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Stakeholder Collaboration and Requirements Quality in Agile Projects

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Abstract

Purpose: Agile teams are told that close collaboration with stakeholders produces good requirements, yet many teams with frequent ceremonies still commit to ambiguous, conflicting or untestable user stories. This review asks which collaboration mechanisms, rather than how much collaboration, account for requirements quality in agile projects. Method: A mechanism-based integrative review of requirements engineering, agile empirical research, traceability, testing and cross-domain governance literature published up to 2024 was conducted, with appraisal focused on construct definition, temporal ordering and outcome measurement. Synthesis: Six mechanisms recur: product owner decision authority, breadth of stakeholder representation, discipline of backlog refinement, cadence of validated feedback, right-sized documentation and the resulting shared understanding. The evidence suggests that interaction frequency improves story quality mainly when authority to close decisions is clear and when affected groups, including security, privacy and operational stakeholders, contribute before sprint commitment. Contribution: The article proposes ACCORD (Authority, Coverage, Cadence, Observable shared understanding, Refinement discipline, Documentation sufficiency), six falsifiable propositions, formal indicators such as a weighted representation coverage index and a QUS-based story defect density, and a validation design. Implications: Teams should manage decision latency, representation gaps and story defect density as leading indicators, and treat meeting volume as a cost rather than evidence of quality. The propositions are untested and require prospective field studies.

Keywords: agile requirements engineering, product owner, backlog refinement, user story quality, QUS framework, shared understanding, stakeholder representation

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1 Introduction

Agile methods relocated requirements engineering from an upfront specification phase into a continuous conversation between a delivery team and the people who will fund, use, operate, secure and support the product. The user story, a short statement of a need written from a user perspective and elaborated through conversation and acceptance criteria, became the dominant requirements artefact, and the

product owner became the accountable person for the content and order of the product backlog. This relocation rests on a strong assumption: that frequent, informal and face-to-face interaction produces requirements that are clearer, more complete and more valuable than those produced by document-centred specification. The assumption is plausible, and the early empirical literature on agile development reported improved customer collaboration and responsiveness, but it also reported that the on-site customer role was demanding, frequently under-resourced and sometimes filled by people with limited authority or domain coverage (Dybå & Dingsøyr, 2008). General requirements engineering guidance similarly treats elicitation as a social process whose output depends on who is consulted and how conflicts are settled, not merely on how often people meet (IEEE Computer Society, 2014; ISO/IEC/IEEE, 2018).

1.1 Why Collaboration Volume Is a Poor Proxy for Requirements Quality

The practical consequence is a pattern practitioners recognise but research has rarely modelled. Teams hold stand-ups, refinement sessions and sprint reviews, yet commit to stories whose acceptance criteria are missing, whose scope overlaps other stories, whose non-functional constraints surface after implementation, or whose meaning differs between analyst, developer and tester. Such defects are expensive because they are discovered late, at sprint review or acceptance testing, after code and tests have been built on the misunderstanding (Eyetsemitan et al., 2023b; Kaner et al., 1999). What matters is whether interaction reaches the right people, closes decisions, happens early enough to change the commitment and leaves a record others can act on (Gotel & Finkelstein, 1994; Ramesh & Jarke, 2001).

This distinction has governance consequences. Organisations that equate collaboration with ceremony attendance tend to monitor meeting counts, velocity and the number of stories marked ready, all of which can rise while requirements quality falls. Indicator frameworks in other management domains show that measures weakly connected to the decisions they inform invite gaming (Sakyi et al., 2022b; Edivri & Oteri, 2024). This review instead identifies the mechanisms through which collaboration produces quality and treats ceremony volume as an input cost, keeping its scope on collaboration inside and around agile teams (Tonoyan et al., 2024b).

1.2 Research Gap, Questions and Contributions

Three gaps motivate the review. First, requirements quality in agile research is usually operationalised at the level of the individual artefact, for example through the INVEST heuristic (independent, negotiable, valuable, estimable, small, testable) or the Quality User Story (QUS) framework with its syntactic, semantic and pragmatic criteria, while collaboration is operationalised at the level of practices or ceremonies. The two levels are seldom connected through an explicit causal model that states which collaboration condition changes which quality attribute. Second, the literature often treats the product owner as a role to be filled rather than as a locus of decision authority whose legitimacy, availability and domain coverage vary widely (Dybå & Dingsøyr, 2008; Akin-Oluyomi & Akhigbe, 2023b). Third, representation breadth, meaning whether security, privacy, compliance, operations and marginal user groups are heard before commitment, is under-theorised even though non-functional requirements are consistently reported as the category most likely to be missed or discovered late (Mairiza et al., 2010; Badmus et al., 2024).

The review addresses three research questions. RQ1 asks which collaboration mechanisms in agile projects are associated with the quality of user stories and acceptance criteria at the point of sprint commitment. RQ2 asks under what conditions higher interaction frequency fails to improve, or degrades,

requirements quality. RQ3 asks how these mechanisms can be measured and governed with indicators that are leading rather than lagging, and resistant to gaming. The questions are framed at the level of the backlog item and the decision about it, because that is where collaboration either changes the requirement or does not, and where downstream consequences such as rework and escaped defects can be traced back through version history and traceability links (Cleland-Huang et al., 2012; Borg et al., 2014).

The article makes four contributions. (1) It synthesises dispersed evidence from agile empirical research, requirements engineering standards, traceability and testing research, and cross-domain governance studies into six collaboration mechanisms with explicit definitions and causal roles. (2) It adjudicates conflicting findings, notably the apparent contradiction between studies that value face-to-face conversation over documentation and studies that attribute defects to missing records, by specifying the conditions under which each holds. (3) It proposes the ACCORD framework (Authority, Coverage, Cadence, Observable shared understanding, Refinement discipline, Documentation sufficiency) and derives six falsifiable propositions, each with a stated empirical test. (4) It defines formal indicators, including a weighted representation coverage index, a story defect density based on QUS criteria, decision latency percentiles and an estimate-divergence measure of shared understanding, and embeds them in a validation design with explicit threats to validity (Wieringa, 2014; Hevner et al., 2004).

2 Theoretical Foundations

Requirements quality needs a definition that is precise enough to measure and appropriate to agile artefacts. ISO/IEC/IEEE 29148 specifies characteristics of individual requirements (necessary, appropriate, unambiguous, complete, singular, feasible, verifiable, correct and conforming) and of requirement sets (complete, consistent, feasible, comprehensible and able to be validated) (ISO/IEC/IEEE, 2018). These characteristics were written with specification documents in mind, but most translate directly to a user story and its acceptance criteria: a story that cannot be verified by a concrete test, or that bundles two independent capabilities, fails the standard in the same way a numbered requirement would. The body of knowledge for software engineering reinforces this by locating validation, negotiation and management of requirements alongside elicitation, which implies that quality is produced by a process and not only by the writing of an artefact (IEEE Computer Society, 2014).

2.1 The QUS Framework and the Limits of Artefact-Level Quality

The QUS framework adapts these ideas to user stories through thirteen criteria grouped into three layers. Syntactic criteria check form: a story should be well formed (containing at least a role and a means), atomic (expressing one requirement) and minimal (free of extraneous detail). Semantic criteria check meaning: a story should be conceptually sound, problem oriented, unambiguous and free of conflict with other stories. Pragmatic criteria check usefulness to the team: a story should be a full sentence, estimable, unique, uniform in format, independent and, as a set, complete. The layered structure is useful for the present review because each layer is plausibly influenced by a different collaboration mechanism. Syntactic defects respond to templates and refinement discipline; semantic defects, especially ambiguity and conflict, respond to representation breadth and decision authority; pragmatic defects such as poor estimability respond to the presence of the people who will build and test the story (Myers et al., 2011; Ammann & Offutt, 2016).

A limitation of artefact-level criteria is that a story can satisfy every QUS criterion and still encode a requirement that the affected users did not need, or omit a constraint that no participant knew to state. Artefact quality is therefore necessary but insufficient, and the review distinguishes it from validity with

respect to stakeholder need, which can only be judged against evidence from use, acceptance testing or operational feedback (Eyetsemitan et al., 2023b; Mairiza et al., 2010). The distinction matters for measurement: automated checkers, including rule-based parsers and more recent language-model judges, can score the syntactic and some semantic criteria at scale, but reviews of language-model evaluation note systematic biases, sensitivity to phrasing and a tendency to reward fluent text, so such scores should be treated as screening rather than as ground truth (Nwakamma et al., 2024a; Borah et al., 2022).

2.2 Shared Understanding as Common Ground and Transactive Memory

Shared understanding is the central mediating concept of the review. Following common ground theory in communication research, two parties share understanding of a requirement when each can predict how the other would interpret it and when both know that this is so. Grounding, the process of establishing common ground, is costly and depends on the medium: synchronous conversation allows immediate repair of misunderstanding, whereas written artefacts allow reference and persistence but not repair. Agile methods privilege conversation precisely because of its repair capability, and the story card is often described as a promise of a conversation rather than a specification. The theory predicts that conversation reduces interpretation gaps only among those who take part and only for issues that someone raises, which is exactly why representation breadth and the timing of conversations matter (Lilian et al., 2020; Odejide, 2024).

Transactive memory theory adds a team-level perspective. A team need not hold every piece of knowledge in every head; it needs an accurate directory of who knows what and reliable routes for retrieving it. When a developer can quickly reach the person who knows how a regulatory rule applies, a question raised during implementation is answered before it hardens into an assumption. When the directory is wrong, for example because a proxy product owner is assumed to know operational constraints that only a service desk lead holds, collaboration yields confident but wrong answers. This links representation breadth to shared understanding and explains why adding meetings without adding the right people changes little (Amayo et al., 2023c; Anyanwu, 2022).

2.3 Boundary Objects, Decision Rights and Legitimate Authority

The user story and its acceptance criteria function as boundary objects: artefacts that are flexible enough to be read differently by business, design, development and test communities, yet robust enough to coordinate their work. Boundary objects succeed when each community can attach its own detail without breaking the shared core, for example when a tester adds Given-When-Then scenarios that a business stakeholder can still read. They fail when the shared core is too thin to constrain interpretation or too detailed to be negotiated. This framing explains why story templates such as the Connextra form ('As a role, I want goal, so that benefit') help with syntactic quality but do not by themselves resolve semantic conflict; the template gives form to the boundary object, but it does not decide whose interpretation prevails (Eyetsemitan et al., 2020; Ike et al., 2021).

Authority must also be legitimate to be effective. Research on cooperation with authorities in the fiscal domain distinguishes coercive power from legitimate power and shows that voluntary cooperation rises when an authority is both trusted and perceived as competent and fair, whereas enforcement based on power alone yields grudging and minimal compliance (Kirchler, 2007; Wahl et al., 2010). Studies of what motivates compliance similarly emphasise perceived fairness, reciprocity and social norms rather than sanctions alone (Alm, 2019). The analogy to agile teams is instructive rather than literal. A product owner who closes decisions by positional fiat may achieve fast closure but reduce the willingness of

developers and specialists to raise concerns, while a product owner who is trusted but lacks mandate cannot close decisions at all. Requirements quality should therefore depend jointly on the formal mandate of the product owner and on the team's trust in that person's domain judgement, a claim formalised in Section 5 (Falemi et al., 2024; Akhigbe et al., 2024).

3 Review Protocol

The review follows an integrative design because the relevant evidence is heterogeneous: controlled experiments on user story quality, field case studies of agile requirements practice, systematic reviews, standards, practitioner surveys and cross-domain governance studies cannot be pooled statistically, but they can be compared on mechanism, context and outcome. The protocol drew on guidance for systematic reviews in software engineering and on the PRISMA 2020 reporting items that apply to non-statistical syntheses, namely transparent eligibility criteria, documented search sources, appraisal and a description of synthesis methods (Kitchenham et al., 2009; Page et al., 2021). Searches covered IEEE Xplore, the ACM Digital Library, Scopus, Web of Science and SpringerLink, supplemented by backward and forward citation tracking from anchor works on agile empirical research, traceability and requirements quality (Dybå & Dingsøyr, 2008; Ramesh & Jarke, 2001).

3.1 Sources, Search Strings and Eligibility

Search strings combined three concept blocks with Boolean conjunction. The agile block included (agile OR scrum OR 'extreme programming' OR kanban OR SAFe). The requirements block included ('user stor*' OR 'product backlog' OR 'backlog refinement' OR 'backlog grooming' OR 'acceptance criteria' OR 'requirements quality' OR 'requirements engineering'). The collaboration block included ('product owner' OR 'customer involvement' OR 'stakeholder participation' OR 'shared understanding' OR 'common ground' OR 'definition of ready' OR 'three amigos' OR 'sprint review' OR documentation). Cross-domain searches for governance, accountability, multi-stakeholder coordination and performance indicator design used the collaboration block with governance terms instead of the agile block. The date window ended in December 2024, with no lower bound for foundational works on traceability, testing adequacy and requirements quality (Zhu et al., 1997; Gotel & Finkelstein, 1994).

Sources were eligible if they reported empirical evidence, a systematic synthesis, a normative standard or a fully specified conceptual model relevant to at least one of the following: a collaboration mechanism, a requirements quality attribute, a boundary condition or a measurement approach. Sources were excluded if they described a practice without any account of its effect or conditions, if they were vendor or marketing material, or if requirements quality was mentioned only as motivation. Cross-domain governance sources were eligible only when they addressed a mechanism with a clear analogue in agile requirements work, such as coverage versus frequency of oversight, authority and escalation design, or indicator gaming, and they were used to inform construct definitions and rival explanations rather than as evidence about software teams (Easterbrook et al., 2008; Obriki & Arumosoye, 2019).

Table 1 summarises the protocol decisions, the operational rule applied to each and the safeguard used against the most likely bias at that stage.

Table 1. Review protocol for collaboration mechanisms and requirements quality in agile projects

Protocol stage	Operational rule for this review	Safeguard against bias
Question framing	Unit of analysis is the backlog item and the decision about it at sprint	Outcome defined before search to avoid fitting mechanisms to

Protocol stage	Operational rule for this review	Safeguard against bias
	commitment	available evidence
Sources	IEEE Xplore, ACM DL, Scopus, Web of Science, SpringerLink; citation tracking from agile, traceability and testing anchors	Forward and backward tracking reduces dependence on indexing vocabulary
Search blocks	Agile terms AND requirements terms AND collaboration terms; governance variant for cross-domain analogues	Synonyms such as grooming and refinement both searched
Eligibility	Evidence or specified model on a mechanism, quality attribute, boundary condition or measure; window ends December 2024	Practice descriptions without effect or condition excluded with reasons
Appraisal	Construct clarity, temporal ordering, outcome measurement, confounding, transferability to agile teams	Cross-domain sources restricted to mechanism analogy, never to effect claims
Extraction	Mechanism, context (team size, distribution, regulation), quality attribute, outcome, direction, conditions	Contradictory findings extracted in the same matrix as supporting ones
Synthesis	Mechanism, context and outcome comparison; adjudication of conflicts by condition	Propositions labelled as untested; negative cases retained

3.2 Screening, Appraisal and Synthesis Logic

Screening proceeded in three stages: title and abstract screening against the concept blocks, full-text screening against the eligibility rules, and a relevance check that asked whether a source informed at least one construct, proposition or indicator of the emerging framework. Appraisal adapted case study reporting guidance for software engineering, which asks whether the research question, case selection, data collection, analysis and threats to validity are reported in enough detail for a reader to judge the credibility of conclusions (Runeson & Höst, 2009). Five appraisal questions were applied to each empirical source: whether the collaboration construct was defined independently of the outcome; whether the requirements quality measure was specified; whether the temporal order of collaboration and quality was observable; whether plausible confounders such as team experience or requirements volatility were addressed; and whether the context was described sufficiently to judge transfer (Easterbrook et al., 2008; Dybå & Dingsøyr, 2008).

Synthesis used mechanism, context and outcome logic. For each candidate mechanism, the review recorded the direction and conditions of reported associations, the quality attribute affected and the downstream outcome, and then compared sources that agreed with those that disagreed. Disagreements were not averaged away. Instead, the review asked whether a contextual difference, such as distributed versus co-located teams, regulated versus unregulated products or proxy versus direct customer involvement, could explain the divergence, and whether that explanation was itself supported by independent evidence. This is the logic behind the adjudication in Section 4.7 and the boundary

conditions attached to each proposition (Wieringa, 2014; Hevner et al., 2004). The overall process from retrieval to framework validation is shown in Figure 1.

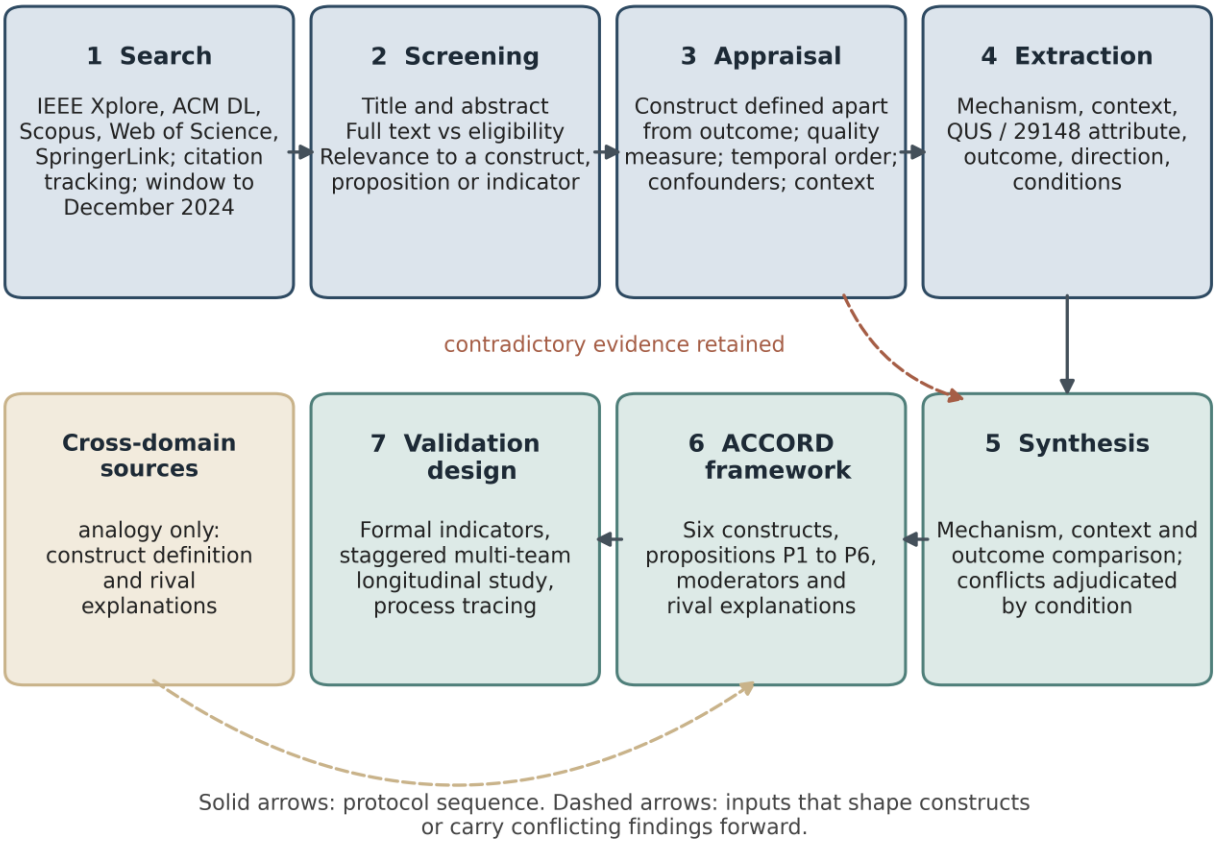

Figure 1. Review process from search to ACCORD framework validation, showing where cross-domain sources enter and where contradictory evidence is retained

Figure 1 makes two design choices visible. Cross-domain governance sources enter only at construct definition and rival explanation, so they shape what is measured without supplying effect estimates for software teams; for example, they sharpen the distinction between how often oversight occurs and how much relevant territory it covers (Obriki & Arumosoye, 2019). Contradictory findings are carried through to adjudication rather than filtered at appraisal.

4 Evidence Synthesis: Six Collaboration Mechanisms

This section synthesises the evidence mechanism by mechanism. Each subsection defines the mechanism, identifies the requirements quality attributes it is most likely to affect, reports where the evidence converges and where it is thin, and names the indicator that later operationalises it. The order follows the flow of a backlog item: who decides (4.1), whose knowledge enters the decision (4.2), how the item is prepared for commitment (4.3), how its implementation is validated (4.4) and how the outcome of these conversations is preserved (4.5). Shared understanding, the state through which these

mechanisms act, is treated last (4.6), followed by an adjudication of conflicting findings (4.7) (Dybå & Dingsøyr, 2008; IEEE Computer Society, 2014).

4.1 Product Owner Authority and Decision Closure

The product owner role concentrates two functions that the traditional requirements process distributed across analysts, sponsors and change boards: representing stakeholder value and deciding what the team will build next. Field research on agile adoption has repeatedly found that this concentration is where practice diverges most from method descriptions. Customer representatives are often part-time, report to a different line manager, lack authority over budget or policy, or act as proxies for stakeholders they rarely consult (Dybå & Dingsøyr, 2008). Business analysis research on structuring ambiguous business problems into automation-ready requirements reaches a compatible conclusion: ambiguity is removed by making scope, rules and exceptions explicit decisions with an owner, not by rewording the artefact (Alieme et al., 2024). The consequence for requirements quality is not primarily that stories are badly written but that decisions about them remain open. An open decision manifests as a story that is refined repeatedly without converging, as acceptance criteria that include alternatives ('the system should either...'), or as a clarification question raised during implementation that waits days for an answer.

Decision latency, the time between a clarification question being raised and a binding answer being recorded, is therefore a more direct indicator of the authority mechanism than the existence of a named product owner. A question answered within refinement costs minutes; the same question answered after a sprint of development may cost a redesign, rework of tests and renegotiation of dependent stories. Reliability engineering offers a general analogue: failures corrected close to their origin are cheaper and less likely to propagate (Gideon et al., 2019). Risk pathway models in heavy industrial operations make the same structural point, tracing how an unresolved upstream condition propagates through dependent tasks (Arumosoye & Obriki, 2022). The actual cost curve in software teams must still be established empirically.

A worked scenario illustrates the mechanism. Consider a hospital outpatient scheduling product in which the product owner is seconded from the information technology department. A story reads: 'As a scheduler, I want to book follow-up appointments automatically, so that patients are not lost to follow-up.' During refinement, a developer asks whether automatic booking should respect clinician-specific template rules and whether patients must consent to automatically assigned slots. The product owner cannot answer the first question without the clinic operations lead and cannot answer the second without the patient liaison office and information governance. If these questions are logged but left open, the story is committed with an implicit assumption, typically the simplest to implement, and the gap surfaces at sprint review when clinicians reject the behaviour. Governance studies of healthcare infrastructure and diagnostic quality systems emphasise the same need for named accountability across clinical, operational and regulatory owners before design choices are locked in (Aminu-Ibrahim et al., 2019; Yusuf & Abdulrazaq, 2018).

4.2 Representation Breadth and the Proxy Problem

Representation breadth refers to the degree to which the groups affected by, or holding knowledge about, a requirement contribute to its definition before commitment. It differs from participation frequency: a team can meet its product owner daily while never hearing from the operations staff who will run the system or users with accessibility needs. Research on diversity in project teams finds that heterogeneous knowledge improves problem framing only when processes allow divergent perspectives to be voiced

and integrated (Amayo et al., 2023c), and models for evaluating inclusion investments distinguish the presence of participants from their influence on decisions (Uchechi et al., 2022). Market research frameworks for regulated industrial services similarly stress that stakeholder needs in such sectors are segmented and constrained by rules that outsiders do not see (Sanni & Attah, 2023c). What matters is whether a group's input changed or confirmed a requirement before commitment.

The groups most often missing are those whose concerns are expressed as non-functional requirements: security, privacy, compliance, accessibility, performance and operability. The notion of a non-functional requirement is itself contested, with inconsistent definitions and classifications across the literature, which makes these requirements easy to defer because no single role owns them (Mairiza et al., 2010). Security architecture studies for operational technology and regulated energy networks show that controls retrofitted after design are more costly and less effective than those designed in, and that alignment with governance frameworks has to be established early in the lifecycle (Adegbite et al., 2020; Adegbite et al., 2022; Ahmed et al., 2021). Privacy by design literature makes the same argument for personal data, including role-based access architectures on commercial platforms and privacy obligations embedded in corporate transactions (Badmus et al., 2024; Ominyi, 2021).

Security and privacy stakeholders are therefore a critical test case for representation breadth. Reviews of intrusion detection, integrated network and security operation centres and access control policy show that the security function holds knowledge about threat patterns, logging needs and policy constraints that product teams rarely possess (Dosunmu & Ogundele, 2020; Ladapo et al., 2024; Ladapo et al., 2023b), and field evidence on device adoption in administrative offices shows how information security risk grows when adoption decisions outpace security input (Onche et al., 2023). Governance frameworks make such knowledge actionable only when it becomes concrete requirements with named owners (Jimoh et al., 2023). Without these stakeholders, an 'export report' story with no data classification rule, or an integration story with no rate limiting, invites the attack classes that network-level analyses describe (Jimoh & Ahmed, 2024; Adebayo et al., 2023).

The proxy problem compounds the gap. Product owners, analysts and user researchers often speak for absent stakeholders. Proxies are necessary, but they add a translation step whose fidelity is rarely checked. Techniques for AI-enabled synthesis of stakeholder and survey data offer one way to test that fidelity, because they allow the concerns a proxy reports to be compared with what the represented group states directly across many respondents (Obukadata et al., 2024). Cross-cultural communication research shows that meaning is lost across identity boundaries without mechanisms for clarification (Lilian et al., 2020), and trust-centred communication research emphasises that intermediaries must be trusted by both sides (Odejide, 2024). Financial inclusion research adds that formal access to a channel does not mean it is used (World Bank, 2014). By analogy, a group represented through a proxy may still be effectively absent if the proxy lacks the knowledge or incentive to raise its concerns.

Representation breadth also carries an equity dimension. Aggregate quality measures can look acceptable while particular user groups bear most of the defects. Research on load forecasting shows that a model can be accurate on average while systematically disadvantaging some districts (Komi, 2023), and the same structure appears in requirements: a story set that satisfies the majority persona may systematically underserve users with disabilities, low digital literacy or non-standard workflows. A representation measure should therefore be weighted by the risk each group carries, not by headcount, and quality outcomes should be disaggregated by affected group where the data allow (Uchechi et al., 2022; Komi, 2023).

4.3 Backlog Refinement as a Quality Gate

Backlog refinement is the recurring activity in which the product owner and team add detail, estimates and order to backlog items. Scrum guidance has historically suggested that refinement consume no more than about a tenth of team capacity, and many teams operationalise it through a Definition of Ready listing conditions a story must meet before entering a sprint, such as agreed acceptance criteria, identified dependencies, an estimate and an owner for open questions. Readiness here resembles capability readiness in emergency response, where declared readiness is meaningful only if it is periodically tested against defined scenarios (Arumosoye & Obriki, 2023). The review treats refinement discipline as a distinct mechanism: the extent to which refinement applies explicit quality criteria, involves the roles needed to judge them and blocks items that fail (IEEE Computer Society, 2014; ISO/IEC/IEEE, 2018).

Several refinement techniques target specific quality attributes. The 'three amigos' practice brings a business representative, a developer and a tester together to examine a story from the perspectives of value, feasibility and verifiability. Example mapping structures that conversation around rules, concrete examples and open questions, making unresolved decisions visible as a count of question cards. Behaviour-driven development expresses acceptance criteria as Given-When-Then scenarios that can be executed as tests, which turns verifiability from a promise into an observable property. Testing research explains why this matters: an acceptance criterion is a test oracle, and a requirement that lacks an oracle cannot be verified, however clear it appears (Myers et al., 2011; Ammann & Offutt, 2016). Coverage adequacy criteria from unit testing research provide a further analogue, since a set of examples can be judged by how much of the rule space it exercises rather than by how many examples it contains (Zhu et al., 1997).

Story splitting is the other core refinement technique. Large stories violate the small and estimable criteria of INVEST and the atomic criterion of QUS, and concentrate risk because one misunderstanding affects much work. Splitting by workflow step, business rule, data type, interface or spike reduces this risk, but splitting into technical layers that no user can evaluate damages independence and value. The trade-off resembles regression test prioritisation, whose benefit depends on how well the ordering criterion correlates with fault-revealing potential (Li et al., 2007; Catal & Mishra, 2013). Splitting by business rule tends to expose semantic conflicts early; splitting by technical layer defers them to integration.

Refinement can fail in two opposite ways. Under-refinement commits stories with open questions, missing criteria or unexamined dependencies, and the rework appears within the sprint. Over-refinement specifies details long before they are needed, locks in decisions that later information would change and consumes capacity on items that may never be built. Studies of procedural standardisation in high-volume settings show that standardisation helps when it targets recurring defects but becomes an overhead when applied uniformly regardless of risk (Uchechi et al., 2018). Refinement discipline should therefore be risk proportionate, demanding full Given-When-Then coverage for a regulatory calculation but only a clear acceptance example for a cosmetic change.

Inspection research in engineering quality assurance frames refinement as a gate. Welding inspection and non-destructive testing standards treat a passed inspection as meaningful only when acceptance criteria, inspection coverage and inspector qualification are all specified (Atta et al., 2022; Atta et al., 2021). Likewise, a story marked 'ready' carries information only if its readiness criteria were explicit, applied by

the right roles and not waived under schedule pressure, so the audited rather than labelled proportion of ready stories is the more robust indicator (Sakyi et al., 2022b).

4.4 Feedback Cadence and the Latency of Validation

Feedback cadence refers to the interval between a requirement being implemented and its validation by the people who hold the need, through sprint review, usability testing, beta release or operational telemetry. Short cadences are central to agile claims about requirements quality: if a misunderstanding is revealed within two weeks rather than six months, the cost of correction is small and the learning can be applied to the next stories. The mechanism, however, depends on who gives feedback and on whether feedback changes decisions. A sprint review attended only by the product owner and internal managers provides fast feedback from a narrow and possibly unrepresentative audience, and may confirm the team's interpretation rather than test it (Dybå & Dingsøyr, 2008; Eyetsemitan et al., 2023b).

Cross-domain work on the frequency and coverage of oversight helps to separate these dimensions. A conceptual framework on management safety walkthroughs treats walkthrough frequency and coverage as distinct drivers of safety culture outcomes (Obriki & Arumosoye, 2019), and a review of near-miss and hazard observation data locates value in the utilisation of observations rather than their collection (Arumosoye & Obriki, 2019). Data-driven risk control models in energy infrastructure likewise tie monitoring data to predefined control actions (Obriki & Arumosoye, 2018). These transfer as structural hypotheses: cadence should improve requirements quality only when feedback comes from the groups holding the relevant knowledge and produces recorded backlog changes.

User acceptance testing illustrates how cadence and breadth combine. A structured acceptance framework for lean operational environments shows that acceptance testing is most useful when test scenarios are derived from real workflows and when those who perform the workflows execute them (Eyetsemitan et al., 2023b). In agile settings this suggests embedding lightweight acceptance activities in each increment rather than reserving them for release. Real-time performance tracking systems offer a further mechanism for operational feedback, since telemetry can reveal how features are actually used, but reviews of such systems caution that automated indicators must be interpreted against the decisions they are meant to inform (Tonoyan et al., 2024b). Monitoring architectures such as digital twins in engineering operations show both the potential and the burden of continuous feedback, since more signals require more interpretation capacity (Shittu et al., 2023).

Two indicators capture the cadence mechanism: validation latency, the time from story completion to the first recorded feedback from a representative of the affected group, and feedback yield, the proportion of review sessions producing at least one recorded backlog change. A short cadence with zero yield may reflect excellent upstream quality or an audience that never challenges the work, and only the coverage measure from Section 4.2 can tell these apart. Anomaly detection approaches from financial monitoring suggest that shifts in such indicators can flag process degradation before outcomes deteriorate, provided baseline variation is understood (Atakpa & Fobellah, 2023; Atakpa & Abetoh, 2022).

4.5 Just-Enough Documentation and Traceability

The Agile Manifesto values working software over comprehensive documentation, and this preference is often read as a licence to minimise written requirements. The empirical and conceptual literature on traceability suggests a more nuanced position. Requirements traceability was defined as the ability to follow the life of a requirement in both forward and backward directions, and its chief problem was identified as the difficulty of recovering the origin and rationale of requirements after the fact (Gotel &

Finkelstein, 1994). Reference models distinguish low-end users who trace only requirements to code from high-end users who trace rationale, decisions and stakeholders, and associate the latter with better management of change (Ramesh & Jarke, 2001). Information retrieval approaches can recover some links automatically, but systematic mapping of that field shows limited accuracy and weak evidence of practical use (De Lucia et al., 2007; Borg et al., 2014).

Just-enough documentation is therefore defined here as the minimal record that allows a person who was absent from a decision to understand what was decided, why and by whom, and to find the evidence on which it rested. For a user story this typically means the acceptance criteria, examples, a link to the decision or conversation that resolved each open question, and identification of the stakeholder groups consulted. Documentation sufficiency is not a property of volume; a ten-page specification can omit rationale, and a three-line decision log can preserve it. Research on reconciliation controls in financial workflows provides a useful analogue: control depends on the ability to reconcile what was intended with what was executed, which requires a record at the point of decision rather than a reconstruction afterwards (Dogbatsey et al., 2019). Forensic analytics in regulated communication settings make the same point about evidential trails (Mbonu et al., 2021).

Documentation also carries compliance obligations in regulated products. Frameworks for data protection impact assessment, data sensitivity classification and legal risk modelling show that regulators expect to see the reasoning behind design choices involving personal data (Mbonu et al., 2022a; Aliliele et al., 2024a; Mbonu et al., 2018). Agile supply chain transformation with embedded ISO compliance controls shows how controls can be integrated into iterative work rather than appended to it (Mbonu et al., 2020a), and continuous cloud misconfiguration monitoring generates compliance evidence as a by-product of routine work (Aliliele et al., 2023a). Where requirements span organisations, secure cross-organisational data management adds provenance obligations to the decision record (Sanni et al., 2023).

The failure modes of documentation mirror those of refinement. Too little documentation leaves decisions unrecoverable, and when team membership changes, shared understanding dissolves. Too much documentation, or documentation written for the wrong audience, diverts effort from conversation, becomes outdated and creates a false sense of agreement because the text is read differently by different communities. Studies of cross-functional legal education in engineering teams report that shared vocabulary and understanding of contractual terms reduced contract errors, which suggests that documentation works best when readers have been prepared to interpret it (Anichukwueze et al., 2022). Research on liability mitigation in high-value service contracts likewise shows that disputes arise less from missing clauses than from clauses that parties interpret differently (Uchechi & Ominyi, 2019). For agile teams, documentation sufficiency and shared understanding are complements, not substitutes.

4.6 Shared Understanding as the Mediating State

The preceding mechanisms converge on shared understanding as the state through which they affect requirements quality. Authority closes decisions, so that there is a single interpretation to share. Representation breadth ensures that the interpretation incorporates the knowledge of affected groups. Refinement discipline creates the occasions and criteria for testing whether understanding is shared. Feedback cadence reveals where it is not. Documentation preserves it beyond the conversation in which it was established. This mediation structure implies that shared understanding should be measured directly rather than inferred from the presence of practices, since a team could adopt every practice and still hold divergent interpretations (Hevner et al., 2004; Wieringa, 2014).

Direct measurement is feasible with methods already used in agile teams. Planning poker produces independent estimates before discussion; the dispersion of these first-round estimates, for example measured as the coefficient of variation, indicates how differently team members interpret the scope of a story. Large dispersion is not a defect in itself, since it is the signal that prompts discussion, but persistent dispersion after refinement indicates unresolved interpretation. A second method asks two or three team members to write, independently, a test for the same acceptance criterion and then compares the tests; agreement can be quantified with Krippendorff's alpha on coded outcomes. A third method, suited to research rather than routine practice, uses brief structured interviews after refinement to elicit each participant's understanding of scope, constraints and done criteria. These measures are analogous to inter-rater reliability in quality assurance settings, where disagreement between qualified assessors signals ambiguity in the standard rather than incompetence of the assessors (Asiedu & Asiedu, 2024b; Yusuf & Abdulrazaq, 2018).

4.7 Conflicting Findings and Their Adjudication

The literature contains several apparent contradictions that the framework must resolve rather than ignore. Table 2 summarises the principal conflicts, the evidence pattern on each side and the adjudication adopted.

Table 2. Conflicting findings on collaboration and requirements quality, with the adjudication adopted in the ACCORD framework

Contested claim	Pattern supporting the claim	Pattern contradicting the claim	Adjudication by condition
Conversation substitutes for documentation	Co-located teams with stable membership report rapid clarification and low rework	Distributed or high-turnover teams report lost rationale and repeated debates	Holds when membership is stable and stakeholders are co-located; fails with turnover, distribution or audit duty
More customer involvement improves requirements	Direct involvement exposes tacit needs and speeds validation	On-site customer burden, proxy distortion and dominance by vocal stakeholders	Holds when involvement spans affected groups and a mandated owner closes decisions
Story templates improve quality	Templates reduce syntactic defects such as missing role or benefit	Well-formed stories still ambiguous or conflicting	Templates act on the syntactic QUS layer only; semantic quality needs representation and authority
Definition of Ready prevents rework	Explicit readiness criteria reduce stories committed with open questions	Ready checks become box-ticking; over-specification delays learning	Holds when criteria are risk proportionate and compliance is audited on committed items
Short feedback	Frequent reviews	Reviews attended by	Holds when reviewers

Contested claim	Pattern supporting the claim	Pattern contradicting the claim	Adjudication by condition
cycles catch misunderstanding	reveal gaps within one iteration	internal proxies confirm rather than test	include affected users and feedback yields recorded backlog changes

The first conflict concerns conversation and documentation. Evidence favouring conversation comes mainly from co-located teams with stable membership, where grounding is cheap and the directory of who knows what is accurate. Evidence favouring documentation comes from distributed teams, teams with high turnover and regulated products, where the cost of grounding is higher and the need to reconstruct decisions is greater. Research on cross-border regulatory harmonisation and security cooperation between states illustrates how the absence of shared, recorded agreements undermines coordination across boundaries even among willing partners (Jones & Ominyi, 2024b; Liadi, 2024c). The adjudication is conditional: conversation substitutes for documentation only when team stability and co-location make grounding cheap and when no external party must later verify the decision (Cleland-Huang et al., 2012).

The second conflict concerns customer involvement. Positive findings emphasise that direct involvement surfaces tacit needs. Negative findings emphasise that involvement is costly for customers, that proxies distort, and that vocal stakeholders can dominate. Research on multidisciplinary collaboration in emergency departments shows that the benefit of involving multiple professions depends on role clarity and structured communication, since unstructured involvement can increase conflict and delay (Ohunyon et al., 2023). Supplier relationship research similarly reports that collaboration fosters innovation when governance defines contribution and decision rights (Ike et al., 2021). The adjudication is that involvement improves requirements when it spans the affected groups and when a mandated owner closes the decisions it raises; involvement without authority increases decision latency, and involvement without breadth increases confidence without increasing validity (Eyetsemitan et al., 2020).

The third and fourth conflicts concern templates and readiness criteria. Both show the same pattern: a structural device improves the quality attributes it directly constrains, but may be mistaken for a solution to problems it does not address. Templates improve syntactic quality; they do not prevent semantic conflict between stories written by different product owners. Readiness criteria reduce the number of stories committed with open questions; they do not ensure that the questions were answered by the right people. The fifth conflict concerns feedback cycles, and its resolution follows from Section 4.4: short cycles are valuable only when the feedback comes from representative users and changes the backlog. Across these conflicts the recurring lesson is that a practice is a vehicle for a mechanism, and evaluating the vehicle without the mechanism produces contradictory results (Tonoyan et al., 2022b; Sanni et al., 2022).

5 The ACCORD Framework and Propositions

The ACCORD framework organises the synthesis into six constructs arranged along a causal path. Authority (A) is the degree to which a mandated and trusted owner closes decisions about backlog items within a bounded time. Coverage (C) is the risk-weighted breadth of stakeholder representation in

decisions before commitment. Cadence (C) is the interval and yield of validation feedback from affected groups. Observable shared understanding (O) is the degree of convergence among team members and stakeholders in their interpretation of a backlog item, measured directly. Refinement discipline (R) is the extent to which refinement applies explicit, risk-proportionate quality criteria and blocks commitment of failing items. Documentation sufficiency (D) is the adequacy of the decision record for an absent reader. Authority, coverage, refinement and documentation act primarily before commitment; cadence acts after implementation and feeds back into the backlog; shared understanding mediates between them and requirements quality (IEEE Computer Society, 2014; Hevner et al., 2004).

5.1 Quality Outcomes, Moderators and Construct Operationalisation

Requirements quality is measured at the story level through the three QUS layers and the verifiability criterion of ISO/IEC/IEEE 29148, and at the set level through consistency and completeness. Downstream outcomes include requirements-related rework, defects escaping to acceptance testing or production that trace to a requirement rather than an implementation error, and stakeholder acceptance. Moderators include requirements volatility, team distribution and stability, regulatory exposure and product criticality. Figure 2 shows the framework structure, and Table 3 operationalises each construct with a diagnostic question, a primary indicator, a failure signal and a governance response (ISO/IEC/IEEE, 2018; Kaner et al., 1999).

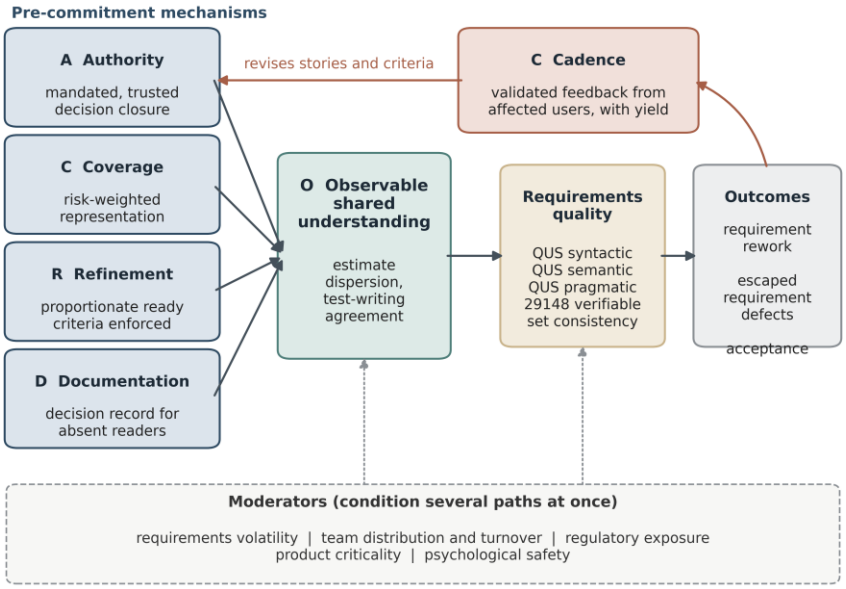

Figure 2. The ACCORD framework: pre-commitment mechanisms, the mediating role of observable shared understanding, QUS-based requirements quality, downstream outcomes and the feedback loop

Figure 2 is read from left to right. The four pre-commitment mechanisms converge on observable shared understanding, which determines requirements quality at commitment; quality in turn shapes rework, escaped defects and acceptance. Cadence closes the loop by returning validated feedback to the backlog, where it revises stories and, over time, the refinement criteria themselves. The moderators in the lower

band do not act on a single arrow; they change the strength of several relationships at once, which is why the propositions below state conditions rather than main effects (Arumosoye & Obriki, 2021).

Table 3. Operationalisation of the ACCORD constructs with indicators, failure signals and governance responses

Construct	Diagnostic question	Primary indicator	Failure signal	Governance response
Authority	Are open questions closed by a mandated, trusted owner in time?	Decision latency, median and 85th percentile, from question to recorded decision	Latency tail exceeds one sprint; decisions reopened at review	Clarify decision rights; define escalation route and time box
Coverage	Did affected groups shape the item before commitment?	Risk-weighted representation coverage index RC	RC below agreed floor for high-risk items; late NFR discovery	Invite missing groups to refinement; add specialist review step
Cadence	Does validation from affected users reach the backlog quickly?	Validation latency and feedback yield per review	Reviews with zero backlog changes over several sprints	Change review audience; add usability or acceptance sessions
Observable shared understanding	Do team members interpret the item the same way?	Post-refinement estimate dispersion; test-writing agreement	Persistent dispersion after refinement	Hold example mapping; split or rewrite story
Refinement discipline	Do committed items genuinely meet risk-proportionate readiness criteria?	Audited ready ratio on committed items; QUS defect density	Ready label without criteria met; defect density rising	Audit a sample each sprint; revise Definition of Ready
Documentation sufficiency	Can an absent reader reconstruct what was decided and why?	Share of decisions with linked rationale and consulted groups	Repeated debates on settled items; audit findings	Adopt lightweight decision log linked to stories

5.2 Propositions and Their Tests

Six propositions follow from the synthesis. Each specifies a relationship, the conditions under which it should hold and an observation that would falsify it. P1 (authority moderation): the association between interaction frequency and semantic story quality is positive when decision authority is clear and weak or absent when it is fragmented. In a moderated regression of semantic QUS defect density on interaction frequency F, authority clarity A and their product, the model $SQ = \beta0 + \beta1F + \beta2A + \beta3(F\times A) + \varepsilon$ predicts $\beta3$ below zero for defect density, that is, frequency reduces defects more strongly as authority

rises. The proposition is falsified if β3 is indistinguishable from zero across adequately powered samples, or if frequency reduces defects equally under fragmented authority (Wahl et al., 2010; Kirchler, 2007).

P2 (coverage and non-functional completeness): the risk-weighted representation coverage index at commitment is negatively associated with the rate of non-functional requirements discovered after commitment, and this association is stronger in regulated products. The test compares late-discovered security, privacy, accessibility and operability requirements per hundred stories across teams or periods with different coverage scores, controlling for product criticality. The proposition is falsified if late discovery is unrelated to coverage once criticality and volatility are controlled (Mairiza et al., 2010; Fadayomi et al., 2019). P3 (refinement discipline): the audited ready ratio, rather than the labelled ready ratio, predicts requirements-related rework in the following sprint. The test compares the predictive power of the two ratios for rework hours traced to requirement defects; the proposition is falsified if the labelled ratio predicts rework as well as the audited ratio, which would imply that labelling is accurate and auditing adds no information (Atta et al., 2022; Sakyi et al., 2022b).

P4 (mediation by shared understanding): the effects of authority, coverage and refinement discipline on requirements quality are substantially mediated by observable shared understanding. In a mediation model with collaboration condition X, shared understanding M and quality Y, the indirect effect a×b should account for a meaningful share of the total effect. The proposition is falsified if the direct effect dominates and shared understanding measures do not change with the collaboration conditions, which would suggest that the mechanisms act through another route, for example by filtering which stories enter the sprint (Hevner et al., 2004; Wieringa, 2014). P5 (feedback yield): feedback cadence reduces escaped requirement defects only when feedback yield exceeds a threshold, meaning that reviews produce recorded backlog changes. The test compares escaped defects across teams with similar review frequency but different yield. The proposition is falsified if frequency alone predicts escaped defects regardless of yield (Arumosoye & Obriki, 2019; Obriki & Arumosoye, 2019).

P6 (documentation and stability): the effect of documentation sufficiency on requirements quality increases with team turnover, distribution and regulatory exposure, and is near zero in stable co-located teams building unregulated products. The test estimates the interaction between documentation sufficiency and a composite instability index. The proposition is falsified if documentation sufficiency has the same effect in stable and unstable contexts, or if it has a negative effect in unstable contexts, which would suggest that documentation displaces conversation rather than preserving its results (Cleland-Huang et al., 2012; Ramesh & Jarke, 2001). All six propositions permit null or adverse findings, and the framework would need revision if several were falsified in the same direction, for example if collaboration mechanisms turned out to matter less than team experience across the board (Runeson & Höst, 2009).

5.3 Causal Pathway, Trade-offs and Rival Explanations

The framework makes causal claims, and causal claims in agile research face well-known obstacles. Teams are not randomly assigned to collaboration practices; mature teams adopt more practices and also produce better requirements for reasons unrelated to those practices. Four rival explanations must be tested against the ACCORD pathway. The first is team experience: experienced teams may write better stories and collaborate more effectively without the latter causing the former. The second is requirements volatility: stable domains produce fewer late changes regardless of collaboration. The third is product simplicity: simple products have fewer non-functional constraints to miss. The fourth is reverse causality:

teams that already have good requirements find refinement easy and therefore do more of it, whereas teams with poor requirements abandon refinement as unproductive (Easterbrook et al., 2008; Dybå & Dingsøyr, 2008).

The pathway also contains trade-offs that make simple maximisation inappropriate, two of which Figure 3 illustrates. Panel (a) shows the documentation trade-off: total cost, the sum of recording effort and rework from lost rationale, is minimised at an intermediate level of documentation, and the minimum shifts right as team instability rises. Panel (b) shows the authority moderation predicted by P1: under clear authority, quality rises with interaction frequency before levelling off, whereas under fragmented authority extra interaction adds little and may lower quality as unresolved debate accumulates. Both panels illustrate the propositions and are not empirical estimates; simulation studies show that such curves are sensitive to assumed cost parameters (Tonoyan et al., 2022b; Tonoyan et al., 2023), and conceptual risk models for environmental stress show how an external load can shift an entire response curve rather than a single point (Arumosoye & Obriki, 2018).

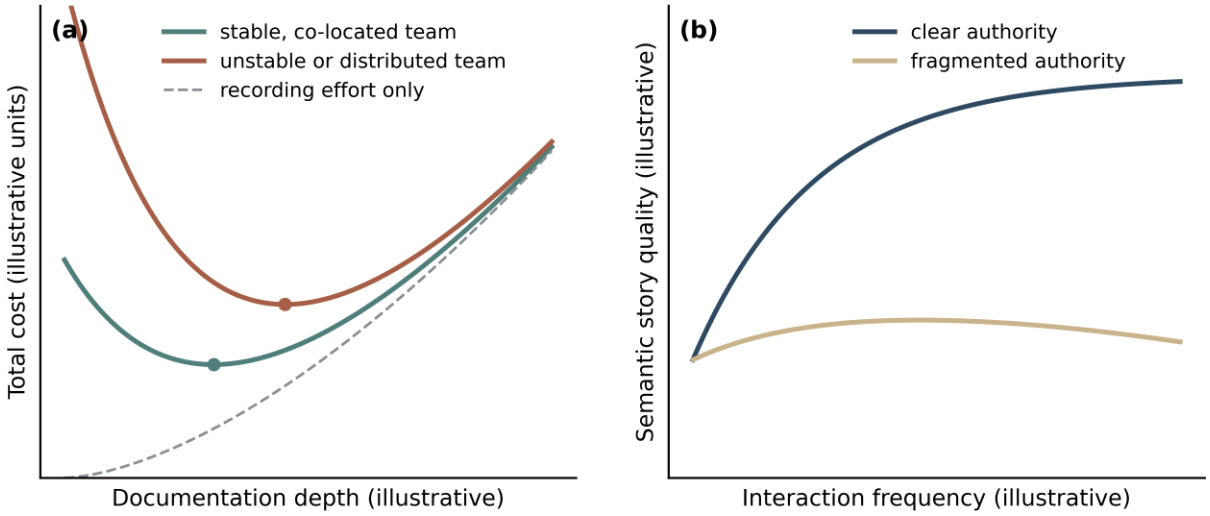

Figure 3. Illustrative trade-offs implied by ACCORD: (a) documentation depth against total cost under stable and unstable teams; (b) interaction frequency against semantic story quality under clear and fragmented authority

Figure 3 also clarifies what would count as disconfirming evidence: a monotonically decreasing documentation cost curve would undercut the just-enough principle, and parallel authority curves would falsify P1. Rival explanations can be addressed by measuring team experience, volatility and product complexity at baseline, by within-team designs with known adoption dates, and by process tracing that checks whether decision latency and estimate dispersion change before quality outcomes do (Arumosoye & Obriki, 2021; Obogo et al., 2019a).

A further rival explanation concerns psychological safety: teams whose members feel safe to voice concerns may both collaborate more openly and write better stories. Research on leadership-driven safety culture and on safety leadership in temporary project organisations indicates that leaders' behaviour shapes whether workers report hazards and challenge instructions (Obogo et al., 2019a; Arumosoye & Obriki, 2024; Obogo et al., 2023). The analogous claim is that a product owner's response to challenge

shapes whether developers raise ambiguities. ACCORD treats this as a moderator of authority, but it should be measured directly so that its independent contribution can be estimated (Obriki & Arumosoye, 2020).

6 Measurement and Validation Design

Each ACCORD construct requires an indicator with a specified unit, numerator, denominator and observation window. Story defect density operationalises requirements quality: for a set of n stories evaluated against the thirteen QUS criteria, QD = (Σ v_i) / (13n), where v_i is the number of criteria violated by story i. The measure can be decomposed by layer (syntactic, semantic, pragmatic) because the ACCORD mechanisms are expected to act on different layers. Automated tools can estimate the syntactic layer reliably, while semantic criteria such as unambiguity and conflict freedom require human judgement or carefully validated automated assistance; reviews of artificial intelligence in software testing and secure regression control describe both the promise of automation and the need for human oversight of its outputs (Borah et al., 2022; Mbonu et al., 2021b).

6.1 Formal Indicators for Coverage, Authority and Shared Understanding

The representation coverage index operationalises coverage. For a backlog item with a set G of affected stakeholder groups, each with risk weight w_g reflecting the consequences of omitting its concerns, RC = Σ w_g·I_g / Σ w_g, where I_g equals one if group g provided input recorded before commitment and zero otherwise. Weights can be derived from a lightweight impact assessment of the kind used in data protection governance (Mbonu et al., 2022a; Aliliele et al., 2024a), or from transparent risk scoring of the kind used for transaction screening, provided the scoring rule is documented (Adesuyi et al., 2024). The index is item-specific: a cosmetic change may reach RC of one with only the product owner and a designer, while a consent change requires information governance and patient representatives. Coverage indicators are only as valid as the enumeration of what should be covered, so the group list must be reviewed periodically (Dagodzo & Ahiaeke Patrick, 2020).

Decision latency operationalises authority. For each clarification question q raised about a backlog item, L_q = t_decision minus t_raised, measured in working hours. Because latency distributions are heavily right-skewed, the median understates the problem; the 85th or 90th percentile better captures the tail of questions that remain open long enough to cause rework. Teams should also record the reopening rate, the proportion of decisions that are reversed or reopened within a set window, since fast closure followed by reopening indicates authority without legitimacy. Real-time KPI tracking systems can compute these measures from issue tracker events, but reviews of such systems stress that metric definitions must be stable and documented if trends are to be interpretable (Tonoyan et al., 2024b; Adesuyi et al., 2023).

Observable shared understanding is operationalised through first-round estimate dispersion and test-writing agreement. For a story with k independent estimates e_1 to e_k, dispersion is CV = s/ē, the standard deviation divided by the mean. The indicator of interest is post-refinement dispersion, which should be low for well-understood stories. Test-writing agreement can be quantified by coding each independently written acceptance test for the scenarios it covers and computing Krippendorff's alpha across writers. Validation latency and feedback yield operationalise cadence, and the share of decisions with linked rationale and identified consulted groups operationalises documentation sufficiency. Requirements-related rework, the downstream outcome, is RR = rework effort traced to requirement

defects divided by total delivery effort in the same window, which requires a classification rule for distinguishing requirement defects from implementation defects (Daka & Fraser, 2014; Ammann & Offutt, 2016).

Classification rules determine what the outcome measures. A defect is a requirement defect if the implemented behaviour matches the story as written but not the stakeholder need, or if the story was ambiguous enough that the implemented interpretation was reasonable; it is an implementation defect if the behaviour contradicts an unambiguous acceptance criterion. Detection work in other quality-assurance domains separates sensitive screening from specific confirmation (Tawose et al., 2023), and the same two-stage logic applies here: automated classification flags candidates, two raters confirm borderline cases, and uncertainty in the counts is reported (Wedraogo & Sanni, 2024; Komi & Adamolekun, 2021).

6.2 Study Design, Threats to Validity and Decision Control

The preferred validation design is a multi-team longitudinal study with staggered adoption of collaboration changes. Teams would be observed for a baseline period of at least four sprints to estimate normal variation in the indicators, after which specific changes, such as adding representatives of missing stakeholder groups to refinement, introducing a decision time box with escalation, or auditing the Definition of Ready, would be introduced at different times in different teams. A stepped design of this kind allows each team to serve as its own control while also providing between-team comparison, and interrupted time series analysis can estimate level and slope changes in the indicators. Where multiple organisations are involved, difference-in-differences estimation with pre-trend checks can strengthen inference (Runeson & Höst, 2009; Onwuzulike et al., 2024).

Qualitative process tracing should accompany the quantitative analysis. For a sample of stories in each period, researchers would reconstruct the decision history from issue tracker records, meeting notes and brief interviews, checking whether the proposed mechanism operated: whether the added stakeholders actually changed or confirmed requirements, whether escalation actually closed decisions, whether audited readiness actually blocked committing incomplete stories. Evidence from capability interventions in other fields shows that effects are often modest and heterogeneous, and that null results frequently reflect weak implementation rather than theory failure (Miller et al., 2015). Process tracing distinguishes these possibilities. Evaluations of health system performance using real-world evidence make the same point about the need to link interventions to intermediate processes before crediting outcome changes (Ilodigwe & Adesemoye, 2024a; Ilodigwe & Adesemoye, 2024b).

Table 4 identifies the principal threats to validity in such a study and the mitigation for each, specific to collaboration and requirements quality research.

Table 4. Threats to validity in a longitudinal study of ACCORD mechanisms and their mitigation

Validity type	Specific threat in agile requirements research	Mitigation
Construct	Story defect density scored by one rater or an unvalidated automated tool captures form rather than meaning	Two raters on semantic criteria with agreement statistics; automated scores used for syntactic layer only

Validity type	**Specific threat in agile requirements research**	**Mitigation**
Construct	Representation recorded as attendance rather than recorded input	Count a group only when its input is linked to the item before commitment
Internal	Mature teams adopt more practices and write better stories (selection)	Within-team staggered adoption; baseline trends; experience measured at entry
Internal	Volatility shocks (reorganisation, regulation change) coincide with adoption	Log external events; exclude or model affected sprints; sensitivity analysis
Internal	Hawthorne effect: teams improve because they are observed	Extended baseline; indicators drawn from routine tool data where possible
External	Findings from co-located product teams transferred to distributed or regulated programmes	Report distribution, regulation, team size and product criticality; test moderators
Conclusion	Few teams and autocorrelated sprint data inflate apparent effects	Multilevel models with sprint nested in team; report intervals and null results
Ethical	Collaboration metrics used to rank individuals or product owners	Aggregate at team level; agree use with teams; prohibit individual performance use

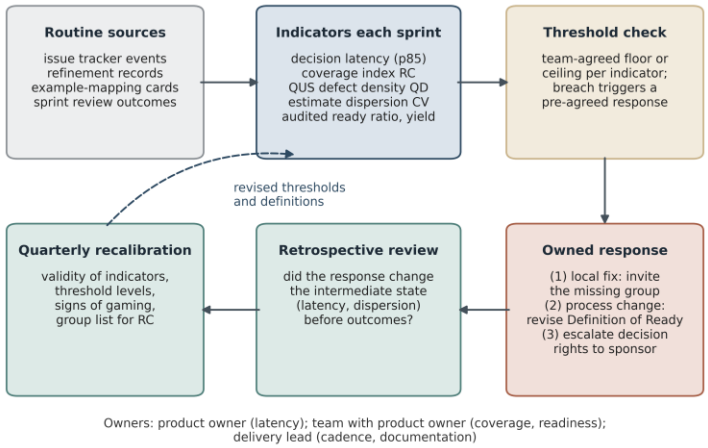

Figure 4. ACCORD decision-control loop: indicator sources, thresholds, owned responses, retrospective review and quarterly recalibration

Two threats in Table 4 deserve comment. Automated story scoring is reliable for form but not meaning, so the semantic layer, where ACCORD makes its strongest predictions, requires human scoring. The ethical threat reflects governance experience in which learning indicators were repurposed for individual

evaluation and then gamed (Sakyi et al., 2022b; Adesuyi et al., 2023): a product owner judged on decision latency may close decisions prematurely (Anioke & Atima, 2023a).

For practical use, the indicators must be tied to decisions. Figure 4 shows the decision-control loop that ACCORD proposes. Routine data from issue trackers, refinement records and review outcomes feed the indicators each sprint. Each indicator is compared with a team-agreed threshold, and a breach triggers a specific, pre-agreed response owned by a named role. Responses are reviewed at the next retrospective, and thresholds and responses are recalibrated each quarter using the accumulated evidence. The loop is modelled on performance governance frameworks in which a threshold without an owner and an action is reporting rather than control (Edivri & Oteri, 2024; Eze et al., 2022b).

Figure 4 highlights three features. Every indicator has a named owner; responses are graduated from a local fix, such as inviting a missing group to the next refinement, through a process change, such as revising the Definition of Ready, to escalation of decision rights; and quarterly recalibration checks whether indicators remain valid or are being gamed. Risk-based regulatory decision models balance speed against evidence quality in the same way (Eze et al., 2024b; Okonkwo et al., 2021).

7 Discussion

Section 7 considers what the synthesis changes for theory, what it asks of practitioners and where its claims are most exposed to challenge. Because the ACCORD propositions are untested, the implications are stated as conditional expectations rather than recommendations backed by effect estimates. They are nevertheless specific enough to guide both research design and the incremental adoption of indicators by teams that want to test the framework in their own setting, which is the route by which design-oriented theories in information systems typically mature from a proposed artefact, through evaluation in context, to a validated contribution with known boundaries (Hevner et al., 2004; Wieringa, 2014).

7.1 Theoretical Implications

The synthesis has three implications for theory in agile requirements engineering. First, it relocates the explanatory weight from practices to mechanisms. Practices such as refinement meetings, story templates and sprint reviews are vehicles whose effect depends on whether they activate authority, coverage, cadence, shared understanding, refinement discipline and documentation sufficiency. Theories that link practices directly to outcomes will continue to produce inconsistent findings because the same practice activates different mechanisms in different contexts. A mechanism-based theory predicts these inconsistencies and specifies the contextual variables, such as team stability and regulatory exposure, that account for them (Hevner et al., 2004; Wieringa, 2014).

Second, the framework integrates artefact-level and process-level views of requirements quality. The QUS layers provide a fine-grained dependent variable, and the ACCORD mechanisms provide process-level explanations of why particular layers fail. This integration allows more precise hypotheses: templates and tooling should affect syntactic quality, representation and authority should affect semantic quality, and the presence of builders and testers in refinement should affect pragmatic quality. Traceability theory contributes the insight that quality includes the recoverability of rationale over time, which extends the dependent variable beyond the artefact at a single moment (Ramesh & Jarke, 2001; Gotel & Finkelstein, 1994).

Third, the framework imports the distinction between power and legitimacy from research on cooperation with authorities into the analysis of the product owner role. This distinction explains why product owners with formal authority sometimes fail to produce convergent requirements and why trusted but unempowered owners produce endless discussion. It generates the testable prediction in P1 and suggests that the empirical study of product ownership should measure both mandate and trust. The broader theoretical point is that agile requirements work is a coordination problem among parties with partially divergent interests and partial knowledge, and theories of cooperation, communication and organisational learning are needed alongside software engineering theory to explain it (Kirchler, 2007; Alm, 2019; Arumosoye & Obriki, 2021).

7.2 Practical Implications

For product owners and delivery leads, the first implication is to measure decision latency and to treat its tail as a risk signal. A backlog in which a tenth of clarification questions remain open for more than a sprint indicates an authority problem that more refinement meetings will not solve. The response is to clarify decision rights, including which decisions the product owner can make alone, which require specialist input and which must be escalated, and to agree time boxes for each. Governance frameworks for public-private partnerships and multi-stakeholder joint ventures show that pre-agreed escalation routes reduce the time decisions spend unresolved (Aminu-Ibrahim et al., 2024; Eyetsemitan et al., 2020).

The second implication concerns representation. Teams should keep, for each product area, a risk-weighted list of stakeholder groups and a record of when each last shaped a decision, and should not commit high-risk items without input from the groups that carry the risk. Security, privacy, compliance and operations representatives belong in refinement for items touching their concerns, consistent with privacy by design and with evidence that readiness for regulation such as the EU Artificial Intelligence Act depends on embedding compliance roles in delivery (Ominyi et al., 2024b; Badmus et al., 2024; Nwakamma et al., 2024b). Language-model tools that generate stories at scale raise the stakes, since they can multiply semantic defects without human review (Nwakamma et al., 2024a).

The third implication concerns refinement and documentation. Teams should audit a sample of committed stories each sprint against their Definition of Ready, and should design readiness criteria in proportion to risk. Decision logs linked to stories, recording the question, the decision, the decider and the groups consulted, provide just-enough documentation at low cost. Tooling can help, but reviews of cybersecurity assurance, cloud monitoring and enterprise threat trends caution that tools deliver value only when their outputs are embedded in routines with clear ownership (Fadayomi et al., 2019; Okoruwa et al., 2024; Aliliele et al., 2023a). Finally, organisations should resist using ACCORD indicators to rank teams or individuals. The indicators are designed for learning and control within teams; used for evaluation, they will be gamed and lose their diagnostic value (Sakyi et al., 2022b; Falemi et al., 2024).

A brief worked example shows how the pieces fit. Returning to the outpatient scheduling scenario, suppose the team measures a 90th percentile decision latency of twelve working days, an RC of 0.4 for stories touching consent and a post-refinement estimate CV of 0.6 for the same stories. ACCORD diagnoses an authority problem compounded by missing coverage: the proxy product owner cannot decide consent questions, and information governance and patient representatives are absent. The responses are to agree that information governance holds decision rights on consent rules with a three-day time box, to invite a patient liaison representative to refinement for consent-related stories, and to run example mapping on those stories before commitment. Success would appear first as reduced latency and

dispersion and only later as reduced rework, the ordering that process tracing should confirm (Ogbete et al., 2023; Ogbete et al., 2018).

7.3 Counter-Arguments and Boundary Conditions

Critics of a framework like this raise several objections. The first holds that ACCORD reintroduces the procedural overhead agile methods were designed to remove. The framework, however, measures mechanisms rather than prescribing documents, most of its indicators can be computed from issue tracker data teams already produce, and its refinement construct explicitly penalises over-specification. Small, low-risk products built by stable co-located teams may satisfy most indicators without effort, in which case the framework predicts little benefit from formal measurement (Uchechi et al., 2018; Tonoyan et al., 2022b). Where the framework is adopted, change management research on small business digital transformation favours lean, incremental adoption over wholesale procedural change, which suggests introducing the ACCORD indicators one construct at a time and retaining only those that inform decisions (Eyetsemitan et al., 2023a).

The second counter-argument holds that requirements quality in agile projects is less important than rapid learning from working software: if a story is wrong, the next sprint will fix it. This argument is persuasive where the cost of a wrong increment is low and reversible, as in many consumer web products with feature flags and rapid deployment. It is less persuasive where increments affect safety, finance, health, privacy or legal obligations, where data migrations are irreversible, or where many teams build on the same interpretation. Design standards for scalable health service networks and reliability engineering both emphasise that some decisions are costly to reverse and must be right before deployment (Ogbete et al., 2022; Gideon et al., 2019). ACCORD therefore applies with greatest force to products with high reversal costs.

The third counter-argument concerns scaled agile settings, where requirements decisions are distributed across product management, architecture and team levels. ACCORD can be applied at each level, but authority must be defined where the decision is actually made, and cross-team dependencies must count as a stakeholder group. Governance models for multi-contractor projects show accountability fragmenting across contractual boundaries and the need for a single risk governance layer above them (Obogo et al., 2019b; Arumosoye & Obriki, 2020; Aminu-Ibrahim et al., 2019), which predicts longer latency tails in scaled programmes. Work on optimising project governance in multinational infrastructure programmes similarly treats the alignment of decision rights between global and local levels as a governance task in its own right (Amayo et al., 2023a). Systematic hazard identification practice further suggests that cross-boundary risks are missed unless someone is assigned to look for them (Obogo et al., 2019). Distributed, cross-cultural teams also raise the value of documentation sufficiency, consistent with P6 (Lilian et al., 2020; Jones & Ominyi, 2021).

8 Limitations and Future Research Agenda

The review has limitations that bound its conclusions. It is integrative rather than statistical, so it cannot estimate effect sizes and its propositions remain untested. Its synthesis depends on the published literature, which likely over-represents successful agile adoptions, co-located teams and software product firms relative to public-sector, regulated and distributed settings. Terminology varies widely: refinement, grooming and backlog preparation are used interchangeably, and shared understanding is defined

inconsistently, which introduces uncertainty into both search and extraction. Cross-domain sources were used only for mechanism analogy, but even analogies can mislead where institutional conditions differ, for instance between a construction site safety walkthrough and a sprint review. These limitations are typical of integrative reviews in software engineering and are addressed by treating the output as a framework for testing rather than a statement of established effects (Kitchenham et al., 2009; Page et al., 2021).

Four lines of future research follow. First, the propositions should be tested in the multi-team longitudinal design described in Section 6, beginning with P1 and P3, which require only issue tracker data and story quality scoring. Second, measures of observable shared understanding should be validated against each other and against downstream outcomes, since estimate dispersion, test-writing agreement and interview-based measures may capture different aspects of convergence. Third, the representation coverage index needs a validated method for enumerating stakeholder groups and assigning risk weights, ideally with evidence on inter-rater reliability. Fourth, the growing use of language-model tools to draft and critique user stories calls for studies that measure whether these tools improve semantic quality or merely polish syntax, and whether they change who participates in refinement (Nwakamma et al., 2024a; Borah et al., 2022; Shittu et al., 2022).

Further questions concern context and equity. Studies should compare ACCORD mechanisms across regulated and unregulated products, co-located and distributed teams, and single-team and scaled programmes, to establish which propositions generalise and which are context-bound. Research should also examine whether gains in aggregate requirements quality are shared across user groups or concentrated among majority personas, using disaggregated outcome measures of the kind advocated in fairness research on forecasting (Komi, 2023). Finally, the relationship between product owner capability, training and authority deserves direct study, since professional development and skill transfer research suggest that capability can be developed but that its effects emerge slowly and depend on organisational support (Joseph & Nwankwo, 2024; Anyanwu, 2022; Jones & Ominyi, 2021).

9 Conclusion

Stakeholder collaboration improves requirements quality in agile projects through identifiable mechanisms, not through the volume of interaction. Six mechanisms carry the effect: a mandated and trusted product owner who closes decisions promptly, risk-weighted coverage of the groups affected by each requirement, refinement that applies proportionate quality criteria and blocks incomplete items, feedback from representative users that changes the backlog, a decision record sufficient for those who were absent, and the observable shared understanding that these conditions jointly produce. The ACCORD framework brings these mechanisms together, connects them to the syntactic, semantic and pragmatic layers of user story quality, and states six propositions that field studies can confirm or refute. Its central message for practice is that decision latency, representation gaps and story defect density are better guides to requirements quality than ceremony counts, and that each indicator earns its place only when a named owner acts on it. Its central message for research is that agile requirements practices should be evaluated through the mechanisms they are meant to activate, with intermediate states measured before outcomes are credited.

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References

1. Adebayo, A., Adegbite, M. P., & Ahmed, M. O. (2023). AI augmented threat detection in industrial control systems: A systematic review of machine learning approaches for ICS anomaly detection. International Journal of Engineering and Modern Technology, 9(3), 287-340. https://doi.org/10.56201/ijcsmt.v9.no3.2023.pg287.340
2. Adegbite, M. P., Adebayo, A., & Ahmed, M. O. (2022). A security architecture model for IT and OT convergence in regulated energy networks: Design principles and governance alignment. International Journal of Computer Science and Mathematical Theory, 8(2), 81-132. https://doi.org/10.56201/ijcsmt.v8.no2.2022.pg81.132
3. Adegbite, M. P., Adebayo, A., & Ahmed, M. O. (2020). Securing operational technology networks in electric utilities: A systematic review of NERC CIP compliance and architectural threat mitigation. International Journal of Engineering and Modern Technology, 6(3), 103-146. https://doi.org/10.56201/ijemt.vol.6.no3.2020.pg103.146
4. Adesuyi, M. O., Akomolafe, O., Olaogun, B. O., Ndukwe, V. U., & Sakyi, J. K. (2024). AI-driven risk scoring model for global cross-border trade payment transactions. International Journal of Advanced Multidisciplinary Research and Studies, 4(1), 1569-1581. https://doi.org/10.62225/2583049X.2024.4.1.5281
5. Adesuyi, M. O., Kalu, A., & Walawalkar, G. (2023). Data-led cost governance in technology-intensive enterprises. International Journal of Scientific Research in Computer Science, Engineering and Information Technology, 9(3), 877-896. https://doi.org/10.32628/IJSRCSEIT
6. Ahmed, M. O., Adegbite, M. P., & Adebayo, A. (2021). Zero trust architecture for operational technology in North American critical infrastructure: A framework for implementation and resilience optimization. International Journal of Engineering and Modern Technology, 7(1), 66-113. https://doi.org/10.56201/ijemt.vol.7.no1.2021.pg66.113
7. Akhigbe, R., Falemi, A., & Akin-Oluyomi, O. T. (2024). An advanced framework for technology adoption that supports employee readiness in modern organizations. International Journal of Advanced Multidisciplinary Research and Studies, 4(1), 1637-1659. https://doi.org/10.62225/2583049X.2024.4.1.5344
8. Akin-Oluyomi, O. T., & Akhigbe, R. (2023b). A conceptual supply chain leadership model for aligning logistics decisions with enterprise strategy. International Journal of Advanced Multidisciplinary Research and Studies, 3(1), 1725-1744. https://doi.org/10.62225/2583049X.2023.3.1.5340

9. Alieme, J. I., Sule, A., & Obukadata, V. O. (2024). From ambiguity to AI-ready requirements: A business analysis framework for structuring business problems for intelligent process automation. International Journal of Multidisciplinary Research and Growth Evaluation, 5(6), 2088-2117. https://doi.org/10.54660/.IJMRGE.2024.5.6.2088-2117
10. Aliliele, C., Mbonu, I. S., & Iwuanyanwu, U. (2023a). A conceptual framework for continuous cloud misconfiguration monitoring and enterprise risk mitigation strategies. International Journal of Scientific Research in Computer Science, Engineering and Information Technology, 9(10), 373-394. https://doi.org/10.32628/CSEIT2361071
11. Aliliele, C., Mbonu, I. S., & Iwuanyanwu, U. (2024a). A conceptual framework for enterprise data sensitivity classification and regulatory traceability mechanisms. International Journal of Advanced Multidisciplinary Research and Studies, 4(6), 3103-3124. https://doi.org/10.62225/2583049X.2024.4.6.5991
12. Alm, J. (2019). What motivates tax compliance? Journal of Economic Surveys, 33(2), 353-388. https://doi.org/10.1111/joes.12272
13. Amayo, E. B., Owulade, O. A., & Isi, L. R. (2023a). Optimizing project governance in multinational infrastructure projects: Insights from General Electric's global operations. International Journal of Multidisciplinary Research and Growth Evaluation, 4(1), 975-983. https://doi.org/10.54660/.IJMRGE.2023.4.1.975-983
14. Amayo, E. B., Owulade, O. A., & Isi, L. R. (2023c). The role of diversity and inclusion in enhancing project team performance and delivery in multinational environments. Journal of Frontiers in Multidisciplinary Research, 4(1), 48-58. https://doi.org/10.54660/.IJFMR.2023.4.1.48-58
15. Aminu-Ibrahim, A. Y., Ogbete, J. C., & Ambali, K. B. (2019). Capital project delivery models for high risk healthcare infrastructure in developing national health systems. Iconic Research and Engineering Journals, 2(10), 626-649. https://doi.org/10.64388/IREV2I10-1713588
16. Aminu-Ibrahim, A. Y., Ogbete, J. C., & Ambali, K. B. (2024). Governance and accountability models for public private partnerships in healthcare infrastructure development. International Journal of Advanced Multidisciplinary Research and Studies, 4(6), 2943-2960. https://doi.org/10.62225/2583049X.2024.4.6.5699
17. Ammann, P., & Offutt, J. (2016). Introduction to Software Testing (2nd ed.). Cambridge University Press.
18. Anichukwueze, C. C., Ominyi, M., Uzougbo, N. S., & Jones, B. C. (2022). Cross-functional legal education as risk mitigation: Empirical analysis of contract error reduction in engineering teams. International Journal of Engineering and Modern Technology, 8(5), 142-180. https://doi.org/10.56201/ijemt.v8.no5.2022.pg142.180
19. Anioke, S. C., & Atima, M. E. (2023a). Public health governance models using process optimization and performance metrics for regulatory oversight. International Journal of Advanced Multidisciplinary Research and Studies, 3(6), 2534-2548. https://doi.org/10.62225/2583049X.2023.3.6.5491
20. Anyanwu, K. C. E. (2022). Bridging enterprise IT operations and digital entrepreneurship: A systematic review of skill transfer mechanisms and pathways. World Journal of Entrepreneurial Development Studies, 7(1), 114-134. https://doi.org/10.56201/wjeds.v7.no1.2022.pg114.134

21. Arumosoye, O. M., & Obriki, O. D. (2020). A governance-oriented conceptual model for contractor safety performance in multi-contract industrial projects. International Journal of Multidisciplinary Research and Growth Evaluation, 1(5), 728-740. https://doi.org/10.54660/.IJMRGE.2020.1.5.728-740
22. Arumosoye, O. M., & Obriki, O. D. (2023). Conceptual model for emergency response readiness and capability in energy and process facilities. International Journal of Scientific Research in Computer Science, Engineering and Information Technology, 9(3), 897-917. https://doi.org/10.32628/CSEIT25112791
23. Arumosoye, O. M., & Obriki, O. D. (2024). Conceptual model of safety leadership influence in large temporary project organizations. International Journal of Advanced Multidisciplinary Research and Studies, 4(6), 3034-3047. https://doi.org/10.62225/2583049X.2024.4.6.5895
24. Arumosoye, O. M., & Obriki, O. D. (2022). Conceptual risk pathway model for lifting and rigging operations in heavy industrial construction. Gyanshauryam, International Scientific Refereed Research Journal, 5(5), 346-369. https://doi.org/10.32628/GISRRJ2256237
25. Arumosoye, O. M., & Obriki, O. D. (2018). Development of an integrated heat stress risk conceptual model for industrial operations in extreme environments. Iconic Research and Engineering Journals, 1(12), 141-160. https://doi.org/10.64388/IREV1I12-1714415
26. Arumosoye, O. M., & Obriki, O. D. (2021). Organizational learning-based conceptual maturity model for continuous safety performance improvement. International Journal of Multidisciplinary Research and Growth Evaluation, 2(1), 970-980. https://doi.org/10.54660/.IJMRGE.2021.2.1.970-980
27. Arumosoye, O. M., & Obriki, O. D. (2019). Systematic review of near-miss and hazard observation data utilization in industrial safety management. Iconic Research and Engineering Journals, 3(2), 981-999. https://doi.org/10.64388/IREV3I2-1714417
28. Asiedu, C. S., & Asiedu, A. A. (2024b). Reconceptualizing quality assurance in pharmaceutical manufacturing as a determinant of supply reliability. International Journal of Health and Pharmaceutical Research, 9(5), 148-173. https://doi.org/10.56201/ijhpr.v9.no5.2024.pg148.173
29. Atakpa, M. I., & Abetoh, N. F. (2022). A systematic review of machine learning advances in financial fraud detection for banking systems. International Journal of Scientific Research in Computer Science, Engineering and Information Technology, 8(2), 771-801. https://doi.org/10.32628/CSEIT23906220
30. Atakpa, M. I., & Fobellah, A. N. (2023). Anomaly detection in financial time-series data: A conceptual model for healthcare and banking applications. International Journal of Scientific Research in Computer Science, Engineering and Information Technology, 9(2), 967-997. https://doi.org/10.32628/CSEIT2342441
31. Atta, S., Adjaklo, E., Asomani, E., & Adenuga, O. M. (2022). Advances in welding inspection standards and quality assurance practices in large-scale power generation projects. International Journal of Engineering and Modern Technology, 8(5), 101-124. https://doi.org/10.56201/ijemt.v8.no5.2022.pg101.124
32. Atta, S., Tofah, P., & Adenuga, O. M. (2021). Advances in non-destructive testing methods for weld integrity evaluation in high-capacity power infrastructure. International Journal of Engineering and Modern Technology, 7(1), 20-47. https://doi.org/10.56201/ijemt.vol.7.no1.2021.pg20.47

33. Badmus, O., Jooda, D., & Anunagba, C. O. (2024). A privacy-by-design framework for role-based security architecture in Salesforce environments handling sensitive personal data. International Journal of Advanced Multidisciplinary Research and Studies, 4(6), 3244-3254. https://doi.org/10.62225/2583049X.2024.4.6.6243
34. Borah, S., Aliliele, K. C., Rakshit, S., & Vajjhala, N. R. (2022). Applications of artificial intelligence in software testing. In P. K. Mallick et al. (Eds.), Cognitive informatics and soft computing (Lecture Notes in Networks and Systems, Vol. 375, pp. 727-736). Springer. https://doi.org/10.1007/978-981-16-8763-1_60
35. Borg, M., Runeson, P., & Ardö, A. (2014). Recovering from a decade: A systematic mapping of information retrieval approaches to software traceability. Empirical Software Engineering, 19, 1565-1616. https://doi.org/10.1007/s10664-013-9255-y
36. Catal, C., & Mishra, D. (2013). Test case prioritization: A systematic mapping study. Software Quality Journal, 21, 445-478. https://doi.org/10.1007/s11219-012-9181-z
37. Cleland-Huang, J., Gotel, O., & Zisman, A. (Eds.). (2012). Software and Systems Traceability. Springer. https://doi.org/10.1007/978-1-4471-2239-5
38. Dagodzo, D., & Ahiaeke Patrick, M. C. (2020). UAV-based pipeline and corridor monitoring: A review of current practices and emerging technologies. Iconic Research and Engineering Journals, 3(10), 574-597. https://doi.org/10.64388/IREV3I10-1716084
39. Daka, E., & Fraser, G. (2014). A survey on unit testing practices and problems. IEEE International Symposium on Software Reliability Engineering Workshops, 201-211. https://doi.org/10.1109/ISSREW.2014.11
40. De Lucia, A., Fasano, F., Oliveto, R., & Tortora, G. (2007). Recovering traceability links in software artifact management systems using information retrieval methods. ACM Transactions on Software Engineering and Methodology, 16(4), Article 13. https://doi.org/10.1145/1276933.1276934
41. Dogbatsey, E. A., Ebhojie, O., & Oyeleye, A. O. (2019). Reconciliation control and financial workflow redesign in emerging market organizations: A conceptual framework. Zenodo. https://doi.org/10.5281/zenodo.20447103 \[Originally numbered 3(5); journal name not captured in source.\]
42. Dosunmu, A. A., & Ogundele, P. O. (2020). Intrusion detection and prevention models for enhancing organizational cyber defense effectiveness. Iconic Research and Engineering Journals, 4(6), 310-324. https://doi.org/10.64388/IREV4I6-1713226
43. Dybå, T., & Dingsøyr, T. (2008). Empirical studies of agile software development: A systematic review. Information and Software Technology, 50(9-10), 833-859. https://doi.org/10.1016/j.infsof.2008.01.006
44. Easterbrook, S., Singer, J., Storey, M., & Damian, D. (2008). Selecting empirical methods for software engineering research. In Guide to Advanced Empirical Software Engineering (pp. 285-311). Springer.
45. Edivri, J., & Oteri, O. (2024). A conceptual KPI-driven decision and optimization framework for IT service delivery, portfolio performance, and adoption. Gyanshauryam, International Scientific Refereed Research Journal, 7(1), 167-187. https://doi.org/10.32628/GISRRJ246643
46. Eyetsemitan, R. A., Ambali, K. B., Oyeleye, A. O., & Fadayomi, O. (2023a). Change management in small business digital transformation: A systematic review and lean change adoption framework.

Gyanshauryam, International Scientific Refereed Research Journal, 6(6), 521-550. https://doi.org/10.32628/GISRRJ236648

47. Eyetsemitan, R. A., Ambali, K. B., Oyeleye, A. O., & Fadayomi, O. (2023b). User acceptance testing in small business technology deployment: A structured validation framework for lean operational environments. International Journal of Multidisciplinary Research and Growth Evaluation, 4(6), 1512-1531. https://doi.org/10.54660/IJMRGE.2023.4.6.1512-1531
48. Eyetsemitan, R. A., Ambali, K. B., Oyeleye, A. O., & Fadayomi, O. (2020). Multi-stakeholder governance alignment in joint venture operations: A conceptual framework for coordinating business processes in highly regulated environments. Iconic Research and Engineering Journals, 4(4), 418-441. https://doi.org/10.64388/IREV4I4-1716955
49. Eze, F. I., Akinleye, O. K., & Anene, U. N. (2024b). Development of a risk-based accelerated approval decision model balancing speed, safety, and evidence quality in pharmaceutical regulatory science. Research Journal of Pure Science and Technology, 7(6), 120-161. https://doi.org/10.56201/rjpst.v7.no6.2024.pg120.161
50. Eze, F. I., Anene, U. N., & Akinleye, O. K. (2022b). Design of an integrated regulatory readiness maturity model for pharmaceutical companies seeking global market entry. International Journal of Health and Pharmaceutical Research, 7(1), 77-112. https://doi.org/10.56201/ijhpr.v7.no1.2022.pg77.112
51. Fadayomi, O., Abolaji, T. O., Edivri, J., Ogbole, J. I., Okoruwa, P. O., & Akeju, B. (2019). Risk-based cybersecurity assurance and data availability: Limitations, advances and future research opportunities. Iconic Research and Engineering Journals, 2(12), 602-617. https://doi.org/10.64388/IREV2I12-1713779
52. Fadayomi, O., Abolaji, T. O., Edivri, J., Ogbole, J. I., Okoruwa, P. O., & Akeju, B. (2019). Risk-based cybersecurity assurance and data availability limitations, advances and future research opportunities. Iconic Research and Engineering Journals, 2(12), 602–617. https://doi.org/10.64388/IREV2I12-1713779
53. Fadayomi, O., Abolaji, T. O., Edivri, J., Ogbole, J. I., Okoruwa, P. O., & Akeju, B. (2019). Risk-based cybersecurity assurance and data availability: Limitations, advances and future research opportunities. IRE Journals, 2(12). https://doi.org/10.64388/IREV2I12-1713779
54. Falemi, A., Akhigbe, R., & Akin-Oluyomi, O. T. (2024). A conceptual enterprise risk management model that integrates HR strategy with operational analytics. International Journal of Multidisciplinary Research and Growth Evaluation, 5(6), 1730-1753. https://doi.org/10.54660/.ijmrge.2024.5.6.1730-1753
55. Gideon, E. N., Adaramola, T. S., & Fadero, S. (2019). Reliability engineering and failure analysis in complex engineering systems. Iconic Research and Engineering Journals, 2(11), 703-727. https://doi.org/10.64388/IREV2I11-1722490
56. Gotel, O. C. Z., & Finkelstein, A. C. W. (1994). An analysis of the requirements traceability problem. IEEE International Conference on Requirements Engineering, 94-101. https://doi.org/10.1109/ICRE.1994.292398
57. Hevner, A. R., March, S. T., Park, J., & Ram, S. (2004). Design science in information systems research. MIS Quarterly, 28(1), 75-105. https://doi.org/10.2307/25148625

58. IEEE Computer Society. (2014). Guide to the Software Engineering Body of Knowledge Version 3.0. IEEE.
59. Ike, P. N., Ogbuefi, E., Nnabueze, S. B., Olatunde-Thorpe, J., Aifuwa, S. E., Oshoba, T. O., & Akokodaripon, D. (2021). Supplier relationship management strategies fostering innovation, collaboration, and resilience in global supply chain ecosystems. International Journal of Multidisciplinary Evolutionary Research, 2(2), 52-62. https://doi.org/10.54660/IJMER.2021.2.2.52-62
60. Ilodigwe, L., & Adesemoye, A. C. (2024a). Advances in real-world evidence, predictive analytics, and data-driven decision making for improving health system performance and patient outcomes. International Journal of Health and Pharmaceutical Research, 9(5), 174-197. https://doi.org/10.56201/ijhpr.v9.no5.2024.pg174.197
61. Ilodigwe, L., & Adesemoye, A. C. (2024b). Beyond technology: A strategic framework for building sustainable and resilient health systems through organizational strategy, operational excellence, and workforce capability. International Journal of Medical Evaluation and Physical Report, 8(6), 299-319. https://doi.org/10.56201/ijmepr.v8.no6.2024.pg299.319
62. ISO/IEC/IEEE. (2018). ISO/IEC/IEEE 29119-2 Software and systems engineering: Software testing processes. International Organization for Standardization.
63. ISO/IEC/IEEE. (2018). ISO/IEC/IEEE 29148 Systems and software engineering: Life cycle processes and requirements engineering. International Organization for Standardization.
64. Jimoh, H. O., & Ahmed, M. O. (2024). Analyzing Network Time Protocol (NTP) based amplification DDoS attack and its mitigation techniques. Journal of Digital Innovations and Contemporary Research in Science, Engineering and Technology, 12(2), 17-24. https://doi.org/10.22624/AIMS/DIGITAL/V11N2P2x
65. Jimoh, H. O., Ahmed, M. O., & Fagbade, M. O. (2023). The role of frameworks in cybersecurity governance. Journal of Behavioural Informatics, Digital Humanities and Development Research, 9(4), 7-16. https://doi.org/10.22624/AIMS/BHI/V9N4P2
66. Jones, B. C., & Ominyi, M. (2024b). A conceptual framework for harmonizing digital trade regulations in cross-border e-commerce between the United States and Nigeria. International Journal of Economics and Financial Management, 9(9), 337-364. https://doi.org/10.56201/ijefm.v9.no9.2024.pg337.364
67. Jones, B. C., & Ominyi, M. (2021). Developing a conceptual framework linking West African agricultural value chains to household economic stability. International Journal of Economics and Financial Management, 6(2), 89-114. https://doi.org/10.56201/ijefm.v6.no2.2021.pg89.114
68. Joseph, O. B., & Nwankwo, C. U. (2024). Professional development for STEM educators: Enhancing teaching effectiveness through continuous learning. International Journal of Applied Research in Social Sciences, 6(8), 1558-1574. https://doi.org/10.51594/ijarss.v6i8.1370
69. Kaner, C., Falk, J., & Nguyen, H. Q. (1999). Testing Computer Software (2nd ed.). Wiley.
70. Kirchler, E. (2007). The Economic Psychology of Tax Behaviour. Cambridge University Press.
71. Kitchenham, B., Brereton, O. P., Budgen, D., Turner, M., Bailey, J., & Linkman, S. (2009). Systematic literature reviews in software engineering: A systematic literature review. Information and Software Technology, 51(1), 7-15. https://doi.org/10.1016/j.infsof.2008.09.009

72. Komi, N. M., & Adamolekun, A. (2021). Interpretable machine learning for early failure prediction in distributed renewable energy assets. International Journal of Multidisciplinary Research and Growth Evaluation, 2(6), 1015-1038. https://doi.org/10.54660/.IJMRGE.2021.2.6.1015-1038
73. Komi, N. M. (2023). When accurate forecasts are not fair forecasts: Deep learning load prediction and equity across districts. Shodhshauryam, International Scientific Refereed Research Journal, 6(6), 476-546. https://doi.org/10.32628/SHISRRJ247102
74. Ladapo, O. O., Dosunmu, A. A., Jooda, D., & Abolaji, T. O. (2024). Integrated network and security operation center: A systematic analysis. International Journal of Multidisciplinary Futuristic Development, 5(1), 65-80. https://doi.org/10.54660/IJMFD.2024.5.1.65-80
75. Ladapo, O. O., Jooda, D., Dosunmu, A. A., & Abolaji, T. O. (2023b). Systematic literature review on security access control policies and techniques based on privacy requirements in a BYOD environment. International Journal of Advanced Multidisciplinary Research and Studies, 3(6), 2890-2904. https://doi.org/10.62225/2583049X.2023.3.6.6206
76. Liadi, K. O. (2024c). Designing a cross-border security cooperation model: Nigeria's foreign policy response to regional terrorism. Gyanshauryam, International Scientific Refereed Research Journal, 7(3), 311-338. https://doi.org/10.32628/GISRRJ247324
77. Lilian, I. N., Liadi, K. O., Yeboah, T. J., & Apelehin, A. A. (2020). Understanding cross-cultural communication: Identity, diversity, and global interaction. Gyanshauryam, International Scientific Refereed Research Journal, 3(4), 153-176. https://doi.org/10.32628/GISRRJ21352
78. Li, Z., Harman, M., & Hierons, R. M. (2007). Search algorithms for regression test case prioritization. IEEE Transactions on Software Engineering, 33(4), 225-237. https://doi.org/10.1109/TSE.2007.38
79. Mairiza, D., Zowghi, D., & Nurmuliani, N. (2010). An investigation into the notion of non-functional requirements. ACM Symposium on Applied Computing, 311-317. https://doi.org/10.1145/1774088.1774153
80. Mbonu, I. S., Aliliele, C., Iwuanyanwu, U., & Oluoha, O. M. (2018). A conceptual framework for legal and ethical risk modeling in enterprise data protection governance systems. Iconic Research and Engineering Journals, 2(2), 207-226. https://doi.org/10.64388/IREV2I2-1714911
81. Mbonu, I. S., Aliliele, C., Iwuanyanwu, U., & Uzoka, E. (2021b). Advances in artificial intelligence techniques for secure software testing and automated regression control mechanisms. International Journal of Scientific Research in Computer Science, Engineering and Information Technology, 7(5), 468-496. https://doi.org/10.32628/CSEIT217565
82. Mbonu, I. S., Iwuanyanwu, U., Aliliele, C., & Uzoka, E. (2020a). A conceptual framework for agile supply chain digital transformation with embedded IT risk and ISO compliance controls. Iconic Research and Engineering Journals, 3(11), 566-593. https://doi.org/10.64388/IREV3I11-1714916
83. Mbonu, I. S., Iwuanyanwu, U., Aliliele, C., & Uzoka, E. (2022a). A review of data protection impact assessment models in multi cloud financial infrastructure systems. International Journal of Scientific Research in Computer Science, Engineering and Information Technology, 8(1), 589-623. https://doi.org/10.32628/CSEIT25442
84. Mbonu, I. S., Iwuanyanwu, U., Aliliele, C., & Uzoka, E. (2021). A review of VoIP forensic analytics models for financial fraud detection and regulatory compliance monitoring. International Journal of

Multidisciplinary Research and Growth Evaluation, 2(6), 711-730. https://doi.org/10.54660/.IJMRGE.2021.2.6.711-730

85. Miller, M., Reichelstein, J., Salas, C., & Zia, B. (2015). Can you help someone become financially capable? World Bank Research Observer, 30(2), 220-246. https://doi.org/10.1093/wbro/lkv009
86. Myers, G. J., Sandler, C., & Badgett, T. (2011). The Art of Software Testing (3rd ed.). Wiley.
87. Nwakamma, S., Ojukwu, J., & Oyesiji, S. O. (2024a). LLM-as-a-judge for automated model governance: A review of methods, biases, and release-gating practices. World Journal of Innovation and Modern Technology, 8(6), 185-216. https://doi.org/10.56201/wjimt.v8.no6.2024.pg185.216
88. Nwakamma, S., Ojukwu, J., & Oyesiji, S. O. (2024b). Securing agentic AI enterprise workflows against prompt injection, tool poisoning, memory manipulation, and excessive agency threats. World Journal of Innovation and Modern Technology, 8(6), 217-248. https://doi.org/10.56201/wjimt.v8.no6.2024.pg217.248
89. Obogo, S. F., Nwafor, M. I., & Ozobu, C. O. (2023). Conceptual leadership model for safety culture development in construction and engineering projects. International Journal of Scientific Research in Civil Engineering, 7(6), 121-153. https://doi.org/10.32628/IJSRCE237554
90. Obogo, S. F., Ozobu, C. O., & Uduokhai, D. O. (2019a). Advances in leadership driven safety culture transformation in large construction workforces. Iconic Research and Engineering Journals, 3(5), 507-523. https://doi.org/10.64388/IREV3I5-1715497
91. Obogo, S. F., Ozobu, C. O., & Uduokhai, D. O. (2019b). Development of a construction safety risk governance model for multi contractor high rise projects. Iconic Research and Engineering Journals, 2(9), 502-522. https://doi.org/10.64388/IREV2I9-1715495
92. Obogo, S. F., Uduokhai, D. O., & Ozobu, C. O. (2019). Systematic review of hazard identification and risk control practices in urban construction projects. Iconic Research and Engineering Journals, 2(12), 666-681. https://doi.org/10.64388/IREV2I12-1715496
93. Obriki, O. D., & Arumosoye, O. M. (2019). A conceptual framework linking management safety walkthrough frequency and coverage to safety culture outcomes in mega projects. Iconic Research and Engineering Journals, 2(8), 355-374. https://doi.org/10.64388/IREV2I8-1714416
94. Obriki, O. D., & Arumosoye, O. M. (2020). Conceptual framework for human error causation in high-risk construction and industrial activities. International Journal of Multidisciplinary Research and Growth Evaluation, 1(5), 715-727. https://doi.org/10.54660/.IJMRGE.2020.1.5.715-727
95. Obriki, O. D., & Arumosoye, O. M. (2018). Conceptual modeling of data-driven occupational safety risk control in large-scale energy infrastructure projects. Iconic Research and Engineering Journals, 1(7), 169-189. https://doi.org/10.64388/IREV1I7-1714414
96. Obukadata, V. O., Ezeako, R., Okoli, I. E., & Alugwe, S. (2024). AI-enabled synthesis of stakeholder and survey data in operations research: A review of advances and applications. International Journal of Advanced Multidisciplinary Research and Studies, 4(6), 3539-3563. https://doi.org/10.62225/2583049X.2024.4.6.6931
97. Odejide, G. S. (2024). A trust-centered conceptual model for AI-driven multilingual emergency communication. International Journal of Scientific Research in Computer Science, Engineering and Information Technology, 10(6), 2781-2811. https://doi.org/10.32628/CSEIT2410794

98. Ogbete, J. C., Aminu-Ibrahim, A. Y., & Ambali, K. B. (2022). Design standards and operational planning frameworks for scalable blood collection networks. Gyanshauryam, International Scientific Refereed Research Journal, 5(6), 267-300. https://doi.org/10.32628/GISRRJ225635
99. Ogbete, J. C., Aminu-Ibrahim, A. Y., & Ambali, K. B. (2023). Lifecycle performance evaluation of purpose built diagnostic laboratories supporting long term healthcare delivery. International Journal of Advanced Multidisciplinary Research and Studies, 3(6), 2605-2621. https://doi.org/10.62225/2583049X.2023.3.6.5698
100. Ogbete, J. C., Aminu-Ibrahim, A. Y., & Ambali, K. B. (2018). Optimizing laboratory spatial planning strategies to improve diagnostic accuracy, safety, and clinical throughput. Iconic Research and Engineering Journals, 2(1), 87-113. https://doi.org/10.64388/IREV1I7-1713587
101. Ohunyon, G., Ayinde, M., & Ojukwu, P. U. (2023). The impact of multidisciplinary collaboration on patient outcomes in emergency departments. International Journal of Advanced Multidisciplinary Research and Studies, 3(6), 2727-2741. https://doi.org/10.62225/2583049X.2023.3.6.6029
102. Okonkwo, C. S., Ogunwole, O., Mayo, W., & Okeke, O. T. (2021). Framework for regulatory-compliant procurement in high-risk energy environments. International Journal of Multidisciplinary Research and Growth Evaluation, 2(6), 595-605. https://doi.org/10.54660/IJMRGE.2021.2.6.595-605
103. Okoruwa, P. O., Fadayomi, O., Abolaji, T. O., Edivri, J., Ogbole, J. I., & Akeju, B. (2024). Enterprise cybersecurity trends and threat evolution, advances and emerging research directions. Global Multidisciplinary Perspectives Journal, 1(6), 194-204. https://doi.org/10.54660/GMPJ.2024.1.6.194-204
104. Ominyi, M., Anichukwueze, C. C., & Uzougbo, N. S. (2024b). A systematic review of organizational readiness for the EU Artificial Intelligence Act in multinational enterprises. World Journal of Innovation and Modern Technology, 8(6), 185-203. https://doi.org/10.56201/wjimt.v8.no6.2024.pg185.203
105. Ominyi, M. (2021). Toward a conceptual framework for embedding privacy by design in corporate restructuring and transaction structuring. Journal of Accounting and Financial Management, 7(5), 152-173. https://doi.org/10.56201/jafm.vol.7.no5.2021.p152.173
106. Onche, V. O., Adegbite, M. P., & Ogbonna, C. S. (2023). BYOD adoption and information-security risk in university administrative offices: Evidence from Nigerian federal universities. International Journal of Multidisciplinary Research and Growth Evaluation, 4(6), 1549-1563. https://doi.org/10.54660/.IJMRGE.2023.4.6.1549-1563
107. Onwuzulike, O. C., Uzondu, N. C., & Joseph, O. B. (2024). Impact of strategic management education on professional development: A longitudinal study. World Journal of Advanced Research and Reviews, 23(3), 323-337. https://doi.org/10.30574/wjarr.2024.23.3.2672
108. Page, M. J., et al. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. BMJ, 372, n71. https://doi.org/10.1136/bmj.n71
109. Ramesh, B., & Jarke, M. (2001). Toward reference models for requirements traceability. IEEE Transactions on Software Engineering, 27(1), 58-93. https://doi.org/10.1109/32.895989
110. Runeson, P., & Höst, M. (2009). Guidelines for conducting and reporting case study research in software engineering. Empirical Software Engineering, 14, 131-164. https://doi.org/10.1007/s10664-008-9102-8

111. Sakyi, J. K., Filani, O. M., Nnabueze, S. B., Okojie, J. S., & Ogedengbe, A. O. (2022b). Developing KPI frameworks to enhance accountability and performance across large-scale commercial organizations. Journal of Frontiers in Multidisciplinary Research, 3(2), 81-93. https://doi.org/10.54660/.IJFMR.2022.3.2.81-93
112. Sanni, J. O., Atima, M. E., & Attah, A. (2022). Systematic review of attribution modeling methods resolving bias in multi-touch journeys. Shodhshauryam, International Scientific Refereed Research Journal, 5(1), 304-334. https://doi.org/10.32628/SHISRRJ247135
113. Sanni, J. O., & Attah, A. (2023c). Market research frameworks addressing entry barriers within highly regulated industrial service sectors. International Journal of Scientific Research in Computer Science, Engineering and Information Technology, 10(2), 904-930. https://doi.org/10.32628/CSEIT2342439
114. Sanni, J. O., Iwuanyanwu, U. A., Essien, M. A., & Attah, A. (2023). Lifecycle-aware marketing automation using federated learning for secure cross-organizational data management. Gyanshauryam, International Scientific Refereed Research Journal, 6(6), 337-364. https://doi.org/10.32628/GISRRJ236642
115. Shittu, M. A., Adeniji, I. O., Shittu, H., & Opara, I. S. (2022). Blockchain-assisted secure data exchange architectures for SCADA-controlled power systems. Iconic Research and Engineering Journals, 6(3), 359-379. https://doi.org/10.64388/IREV6I3-1714041
116. Shittu, M. A., Shittu, H. A., Adeleke, O. J., & Adedokun, O. J. (2023). Digital twin modeling for real time monitoring and fault detection in smart substations. International Journal of Industrial Engineering Research and Development, 14(2), 25-44. https://doi.org/10.34218/IJIERD_14_02_003
117. Tawose, O. M., Oluwadele, J. F., Ekeocha, A. H., Odumboni, A. A., & Egbeyemi, O. S. (2023). Aflatoxin detection and quantification in poultry feeds available in selected areas in Ekiti State. FUOYE Journal of Agriculture and Human Ecology, 7(2). https://doi.org/10.62923/fuojahe.v7i2.302
118. Tonoyan, A., Dada, O., & Ayivi-Donkor, S. S. (2023). A conceptual framework for retail asset valuation: Integrating quantitative pricing and multi-unit financial performance prediction. Journal of Accounting and Financial Management, 9(12), 218-250. https://doi.org/10.56201/jafm.v9.no12.2023.pg218.250
119. Tonoyan, A., Dada, O., & Ayivi-Donkor, S. S. (2022b). Algorithmic process optimization and cost reduction: A review of simulation modeling and financial impact assessment. Journal of Accounting and Financial Management, 8(8), 139-169. https://doi.org/10.56201/jafm.vol.8.no8.2022.p139.169
120. Tonoyan, A., Dada, O., & Ayivi-Donkor, S. S. (2024b). Real-time KPI tracking systems: A review of automated performance monitoring and data-driven decision making. World Journal of Innovation and Modern Technology, 8(6), 247-281. https://doi.org/10.56201/wjimt.v8.no6.2024.pg247.281
121. Uchechi, N., Ominyi, M., Anichukwueze, C. C., & Uzougbo, N. S. (2022). Advances in quantitative evaluation models for measuring corporate diversity and inclusion investments. World Journal of Finance and Investment Research, 6(2), 56-101. https://doi.org/10.56201/wjfir.v6.no2.2022.pg56.101

122. Uchechi, N., Ominyi, M., & Jones, B. C. (2018). Procedural standardization and workflow optimization in high-volume dispute resolution clinics: A systematic review. Iconic Research and Engineering Journals, 2(6). https://doi.org/10.64388/IREV2I6-1722789
123. Uchechi, N., & Ominyi, M. (2019). Liability mitigation and dispute prevention in high-value energy service contracts. Iconic Research and Engineering Journals, 3(6). https://doi.org/10.64388/IREV3I6-1722790
124. Wahl, I., Kastlunger, B., & Kirchler, E. (2010). Trust in authorities and power to enforce tax compliance. Journal of Economic Psychology, 31(3), 383-395. https://doi.org/10.1016/j.joep.2010.01.004
125. Wedraogo, L., & Sanni, J. O. (2024). Machine learning models addressing uncertainty in cross-channel campaign performance forecasting accuracy. International Journal of Advanced Multidisciplinary Research and Studies, 4(6), 2875-2890. https://doi.org/10.62225/2583049X.2024.4.6.5648
126. Wieringa, R. J. (2014). Design Science Methodology for Information Systems and Software Engineering. Springer. https://doi.org/10.1007/978-3-662-43839-8
127. World Bank. (2014). Global Financial Development Report 2014: Financial Inclusion. World Bank. https://doi.org/10.1596/978-0-8213-9985-9
128. Yusuf, H. D., & Abdulrazaq, K. (2018). A conceptual framework for strengthening diagnostic quality systems in resource-limited clinical laboratories. Iconic Research and Engineering Journals, 1(11), 145-179. https://doi.org/10.64388/IREV1I11-1723090
129. Zhu, H., Hall, P. A. V., & May, J. H. R. (1997). Software unit test coverage and adequacy. ACM Computing Surveys, 29(4), 366-427. https://doi.org/10.1145/267580.267590