From Scientific Recognition to Scientific Explanation

Organising Investigation of Long-Term Military Environmental Contamination

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Overview 2 · 15-minute presentation · English

1 Opening

Speaker text · 0:00–0:59

The preceding seven contributions described a scientist–AI research system. This final contribution examines a difficulty that runs through all of them: how do we organise investigation when the object itself is still incompletely understood?

We can possess accurate measurements, substantial archives, and competent disciplinary explanations while remaining uncertain about how the observed manifestations belong together. We may not yet know whether we are dealing with one developing process, several interacting processes, or observations whose apparent connection will disappear under examination.

The Scientific Recognition Architecture addresses this situation. The article develops its methodological argument; Operational Specification Version 1.0 translates that argument into research requirements. The unfinished book explores its implications and difficulties. These materials propose an architecture for application and evaluation. They do not demonstrate that it has already succeeded in an empirical project. [8–10]

2 Scientific Recognition

Speaker text · 0:59–2:04

Scientific Recognition here means progressively making an empirical object scientifically recognisable. We clarify its working boundaries, relationships, temporal development, and remaining uncertainty. The term does not mean approval of a researcher by a scientific community.

This distinction matters after Contribution 2, which examined authorship, control, and institutional incentives. There we asked whether attention serves the problem or organisational reproduction. Here we ask what has become recognisable about the object through investigation. A recognised author may still investigate an insufficiently recognised object. [2, 8]

Scientific Explanation addresses how the process operates and why particular outcomes occur. Recognition and explanation interact, but they are distinguishable achievements. We may establish a recurring pattern without establishing its mechanism. We may also possess a useful local explanation without knowing how far it belongs to the larger process.

The distinction allows us to describe progress without claiming more explanatory certainty than the evidence supports.

3 Knowledge before recognition

Speaker text · 2:04–3:10

Contribution 7 required the integrated system to preserve connections between questions, sources, hypotheses, observations, and decisions. The present contribution explains why that requirement reaches beyond information management. The relationships can change what we understand the object to be. [7]

A soil measurement, a water observation, and an archival record each answer particular questions. Bringing them into one database does not establish their empirical connection. It also does not show that the project boundary adequately represents the developing process.

This is knowledge before sufficient recognition: we know components, but their organisation remains partly unresolved. Additional evidence may clarify a relationship or reveal that our original question grouped unlike processes together.

Our assessment therefore asks what changed in the scientific description of the object. Did a boundary become better justified? Did a previously assumed connection fail? Did an observation acquire a different significance? These are specific gains that can precede a mature explanation.

4 A continuing research example

Speaker text · 3:10–4:15

Consider a hypothetical situation for the proposed Vietnam investigation. An archival record identifies a candidate storage or application location. Later soil and water observations are available nearby. We want to know what relationships, if any, connect them.

Contribution 5 requires us to separate a documented statement from a reconstruction, inference, or prediction. Contribution 6 requires an explicit purpose for each field observation. These standards prevent the example from becoming a completed contamination history merely because its components fit a plausible narrative. [5, 6]

We begin by examining place names, dates, methods, and source dependencies. We ask what later changes to drainage or land use could matter. We retain alternative sources and the possibility that the observations do not belong to one process.

This example is a design illustration. It reports no particular Vietnamese finding. Its purpose is to show how recognition develops through justified connections and corrected assumptions.

5 The Pre-Theoretical Domain

Speaker text · 4:15–5:24

The Pre-Theoretical Domain does not mean an absence of theories. Researchers enter with disciplinary knowledge, causal ideas, models, and working assumptions. What may be missing is a sufficiently mature explanation of the object being investigated. [8, 9]

Contribution 4 established hypotheses as provisional instruments. Contribution 6 showed that theory already directs site selection and observation. There is no contradiction. Preliminary explanations help us decide where to look. Their evidential limits determine how much authority they should exercise over the definition of the object. [4, 6]

The later book draft makes this interaction particularly explicit: explanation accompanies inquiry from the beginning, while recognition continues within explanatory work. We should therefore avoid presenting the architecture as a rigid timetable in which observation ends before explanation starts. [10]

The requirement is that an early explanation remain open to evidence that changes its scope, mechanism, or proposed object. A useful hypothesis must not become an unexamined boundary on what investigation can recognise.

6 The Relational Field

Speaker text · 5:24–6:31

In our example, we organise the proposed relationships between the historical record, candidate location, environmental compartments, and observations. This developing organisation is the Relational Field.

Contribution 5 supplies the necessary discipline: the origin of a claim, its checking procedure, and confidence remain distinguishable. The specification adds an explicit requirement to separate empirical association from inferred causality and retain contradictory relationships. [5, 9]

A spatial correspondence may justify further investigation without establishing transport. A temporal sequence may suggest a pathway without proving that pathway. Similar analytical results may reflect a common source, separate inputs, or limitations in the comparison.

The relational record must show which connection has been observed, which has been proposed, and which remains unsupported. It may reveal a relevant receiving area outside the initial project contour. If we cannot investigate that area, the unresolved relationship still belongs in the record. The limits of our capacity do not settle its scientific significance.

7 Process Morphology

Speaker text · 6:31–7:36

Contribution 4 introduced morphology as a way of developing hypotheses from fragmented manifestations. Here Process Morphology describes the emerging form of the process that our relationships make recognisable: distributions, sequences, transitions, and changing configurations. [4, 8]

In the illustrative case, comparisons could reveal a pattern associated with particular locations or observation periods. Its value lies in making a more specific question possible. We can ask which mechanism would produce the pattern and what evidence would distinguish that mechanism from alternatives.

We must also separate change in the environmental process from change in our description. A revised map may reflect a newly observed pathway, corrected coordinates, or an actual change in the territory. These possibilities require different evidence.

Morphology therefore helps organise explanation without certifying it. An increasingly coherent representation can still contain untested connections. The record should preserve those connections as questions, even when the overall pattern becomes persuasive.

8 Explanatory possibilities and testing

Speaker text · 7:36–8:42

Suppose our example suggests movement between a candidate source area and a receiving water body. One explanation proposes transport along the identified drainage connection. Another proposes independent local inputs. A third questions whether historical and modern locations were correctly matched.

These explanations do not deserve equal confidence by default. Their premises, compatibility with evidence, and testable consequences determine their standing. Contribution 6 asks us to select observations that discriminate between them. Contribution 4 requires us to revise or reject hypotheses when appropriate. [4, 6]

A stronger explanation addresses the relevant pattern through supported mechanisms, survives meaningful comparison with alternatives, and states where its account applies. Coherence alone is insufficient.

Morphological Cognitive Openness preserves the possibility of correction while the object remains incompletely recognised. It does not require indefinite indecision. We can adopt the best-supported explanation for a bounded task, identify remaining uncertainties, and continue testing as new observations become available.

9 Persistent and pathological uncertainty

Speaker text · 8:42–9:47

Contribution 5 examined pathological uncertainty: obscured source histories, mixed evidential statuses, and concealed gaps can prevent us from assessing claims. This is distinguishable from uncertainty that persists because the object continues to develop or because better recognition reveals additional relationships. [5]

In the example, clarifying the candidate location may expose an unresolved period of land-use change. A well-designed observation may weaken one pathway while making another worth examining. One uncertainty has decreased; another has become more clearly formulated.

That can constitute progress. It requires a specific account of what changed. Simply reporting that everything is complex does not provide such an account.

The architecture organises work while explanation remains incomplete. It requires uncertainty to remain explicit and connected to research decisions. Our task is to distinguish a gap that can be addressed now, a question requiring different expertise, and an uncertainty that the current project cannot resolve.

10 Scientific Navigation

Speaker text · 9:47–10:49

Scientific Navigation means maintaining a justified direction of inquiry while understanding changes. It makes the next step an explicit decision rather than a retrospective story of inevitable progress.

In our example, an uncertain location may make another archival check more useful than immediate sampling. A plausible location with competing transport explanations may justify a targeted field comparison. New evidence may show that a planned analysis would add little to the question.

Contribution 3 established responsibility to the problem. Contribution 7 connected that responsibility with decisions under limited resources. Together they require us to state why we proceed, change direction, or stop. [3, 7]

Navigation cannot guarantee discovery. It can preserve the grounds of a decision and the alternatives left unexplored. A change of direction becomes a scientific result when its reason is documented and its consequences for the object are made clear.

11 The scientist–AI contribution

Speaker text · 10:49–11:51

Contribution 1 defined the scientist–AI system as the operative cognitive configuration. Its relevance here is the ability to assist comparison across documents, languages, and disciplinary descriptions while maintaining a visible record of uncertainty. [1]

AI can propose alternative connections, identify incompatible descriptions, and help formulate observations that would challenge a preferred account. The expert checks consequential source passages and decides which suggestions have a defensible scientific basis.

Contribution 2 directs attention toward control of conclusions. Contribution 3 retains human accountability for acceptance, publication, and application. The same requirements apply when an apparently convincing reconstruction is produced quickly. [2, 3]

The Scientific Recognition Architecture does not require AI. Our integrated standard is an AI-assisted implementation of its principles. Its value must be evaluated through actual investigations. More suggestions or faster text production do not alone show that the object has become better understood.

12 Operational Specification Version 1.0

Speaker text · 11:51–12:58

Version 1.0 turns the methodological position into operational requirements. Participants accept a common organisation of inquiry without being required to agree on a particular explanation. Initial object definitions and questions remain revisable. Integration occurs during the work, rather than only when separate reports are assembled. [9]

We propose implementing these requirements through the records described in Contributions 5 and 7: source context, claim assessments, hypothesis histories, observations, and consequential decisions remain connected. The specification organises this common work while leaving disciplinary methods to the tasks they must address. [5, 7]

The architecture itself remains open to evaluation. We must record difficulties, unnecessary procedures, and cases where it fails to improve investigation. Agreement with its principles does not establish successful implementation.

The decisive final question is what became scientifically recognisable through the project. That answer can include a corrected boundary, a rejected connection, a better-supported explanation, or a precisely identified unresolved relationship.

13 What the next investigator inherits

Speaker text · 12:58–13:59

Contribution 7 required continuity between projects. The book draft develops this through scientific inheritance: later researchers receive conclusions more easily than the conditions, uncertainties, and abandoned alternatives that produced them. [7, 10]

Our example may remain scientifically active after the pilot ends. Another group needs to know why a location was selected, which links were checked, which results were inconclusive, and what we lacked the capacity to investigate. The usable outcome includes this state of recognition.

The book also examines interventions that change the object. A later investigation must distinguish environmental development from changes associated with deliberate remediation or altered use. Research-informed actions can themselves enter the history requiring explanation. [10]

Administrative completion closes a project. It does not close the object. Preserving an inspectable account allows the next researcher to correct our representation and continue from its remaining questions.

14 Recognition and explanation in one programme

Speaker text · 13:59–15:00

The eight contributions belong to one programme. Contribution 1 defines the scientist–AI configuration. Contribution 2 examines control and authorship. Contribution 3 states responsibility to the problem. Contribution 4 develops competing hypotheses. Contribution 5 separates evidence and uncertainty. Contribution 6 organises field verification. Contribution 7 connects these functions into a working cycle. [1–7]

The present contribution explains why that cycle must allow the definition of the object itself to develop. Preliminary explanations guide inquiry. Justified relationships clarify the process. Discriminating observations support or reject mechanisms. Mature explanations remain bounded and correctable.

We can begin before understanding is complete. What we must preserve is the possibility that the object will change our questions, boundaries, and explanations.

Our obligation is to leave the next state of Scientific Recognition better grounded and more usable than the one we inherited.

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