), and there is little to no accountability for poor reviewers.

As new members continue to onboard into the crypto space, we believe that the emphasis on peer-review (as opposed to the traditional move-fast-and-break-things approach of other blockchains) will ultimately draw many academics into Cardano. Many academics value decentralization (peer-review is a decentralized consensus mechanism, at its core), and Cardano likewise values this decentralization (as evidenced by being one of the most decentralized blockchains). We aim to research how to build and improve upon a decentralized peer-review system leveraging Cardano. We believe that this solution will advance both the Cardano and Academic space. In this first step, we review and synthesize the current academic literature around the peer review and publication process.

Recent years have witnessed intense scrutiny of the academic peer review system, spurring a wave of research into its shortcomings and possible improvements. To map these developments, we analyzed ~500 scholarly works (with 79 making the final review) that empirically or philosophically examine peer review models (traditional and new), the peer review process, or theorize advancements in the field. Five core themes emerged from our systematic review – **incentives to publish**, **incentives to review**, **peer review processes**, **critiques of peer review**, and **certification/reputation** – alongside a set of emergent themes around novel peer review models (e.g. open review, token economies, blockchain, overlay journals, reviewer recognition platforms) and socio-cultural barriers to change. Each article was coded according to these themes, revealing both persistent systemic challenges and a growing movement toward decentralized, technologically augmented, and incentive-aligned peer review models. In this report, we present a structured synthesis of the literature, highlighting key themes, sub-themes, and innovative proposals that together paint a picture of an evolving peer review paradigm. Table 1 (at the end of this report) summarizes each reviewed article, its source, and its key themes.

Methods

Protocol and Registration

This review was conducted in accordance with PRISMA 2020 guidelines. The review protocol was not registered in advance, allowing the researchers to modify / change the search terms and strategies in accordance with the data.

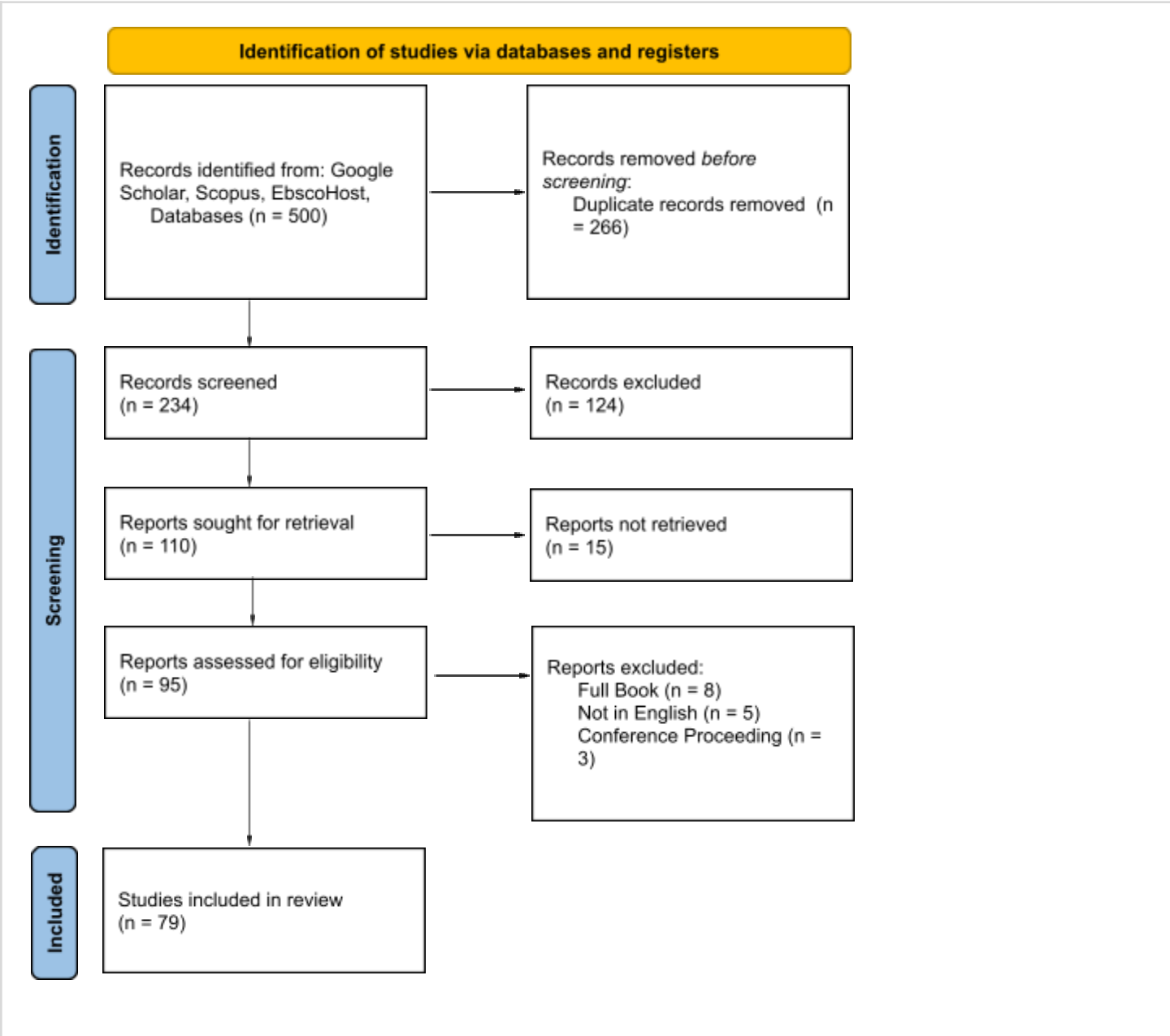


Figure 1: *Screening and Selection Process for Included Studies:*
This flow diagram outlines the systematic review process, following PRISMA guidelines. A total of 500 records were identified through academic databases. After removal of 266 duplicates, 234 records were screened by title and abstract. Of these, 110 reports were sought for retrieval, and 95 were assessed for eligibility. Following the exclusion of non-English articles, full books, and conference proceedings, 79 studies were included in the final qualitative synthesis.

Search Strategy and Information Sources

We employed a multi-pronged search strategy to gather relevant peer-reviewed and gray literature. Searches were conducted using the following databases: Google Scholar, PsycINFO, EBSCO, Scopus, and Pubmed. The initial search terms included, “("scholarly" OR "academic" OR "decentralized" OR "independent") AND ("peer-review" OR Publishing")”, however, these initial searches included approximately 400k results, so we narrowed our search terms. We settled on four distinct search phrases:

1.	("decentralized peer review" OR "distributed peer review" OR "blockchain peer review" OR "community peer review") AND ("trends" OR "emerging themes" OR "current developments" OR "future directions") AND ("scholarly publishing" OR "academic publishing" OR "scientific communication") AND ("systematic review" OR "scoping review" OR "meta-analysis" OR "bibliometric analysis")
2.	("decentralized peer review" OR "distributed peer review" OR "open peer review" OR "blockchain peer review" OR "community peer review") AND ("comparative analysis" OR "model comparison" OR "case study comparison" OR "evaluation study") AND ("double-blind peer review" OR "single-blind peer review" OR "open peer review" OR "post-publication peer review") AND ("academic publishing" OR "scholarly communication" OR "scientific publishing")
3.	("decentralized peer review" OR "distributed peer review" OR "blockchain peer review" OR "alternative peer review") AND ("challenges" OR "barriers" OR "limitations" OR "gaps in research" OR "unresolved issues") AND ("scholarly publishing" OR "scientific publishing" OR "academic publishing") AND ("systematic review" OR "scoping review" OR "critical analysis" OR "bibliometric study”)
4.	("decentralized peer review" OR "distributed peer review" OR "blockchain peer review" OR "review of peer review") AND ("theoretical framework" OR "conceptual model" OR "theory development" OR "academic theory") AND ("implementation" OR "case study" OR "pilot study" OR "real-world application") AND ("academic publishing" OR "scientific publishing" OR "open science")

After these refinements, the initial search return was reduced from over 400k results to approximately 500. We supplemented database searches with manual searches of reference lists and direct retrieval of relevant papers from researcher repositories and thematic reviews.

Eligibility Criteria

Inclusion criteria for articles were:

1. Scholarly papers discussing peer review systems, particularly critiques, incentives, or technological alternatives.
2. Articles published in English.
3. Full-text availability.
4. Articles relevant to one or more of our predefined themes (see Coding Schema below).

Exclusion criteria were:

1. Articles that did not include discussion of peer review or publishing systems.
2. Non-academic pieces, blogs, or opinion essays lacking citation or scholarly framing.

Selection Process

A total of 234 articles were screened by title and abstract by two independent reviewers. Conflicts or unclear cases were resolved through discussion and consensus. With the goal of including as many initial articles as possible, when there was a disagreement about whether or not the article should be coded, we defaulted to include it. That is, only articles that were confirmed by both researchers as outside the scope of the review were excluded. After excluding duplicates and the initial screening round, 79 were selected for full-text review and included in the qualitative synthesis. A PRISMA flow diagram summarizing the screening process is included in Figure 1.

Data Extraction and Coding

We developed a structured coding schema grounded in prior literature and iteratively refined it to account for emergent patterns. The schema captured both predefined themes and emergent subthemes based on content analysis. These included categories such as:

1. Incentives to Publish (e.g., career advancement, prestige)
2. Incentives to Review (e.g., recognition, compensation)
3. The Peer Review Process (e.g., quality control, decentralization)
4. Critiques of Peer Review (e.g., opacity, inequity, delays)
5. Certification and Reputation (e.g., citation metrics, reputation systems)
6. Technological Infrastructure (e.g., blockchain-based review, decentralized identity, sociotechnical bias)

Each article was reviewed and coded independently by two coders. Disagreements were resolved through consensus. Data were organized using a structured Google Sheet to track article metadata, thematic codes, and key excerpts.

Risk of Bias Assessment

No formal risk of bias assessment was conducted. Because the focus of this review was thematic and conceptual, the goal was not to evaluate intervention efficacy or experimental quality but to synthesize trends in peer review discourse. We attempted to include a wide array of the publishing world, including authors from different fields (medicine, education, etc.) and across different models (traditional peer-review, open access, blockchain theoretical models). It should be noted that one researcher has approximately 15 years of experience publishing and reviewing in the academy, however we believe this allows for unique insights into the process.

Data Synthesis

Articles were analyzed using a combination of deductive and inductive thematic analysis. Patterns were synthesized across themes and mapped against the broader challenges in peer review. As these themes began to emerge, articles were later re-analyzed in light of the blockchain trilemma—decentralization, security, and scalability—to explore the extent to which proposed innovations addressed or exacerbated systemic trade-offs in peer review.

Due to the conceptual diversity of the included studies, no meta-analytic synthesis was conducted.

Results

This thematic analysis draws from [117] excerpts across a diverse set of peer-reviewed articles, dissertations, and theses on innovations and critiques of the peer review process. These excerpts were coded using a combination of predefined themes informed by prior theory and personal academic experience, and emergent themes derived inductively from the data. Of the coded excerpts, 28 were labeled as predefined, while 89 were emergent, indicating a field in flux and rich with innovation beyond established typologies.

Main Themes in the Literature

The most prevalent theme across the dataset was **Critiques of Peer Review (n = 34)**, encompassing concerns over **opacity, inefficiency, bias, and lack of reviewer preparation.** This does not come as a shock, as many of the articles would discuss why the peer review process was failing for one reason or another. For instance, one excerpt noted that “No identifiable types of training predicted reviewer success, raising concerns about preparedness and fraud detection.” Major concerns around the timeliness of reviews (sometimes taking years from submission to publication), the inefficiency of the process (requiring an editor and two to three reviewers, on average), the potential bias of reviewers (especially when reviews are anonymous) should not surprise anyone that has attempted to publish an article through the traditional process.

The second most prevalent theme was discussion around the **Peer Review Process (n = 31)**, which included both established practices and proposed modifications to review procedures. This theme captured typologies of **peer review models, ranging from single-blind and double-blind to more open or decentralized frameworks**: one study noted that, “OPR (*OPR = Open Peer Review, authors’ addition*) includes seven core traits and 22 different permutations, reflecting wide experimentation in transparency.” This might have been the most surprising category as it moved away from critiques and towards experimental ideas. Within this category were models of reviewing (single-blind, double-blind) but also methods of opening the peer review process to be more transparent (publishing reviews alongside manuscripts) or alleviating the time required (publishing articles before peer review [preprints or post-publication review] or amending them and publishing multiple versions). Tensions also emerged here regarding who counts as a “peer”, and whether crowd-sourcing models can function in similar fashion. Also mentioned was the sheer diversity of open peer review (OPR) models – each striving to solve one or more of the critiques mentioned above. However, this diversity also highlights that no one solution has been able to fulfill the role of traditional peer review, as “broken” as it seems.

Technological Infrastructure (n = 18) emerged as a prominent theme, particularly focusing on blockchain-enabled reforms to improve transparency, traceability, and efficiency. As one excerpt described: “Smart contracts, decentralized solutions, and token economies offer novel ways to motivate reviewer participation.” There is clearly a connection between traditional academic peer review (at its core, a decentralized consensus mechanism, in theory) and blockchain technologies. As mentioned above, one version of open peer review includes articles that are published first and then reviewed and updated in a later process (post-publication peer review). This can be problematic as other authors might quote outdated or revised manuscripts. Additionally, as many of these articles are centrally hosted, a technical issue might destroy the archived data. However, given the immutable and decentralized nature of the blockchain, articles housed here might have the benefits of immutability and also the advantage of open access as all data would be publicly available.

Findings Overview

This literature review identified five core themes along with several emergent sub-themes across the peer review innovation landscape. Each of these themes reflects critical areas of discussion, debate, and experimentation currently shaping academic publishing.

1. Incentives to Review

This theme addresses the underlying motivational factors influencing academics to participate in peer review:

- **Lack of Recognition:** Peer review is typically unpaid and unrecognized, resulting in reviewer fatigue and overburdening a minority of academics.
- **Recognition & Rewards:** New models propose formal acknowledgment, professional credit (e.g., via Publons or ORCID profiles), and financial incentives to motivate participation.
- **Training & Skill Development:** Enhancing reviewer skills through structured training and feedback is identified as a crucial element in sustaining high-quality peer review.

2. The Peer Review Process

This theme explores how the peer review process is conducted and various modifications aimed at improving its efficacy and fairness.

- **Transparency and Openness:** Experiments with open peer review aim to increase accountability by making reviewer identities and review reports publicly available.
- **Efficiency and Scalability:** Innovations such as cascading reviews, portable peer reviews, and automated systems address inefficiencies and delays inherent in traditional review models.
- **Timing and Methodology:** Shifts towards post-publication peer review and preprints reflect changes in when and how peer review occurs, decoupling dissemination from evaluation.

3. Critiques of Peer Review

This theme encapsulates criticisms commonly directed toward traditional peer review systems, emphasizing the need for reform.

- **Bias and Inequality:** Peer review faces significant criticism for biases favoring established researchers, institutions, or certain demographics, disadvantaging early-career researchers or minority voices.
- **Opacity and Lack of Accountability:** Traditional anonymous review processes are criticized for their lack of transparency, potentially allowing biases and unfair decisions to persist unnoticed.
- **Variability in Quality and Lack of Training:** Peer reviewers often lack formal training, resulting in inconsistent and sometimes superficial reviews, underscoring a need for standardized guidance and professionalization.

4. Certification & Reputation

This theme focuses on how peer review contributes to the credibility and reputation of academic work, journals, and researchers.

- **Metrics and Impact:** Reliance on journal-level metrics (e.g., Impact Factor) is critiqued for oversimplifying research quality, leading to a distorted evaluation system.
- **Altmetrics and Broader Impact Indicators:** Alternative metrics such as online engagement and usage-based statistics emerge as valuable supplements to traditional citation counts.
- **Reviewer Reputation Systems:** Platforms recognizing reviewer contributions formally (e.g., reviewer badges, blockchain-based tokens) aim to enhance the reputation of reviewing as a valued scholarly contribution.

5. Technological Infrastructure

This theme considers the technological developments enabling innovations in peer review.

- **Blockchain & Decentralization:** Proposals leveraging blockchain technologies aim for decentralized, transparent tracking of peer reviews, token economies, and tamper-proof records of academic contributions.
- **Artificial Intelligence and Automation:** AI-assisted peer review systems enhance scalability and efficiency by automating routine aspects of the review process, though human oversight remains crucial to maintain quality.
- **Digital Platforms and Interoperability:** New platforms support interoperability between preprint servers, overlay journals, and peer review databases, promoting seamless exchange of reviews and reviewer credentials.

Emergent Themes

Emergent themes highlight novel, often experimental ideas that surfaced from the literature, signaling potential future directions for peer review systems:

- **Overlay Journals:** Journals leveraging preprint servers and decentralized editorial processes to streamline peer review. One can think of these as a “Layer 2” solution in the crypto space.
- **Token Economies:** Blockchain-based reward systems to formally recognize and incentivize quality peer reviews.
- **Reviewer Recognition Platforms:** Systems formally documenting and promoting peer review contributions as professional credentials.
- **Socio-cultural Barriers:** Recognition of institutional inertia, disciplinary norms, and regional differences as critical factors shaping acceptance and implementation of peer review innovations.

This findings overview provides a concise snapshot of the key themes identified, setting the stage for the detailed thematic analysis and description provided in the main body of this report.

Discussion

Misaligned Incentives in Publishing and Reviewing

One of the most frequently identified issues across the literature is the misalignment of incentives in academia's publish-or-perish culture. Career advancement and prestige are tied predominantly to publishing, pressuring researchers to produce quantity (and chase high-impact outlets) at the expense of quality or openness. Di Donato (2024) observes that current research assessment systems place *"excessive emphasis on quantity and productivity, leaving aside research quality, collaborative open research methods, and wider societal impact"*. This publish-centric reward system can inadvertently encourage practices like salami-slicing of results and submission to prestige journals rather than improving research transparency or rigor. Several works argue that realigning incentives toward **quality** and **open science** contributions is critical. For example, Mabile et al. (2024) provide *Recommendations on Open Science Rewards and Incentives*, calling for academic credit to explicitly include open data, preregistration, and peer review activity, rather than only traditional publications. Such proposals underscore that what gets rewarded will drive researcher behavior – therefore, reforming promotion and funding criteria is a linchpin for change.

In tandem, the incentive (or lack thereof) to serve as a peer reviewer is a major concern. Peer review is largely unpaid, invisible labor, expected as an altruistic duty to the scholarly community. Yet the burden of reviewing is distributed very unevenly. A seminal modeling study of the global peer review system found that, in biomedicine, *"20% of the researchers performed 69% to 94% of the reviews,"* indicating a small minority shouldering nearly all the work (Kovanis et al., 2016). This Pareto-like imbalance, confirmed by publisher data (e.g. U.S. researchers review far more than their share of output while countries like China publish far more than they review), and anecdotal interviews (at a recent conference, not a single reviewer was surprised by this statistic - rather, many indicated a strong endorsement) has led to an overtaxed cadre of reviewers and widespread reviewer fatigue. As Kovanis et al. (2016) note, these overworked "peer-review heroes" risk burnout and declining review quality. Meanwhile, untapped reviewing capacity exists – *"millions of potential peer reviewers"* who are publishing but not reviewing (Belluz, 2016) – suggesting a systemic failure to motivate or invite a broader base of reviewers. In short, the current system's incentives are misaligned: publishing is rewarded, but reviewing is largely expected as a moral obligation.

Multiple studies explore ways to better align incentives for reviewers so that the task is more equitably shared and professionally valued. One theme is **formal recognition** – for example, giving reviewers academic credit or public acknowledgment. A large-scale 2015 survey by the publishing giant Wiley (Warne, 2016) showed that reviewers strongly feel their work is under-acknowledged and suggested that reviewing be recognized as a measurable research output (for instance, via certificates or listing in one's CV). Many journals now publish annual lists of reviewers or offer thank-you badges, but proposals go further: integrating peer review contributions into researcher profiles (e.g. on Publons or ORCID), and even counting them in tenure evaluations.

Another frequently requested incentive is **feedback and training** for reviewers. Because formal training in how to review is rare – *most journals provide little to no training* and less than 25% of reviewers report receiving formal training (Warne, 2016)– reviewers often operate without mentorship (or mentored only by their individual mentor) or quality control. In Wiley's survey, the top thing reviewers desired was feedback on the quality of their reviews, indicating that many are eager to improve if given guidance. To address this, some journals (e.g.

the British Journal of General Practice) have instituted structured feedback from editors to reviewers and even workshops on how to review. Such steps begin to treat reviewing as a skill to be developed, not just a duty.

More radical incentive alignment ideas have also emerged. A few publishers and funding agencies have experimented with **financial incentives** – paying reviewers small honoraria or offering discounts on article-processing charges for timely reviews (Kovanis et al., 2016). While controversial, the argument is that paying for the service could expand the reviewer pool and expedite turnaround. Other proposals involve limiting the number of submissions per author (to reduce load) or using lottery systems for funding reviews – though these remain largely speculative. A less direct but promising avenue is reducing the *opportunity cost* of reviewing by making it count toward career metrics (for instance, the Publons platform – now part of Clarivate – enables researchers to document and get credit for their verified peer reviews). Across these discussions, the literature converges on a key point: without realigning incentives and rewards, improvements in peer review participation and quality will be hard to sustain. In summary, **incentive misalignment** underpins many downstream problems in peer review, and reforms that better balance the "publish" and "review" sides of academia's incentive structure are widely seen as necessary for any decentralized or community-owned peer review system to flourish.

Critiques of Traditional Peer Review

The traditional pre-publication peer review system – typically anonymous (single- or double-blind) evaluations by two or three referees – has long been considered the "gold standard" for ensuring scientific quality. However, our review confirms a chorus of recurring critiques that this system is **opaque, slow, biased, and unaccountable**. Many authors point out that, despite its centrality, there is surprisingly little evidence proving peer review's effectiveness in catching errors or improving manuscripts (Smith, 2006). At the same time, abundant evidence illustrates its weaknesses:

- **Openness and Transparency:** Traditional peer review operates behind closed doors – review reports are seen only by editors and authors, decisions lack explanation, and the wider community has no visibility into the process. This opacity breeds mistrust and makes it hard to investigate fairness. Several papers argue that this non-transparency shields reviewers and editors from accountability and prevents the community from learning from the evaluation process (Warne, 2016; Ross-Hellauer, 2017). Without open records, we don't know why certain papers were accepted or rejected, or whether review comments were thorough or superficial. This has led to calls for **open peer review** (discussed further below) where identities and/or reports are made public to introduce accountability.

- **Biases and Inequities:** Perhaps the most documented critique is that peer review is prone to biases – some overt, others subtle. Studies have shown that in single-blind review (where reviewers know author identities), papers from prestigious institutions or famous authors tend to fare better, while those from lesser-known authors (early-career researchers, women, or researchers from the global south) face harsher judgments. Seeber and Bacchelli (2017) found that, in computer science conferences, single-blind review was associated with significantly fewer contributions from "newcomer" authors, suggesting an *"ingroup–outgroup"* dynamic where known authors have an advantage. Bias can also stem from nationality or language – Thelwall et al. (2021) examined the F1000Research open review platform and detected a tendency for reviewers to be more lenient on authors from their own country (a *geographical bias*), though they found no strong evidence of *conformity bias* (reviewers following the opinions of others) in that setting. Double-blind review (where author identity is hidden) is often

proposed to mitigate prestige, gender, and affiliation biases, and indeed many fields (e.g. economics, some biology conferences) have adopted it. Still, double-blind review cannot eliminate all biases – reviewers may infer authors or be biased by their own theoretical leanings. Moreover, certain emergent biases like *confirmation bias* (favoring findings that align with expectations) or *conservatism* (favoring safe, incremental research over novel, risky ideas) have been noted qualitatively in the literature. In sum, while peer review aspires to be a meritocracy, numerous studies reveal systematic biases that can exclude under-represented voices and novel ideas (Horbach & Halffman, 2018).

- **Lack of Accountability and Training:** As mentioned, traditional peer review provides reviewers little accountability – their identities are hidden (in single- and double-blind models) and their reports are not public (they are, in fact, confidential). Combined with the lack of training, this can result in highly variable review quality. Some reviewers supply only a perfunctory few sentences; others give exhaustive critiques. Errors by reviewers often go unchecked. A recurring observation is that *"peer reviewers are human"* – susceptible to error, conflict of interest, or even malfeasance – yet there is no formal mechanism to systematically evaluate or train them (Warne, 2016). Ortíz Núñez (2024) characterizes peer review as a *"human-driven process and is not entirely free of bias or limitations"*, noting that many biases persist because we have not instituted checks or education to address them. Without feedback or oversight, reviewers may not improve over time . The literature also flags **editorial bias** and inconsistency: editors choose which papers are sent to review and can override reviewer recommendations, yet their decisions are often inscrutable. A paper by Atherton et al. (2024) vividly describes the emotional toll on authors navigating opaque editorial decisions – the *agonies* of revise-and-resubmit cycles with unclear expectations. Gabriel (2010) similarly highlights the identity struggles of authors under peer review and the emotional challenges of facing opaque and sometimes arbitrary judgment. All these factors underscore a need for greater professionalism and ethics in peer review: clearer standards for reviewers, training programs, and perhaps codes of conduct to guide fair practice.

- **Inefficiency and Delay:** Traditional peer review is often **slow**, contributing to publication delays of months or even years. Multiple rounds of review, sequential submission to different journals (so-called "journal shopping"), and editor difficulties finding willing reviewers all add friction. Kovanis et al. (2016) pointed out the cascade of resubmissions – authors commonly try a top-tier journal, get rejected after review, then resubmit to another journal, repeating the cycle. This wastes reviewer effort (each journal recruits new reviewers to re-evaluate largely similar manuscripts) and elongates time-to-publication. Proposals like *"cascade review"* or *"portable peer review"* have been floated, where review reports travel with a manuscript to the next journal to avoid starting from scratch (Teixeira da Silva, 2024).

  Another efficiency issue is that peer review happens *post-study but pre-publication*, meaning the work may sit in review for long periods while the scientific community is unaware of it. This has led to calls for more **rapid dissemination** (e.g. via preprints) in tandem with peer review reform (Horbach & Halffman, 2018). Several of the reviewed articles note that the rise of preprint servers (like arXiv, bioRxiv) is already decoupling dissemination from peer review – the papers are available immediately, and peer review can occur iteratively and post-publication (as with some open science journals). The traditional model, critics argue, has not kept pace with the need for timely sharing of results, especially in fast-moving or socially urgent fields.

Despite these critiques, many authors temper that *peer review is still indispensable* – no better replacement has yet been universally adopted, and it does catch errors and improve papers in many cases. The consensus

is that peer review's intentions are sound, but its execution needs improvement. Hence, a substantial portion of the literature is devoted to **innovations and experiments** aimed at addressing these critiques, which we turn to next.

Evolving Peer Review Models and Processes

To tackle the shortcomings above, scholars and practitioners have been experimenting with alternative peer review models. Our review identified several key innovations in how peer review is organized: from variations in anonymity and timing to entirely new platforms for community evaluation. These can be grouped into a spectrum of **peer review models**:

- **Double-Blind Peer Review (DBPR):** While not new per se, double-blind review has gained wider adoption as a direct response to bias in single-blind review. By hiding author identities, DBPR aims to let work be judged on its merits. Seeber and Bacchelli (2017) provide evidence that DBPR can increase the acceptance of contributions from less-established authors, supporting its bias-mitigating effect. Some fields now mandate double-blind review. However, other studies (e.g., Walker & Rocha da Silva, 2015) note trade-offs: DBPR may be harder to implement (reviewers often infer authors) and does not address all issues like reviewer accountability. Overall, double-blind review is viewed as a useful, if partial, improvement to fairness that is most effective when combined with broader cultural change against elitism.

- **Open Peer Review (OPR):** Open peer review refers to a family of practices aimed at increasing transparency. This can include revealing reviewer identities to authors, publishing the review reports (and sometimes the identities) alongside the article, and/or enabling public commenting on papers. Several papers in our sample champion OPR as a way to rectify opacity and reward reviewing effort. For instance, Ross-Hellauer (2017) outlines common forms of OPR and their prevalence, arguing that openness can improve accountability and quality of reviews (since reviewers know their words may be seen by others). Empirical evidence is mixed: Thelwall et al. (2021) studied F1000Research, where reviewer names and reports are public. They found that one hypothesized risk of OPR – *conformity bias*, where reviewers might be swayed by prior reviews since they can read them – did not materialize significantly. Reviewers largely formed independent judgments even with open reports available. However, they did detect a mild "nationality bias" in open reviews: reviewers tended to give slightly more positive assessments to papers by authors from their own country. This suggests that while OPR increases transparency, it does not automatically eliminate social biases. Moreover, cultural resistance to OPR remains; some reviewers fear reprisal or feel uncomfortable signing critiques, especially of eminent authors. A recurring theme is that **partial openness** might be a balance – for example, revealing identities to authors (to curb uncivil reviews) but not publicly, or publishing reports anonymously. eLife's recent peer review model is an illustrative case: reviewers' names are omitted, but the editorial decision letter and peer reviews are published for each paper, and all accepted papers undergo this transparent review process as "reviewed preprints." Early data from such experiments indicate that authors and readers appreciate the added context of open reviews, and reviewers, when given the choice, often agree to sign or share their reviews. The literature suggests that OPR, in its many flavors, holds promise for addressing opacity and improving reviewer performance (through reputational accountability), but it must be implemented in ways that consider the power dynamics and norms of each community.

- **Post-Publication Peer Review (PPPR):** Traditional peer review occurs pre-publication (as a gatekeeper). An alternative model flips this timing: publish first (or post a preprint), then gather reviews and ratings from the community. Platforms like F1000Research, PeerJ's "PeerJ Preprints" (now discontinued), and recent initiatives such as Review Commons and eLife's new model exemplify this approach. Several reviewed articles highlight **advantages** of PPPR: speed (research is available to readers immediately), inclusivity (potentially anyone in the community can contribute a review or comment), and continual scrutiny (feedback isn't a one-time event) (Thelwall et al., 2021; Walker & Rocha da Silva, 2015). For example, in F1000Research, an article passes through **open, named peer review after publication**, and the reviews (including their content and status like "Approved" or "Not Approved") are visible to all. This process can be quicker for initial dissemination, though certification (indexing in databases) usually awaits a minimum threshold of positive reviews. One emergent theme in our sample is **community commenting**: sites like PubPeer allow post-publication comments on any paper (usually anonymous). These have successfully flagged errors and even misconduct that slipped through initial peer review. Yet, challenges remain – PPPR can lead to important critiques being ignored (since academic reward systems don't strongly incentivize individuals to leave post-publication comments), and there is the risk of *"review fragmentation"* (many scattered comments rather than a cohesive evaluation). Overlay journals (discussed below) are one attempt to organize PPPR in a more formal way. Overall, PPPR addresses the timeliness issue and decouples dissemination from evaluation, but the literature notes it works best when there are incentives or structures to ensure reviews happen and are taken seriously (otherwise, one merely shifts the bottleneck).

- **Portable/Cascading Peer Review:** As mentioned, portable peer review is the idea that a manuscript's reviews travel with it to another venue, to avoid duplicate efforts. Several journals have partnerships (for instance, if Journal A rejects a paper but it's still decent, with author permission they forward the reviews to Journal B, which may accept without new reviews). Teixeira da Silva et al. (2024) describe how partnerships between journals enable more efficient manuscript transfer, saving reviewer time and expediting decisions.Adoption is still limited across publishers due to competitive and logistical barriers, but it reflects a process innovation targeting efficiency.

- **Collaborative or Crowd-sourced Review:** A few innovative trials have involved multiple reviewers consulting with each other or even a wider crowd of referees. For example, some journals have experimented with having reviewers see each other's comments and discuss (a form of *interactive peer review*, used in journals like Atmospheric Chemistry and Physics). This can produce more informed consensus reports and reduce redundancy. Another approach is crowd-review platforms, where a paper is opened to a large self-selected group of reviewers (often early-career researchers) who each comment on specific aspects – a recent example is the journal eLife's "Preprint Review" initiative in partnership with PREreview, where the community is invited to review selected preprints (Ross-Hellauer et al., 2017). While full crowd-sourced peer review is not yet mainstream, the notion of leveraging a wider pool of eyes – potentially aided by technology to aggregate their feedback – is gaining traction as a way to democratize expertise beyond the hand-picked few. One included survey (Walker & Rocha da Silva 2015) found substantial interest among researchers in more participatory peer review models, though senior researchers were more skeptical than junior ones about crowdsourcing quality control.

- **Editorial and Platform-mediated Reforms:** Some reforms are not new *models* per se, but process improvements. For instance, journals instituting **checklists** and **reviewer guidelines** to standardize what a good peer review should cover (methods, ethics, statistics, etc.) address training gaps. The

emergence of **reviewer platforms** like Reviewer Commons and journal-independent review boards aim to raise review quality and coordinate reviews across multiple outlets. Additionally, **fast-track review** for high-impact or urgent papers (as seen during COVID-19) is a process tweak that many argue should be adopted more broadly for efficiency.

Through these varied experiments, the academic community is essentially probing the trade-offs between **anonymity vs. transparency**, **pre- vs. post-publication timing**, and **exclusivity vs. inclusivity** in peer review. Each model has pros and cons: for example, open identities can curb certain bad behaviors but might introduce new biases (people may shy from criticizing famous authors), whereas anonymity protects reviewers but can enable unconstructive tone. What is clear from the literature is that no single model has solved all issues – as one author quipped, *"peer review is the worst system, except for all the others."* Thus, many suggest a pluralistic approach: different fields may adopt the model best suited to their culture and needs (indeed, one theme was that notions of "quality" and acceptable peer review practices are field-specific (Severin, 2018). The trend, however, is unmistakable: a push towards **greater transparency, participation, and efficiency**. Even traditional journals are adding open review options, and the rise of preprints has forced journals to accelerate and iterate their processes. The innovations discussed here pave the way for the more technological and decentralized proposals we examine next.

Certification, Reputation, and Metrics in Peer Review

Beyond the mechanics of review, a critical theme in the literature is the **outcome** of peer review in terms of certification and reputation. Peer review doesn't just filter what gets published; it also effectively certifies research quality and confers prestige – both to authors (via publications) and to reviewers (in a more implicit way). Multiple works in our sample dissect how traditional metrics tied to peer review (like journal impact factor) have created incentive distortions, and they explore alternative metrics and reputation systems that could improve how scholarly contributions are evaluated.

A key insight is that in the traditional system, **publications and journal brands serve as the currency of reputation.** As one sub-theme put it, publications and positive peer review outcomes are "the currency of the realm" in academia. Ostrowska (2009) traced the evolution of journal-level metrics used to proxy quality, noting that for decades the peer-reviewed journal article was the gold standard product of science, and **journal impact factor (JIF)** became a shorthand for quality. However, over-reliance on JIF and citation counts has been widely criticized. Priem (2014) argues that citations capture only a narrow slice of impact – *academic* impact – and miss broader influence on practice, policy, or public discourse.

Several articles on *altmetrics* (alternative metrics) propose that online indicators (downloads, social media mentions, blog discussions, Mendeley readers, etc.) can reveal **previously invisible traces of scholarly impact**. For example, Priem's chapter on altmetrics contends that a highly cited work tells a different story than a highly tweeted or widely downloaded work – ideally, a pluralistic set of metrics should be used to capture different dimensions of quality and impact. The inclusion of **usage-based metrics** (like the *Usage Factor* introduced by Bollen and Van de Sompel in 2007) and **link-based metrics** (the *Web Impact Factor* proposed by Ingwersen in 1996) represent early efforts to expand quality measures beyond citations. Ostrowska (2009) highlights that even by 2009, scholars were calling for moving "beyond impact factor," a theme still resonant today with initiatives like the San Francisco Declaration on Research Assessment (DORA).

From the perspective of peer reviewers, traditional systems offered little in the way of formal credit. Recognition was often limited to a thank-you email from an editor or, at best, an annual published list of reviewers. The

emergent theme of **"reviewer reputation platforms"** aims to change that. One approach has been the development of **profiles for reviewer contributions**. Platforms such as **Publons** (now integrated into Web of Science) allow reviewers to track the number and verified content of reviews they have done, essentially creating a reviewer résumé (Kovanis, 2017). A few of the articles note that Publons and similar systems introduce a reputational incentive: researchers can compete or be proud of their reviewer badges and metrics (e.g. Publons introduced scores for top reviewers by field). While this gamification has its critics, it represents a step toward valuing peer review labor.

Another intriguing concept is designing a **reputation system powered by blockchain or tokens**. Bless et al. (2024) propose a token-based reputation economy for science, where performing reviews or other contributions yields tokens that reflect a scientist's contribution beyond just publications. In their framework, a "reputation token" recorded on a blockchain could be earned through high-quality reviews (with quality perhaps assessed by editors or via subsequent validation). These tokens would then serve as a form of currency indicating trustworthiness or standing in the community. The authors present a prototype smart contract implementing such a token, envisioning that it would *"create stronger incentives for high-quality contributions and deter fraud"* by linking one's scientific reputation to a broader set of contributions. Essentially, this extends the idea of academic credit to encompass peer review service, using blockchain to ensure transparency and tamper-proof tracking of contributions. While largely theoretical at this stage, the model aligns with the broader movement of **Decentralized Science (DeSci)**, which seeks to use blockchain and web3 tools to redefine reward structures in science. For example, other proposals have suggested that reviewers could be "paid" in crypto-tokens that accumulate value or privileges (like reduced conference fees or increased visibility for their own work) – effectively creating a secondary economy around reviewing. The challenge noted in the literature is designing token systems that reward genuine quality rather than encouraging gaming metrics (a parallel to how JIF gaming became an issue). Bless et al. emphasize the need for careful mechanism design so that the token incentives reinforce desired behaviors (thorough, fair reviews) and that any such system would need broad buy-in to succeed.

What about **certification of articles** in new models? Traditionally, acceptance in a reputable journal is the binary certifier of "publishable quality." In open peer review and post-publication review systems, new ways to certify have emerged. For instance, F1000Research labels articles as "Approved" or "Approved with reservations" once they pass peer review, which serves as a signal to readers (Thelwall et al., 2021). Platforms like arXiv have inspired **overlay journals** that curate and certify content on top of preprints – effectively giving a stamp of peer-reviewed approval to papers that already exist publicly. Chen and Sima (2023) discuss overlay journals as a step toward decoupling the certification function from traditional publishers, suggesting that overlays can act as decentralized review hubs for disciplines (e.g. the journal *Discrete Analysis* operates entirely by reviewing arXiv preprints and then declaring them accepted in the journal). Overlay models typically still rely on invited peer reviewers, but the journal itself is often a lightweight website coordinating reviews on preprints; this reduces cost and time to publication. The emergent theme in our data was that overlay journals could contribute to a more **decentralized and transparent infrastructure**, since the reviews often become open (linked to the preprint) and the whole process is conducted in the open literature rather than closed management systems.

Lastly, a few works grappled with the **socio-cultural aspects** of reputation in peer review: for example, how **fear of judgment** or **status dynamics** play out. Gabriel (2010) vividly describes how authors may view reviewers and editors as petty officers and commanders in a battle, with authors experiencing rejection as personal agony. This psychological dimension means any new system must account for the fact that academia is a social community – trust and reputation are hard-won and easily lost. Some authors point out that

increasing transparency (like open reviews) could have positive cultural effects by humanizing the process (authors see that reviewers are thoughtful colleagues, not faceless gatekeepers) or negative effects if not carefully managed (junior reviewers might hesitate to criticize seniors if reviews are public). The ethics of peer review was explicitly examined in studies of non-Western contexts as well, such as Beglou et al. (2024) on Iranian journals, which highlighted cultural norms around reciprocity and respect that can influence review honesty. Broadly, the literature concurs that any new reputation or metric system must be introduced alongside community education and buy-in to foster new norms (for instance, normalizing that reviewing and data-sharing are valued parts of one's reputation, not ancillary).

In summary, this thematic area underscores that **"what we measure is what we get."** Traditional peer review tied reputation to journals and citations, incentivizing volume and venue prestige. The emerging view is to measure and value a more diverse set of contributions – reviewing, data curation, open science practices – to realign the academic reputation economy. Altmetrics provide complementary lenses on impact, and new reputation systems (whether simple badging or blockchain tokens) seek to credit the essential work of reviewing and editing. By broadening the definition of scholarly success, these innovations aim to alleviate some pressure on peer review (e.g. reducing the obsession with journal rank) and to professionalize the role of peer reviewer as a respected scholarly duty.

Toward Decentralized and Scalable Peer Review: Balancing the Trilemma

Across the proposals for improving peer review, a recurring meta-theme can be described in terms of the "blockchain trilemma" – the idea (borrowed from blockchain architecture) that it is difficult to achieve **decentralization**, **scalability**, and **security** simultaneously. In the context of peer review, **decentralization** refers to distributing the power of gatekeeping and evaluation across the community (rather than a few editors and anonymous reviewers per paper); **scalability** refers to handling the growing volume of research efficiently and rapidly; and **security** corresponds to maintaining rigor, quality, and integrity (preventing fraud, bias, and error). Our review finds that many current peer review reforms optimize two of these aspects at the expense of the third, illustrating this trilemma:

- **Traditional peer review** (as practiced in most journals) is relatively **decentralized and secure**, but not very scalable. It is decentralized in the sense that the task is distributed globally among volunteer academics and not controlled by any one central body (also, multiple independent reviewers provide checks and balances). It has proven **robust in terms of security**, in that papers are scrutinized by experts and egregiously flawed work is usually filtered out (and if not, post-publication corrections or retractions act as a safety net). However, traditional review struggles with **scalability**: as submission volumes balloon to tens of thousands per journal, finding enough qualified reviewers and processing manuscripts in a timely way has become increasingly difficult (Kovanis et al., 2016; Horbach & Halffman, 2018). The time from submission to publication can be very long (one of the authors had a publication take nearly a decade between submission and eventual publication), and the system doesn't easily scale up without sacrificing quality (since adding more reviewers quickly is hard). In analogy to blockchains, one might liken traditional peer review to Bitcoin – reasonably decentralized and secure by design, but achieving throughput at scale (processing a flood of papers quickly) remains a problem.

- **Open and community-driven peer review** models (including open peer review, crowd review, and community-run overlay journals) tend to prioritize **decentralization**, potentially improving **scalability**, but they sometimes struggle with **security/quality control**. By opening participation, these models enlist more reviewers; in principle, anyone interested can contribute a review or comment (Ross-Hellauer, 2017; Chen & Sima, 2023). This can dramatically scale the volume of evaluation – for example, a preprint could gather dozens of comments instead of just 2–3 traditional reviews, and platforms like PubPeer have shown crowds can rapidly uncover issues in high-profile papers. The **decentralization** here is evident: evaluation is not monopolized by a journal's chosen referees, but spread across the community, aligning with the ethos of "many eyes" on each paper. However, the challenge is ensuring **reliability and rigor** in this diffuse process. Not all commenters are experts; some feedback may be incorrect or low quality. Without careful curation, open comment systems can become chaotic or biased towards the loudest voices. Walker & da Silva (2015) found that while many researchers appreciate the idea of open/community review, they worry about whether it would uphold the same standards – essentially a concern about the **"security"** pillar. Some overlay journals address this by still having an editor vet community input before an official decision, blending decentralization with a final centralized check. Open peer review journals like eLife also maintain editorial oversight to ensure that the transparent reviews are substantive. In blockchain terms, fully decentralized peer review would be like a permissionless network – inclusive and robust against single-point failure, but needing strong consensus algorithms (or moderation) to prevent errors and abuse. The current solutions thus optimize decentralization and participation, but quality assurance (security) requires further innovation, such as reputation-weighted reviewing (where experienced reviewers' opinions carry more weight in aggregating community evaluations) or AI assistants to filter noise.

- **Scalability-focused innovations** often involve **automation and incentives** – e.g. algorithmic reviewer selection, AI review assistants, and tokenized reward systems. These aim to process the ever-growing scientific output more quickly and with less human burden. For instance, some publishers now use AI tools to screen submissions for language quality or even to generate an initial review summary for the human reviewers. Such tools can flag potential statistical errors or plagiarism, speeding up the review by catching obvious issues early. **Token economies and smart contracts** (Bless et al. 2024) also target scalability: by programmatically rewarding reviews and perhaps automating parts of editorial decision-making (for example, automatically accepting a paper once it receives a threshold of positive community reviews, via a smart contract), the process could, in theory, handle large volumes without bottlenecks. These approaches, however, raise concerns about **security/integrity**. Automated tools might miss subtleties or be gamed; AI "reviewers" lack human judgment and could produce false positives/negatives – a Nature news piece noted that scientists are *"worried"* about AI making reviewer recommendations without accountability (Naddaf, 2025). Most journals have statements around the use of AI, and the consensus (at the time of writing) is that AI cannot be given authorship credit because AI cannot be held accountable for errors (for example, if an author engages in plagiarism, there are potentially serious repercussions, but those cannot be applied to AI at the moment). Token incentives, if not designed right, could encourage superficial reviews done for reward, or even fraudulent behavior like trading of tokens or favorable reviews for tokens. In other words, emphasizing **speed and throughput** (scalability) can introduce new vulnerabilities in **quality control** (Checco, et al. 2021). The literature generally views these tech-enabled solutions as promising for handling scale, but always with a caveat: they should augment, not replace, human expertise, and robust safeguards (ethical policies for AI use, validation of reviewer identity, etc.) are needed to maintain trust.

- **Centralized reputation platforms** and identity-verification systems focus strongly on **security and trustworthiness**, but often at the cost of **decentralization**. For example, a platform that assigns reviewers a score or badge (based on editor ratings of their past reviews) could improve confidence that any given review is competent (a form of security). And requiring verified identities for reviewers (no anonymity) can reduce irresponsible behavior. However, if such systems are run by a single authority or rely on proprietary algorithms, they reintroduce centralization. Publons, for instance, while useful, is a centralized service owned by a corporation, and its metrics or "top reviewer" awards are not transparent in methodology. Similarly, some proposals involve editorial boards acting as **gatekeepers of reviewer quality** – effectively *credentialing* reviewers. This improves reliability (only qualified reviewers' opinions count toward decisions) but concentrates power. The downside is that centralization can undermine the **decentralization** ethos and may unintentionally exclude diverse perspectives (replicating the "old boys' network" problem in a new form). A few authors caution that if we replace the tyranny of JIF with the tyranny of another single metric or authority (even if it's "reviewer reputation score"), we might not truly progress (Priem, 2014). The ideal would balance structure with openness – for instance, a decentralized reputation system (maybe blockchain-based) that no single entity controls, yet provides assurances of quality. That is an area of ongoing exploration.

In evaluating these trade-offs, it becomes evident that achieving all three pillars – a peer review system that is community-driven, can handle the deluge of publications, and consistently upholds rigorous standards – is a formidable challenge. Each pillar tends to weaken when another is strengthened. Many authors effectively call for **hybrid approaches**: for example, using AI to assist but not replace human reviewers (combining scalability with human-quality checks), or implementing open review but with some editorial moderation (mixing decentralization with quality control).

The concept of the *"peer review trilemma"* thus serves as a useful lens. Much like blockchain systems have to balance decentralization, security, and speed (often compromising one), peer review reformers face a triangle of **openness**, **quality**, and **efficiency**. A fully decentralized, crowd-sourced review might maximize openness and perhaps efficiency (many hands make light work), but ensuring quality consensus is hard. A fully automated, tokenized review economy might be highly efficient and somewhat decentralized, but one must ensure the veracity and sincerity of reviews (security). And a highly curated, identity-verified review system would be secure, but not decentralized.

The literature doesn't present a silver bullet to resolve this trilemma (indeed, it may be theoretically impossible to *perfectly* optimize all three), but it does provide guiding principles for future design. One principle is **transparency at all stages** – making processes visible can mitigate downsides of both decentralization and centralization by allowing oversight. Another is **adaptive models** – perhaps initial screening can be automated (for scalability), followed by human open reviews (for decentralization), and then an editorial synthesis (for security). The notion of community self-correction is also encouraging: a decentralized system might allow occasional subpar reviews through, but with many participants, others can counteract or correct those. This is akin to Wikipedia's model of many editors eventually achieving quality consensus, albeit after some tumult. Some peer review platforms are inching toward this: for example, PubPub and Sciety are enabling groups of reviewers to layer evaluations on preprints, and over time a more reliable signal may emerge from multiple, independent decentralized assessments.

In summary, the drive toward a more open, fast, and fair peer review system is accelerating, and each innovation tested in the scholarly community illuminates pieces of the puzzle. The **systemic challenges** – misaligned incentives, biased and opaque practices, and reviewer fatigue – are now widely acknowledged. Equally, there is a *"growing movement toward decentralized, technologically augmented, and incentive-aligned*

peer review models" (as our executive summary stated). The next generation of peer review might not abolish journals or traditional review overnight, but it is likely to be more fluid: with preprints, transparent feedback, portable credentials for reviewers, and platform-based communities complementing journals. The ultimate vision shared by many authors is a research ecosystem where peer review is **faster, fairer, and more accountable** – a system that rewards quality and collaboration rather than sheer quantity and competition. Achieving that will require carefully balancing the ideals of decentralization, scalability, and rigor in peer review. The literature surveyed provides both cautionary tales and innovative blueprints to guide us on this path.

Comparative Matrix of Peer Review Models

Model	Transparency	Scalability	Quality Assurance	Reviewer Incentives	Decentralization	Governance	Adoption Feasibility
Open Peer Review	High transparency – reviewer identities and reports are public, enhancing accountability	Similar to traditional peer review in scale (limited reviewers per paper), though transparency may encourage dialogue.	Maintained by editors; studies show no loss of review quality with open identities.	Recognition-based incentives (credit and visibility for reviewers); no direct financial reward.	Low decentralization – process still managed by journals/editors.	Journal-driven governance; traditional decision process with added openness.	Moderately feasible – growing adoption in many journals, but some resistance remains.
Post-Publication Review	High transparency – reviews and comments occur publicly post-publication.	Potentially very scalable by crowdsourcing reviews from the community.	Relies on crowd oversight; can identify errors overlooked pre-publication, but initial screening may be minimal.	Intrinsic incentives (improving science); some reputational gain for active contributors, but often anonymous participation.	Moderately decentralized – anyone can contribute a review, though platforms may be centrally hosted.	Platform or community governance; minimal editorial control, with moderation to enforce basic rules.	Gradually increasing – common on preprints and discussion forums, but not yet a full substitute for pre-publication review.
Overlay Journals	Moderate transparency – content is open access by design; some overlay journals publish review reports.	Efficient workflow can expedite publication, but peer review itself is still constrained by available reviewers.	Traditional peer review standards (multiple reviewers, editor oversight); proven quality in many cases.	Altruistic and reputational incentives (community-driven ethos); no author fees and typically no reviewer payment.	Decentralized publishing platform (uses repositories); run by academic communities rather than big publishers.	Academic-led governance; editorial boards often from the research community, operating with more autonomy from commercial publishers.	Niche but growing – a few dozen active overlays; acceptance depends on preprint culture and trust in the model.
Blockchain-Based Systems	High transparency – immutable public ledger of all review actions, ensuring traceability .	Potentially high – distributed networks can parallelize review processes; automation (smart contracts) may improve efficiency.	Aims to enhance quality via transparent records and algorithmic checks; can implement reviewer reputation and verification of review rigor.	Strong incentives via tokens/cryptocurrency rewards for reviews; reputation scores; possible penalties for poor behavior.	Highly decentralized – no single authority controls the process; data and decisions distributed across the blockchain network.	Decentralized or hybrid governance – potentially managed by community voting or smart contracts rather than traditional editors.	Low current adoption – experimental stage; requires acceptance of new technology and alignment with academic norms to gain traction.
Reviewer Reputation Platforms	Moderate transparency – review activity and metrics are recorded publicly, though full review texts may remain private.	Highly scalable in tracking reviews (aggregating across many journals and reviewers), but doesn't expand the reviewing capacity itself.	Does not directly ensure quality – focuses on logging reviews; risk of gaming by quantity .	Recognition and badges as incentives (e.g., top reviewer rankings); no monetary reward, but career visibility for reviewers .	Not decentralized – a centralized service (often corporate-owned) aggregates data.	Platform governance – rules set by the service provider; journals and users participate but don't control the platform.	Feasible – gained significant user adoption and publisher integration; however, long-term impact on peer review practice is limited if not universally adopted.

Table 1: Comparison of decentralized peer review models across key attributes. Each model offers distinct advantages (e.g. transparency in OPR and PPPR, efficiency in overlay journals, incentive alignment in blockchain systems, recognition in reputation platforms) and faces unique challenges in implementation and adoption.

Actionable Insights and Recommendations for a Blockchain-Based Peer Review Platform

Drawing on the above analysis of challenges and innovations in peer review, this section outlines **actionable design recommendations** for a proposed blockchain-based decentralized peer review platform. The goal is to translate insights from the literature into functional requirements and features. The platform **should leverage blockchain's strengths** (transparency, security, decentralization) while addressing longstanding issues in peer review such as incentive misalignment, lack of accountability, and scalability. The following recommendations are framed as capabilities the platform *should*, *could*, or *must* provide:

1. **Transparent and Immutable Review Records:** The platform **must** provide an immutable, tamper-proof ledger of the peer review process, recording each submission, review, decision, and revision with timestamps. All stakeholders should be able to verify that no review or decision was altered or hidden. This transparency will increase trust in the process (Morales-Alarcón, et al., 2024). To balance openness with privacy, the platform **should** make review content and decision rationale openly accessible (enhancing transparency in line with open peer review practices), while allowing certain identity information to remain pseudonymous if needed (see Identity recommendation below).

2. **Open Peer Review with Accountability:** Building on transparency, the platform **should** support an open peer review model where review reports are published alongside the article (or made public after a certain point). Authors and readers would thus see the critiques and how the decision was reached, fostering a culture of openness. Importantly, reviewers could choose to sign their reviews or use persistent pseudonyms – either way, their contributions are visible. This openness encourages constructive, professional feedback and allows the wider community to learn from and build upon the reviews (Rabkina, 2019). By making the peer review process visible, the platform addresses calls for greater transparency and accountability in science publishing.

3. **Robust Reviewer Incentive System:** The platform **should** include a built-in incentive mechanism to reward reviewers for high-quality, timely reviews. This could be implemented via a token or credit system: upon completing a review, a reviewer earns tokens or reputation points. To avoid the pitfalls of purely quantity-based incentives (Teixeira da Silva, et al. 2022), the rewards **must** be tied to the quality of the review. For example, tokens might only be issued (or issued in greater amounts) if the review is endorsed as helpful by an editor or by community vote, ensuring *quality-weighted rewards*. Such a token economy can motivate participation by recognizing the value of reviewers' work (Morales-Alarcón, et al., 2024, Bless, et al. 2024). The platform **could** also allow authors or funding bodies to offer bounties (tokens or micro-payments) for reviewing a particular paper, as a further incentive for experts to take on reviews. By formalizing rewards, the system acknowledges reviewer labor and helps alleviate the "unpaid work" disincentive in traditional peer review.

4. **Reviewer Reputation and Accountability:** Beyond raw tokens, the platform **should** implement a **reputation system** that tracks the performance of reviewers over time. Each reviewer could have a profile with a reputation score reflecting their contributions – factoring in the number of reviews, the community/appreciation of those reviews, timeliness, and perhaps the outcomes (e.g., whether those papers needed significant post-publication corrections). This reputation system **must** be designed to promote accountability: high-quality reviewers gain status, while those who provide low-effort or biased

reviews see their reputation suffer (Morales-Alarcón, et al., 2024). Crucially, the reputation mechanism should include **peer feedback** on review quality. For instance, authors might rate reviews for helpfulness, or other reviewers could evaluate the thoroughness of a peer's review. Such feedback loops ensure that it's not just the quantity of reviews that counts, but the quality (Teixeira da Silva, et al., 2022). Over time, the reputation score can be used to **incentivize good behavior** (top scorers could receive additional privileges or recognition) and to **filter out poor actors** (a consistently low score might temporarily suspend one's reviewing privileges or require retraining). All reputation data would be recorded on-chain for transparency, but the platform **should** display it in an aggregate, user-friendly form (e.g., badges or levels) to encourage a bit of gamification that drives engagement.

5. **Quality Control Mechanisms:** To uphold the scientific rigor of published work, the platform **must** incorporate strong quality control despite its decentralized nature. One recommendation is to use **multi-layered review and validation**: for example, an initial set of reviewers evaluates the paper, and then an independent second check is performed. This second layer could be an editor or an algorithmic scan combined with community oversight. The platform **should** enable an editorial board or a committee of highly reputed reviewers to oversee difficult cases – decentralization does not mean the absence of any hierarchy, but rather that the hierarchy is transparent and accountable to the community. Smart contracts can be employed to automatically verify that required steps are completed (e.g., at least 2 independent reviews submitted, all reviewers above a certain reputation score, etc.) before a paper is considered "peer-reviewed". Additionally, the platform **could** implement an automated fraud and plagiarism detection service as part of submission, to assist reviewers by flagging potential issues early. To maintain quality in reviews themselves, the system **should** allow flagging of substandard or inappropriate reviews. If a reviewer is flagged by multiple parties, an editor or arbiters can audit that review – if it's indeed inappropriate (e.g., libelous, utterly unconstructive), it could be removed or discounted, and the reviewer's reputation penalized. By building in these safeguards, the platform addresses concerns that a more open or rapid review process might let errors or poor reviews slip through. Every published paper on the platform should carry a clear **verification status** (e.g., "peer review completed with 3 approvals") and link to the reviews, so readers know the level of scrutiny it has undergone (Ross-Hellauer, 2017).

6. **Dispute Resolution and Appeals:** The platform **must** provide a formal dispute resolution mechanism to handle conflicts that arise during peer review. In traditional journals, if an author strongly disagrees with reviewers, they appeal to the editor; if a reviewer finds an author's behavior problematic, they inform the editor. In a decentralized system, the platform **should** establish an *"appeal board"* or use smart contracts to manage disputes. For example, if an author believes a review is unfair or erroneous, they could trigger an appeal smart contract that gathers additional opinions: the paper might be sent to two new independent reviewers (or a higher-tier committee of distinguished reviewers) for adjudication. The results of the appeal (perhaps decided by majority vote or a consensus report by the committee) would then be recorded on-chain as the final decision. Similarly, if a reviewer feels their well-founded critique was ignored in the decision, they might request an appeal. The platform's governance (see next point) would specify who is eligible to serve on appeal panels – likely experienced members with high reputation. All dispute outcomes and reasoning should be documented openly to ensure transparency in how conflicts are resolved. Additionally, the platform **could** allow post-publication commenting and continued review as a form of *informal dispute resolution*: if the community spots issues after a paper is "accepted," those comments are appended to the public record, and authors are encouraged to respond or issue corrections. In essence, the dispute system ensures there is a safety valve for errors or biases, thereby maintaining fairness and trust in the process even without a traditional editor-in-chief

as the sole arbitrator.

7. **Decentralized Governance and Community Oversight:** To truly realize the decentralized ethos, the platform **should** incorporate a governance model that gives stakeholders a voice in key decisions. One approach is to form a **decentralized autonomous organization (DAO)** for the platform, where tokens (or another form of stake, possibly the reputation points) confer voting rights on proposals. Participants could vote on protocol upgrades, changes to review criteria, or election of committee members. For instance, the community might vote on adjusting the token reward rate, or on selecting moderators/ombudspersons for disputes. This democratic governance ensures the platform can evolve based on the collective input of its users rather than being controlled by a single company or executive editor (Morales-Alarcón, et al., 2024). The platform **must** establish a clear constitution or set of bylaws (recorded on-chain) that outline how governance works, what issues are subject to vote, and how proposals are made. To prevent governance from being dominated by a few, it could weight votes in a way that balances interests (for example, a mix of one-person-one-vote for certain issues and stake-weighted voting for others, or quadratic voting mechanisms). Additionally, important roles like *curators* or *stewards* could be created – these are community-elected moderators who help enforce rules and curate content (similar to how Wikipedia or Stack Exchange have community moderators). By distributing governance, the platform not only decentralizes the technical process but also who holds power, thus reducing the likelihood of biased gatekeeping and increasing buy-in from the research community.

8. **Verified Identities and Reputation Protection:** While blockchain allows pseudonymity, in academic peer review it is important to verify that reviewers have appropriate expertise. The platform **should** integrate with identity and credential systems (such as ORCID or institutional logins) to **verify the real-world identity and qualifications** of users without necessarily exposing their personal details on the public ledger. For example, a reviewer might verify their PhD and field of expertise through an attestation (this could be done off-chain and linked to their account via a secure token). Once verified, a user could contribute under a consistent digital identity. The platform **must** then give reviewers the option to be credited under their real name or to use a persistent pseudonymous handle. This flexibility is crucial: it allows those who fear retribution (perhaps reviewing a paper by a direct competitor or a famous author) to remain anonymous to the author/public while still building a verified reputation under their handle. In either case, the reviewer's contributions are tracked and can be associated with their real identity for credit when needed (e.g., a tenure dossier) via privacy-preserving means. By implementing decentralized identity management, the platform addresses both **accountability** (since fake accounts or unqualified reviewers can be filtered out) and the need to **protect reviewers** from potential backlash. It also prevents abuses like one person creating multiple accounts to inflate their influence – the system can enforce one verified identity per human. Finally, tying into identity, the platform **should** issue **microcredentials or badges** for participation: for instance, a "Certified Reviewer in Neuroscience" badge once a user has completed a certain number of high-quality reviews in that field. This not only incentivizes continued good work but also communicates expertise to others using the platform.

9. **Scalability and Performance Optimization:** To ensure the platform can be adopted broadly, it **must** be designed for scalability and efficiency. Blockchain transactions can be slow or costly on some networks, so the system should minimize on-chain operations for speed. One approach is to use a **hybrid architecture**: critical records (review submissions, final decisions, reputation updates) are stored on-chain, while bulky data (full manuscripts, detailed review texts) might be stored off-chain in distributed storage (like IPFS or a secure cloud) with cryptographic hashes on-chain to ensure integrity.

This would drastically reduce costs and improve throughput. The platform **should** also consider using a high-performance blockchain or layer-2 scaling solution so that interactions (like posting a review or voting on a decision) happen with minimal delay and fee. From the user's perspective, the peer review process should feel as seamless as using a typical web-based submission system. Any requirement for handling cryptocurrency (for example, to pay transaction fees) should be abstracted away or handled by the platform in the background to avoid deterring non-crypto-savvy users. By engineering the system for speed and low friction, the platform can handle large numbers of submissions and reviews concurrently, addressing the growing volume of research outputs that need evaluation. Scalability is not only technical but also social: the platform **should** provide user-friendly interfaces, clear documentation, and perhaps training resources to help new users (authors, reviewers, editors) understand this novel workflow. Lowering the barrier to entry will be key for widespread adoption.

10. **Interoperability and Integration with Existing Systems:** To facilitate adoption, the platform **could** offer integration points with the conventional publishing ecosystem. For instance, it might issue **Digital Object Identifiers (DOIs)** for manuscripts and even for peer review reports (making reviews citable objects of record). It could integrate with preprint servers so that authors can easily port their preprint into the peer review system, or conversely, deposit the reviewed version back to repositories. Compatibility with indexing services (like Google Scholar, Web of Science) is important so that papers reviewed via the platform are discoverable and countable in researchers' profiles. The platform **should** also allow exporting of data or linking of profiles to ORCID, so that a reviewer's contributions can be automatically added to their ORCID record (similarly to how Publons integrated with ORCID). By aligning with common standards and data formats used in scholarly communication, the platform can augment rather than isolate itself from current workflows (Morales-Alarcón, et al., 2024). For example, journals could choose to accept reviews done on the platform (a scenario where an editor at a traditional journal outsources the review process to the blockchain platform and then makes a publication decision based on those reviews). Such hybrid usage could be a bridge toward fuller adoption. Ultimately, making the platform's outputs **trusted and recognized** (through interoperability) will encourage researchers to participate, since they know their efforts will be counted in academic evaluations and their papers will be visible to the wider community.

In summary, a blockchain-based decentralized peer review platform should be designed with a **holistic approach**, combining technological innovation with the hard-earned lessons of peer review research. It *must* prioritize transparency, fairness, and incentive alignment at its core. By rewarding reviewers fairly, enforcing accountability through reputations, and enabling community governance, the platform can tackle the inefficiencies and inequities of the current system. At the same time, by maintaining rigorous quality control and offering a clear, user-friendly process, it will ensure that the fundamental purpose of peer review – quality assurance and improvement of scholarly work – is upheld. Incorporating these features will position the platform as a viable and progressive system that addresses researchers' frustrations with the status quo and paves the way for a more open, trustworthy, and decentralized scholarly publishing ecosystem.

Conclusion

Academic peer review is in a state of active evolution. Our systematic review of ~100 articles reveals a scholarly community that is at once highly critical of the status quo and creatively optimistic about alternatives. On one hand, traditional peer review is criticized for entrenched problems – undue gatekeeping power, long delays, lack of transparency, and biases that undermine its legitimacy. On the other hand, experiments in open

peer review, post-publication evaluation, incentive alignment, and new technology are paving the way for a reimagined system. The findings can be summarized in a few key takeaways:

- **Incentives Matter:** The efficiency and equitability of peer review are ultimately linked to academic incentive structures. Misalignment (e.g. all rewards to publishing, none to reviewing) has led to reviewer scarcity and overburden. Aligning incentives – through recognition, training, and new reward mechanisms – is essential to engage the full academic community in peer review and to prevent burnout of the few.

- **Transparency and Accountability:** Increasing the transparency of peer review (from open identities to published reports) addresses many ethical and quality concerns. It holds reviewers (and editors) accountable, helps detect bias, and educates the community by example. While not a panacea, transparency is a thread that runs through most successful reform models, indicating that the field is moving away from blind trust in an opaque process to more sunlight and scrutiny.

- **Diversity and Decentralization:** A healthier peer review system will draw on a **wider pool of contributors** – across regions, career stages, and disciplines. Decentralizing peer review (both in who contributes and in creating interlinked networks of review outside the traditional journal silos) can mitigate biases and improve resilience. However, decentralization must be coupled with clever curation (via reputation systems or moderation) to maintain quality.

- **Technology and Tools:** Automation and digital platforms are crucial to handle the growing scale of scientific output. AI can assist in reviewer selection, detect statistical issues, or summarize manuscripts to save reviewer time. Blockchain and databases can track contributions securely and enable novel incentive models. The community is rightly cautious to integrate these tools in measured ways – as amplifiers of human judgment, not replacements. When used appropriately, they promise to streamline workflows and perhaps even detect problems (like plagiarism or data fabrication) that humans might miss.

- **No One-Size-Fits-All:** Different fields and publication cultures may adopt different models. For instance, fast-moving fields like computer science and physics already rely on preprints and are embracing open review, whereas some humanities fields still prefer traditional editorial-led review. The future will likely see a coexistence of models, with interoperability (e.g. portable reviews, common reviewer recognition platforms) ensuring that despite different workflows, the core values of peer review – rigor, fairness, and constructive feedback – are upheld everywhere.

In closing, peer review is often called the *“cornerstone of scientific quality control.”* The research examined here suggests that this cornerstone is being recast: from a closed, centralized process into a more open, community-centric, and technologically supported one. The transition is not without challenges, as innovations must balance competing demands and overcome inertia in academic norms. Yet, the momentum for change is clear. As one survey respondent succinctly put it, *“peer review is too important to remain stuck in the past.”* The collective endeavors documented in this report – whether it is an altmetrics manifesto, a blockchain pilot, an open-review trial, or a policy recommendation for incentivizing reviewers – all contribute toward a common goal: a peer review system that is worthy of the trust we place in it as the guarantor of scientific integrity.

Ancillary Works cited (non-coded articles and other sources discussed)

Checco, A., Bracciale, L., Loreti, P., Pinfield, S., & Bianchi, G. (2021). AI-assisted peer review. Humanities and Social Sciences Communications, 8(1), 1–11. https://doi.org/10.1057/s41599-020-00703-8

Belluz, J. (2016, November 23). This new study may explain why peer review in science often fails. Vox. https://www.vox.com/science-and-health/2016/11/23/13713324/why-peer-review-in-science-often-fails

Naddaf, M. (2025). AI is transforming peer review — and many scientists are worried. Nature.com. https://doi.org/10.1038/d41586-025-00894-7

Teixeira da Silva, J. A., & Serhii Nazarovets. (2022). The Role of Publons in the Context of Open Peer Review. Publishing Research Quarterly, 38(4), 760–781. https://doi.org/10.1007/s12109-022-09914-0

Teixeira da Silva, Jaime. (2024). Historical assessment of three extinct portable peer review and cascade peer review models. Library and Information Science Research E-Journal. 33. 9-27. 10.32655/LIBRES.2023.1.2.

Warne, V. (2016). Rewarding reviewers - sense or sensibility? A Wiley study explained. Learned Publishing, 29(1), 41–50. https://doi.org/10.1002/leap.1002

References (coded articles)

Almgren, H., Parsons, N., Van Den Bossche, S., & Marinazzo, D. (2020). A review of ideas and strategies to improve scientific research and its dissemination in life and social sciences. *OSF Preprints*. https://doi.org/10.31219/osf.io/gzbnw

Anzt, H., Cojean, T., & Kühn, E. (2019). Towards a new peer review concept for scientific computing ensuring technical quality, software sustainability, and result reproducibility. *Proceedings in Applied Mathematics and Mechanics, 19*(1), e201900490. https://doi.org/10.1002/pamm.201900490

Atherton, O. E., Wilkinson Westberg, D., Perkins, V., Lawson, K. M., Jeftic, A., Jayawickreme, E., ... & Chung, J. M. (2024). Examining personality psychology to unpack the peer review system: Towards a more diverse, inclusive, and equitable psychological science. *European Journal of Personality* (conditionally accepted). https://osf.io/tcwxd/

Barroga, E. (2020). Innovative strategies for peer review. *Journal of Korean Medical Science, 35*(20), e138. https://doi.org/10.3346/jkms.2020.35.e138

Benos, D. J., Bashari, E., Chaves, J. M., Gaggar, A., Kapoor, N., LaFrance, M., ... & Zotov, A. (2007). The ups and downs of peer review. *Advances in Physiology Education, 31*(2), 145–152. https://doi.org/10.1152/advan.00104.2006

Bless, C., Denzler, A., Karras, O., & Auer, S. (2024). A reputation system for scientific contributions based on a token economy. In A. Antonacopoulos, A. Hinze, B. Piwowarski, M. Coustaty, G. M. Di Nunzio, F. Gelati, & N. Vanderschantz (Eds.), Linking theory and practice of digital libraries: Proceedings of the 28th International Conference on Theory and Practice of Digital Libraries, TPDL 2024, Ljubljana, Slovenia, September 24–27, 2024 (pp. 41–61). Springer. https://doi.org/10.1007/978-3-031-72437-4_3

Boldt, A. (2011). Extending arXiv.org to achieve open peer review and publishing. *Journal of Scholarly Publishing, 42*(3), 239–250. https://doi.org/10.3138/jsp.42.3.239

Callaos, N. (2011). Peer reviewing: Weaknesses and proposed solutions (2nd draft). *International Institute of Informatics and Systemics (IIIS)*.

Camussone, P. F., Cuel, R., & Ponte, D. (2010). ICT and innovative review models: Implications for the scientific publishing industry. In *WOA 2010, XI Workshop dei Docenti e dei Ricercatori di Organizzazione Aziendale*. Università di Bologna.

Caruso, J., Nicol, A., & Archambault, É. (2014). State-of-art analysis of OA strategies to scientific data. *Science-Metrix Report for the European Commission*.

Chen, Z., & Sima, G. (2023). Reimagining overlay journals: Exploring operations and development trends. *Resources Data Journal, 2*, 93–101. https://doi.org/10.50908/rdj.2.0_93

Cheng, X., Wang, H., Tang, L., Jiang, W., & Zhou, M. (2024). Open peer review correlates with altmetrics but not with citations: Evidence from Nature Communications and PLoS One. *Journal of Informetrics, 18*, 101540. https://doi.org/10.1016/j.joi.2024.101540

Chung, J., Nam, E., Cho, S.-N., Lee, J.-M., Kim, H., Kim, H.-S., & Kim, W. J. (2024). Online submission and review system for open science: A case of AccessON Peer Review Management System Plus (ACOMS+). *Journal of Information Science Theory and Practice, 12*(1), 87–101. https://doi.org/10.1633/JISTaP.2024.12.1.6

Dallmeier-Tiessen, S., Goerner, B., Darby, R., Hyppoelae, J., Igo-Kemenes, P., Kahn, D., ... & van der Stelt, W. (2010). Open access publishing: Models and attributes. *SOAP Project Report*. https://arxiv.org/abs/1011.6590

Dall'Aglio, P. (2006). Peer review and journal models. *arXiv preprint*. https://arxiv.org/abs/physics/0608307

Dappert, A et al 2017 Connecting the Persistent Identifier Ecosystem: Building the Technical and Human Infrastructure for Open Research. Data Science Journal, 16: 28, pp. 1–16, DOI: https://doi.org/10.5334/dsj-2017-028

Di Donato, F. (2024). What we talk about when we talk about research quality. *Bollettino telematico di filosofia politica*. https://doi.org/10.5281/zenodo.10650140

Dondio, P., Casnici, N., Grimaldo, F., Gilbert, N., & Squazzoni, F. (2019). The "invisible hand" of peer review: The implications of author-referee networks on peer review in a scholarly journal. *Journal of Informetrics, 13*(3), 708–716. https://doi.org/10.1016/j.joi.2019.03.018

Fatahi Valilai, O. (2021). A network-based blockchain ecosystem for peer review publication. *Unpublished manuscript*. Retrieved from https://sites.google.com/view/fatahivalilai-omid/

Ferreira, C., Bastille-Rousseau, G., Bennett, A. M., Ellington, E. H., Terwissen, C., Austin, C., ... & Murray, D. L. (2016). The evolution of peer review as a basis for scientific publication: Directional selection towards a robust discipline? *Biological Reviews, 91*(3), 597–610. https://doi.org/10.1111/brv.12185

Ford, E. (2021). *Stories of open: Opening peer review through narrative inquiry* (ACRL Publications in Librarianship No. 76). Association of College and Research Libraries.

Forsberg, E., Geschwind, L., Levander, S., & Wermke, W. (Eds.). (2022). Peer review in an era of evaluation: Understanding the practice of gatekeeping in academia. Palgrave Macmillan. https://doi.org/10.1007/978-3-030-75263-7

Gabriel, Y. (2010). Organization studies: A space for ideas, identities and agonies. *Organization Studies, 31*(6), 757–775. https://doi.org/10.1177/0170840610372574

Hofmann, B. (2022). Open science knowledge production: Addressing epistemological challenges and ethical implications. *Publications, 10*(24). https://doi.org/10.3390/publications10030024

Horbach, S. P. J. M., & Halffman, W. (2018). The changing forms and expectations of peer review. *Research Integrity and Peer Review, 3*, 8. https://doi.org/10.1186/s41073-018-0051-5

Hug, S. E. (2022). Towards theorizing peer review. *Quantitative Science Studies, 3*(3), 815–831. https://doi.org/10.1162/qss_a_00195

Jang, D., Doh, S., Kang, G. M., & Han, D.-S. (2017). Impact of alumni connections on peer review ratings and selection success rate in national research. *Science, Technology, & Human Values, 42*(1), 116–143. https://doi.org/10.1177/0162243916665466

Jeong, Y. I., Ro, J. Y., Cho, S. N., & Ahn, S. (2022). A study on science and technology scholarly societies' understanding on open peer review. *The Journal of the Korea Contents Association*, *22*(10), 59-73. https://doi.org/10.5392/JKCA.2022.22.10.059

Kovanis, M. (2017). Modeling the complex system of scientific publication (Doctoral dissertation, Université Sorbonne Paris Cité). HAL Archives. https://theses.hal.science/tel-02117693v1

Kovanis, M., Porcher, R., Ravaud, P., & Trinquart, L. (2016). The global burden of journal peer review in the biomedical literature: Strong imbalance in the collective enterprise. *PLOS ONE, 11*(11), e0166387. https://doi.org/10.1371/journal.pone.0166387

Laudel, G. (2024). Where do field-specific notions of research quality come from? *Research Evaluation, 33*, rvae027. https://doi.org/10.1093/reseval/rvae027

Lauria, M. (2023). Reviewing peer review: A flawed system with immense potential. *Publishing Research Quarterly, 39*, 178–190. https://doi.org/10.1007/s12109-023-09943-3

Leung, D., Law, R., Kucukusta, D., & Guillet, B. D. (2014). How to review journal manuscripts: A lesson learnt from the world's excellent reviewers. *Tourism Management Perspectives, 10*, 46–56. https://doi.org/10.1016/j.tmp.2014.01.003

Levkoe, C. Z., Wilson, A., & Schembri, V. (2018). Community-academic peer review: Prospects for strengthening community-campus engagement and enriching scholarship. *Engaged Scholar Journal: Community-Engaged Research, Teaching, and Learning, 4*(2), 1–18.

Lujano, I., & Khalifa, M. (2017). Open access monitoring and business model in Latin America and Middle East: A comparative study based on DOAJ data and criteria. *IFLA World Library and Information Congress Proceedings*.

Mabile, L., Shmagun, H., Erdmann, C., Cambon-Thomsen, A., Thomsen, M., & Grattarola, F. (2024). Recommendations on open science rewards and incentives: Guidance for multiple stakeholders in research. *Research Data Alliance SHARC Interest Group Report*.

Mackey, T. K., Shah, N., Miyachi, K., Short, J., & Clauson, K. (2019). A framework proposal for blockchain-based scientific publishing using shared governance. *Frontiers in Blockchain, 2*, 19. https://doi.org/10.3389/fbloc.2019.00019

Majumdar, S. (2023). The scope of open peer review in the scholarly publishing ecosystem. *Annals of Library and Information Studies, 70*(1), 10–21. https://doi.org/10.56042/alis.v70i1.68736

Mayden, K. D. (2012). Peer review: Publication's gold standard. *Journal of the Advanced Practitioner in Oncology, 3*(2), 117–122.

Morales-Alarcón, C. H., Bodero-Poveda, E., Villa-Yánez, H. M., & Buñay-Guisñan, P. A. (2024). Blockchain and its application in the peer review of scientific works: A systematic review. *Publications, 12*, 40. https://doi.org/10.3390/publications12040040

OECD. (2023). *Artificial intelligence in science: Challenges, opportunities and the future of research*. OECD Publishing. https://doi.org/10.1787/a8d820bd-en

Ortiz Núñez, R. (2024). Peer review as a science evaluation tool: Main tensions and some alternative proposals. *e-Ciencias de la Información, 14*(1). https://doi.org/10.15517/eci.v14i1.55921

Osborne, R. (2015). Open access publishing, academic research and scholarly communication. *Online Information Review, 39*(5), 637–648. https://doi.org/10.1108/OIR-03-2015-0083

Ostrowska, A. (2009). Open access journals quality – How to measure it? In *INFORUM 2009: 15th Conference on Professional Information Resources*, Prague, May 27–29.

O'Sullivan, L., Ma, L., & Doran, P. (2021). An overview of post-publication peer review. *Scholarly Assessment Reports, 3*(1), 6. https://doi.org/10.29024/sar.26

Patel, J., Pierce, M., Boughton, S. L., & Baldeweg, S. E. (2017). Do peer review models affect clinicians' trust in journals? A survey of junior doctors. *Research Integrity and Peer Review, 2*, 11. https://doi.org/10.1186/s41073-017-0029-8

Peruginelli, G., Stojanovski, J., Sanz-Casado, E., & Agnoloni, T. (2022). Assessment of law journals in Croatia, Italy and Spain. In T. C. E. Engels & E. Kulczycki (Eds.), *Handbook on Research Assessment in the Social Sciences* (pp. 123–143). Edward Elgar Publishing.

Priem, J. (2014). Altmetrics. In B. Cronin & C. R. Sugimoto (Eds.), *Beyond bibliometrics: Harnessing multidimensional indicators of scholarly impact* (pp. 263–288). MIT Press.

Prug, T. (2010). Open-process academic publishing. *ephemera: theory & politics in organization, 10*(1), 40–63. http://www.ephemerajournal.org/

Rabkina, N. (2019). Open peer review: Features, benefits and considerations for scholarly communication. In C. Hollister (Ed.), *Perspectives on Scholarly Communication: Volume One* (pp. 85–94). University at Buffalo, Department of Information Science.

Rajabali Beglou, R., Seghatoleslami, A., & Rajabali Beglou, Z. (2024). Peer review ethics in Iranian scientific journals: Evidence-based case study of the Journal of Information Processing and Management (JIPM). *Journal of Information Processing and Management, Special Issue (Spring)*, 205–230. https://doi.org/10.22034/jipm.2024.711530

Rebernig, C. A. (2018). Reviewing the review process: Investigation of researchers' opinions on different methods of peer review (Master's thesis, University of Borås, Sweden).

Refsdal, M. (2010). Peer review at the University of Tromsø: A study of time spent on reviewing and researchers' opinions on peer review. (Master's thesis, University of Tromsø).

Ren, X. (2013). Open and networked initiatives and the digital transformation of academic publishing in China (Doctoral dissertation, Queensland University of Technology).

Ross-Hellauer, T. (2017). What is open peer review? A systematic review [version 2; peer review: 4 approved]. *F1000Research, 6*, 588. https://doi.org/10.12688/f1000research.11369.2

Schmidt, B., & Görögh, E. (2017). New toolkits on the block: Peer review alternatives in scholarly communication. In L. Chan & F. Loizides (Eds.), *Expanding Perspectives on Open Science: Communities,*

Cultures and Diversity in Concepts and Practices (pp. 62–70). IOS Press. https://doi.org/10.3233/978-1-61499-769-6-62

Seeber, M., & Bacchelli, A. (2017). Does single blind peer review hinder newcomers? *Scientometrics, 113*(1), 567–585. https://doi.org/10.1007/s11192-017-2264-7

Severin, A., Egger, M., Eve, M. P., & Hürlimann, D. (2018). Discipline-specific open access publishing practices and barriers to change: An evidence-based review [version 1; peer review: 3 approved with reservations]. *F1000Research, 7*, 1925. https://doi.org/10.12688/f1000research.17328.1

Silverstein, P., Elman, C., Montoya, A., McGillivray, B., Pennington, C. R., Harrison, C. H., ... & Syed, M. (2024). A guide for social science journal editors on easing into open science. *Research Integrity and Peer Review, 9*, 2. https://doi.org/10.1186/s41073-023-00141-5

Sivakumar, E., Singh, K. J., & Chawla, P. (2024). Artificial intelligence in blockchain and smart contracts for disruptive innovation. In S. Mahajan, P. Raj, & A. K. Pandit (Eds.), *Deep reinforcement learning and its industrial use cases: AI for real-world applications* (pp. 115–136). Scrivener Publishing. https://doi.org/10.1002/9781394272587.ch6

Skala, K., Šojat, Z., Maričević, J., Davidović, D., Bojović, V., Zubčić, T., ... & Pecimotika, M. (2024). Prospects of digital scientific publishing on blockchain: The concept of DAP. *Open Research Europe, 3*, 117. https://doi.org/10.12688/openreseurope.15771.2

Smith, R. (2006). Peer review: A flawed process at the heart of science and journals. *Journal of the Royal Society of Medicine, 99*(4), 178–182. https://doi.org/10.1258/jrsm.99.4.178

Souder, L. (2011). The ethics of scholarly peer review: A review of the literature. *Learned Publishing, 24*(1), 55–74. https://doi.org/10.1087/20110109

Tennant, J. P. (2018). The state of the art in peer review. *FEMS Microbiology Letters, 365*(19), fny204. https://doi.org/10.1093/femsle/fny204

Tennant, J. P., Dugan, J. M., Graziotin, D., Jacques, D. C., Waldner, F., Mietchen, D., ... & Colomb, J. (2017). A multi-disciplinary perspective on emergent and future innovations in peer review [version 3; referees: 2 approved]. *F1000Research, 6*, 1151. https://doi.org/10.12688/f1000research.12037.3

Tennant, J. P., Dugan, J. M., Graziotin, D., Jacques, D. C., Waldner, F., Mietchen, D., ... & Colomb, J. (2017). A multi-disciplinary perspective on emergent and future innovations in peer review. *F1000Research, 6*, 1151. https://doi.org/10.12688/f1000research.12037.3

Tenorio-Fornés, Á., Pérez Tirador, E., Sánchez-Ruiz, A. A., & Hassan, S. (2021). Decentralizing science: Towards an interoperable open peer review ecosystem using blockchain. *Information Processing & Management, 58*(5), 102724. https://doi.org/10.1016/j.ipm.2021.102724

Thangavel, V. (2023). The important role of peer review sources and their various functions in improving to international journals standards. *SSRN Electronic Journal*. https://www.researchgate.net/publication/372448393

Thelwall, M., Allen, L., Papas, E., Nyakoojo, Z., & Weigert, V. (2021). Does the use of open, non-anonymous peer review in scholarly publishing introduce bias? Evidence from the F1000Research post-publication open peer review publishing model. *Journal of Information Science*. https://doi.org/10.1177/01655515211002410

Toli, E., Sifacaki, E., Manola, N., Ioannidis, Y., Ross-Hellauer, T., Görögh, E., ... & Woutersen-Windhouwer, S. (2018). Developing sustainable Open Science solutions in the frame of EU funded research: The OpenUP case. In *Proceedings of the 14th International Symposium on Open Collaboration (OpenSym'18)*, Paris, France. https://doi.org/10.1145/3233391.3233528

Traag, V. A. (2023). Citation models and research evaluation. In T. Yasseri (Ed.), *Handbook of Computational Social Science*. Edward Elgar Publishing Ltd.

Trovò, B., & Massari, N. (2021). Ants-Review: A privacy-oriented protocol for incentivized open peer reviews on Ethereum. In B. Balis & D. B. Heras (Eds.), *Euro-Par 2020: Parallel Processing Workshops. Euro-Par 2020 International Workshops, Warsaw, Poland, August 24–25, 2020, Revised Selected Papers* (pp. 18–29). Springer. https://doi.org/10.1007/978-3-030-71593-9_2

Tsang, E. W. K. (2013). Is this referee really my peer? A challenge to the peer-review process. *Journal of Management Inquiry, 22*(2), 166–171. https://doi.org/10.1177/1056492612461306

Walker, R., & Rocha da Silva, P. (2015). Emerging trends in peer review—A survey. *Frontiers in Neuroscience, 9*, 169. https://doi.org/10.3389/fnins.2015.00169

Ware, M., & Mabe, M. (2015). The STM report: An overview of scientific and scholarly journal publishing (4th ed.). *International Association of Scientific, Technical and Medical Publishers*. http://digitalcommons.unl.edu/scholcom/9

Watve, M. (2023). Behavioral optimization in scientific publishing. *Qeios*. https://doi.org/10.32388/8W10ND

Wusu, J. O. (2018). Open science: A review on open peer review literature. *Library Philosophy and Practice (e-journal), 1874*. http://digitalcommons.unl.edu/libphilprac/1874

Yu, L., & Schmid, B. F. (1999). A conceptual framework for agent oriented and role based workflow modeling. *Institute for Media and Communications Management, University of St. Gallen*. Retrieved from http://www.netacademy.org

Yu, L., & Schmid, B. F. (1999). The NetAcademy: Managing Internet peer review process in a multi-agent framework. *Institute for Media and Communications Management, University of St. Gallen*. Retrieved from http://www.netacademy.org