Systemic Action Learning and Action Research: A Fidelity Analysis of Protocol Delivery

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Abstract: This paper presents Systemic Action Learning and Action Research (SALAR) as a twelve-item sequenced, transferable protocol for ecosystem-level participatory inquiry, and reports its first external application at a clean energy co-design event at an Africa Centre of Excellence at a public university of technology in West Africa. The event convened 230 stakeholders across eight roundtables. The paper introduces implementation fidelity analysis as a standard reporting obligation for participatory methodology, applying a four-component fidelity framework to identify six protocol departures — in instrument versioning, registration pipelines, data capture capacity, session sequencing, roundtable instrumentation, and governance — and the precondition each departure reveals. The central finding is structural: data yield was determined by research apparatus, not participant willingness. The analysis generates five specific protocol revisions, including a mandatory governance pre-agreement for hosted delivery and an explicit data capture capacity requirement. The contribution is methodological: a deployable protocol with an fidelity account provides research teams with both a roadmap and a credible constraint inventory.

Keywords: Systemic Action Learning and Action Research (SALAR), Participatory Co-design, Implementation Fidelity, Inclusive Innovation Ecosystems, Next-generation Solar Manufacturing

1. Introduction

Participatory research methodology sits at the intersection of rigorous knowledge production and inclusive community engagement. As innovation challenges grow increasingly complex through spanning multiple sectors, geographies and stakeholder groups, the capacity to generate reliable evidence with rather than from communities has become a methodological imperative. Systemic Action Learning and Action Research (SALAR) represents one such methodology: a framework that adapts Theory U across five co-creation movements and deploys the SHAPE model to map eight stakeholder categories, enabling authentic engagement and qualitative data generation to occur within a single participatory encounter (Van der Westhuizen, 2018, 2023a, 2023b). This paper presents SALAR as a sequenced, transferable protocol for ecosystem-level inquiry, and examines the conditions that must hold for its design to be realised in delivery.

The significance of this work is located at the intersection of two persistent failures in participatory practice. The first is contextual: expanding renewable energy access across sub-Saharan Africa is no longer principally a technological problem. Next-generation photovoltaic technologies are advancing rapidly, yet whether they will be manufactured, maintained, financed and used locally depends on the innovation ecosystems that surround them — ecosystems that require inquiry conducted with the full range of value chain role players, not on them (Davy, Hansen and Nygaard, 2021). Participatory approaches are widely advocated for precisely this reason (Burns, Howard and Ospina, 2021), yet in practice community engagement and data collection are typically sequenced as separate activities: researchers convene stakeholders, then return to extract data from them. This separation is both methodologically costly and ethically compromised — participants are positioned as sources rather than partners, and the interpretive energy of the encounter dissipates before it can be captured. The second failure is reportorial: participatory methodology is typically reported as designed rather than as delivered (Toomey et al., 2025; Vargas et al., 2025), so the conditions on which a protocol depends remain implicit until they fail. Together, these failures constitute the gap this paper addresses.

Despite its stated systemic and stakeholder-facing orientation, SALAR has been developed and evaluated almost exclusively within university ecosystems, as a means of building individual entrepreneurial orientation among students (Dhliwayo, 2008; Van der Westhuizen, 2023; Nyamunda, 2020). It has not previously been specified as a sequenced protocol for generating data across a heterogeneous external network — manufacturers, technicians, regulators, cooperatives and end-users. A compounding gap compounds the first: no implementation fidelity account of a SALAR deployment exists in the literature, leaving its operational preconditions invisible to any team seeking to replicate it.

This paper addresses both gaps through the following research question: What conditions must hold for co-creation and qualitative data generation to be fused within a single participatory encounter in a complex innovation ecosystem? Three objectives follow. First, to specify SALAR as a sequenced, transferable protocol for ecosystem-level inquiry. Second, to examine its application at a clean energy co-design event at a public university of technology in West Africa, attended by 230 stakeholders across eight roundtables. Third, to derive, from the observed departures between protocol design and delivery, the preconditions that a replicating team must satisfy.

The contribution is twofold. Theoretically, the paper extends SALAR from individual capability development to ecosystem-level knowledge production, and engages the intervention fidelity literature (Trickett, Rasmus and Allen, 2020; Lemire, Rousseau and Dionne, 2023) to argue that embedding data collection within co-creation strengthens both ethical reciprocity and data richness. Practically, it offers research teams a documented twelve-item protocol together with an fidelity analysis — an account rarely available in the participatory literature, where implementation difficulty is more often conceded in a limitations paragraph than analysed as evidence.

The paper proceeds as follows. Section 2 establishes the theoretical foundations and terminology. Section 3 traces the development of the protocol from its doctoral origins. Section 4 presents the twelve-item SALAR protocol. Section 5 reports its application. Section 6 conducts the fidelity analysis and derives the preconditions. Section 7 discusses implications for research teams, funders and host institutions.

2. Theoretical Foundations and Terminology

Action research holds that knowledge is produced through change, by those who live with it (Lewin, 1951; Revans, 1982). Zuber-Skerritt (2002, 2015) integrated these traditions into Participatory Action Learning and Action Research (PALAR), legitimising inquiry conducted with communities. Systemic Action Learning and Action Research (SALAR) extends this to entire ecosystems of diverse actors. It facilitates interactive processes between stakeholders and researchers to observe dynamics at a systemic level, treating participant heterogeneity as a resource (Schweikert et al., 2014; Scharmer et al., 2021).

Co-engagement, as used here, denotes a single participatory encounter in which co-creation and data generation occur simultaneously rather than sequentially. It is distinguished from co-design, co-production and co-creation as those terms are differentiated by Vargas et al. (2022) by this simultaneity, rather than by the degree of participant authority.

SALAR is operationalised through two models, given in Figures 1 and 2. Figure 1 sets out the five movements of the co-creation process, adapted from Scharmer's (2009) Theory U and its recent extension (Scharmer and Pomeroy, 2024), and aligned with design thinking across three phases. Figure 2 sets out the SHAPE model, which maps the ecosystem into eight categories.

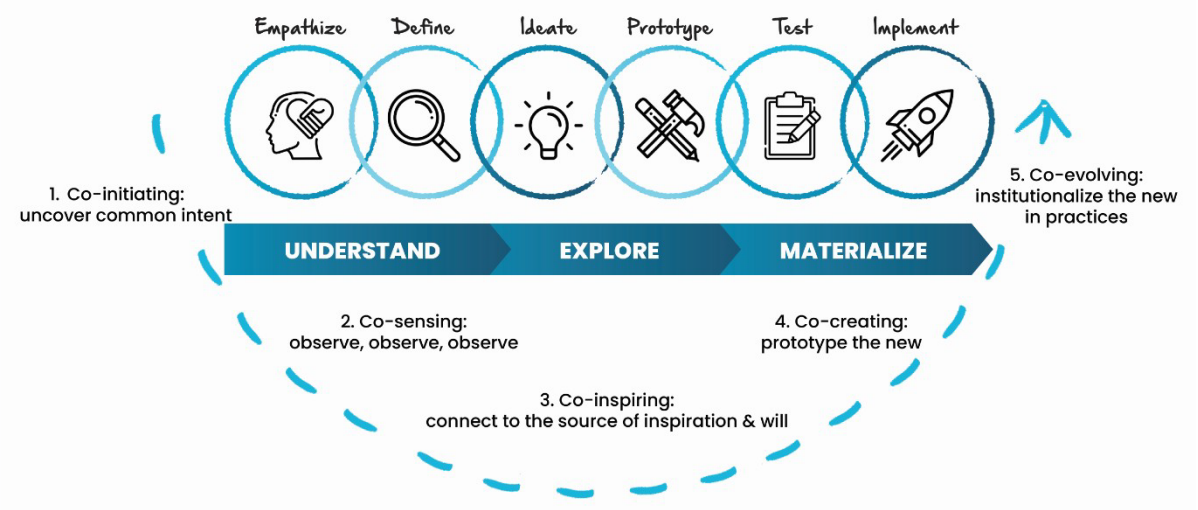


Figure 1: The systemic co-creation (SCC) model for inclusive community engagement



Figure 2: The SHAPE model for inclusive ecosystem co-creation

Six of the eight SHAPE categories denote populations of role players and are the basis on which delegates are allocated. Two — personality traits and internationalisation — are cross-cutting dimensions that bear on every category rather than constituting one; they are applied as lenses in facilitation and observation. The distinction is consequential for delivery and is returned to in Section 6.

3. Development of the Protocol

SALAR emerged from the SHAPE ecosystem strategy (Shifting Hope, Activating Potential Entrepreneurship) at the University of KwaZulu-Natal (Van der Westhuizen, 2016). Initially an eleven-phase programme for student entrepreneurship, it was refined through successive university deployments (Van der Westhuizen, 2023). To adapt SALAR for external multi-sector application, we extended the SHAPE model to eight categories, incorporated design thinking to clarify the co-creation movements, and compressed the temporal architecture into a single encounter protocol. This compression exposes new vulnerabilities: operational dependencies that were manageable in longitudinal cycles become critical failure points in a one-day workshop.

4. The SALAR Protocol

4.1 Scope and Boundaries

The protocol is purpose-built for a specific research task: generating qualitative and quantitative data across a heterogeneous stakeholder ecosystem within a single convened participatory encounter. Three conditions define its operating context. The encounter must run for at least half a day. A stakeholder map must be in place before delegates are allocated. The research team must have confirmed sufficient data capture capacity proportionate to expected attendance — meaning a sufficient number of trained field assistants and digital devices to reach every participant within the available time. These are not incidental requirements. They are the structural foundations on which each successive protocol item depends, and the fidelity analysis in Section 6 demonstrates precisely what occurs when they are treated as negotiable.

The protocol's scope is also deliberately bounded. The SHAPE model is deployed here as an ecosystem mapping instrument for allocating delegates and orienting facilitation. This is distinct from its developmental application in student entrepreneurship programmes, where it functions as a framework for cultivating individual entrepreneurial orientation. Both applications are valid and complementary. They address different units of analysis and should not be conflated.

Achieving high fidelity against this protocol is evidence of methodological rigour in execution. It is not a claim about the broader quality of the research. A study may deliver the protocol with precision and still face limitations in its analytical claims. Equally, a study that departs significantly from the protocol should account for those departures, as this paper does, rather than absorbing them silently into a limitations section.

Finally, the protocol is designed to complement longitudinal research designs rather than replace them. A single encounter can establish a robust baseline and generate rich cross-sectional data across stakeholder categories. It cannot, by design, observe developmental change over time. Research teams whose primary interest is change over time should treat the protocol as a rigorous point-of-entry instrument within a broader longitudinal architecture.

4.2 Protocol Items

The protocol comprises twelve items, set out in Table 1. Its sequence follows the three phases of Figure 1 — understand, explore, materialise — with a final pair of reporting items that fall outside the encounter itself. The ordering is not merely chronological. Each item establishes a condition that later items consume, and the failure modes documented in Section 6 are, without exception, cases in which a later item was attempted on a foundation an earlier item had not laid.

Items 1 to 5 constitute the understand phase and are wholly preparatory. Instrument finalisation (1) precedes mobilisation (2) because an instrument revised after invitation has been issued cannot be assumed to fall within the scope of the ethical approval under which participants agreed to attend; version control is therefore a consent matter before it is an analytical one. Mobilisation is specified as multi-channel and category-targeted because the SHAPE map is only as good as the recruitment that populates it: a channel strategy biased toward institutional email will return an ecosystem biased toward institutions. Registration and baseline capture (3) is placed at the point of registration rather than on the day, since it converts a moment participants must pass through anyway into the quantitative baseline, and consolidates consent into a single pipeline. Enumeration capacity (4) is specified in advance as a ratio of devices and field assistants to expected participants, because it sets the ceiling on how much data the encounter can physically yield. Conceptual levelling (5) closes the phase: where delegates arrive with radically unequal familiarity with the subject matter, deliberation without a shared vocabulary reproduces existing hierarchies of confidence rather than surfacing distributed knowledge.

Items 6 to 8 constitute the explore phase, in which the primary qualitative data are generated. Stakeholder-aligned roundtables (6) instantiate the six populated SHAPE categories, each with a trained facilitator and a designated recorder — two roles, not one, because facilitation and recording compete for the same attention. The protected deep-dive session (7) is the segment carrying the heaviest data load and is ring-fenced in the agenda precisely because it is the segment most easily sacrificed when a day runs late. The structured co-design activity (8) closes the phase by requiring each table to produce a tangible artefact, which serves simultaneously as data, as a prioritisation record, and as the reciprocal return participants take away.

Items 9 and 10 materialise the encounter. Systematic observation (9) runs across all categories, since inclusivity can only be evidenced where it was observed. Synthesis and return (10) closes the encounter by reporting back and leaving co-designed outputs in participants' hands.

Items 11 and 12 sit outside the encounter and govern its reporting. Flow reporting (11) and fidelity reporting (12) are treated here as standard obligations rather than optional disclosures, on the argument developed in Section 6.

Table 1: The SALAR co-engagement protocol

Item	Protocol Element	What the Research Team Does	Data Generated	Where Addressed in This Paper
1	Instrument finalisation	Finalise and obtain ethical clearance for all instruments before any invitation is issued. Record the version deployed.	Version-controlled instrument set	Section 5; Table 2, Item 1
2	Multi-channel mobilisation	Invite across email, social media, messaging applications and word-of-mouth, targeting every stakeholder category in the ecosystem map.	Registration record by category	Section 5
3	Registration and baseline capture	Route every registrant through a single consent-and-survey pipeline at the point of registration.	Consent record; quantitative baseline	Section 5; Table 2, Item 2

Item	Protocol Element	What the Research Team Does	Data Generated	Where Addressed in This Paper
4	Data capture capacity	Specify and confirm a minimum ratio of trained field assistants and digital devices to expected participants before the event.	Field assistant and device log	Section 5; Table 2, Item 3
5	Conceptual levelling	Open with a plenary session explaining core concepts in accessible language before any deliberation begins.	Observation of comprehension points	Section 5
6	Stakeholder-aligned roundtables	Pre-assign delegates to tables by populated ecosystem category. Assign a trained facilitator and a designated recorder to each table.	Group interview data; facilitator notes	Section 5; Table 2, Item 4
7	Protected deep-dive session	Ring-fence the primary data-generation segment in the agenda and protect it against schedule compression.	Theme-specific qualitative data	Section 5; Table 2, Item 5
8	Structured co-design activity	Set each table a defined co-design task producing a tangible participant-owned output, followed by a gallery walk.	Co-design artefacts; prioritisation record	Section 5
9	Systematic observation	Deploy structured observation schedules across all categories, recording engagement, participation equality, facilitation and logistics.	Ordinal ratings and field notes	Section 5; Table 2, Item 6
10	Synthesis and return	Close with a plenary synthesis and leave co-designed outputs with participants.	Synthesis record	Section 5
11	Flow reporting	Report participant and data flow from mobilisation to retained data, stating attrition and reasons at each stage.	Participant and data flow diagram (Figure 3)	Figure 3
12	Fidelity reporting	Report departures between protocol as designed and as delivered, and the preconditions each departure reveals.	Fidelity analysis	Section 6; Table 2

4.3 Using the Protocol

The protocol is written to be consulted at the planning stage, not at write-up. Its value lies almost entirely in the first five items, which are executed weeks before the encounter and which determine what the encounter is capable of producing. A team that discovers the protocol while drafting its methods section will find that the items it most needed have already expired.

The final column of Table 1 is intended to be completed as the study proceeds, recording where in the eventual report each item is addressed. Completed prospectively it functions as a planning checklist; completed retrospectively it functions as a reporting index, and the blanks are themselves informative — an item with no corresponding location in the report is an item that was either not delivered or not documented.

Items 11 and 12 warrant particular emphasis. Flow reporting and fidelity reporting are proposed here as standard obligations, on the same footing as reporting a sample size. Neither requires the study to have gone well. A team that reports substantial attrition and multiple departures, with reasons, has produced a more useful methods account.

5. Application

The protocol was applied at a clean energy co-design day convened in June 2026 at the Africa Centre of Excellence of a public university of technology in West Africa. The event formed part of a UKRI-funded international research consortium on next-generation solar module manufacturing, whose remit extends beyond device performance to the question of whether such modules can be manufactured, maintained and financed within the economies that will use them. The co-design day was the consortium's first ecosystem-level engagement, and its purpose was twofold: to convene the local value chain around that question, and to generate the baseline evidence against which subsequent work would be designed.

Delivery is reported here item by item against the protocol in Table 1, with participant and data flow given in Figure 3. Instruments were prepared and submitted for ethical clearance (item 1), but registration

opened before the digital instrument was finalised; a separate host-administered survey was used for registrants in the interim, and the instrument was subsequently revised, so that four versions existed by the day itself. Mobilisation (item 2) was multi-channel, drawing on institutional email, social media, messaging applications and the host's existing networks, and returned registrations across all SHAPE categories. Attendance reached 230 stakeholders, exceeding projections.

Registration and baseline capture (item 3) operated as two parallel streams held by different institutions rather than the single consent-and-survey pipeline the protocol specifies. Enumeration capacity (item 4) was the binding constraint on the day: available devices and field assistants supported 76 completed survey responses from 230 attendees. Conceptual levelling (item 5) was delivered as an opening plenary in accessible language, and the questions raised in that session indicated that the levelling was necessary; several core terms in the consortium's vocabulary were unfamiliar to substantial parts of the room.

Delegates were allocated across eight roundtables corresponding to the eight SHAPE categories (item 6). Under time pressure the survey and group-interview instruments were consolidated into a single digital form, and no recorders were designated, so the dialogic layer the protocol relies on for qualitative depth was not captured in the form the design anticipated. The protected deep-dive session (item 7) was not run as designed once registration volume exceeded projections and the day's schedule compressed. The structured co-design activity (item 8) proceeded, and each table produced a tangible output that remained with participants. Structured observation (item 9) had been designed for three participant types; five of the eight tables were therefore outside its scope, and no completed schedules were returned. The day closed with a plenary synthesis and the co-designed outputs were left with participants (item 10).

The survey findings are reported here descriptively and are subordinate to the methodological argument; they are presented in full elsewhere. Three directions were consistent across respondents. Affordability was the dominant constraint on adoption, named more frequently than availability, reliability or technical performance. Respondents expressed a strong preference for repair to be available locally rather than through return-to-manufacturer arrangements. And there was marked receptiveness to service-based payment models in place of outright purchase.

Read against the protocol, the day delivered its co-creation function and a usable quantitative baseline, but generated substantially less of the qualitative material the design was built to capture. That gap is not incidental to the argument of this paper. It is the evidence on which Section 6 rests.

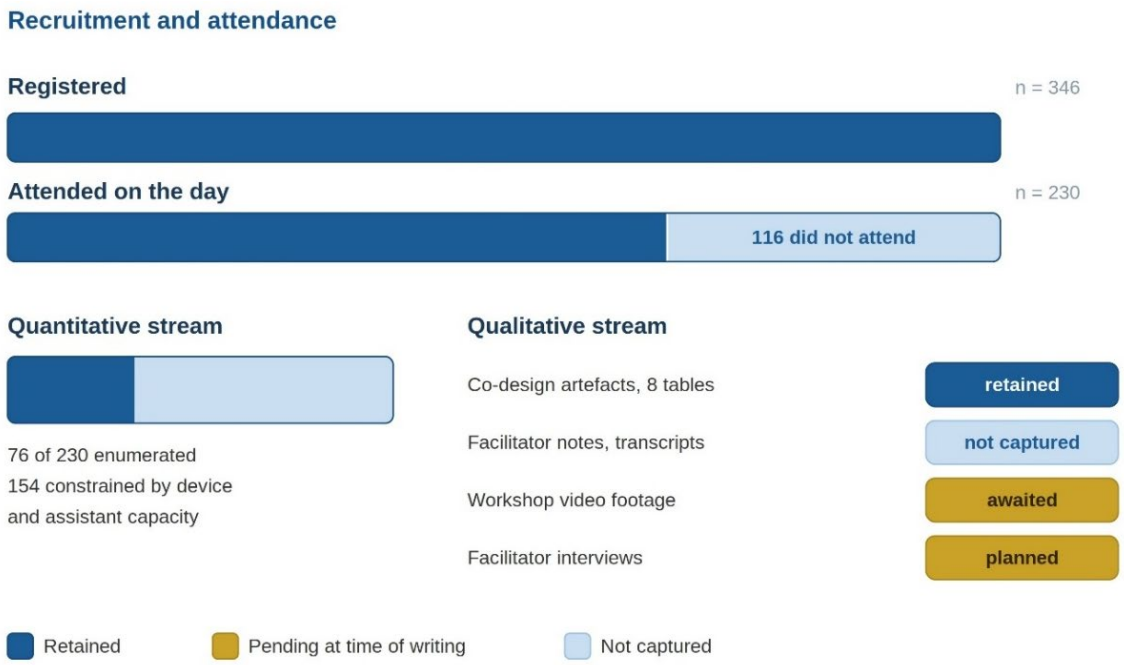


Figure 3: Participant and data flow

6. Implementation Fidelity

Fidelity — the correspondence between an intervention as designed and as delivered — is well established in trial methodology (Ginsburg et al., 2021) and largely absent from participatory reporting. Toomey et al. (2025) find that even where fidelity frameworks exist, consensus on terminology is lacking and the frameworks themselves remain underutilised. Vargas et al. (2025), reviewing 55 co-design studies, report that nearly half offered no definition of co-design at all. The consequence for participatory work is that a protocol's preconditions stay implicit until an application encounters conditions under which they do not hold.

This application encountered such conditions. Table 2 sets out the departures observed between the protocol as designed and as delivered, and the precondition each one reveals. The framing is deliberate: a departure is treated here not as a shortfall to be conceded but as evidence about the protocol, of a kind obtainable only through delivery. Read against the four-component conceptualisation of fidelity proposed by Lemire, Rousseau and Dionne (2023), the departures cluster. Items 1, 3, 6 and 9 are failures of adherence, in which a specified element was replaced by a substitute or not delivered. Item 4 is a failure of dosage: the element was delivered, but to a third of the intended population. Item 7 is a failure of quality of delivery. None concerns participant responsiveness, which was high throughout — a distinction worth stating plainly, since it locates the constraint in the research apparatus rather than in the participants.

Two observations bear on transferability. First, in prior university-ecosystem deployments the protocol held, and the reason is now visible: those deployments ran over months, under the direct operational control of the research team. The doctoral work recorded that dependency explicitly but could not test it. This application is the first delivery in which sequencing was controlled by a partner institution, and the governance departure in Table 2 is the consequence. Second, three distinct eight-category schemes operated simultaneously without reconciliation. The SHAPE model supplied one set; the roundtables were constituted on a second, in which two cross-cutting SHAPE dimensions were replaced with populated substitutes; and the survey routed responses on a third, introducing categories absent from both. No single mapping therefore links a delegate's table to their survey record, and the observation schedules — designed for three participant types — could not span a structure that was never fixed. The substitutions were reasonable field adaptations; their cost was that they went undocumented.

A third observation concerns what happens after the encounter. Contemporaneous qualitative capture failed, but recovery is under way: workshop video footage is awaited and roundtable facilitators are to be interviewed. Recovery of this kind is worth attempting and worth reporting, but it is not equivalent to capture. A facilitator interviewed some weeks afterwards reconstructs rather than records, and the reconstruction is shaped by what has since become salient. The protocol as originally specified made no provision for post-hoc recovery, and in making none it implied a false binary between data captured and data lost. Recovered material occupies a third position, and should be reported and weighted as such.

Table 2: Departures between protocol as designed and as delivered

Protocol Item	Departure Observed in Application	Precondition Revealed
1. Instrument finalisation	Registration opened before the digital instrument was finalised; registrants completed a separate host-administered survey, and the instrument was subsequently revised, producing four versions.	Instruments must be fixed and cleared before mobilisation. Version proliferation after clearance creates both analytical and ethical-scope risk.
3. Registration and baseline capture	Two parallel registration and survey streams operated, held by different institutions.	A single consent-and-data pipeline is a design requirement, not an administrative convenience.
4. Enumeration capacity	Insufficient devices and field assistants; 76 responses captured from 230 participants.	Response ceiling is set by enumeration capacity, not participant willingness. Ratios should be specified and confirmed in advance.
6. Roundtable composition	Tables were constituted on categories that departed from the SHAPE map, and the survey routed responses on a third scheme again; the substitutions were undocumented.	Ecosystem map, table allocation and instrument routing must resolve to one reconciled scheme, or delegate-level records cannot be linked.

Protocol Item	Departure Observed in Application	Precondition Revealed
6. Roundtable instrumentation	Survey and group-interview instruments were consolidated into a single digital form under time pressure; no recorders were designated.	Individual-survey and group-interview instruments are not interchangeable. Consolidation collapses the dialogic layer that generates qualitative depth.
7. Protected deep-dive session	The scheduled facilitated interview session was not run as designed once registration volume exceeded projections.	Segments carrying the primary data-generation load must be ring-fenced against schedule compression.
9. Systematic observation	Observation schedules were designed for three participant types and none were returned. Co-design artefacts were retained; footage and facilitator interviews are being sought after the event.	Observation must span all categories. Where contemporaneous capture fails, recovered material is a third category — neither captured nor lost — and must be reported as such.
— Governance	The event was hosted, funded and programmed by the partner institution, with concurrent activities outside the research team's control.	The protocol presupposes researcher control of sequencing. Hosted delivery requires a written pre-agreement specifying which segments are protected and who directs them.

This application produced five specific revisions to the protocol:

1. Item 1 is amended to state that ethical clearance must cover a named, version-controlled instrument set, and that mobilisation may not open until that set is fixed.
2. Item 4 is amended to specify enumeration capacity as an explicit ratio, confirmed in writing before the encounter, rather than as a staffing intention.
3. Item 6 is amended to require that the ecosystem map, the table allocation and the instrument routing resolve to a single reconciled scheme, with any substitution documented before delivery.
4. Item 9 is amended to add a recovery provision: where contemporaneous capture fails, recovered material is reported separately from captured material, with the interval and method of recovery stated.
5. A new precondition is added ahead of item 1: where delivery is hosted by a partner institution, a written pre-agreement must specify which agenda segments are protected and which party directs them.

7. Discussion

The West Africa application demonstrates that SALAR can function at ecosystem level, with co-creation activities and a quantitative baseline successfully delivered across 230 stakeholders drawn from industry, government, research, and community groupings. Qualitative depth was curtailed not by participant disengagement but by constraints in the research apparatus: insufficient data capture capacity (trained field assistants and digital devices to reach every participant within the available time), instrument proliferation across eight stakeholder tables, the absence of a protected deep-dive session, and no designated recorders for qualitative material. This distinction between apparatus constraint and participant constraint is central to interpreting the application's data yield.

The value of applying a structured fidelity framework is that it locates constraint precisely rather than globally. Using Lemire et al.'s (2023) four-component framework of dosage, fidelity of delivery, reach, and adaptation, each of the six protocol departures identified in this study can be assigned to a specific component and, more usefully, to a specific corrective design action. Toomey et al. (2025) and Vargas et al. (2025) both observe that participatory health and community research consistently underutilises fidelity frameworks, leaving implementation constraints undiagnosed and unreported. The present analysis demonstrates that systematic fidelity reporting shifts accountability from participants to design, a constructive reframing for the wider participatory research community.

Prior SALAR deployments operated over several months under research-team control, enabling iterative refinement, high dosage, and strong fidelity across most protocol components. The West Africa application ran over a single day in a host-controlled environment, producing six protocol departures concentrated in sequencing, data capture, and session protection. This contrast should not be interpreted as a delivery failure: the governance departure, that is, host-controlled sequencing, was a foreseeable structural condition of single-day hosted delivery for which the protocol lacked an explicit precondition. It is a design

disclosure, not an execution failure, and the revised protocol addresses it through a mandatory pre-agreement requirement.

Substantively, the survey findings contribute evidence of consistent stakeholder perspective on solar energy access constraints and preferences in the West Africa context. Affordability dominated as the principal barrier, local repair capacity was the preferred service model, and service-based payment arrangements attracted receptive responses. These findings are consistent with the solar energy access literature for sub-Saharan Africa (Amankwah-Amoah, 2015; Davy et al., 2021), confirming that the structural barriers identified in the broader literature are legible at ecosystem level. That this pattern emerged despite the apparatus constraints noted above lends it credibility: it reflects participant consensus under imperfect conditions, not curated data under controlled ones.

This study carries four limitations that future research should address. First, the application is single-geography, limiting generalisability across ecosystem types, governance cultures, and institutional configurations. Second, this is a single external deployment; a replication series is needed before claims about the protocol's transferability can be made with confidence. Third, fidelity data were partially self-reported: direct observation covered only three of the eight stakeholder tables, and qualitative material from unobserved tables relies on participant recall and researcher documentation. Fourth, the protocol was under active development during the application, meaning that some departures may reflect protocol immaturity rather than field constraints, a confound that subsequent applications of the revised protocol will help resolve.

8. Contributions

This study makes three theoretical contributions. First, it extends the SALAR framework from organisational and community settings to ecosystem-level knowledge production, demonstrating that a structured participatory methodology can integrate multi-sector stakeholder knowledge across industry, government, research, and community actors within a single encounter. In doing so, it introduces the concept of co-engagement, defined as the simultaneous mobilisation of stakeholder knowledge across an ecosystem, as a distinct analytic construct that differentiates it from the co-production frameworks of Vargas et al. (2022), which address dyadic or small-group collaboration. Second, it extends fidelity frameworks developed for health and community interventions (Lemire et al., 2023; Toomey et al., 2025) to participatory research methodology, demonstrating that dosage, delivery fidelity, reach, and adaptation apply with equal precision to a structured stakeholder encounter. Third, it articulates the research apparatus, comprising data capture capacity, instrument design, session protection, and governance, as an independent determinant of data yield, separable from participant-side factors.

Methodologically, the study contributes a twelve-item sequenced protocol for SALAR delivery, with each item carrying a rationale, a failure mode, and an addressee. Items 11 and 12, covering flow reporting and fidelity reporting respectively, are proposed as standard obligations for any published SALAR application, establishing transparency norms for the methodology. Data capture capacity is introduced as an explicit, costed design parameter that must appear in research plans and grant applications, not as incidental overhead. The fidelity analysis framework is operationalised at the item level, enabling future teams to identify precisely which protocol components require adaptation and for what structural reason.

Practically, the study delivers a deployable protocol with a fully implementation account, making the constraints of external, hosted SALAR delivery legible to research teams before they encounter them in the field. The recommendation of a written pre-agreement specifying which segments are protected and what data capture resources are committed provides a standardisable governance instrument for hosted delivery. Research teams adopting the protocol gain the roadmap and credible design parameters; host institutions gain clear boundaries for their commitment.

9. Research Implications

For research teams planning SALAR or comparable participatory ecosystem encounters, protocol preparation must begin six to eight weeks before the encounter. Items 1 through 5, covering ecosystem mapping, governance agreement, and data capture planning, must be resolved before invitations are

issued. Treating these as logistical rather than substantive design decisions is the source of the most consequential departures; teams should satisfy all twelve items before deployment.

For funders, data capture capacity is a data-yield determinant, not overhead. Budgets that under-resource field assistants and digital devices reduce the research return on the full investment. Grant applications should include a line-item for data capture capacity, specifying the number of trained assistants, devices, and coverage calculations. Funders should treat the absence of such a line item as a design signal requiring scrutiny. The study also recommends that governance pre-agreement be a funding requirement for externally hosted delivery, not an optional arrangement.

For host institutions offering their ecosystem as a research site, the governance pre-agreement recommended in this study provides a practical instrument. A standardised pre-agreement would specify the segments of the encounter that are under research-team direction, the host institution's role in facilitation versus logistics, data capture resources, and review timelines. This instrument protects both parties: the research team gains structural conditions for fidelity, and the host institution gains a clear, bounded role.

For the broader participatory research community, the study argues that flow and fidelity reporting should become standard disclosures in published participatory research. The field accumulates learning more effectively from constraint accounts, than from polished success reports that obscure design decisions and resource conditions. Transparent fidelity reporting enables replication and meta-analysis, building cumulative understanding of what conditions participatory methods require to function at scale.

10. Conclusion

This paper specified the SALAR methodology as a twelve-item sequenced, transferable protocol and examined its first external application in West Africa. The protocol codifies the design decisions, sequencing logic, and delivery conditions implicit in prior SALAR applications, making them explicit and replicable by teams beyond the originators. The fidelity analysis framework provides the analytic structure for evaluating how faithfully the protocol was delivered and for locating the precise source of any departures.

The central finding is structural. Data yield in the West Africa application was determined by research apparatus, not by participant willingness. Two hundred and thirty stakeholders demonstrated consistent engagement across all eight tables and contributed substantive responses on affordability, repair capacity, and service-based payment preferences. The six protocol departures identified were all located in design and delivery infrastructure: sequencing governance, data capture capacity, instrument proliferation, and session protection. None were attributable to participant responsiveness. This finding reframes the evaluation of participatory research encounters: outcome quality should be assessed against the design conditions provided, not against an abstract standard of full-protocol delivery.

The protocol delivers four practical revisions and one new precondition arising from the West Africa analysis: a mandatory governance pre-agreement, an explicit data capture capacity requirement, instrument rationalisation, and fidelity and flow reporting obligations. These revisions strengthen the protocol's transferability and its value as a research instrument. Future work should replicate the protocol across diverse ecosystem types, governance arrangements, and geographic contexts to extend the bounds of its applicability, and should develop the co-engagement construct into a formal theoretical contribution to the ecosystem knowledge-production literature.

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Ethics Declaration

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AI Declaration

The tool Claude was used for graphic design in figure 3 and cross- checking references.

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