

The Fourteen-Layer Architecture as a Form of Transdisciplinary Synthesis

Companion Paper on Methodology to the Working Paper ‘Animal, Human, Industry’ v0.2

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Preface

This Companion Paper accompanies the Working Paper “Animal, Human, Industry” v0.2. It reflects on the methodological form in which the Main Paper is written — the Fourteen-Layer Architecture — as a synthesis form in its own right, beyond established transdisciplinary methods.

The Companion Paper can be read independently of the Main Paper. It is intended as a methodological foundation: what does a layer architecture accomplish, what does it not; how does it relate to consilience arguments after Whewell and Wilson; how to the method of intellectual-historical syntheses; how to social-scientific mixed-methods research. At the same time it will serve as an anchor for future transdisciplinary research from the same workshop line that applies the same architecture to other questions.

The paper is a proposal, not a finished methodology. It makes visible a form that has emerged in practice, and examines whether this form is methodologically tenable.

1. The problem of disciplinary fragmentation

Most contemporary major questions — climate crisis, artificial intelligence, pandemic policy, food systems, energy transition, animal production — elude the single discipline. They are not “the question of climate science,” “the question of AI ethics,” “the question of animal ethics.” They are complexes in which natural-scientific, social-scientific, economic, ethical, political, and cultural strands are inextricably entangled.

The established institutional answers — interdisciplinary research consortia, mixed-methods studies, sustainability science, transformative science — accomplish a great deal, but they typically operate with a discourse center, a leading paradigm, to which the other disciplines are brought. Climate research with economic components. Bioethics with philosophical components. AI research with socio-political components.

What rarely exists: a synthesis form in which several disciplines work *independently alongside each other*, each in its own methodological rigor, and the convergence or divergence of findings *between* the layers is treated as an argument in its own right. It is this form that the Main Paper practices and that this Companion Paper theoretically grasps.

2. What a layer is

In the sense of this architecture, a layer is defined by:

Methodological autonomy. Each layer works with the methods regarded as state-of-the-art in its discipline of origin. Layer 1 (paleoanthropology) works with fossil-archaeological methods, sampling controls, dating techniques. Layer 5 (nutritional epidemiology) works with prospective cohort studies, RCTs, Mendelian randomization. Layer 11 (ethics) works with philosophical argumentation, conceptual analysis, justification structures. The methods are not blended; the disciplinary boundary remains recognizable.

Its own evidence base. Each layer grounds its findings in sources regarded as reliable within the respective discipline of origin. Source critique is disciplinary: what counts as a serious study in genetics differs from what counts in ethnology. A layer architecture respects these differences.

Its own finding-character. Layers produce *their own* findings that are not contained in the findings of other layers. A layer is not a repetition of a previous one from a different angle; it delivers new information.

Bridges to other layers. Layers communicate via explicitly declared bridges (see Section 4). A bridge is a connection between a claim of one layer and a claim of another, with documented relation-type (supporting, calibrating, tense, additive, analogous).

3. The architecture of the Fourteen-Layer Paper

The Main Paper organizes its fourteen layers into three parts plus two extension layers:

Part I — Natural History and the Body (Layers 1–4) - Layer 1: Evolutionary Anthropology - Layer 2: Comparative Anatomy and Physiology - Layer 3: Biochemistry of Meat Consumption - Layer 4: Genetic Adaptations

Part II — Science and Industry (Layers 5–8, plus 13) - Layer 5: Nutritional Science - Layer 6: The Dairy Complex - Layer 7: Pathogens and Disease - Layer 8: Industry and Political Economy - Layer 13 (v0.2 extension): Aquaculture and Fisheries

Part III — Taboo, Affect, Synthesis (Layers 9–12, plus 14) - Layer 9: Affect and Taboo - Layer 10: Anthropology of the Taboo Boundary (Cannibalism) - Layer 11: Ethics and the Animal Question - Layer 12: Marxist Synthesis - Layer 14 (v0.2 extension): Alternatives and Pathways

The ordering follows no compelling logic. It reflects a pedagogical-rhetorical sequence: from the corporeal-natural-historical, through the industrial-structural, to the ideological-ethical. Another ordering would be possible. What matters: each layer stands on its own, and the sequence organizes not the content but the reading path.

4. Bridges — the actual synthetic argument

The methodological pointed claim of the architecture lies not in the individual layers but in the bridges between them. A bridge is a declared relation between a claim of one layer and a claim of another, with five possible types:

Supporting bridge. Two layers arrive at the same conclusion through independent paths. Example: Layer 1 (paleoanthropological: meat consumption was not a dominant selection pressure for brain enlargement) and Layer 4 (genetic: AMY1 expansion is a Holocene adaptation to starch) support each other. Both paths are methodologically independent; their convergence carries information.

Calibrating bridge. One layer relativizes or refines the finding of another. Example: Layer 5 (EPIC-Oxford shows elevated stroke rate in vegans alongside lower CHD rate) calibrates the pro-vegan finding of Layer 5 (AHS-2 shows lower all-cause mortality). This is not contradiction but refinement.

Tense bridge. A layer stands in unresolved tension with another. Example: Layer 11 (ethical arguments for vegan universalism) stands in tension with Layer 12.5b (subsistence pastoralism).

The tension is not hidden; it is declared and resolved in the synthesis through differentiating limitation.

Additive bridge. Two layers document independent mechanisms that add together. Example: Layer 3 (TMAO as cardiovascular mechanism) and Layer 3 (Neu5Gc as inflammation mechanism) are biochemically independent; their effects add together.

Structurally analogous bridge. Two layers show the same structural pattern in different domains. Example: Layer 7 (BSE through meat-and-bone-meal feeding — ruminants eating ruminants) and Layer 10 (Kuru through endocannibalism — humans eating humans) show structurally analogous the same prion accumulation pathology under species-boundary crossing.

The bridges are machine-readably documented in the MYZEL knot set. They are the *actual* synthetic argument of the paper. Whoever wishes to contest bridges must contest concrete bridges, not the layer-overall-impression.

5. Convergence as argument — Wilson, Whewell, and the concept of consilience

The methodological root of this argumentation lies in the concept of *consilience* introduced by William Whewell in 1840 and popularized by E. O. Wilson in 1998 — the agreement of independent evidence lines.

Whewell's classical formulation (William Whewell, *The Philosophy of the Inductive Sciences, Founded upon Their History*, London: John W. Parker, 2 volumes, 1840; 2nd expanded edition 1847): "If a hypothesis set up to explain one class of phenomena turns out to be sufficient to explain another class of phenomena of different kind, without the hypothesis having to be specifically modified for this purpose, then this is a consilience of inductions, and it is a proof of the truth of the hypothesis."

Wilson's modernized form (Edward O. Wilson, *Consilience: The Unity of Knowledge*, New York: Knopf, 1998): scientific truths become the more credible the more independent research lines independently support them. Wilson overstretched this idea in his book in problematic ways toward a reductionist program. But the methodological core insight remains: convergence of independent findings from different methods is an argument in its own right.

The Fourteen-Layer Architecture operationalizes precisely this insight. It turns convergence not into a rhetorical effect but into a declared methodological structure. Every bridge is a small consilience; the totality of bridges is the large one.

The difference to the Wilson tradition: the layer architecture does not reduce. It does not claim that Layer 1 (anthropology) is "fundamentally" Layer 4 (genetics). It respects the methodological autonomy of each discipline and seeks convergence *despite* different methodology, not *because of* a unified one.

6. What the architecture accomplishes — and what it does not

It accomplishes: - Structured synthesis without disciplinary overreach - Explicit bridges instead of implicit entanglement - Reproducibility through the MYZEL knot set - Convergence-based epistemic strength - Fairness toward counter-evidence (each layer has its own source critique) - Falsifiability: each layer and each bridge is individually attackable

It does not accomplish: - Deep single-discipline innovation: a layer is never *the* original research in its discipline but a synthesis of the findings there - Quantitative modeling across the whole: the architecture is primarily narrative-argumentative - Methodologically consensual disciplinary boundaries: what belongs in Layer 5 vs Layer 6 vs Layer 7 is a convention of this architecture, not a naturally given separation - Proof in the strict sense: consilience raises confidence; it does not deliver certainty

These limitations are not defects, but properties. An architecture that could do everything would be unfocused.

7. Relation to related synthesis forms

Systematic review (Cochrane tradition). The Fourteen-Layer Architecture is *not* a systematic review. It does not sum up study by study within a discipline but transcends disciplinary boundaries. It can contain a systematic review as *one* layer (e.g., in Layer 5 on nutritional epidemiology), but it is not itself one.

Mixed Methods (Creswell, Tashakkori & Teddlie). The architecture shares with Mixed Methods the concern for methodological plurality, but differs through the absence of an overarching research design. Mixed Methods integrate qualitative and quantitative data within one research question; the layer architecture places different disciplinary findings alongside each other without forcing a unified data model.

Transdisciplinary research after Nicolescu, Klein, Mittelstraß. The architecture is transdisciplinary in the sense of the Nicolescu tradition: it takes reality levels seriously that cannot be grasped within a single discipline. It differs through its explicit layer structure — Nicolescu’s “between-, within-, beyond-disciplinarity” is methodologically suggestive but operationally vague. The layer architecture is operationally precise.

Intellectual-historical syntheses (Foucault, Charles Taylor, Hans Blumenberg). The architecture shares with this tradition the concern for large synthetic arcs. It differs through the explicit commitment to evidence-basedness in each layer — where Foucault writes a narrative genealogy, the architecture writes a cross-sectional convergence. The methods are complementary, not competing.

Sustainability science / integrated assessment models. These fields attempt something similar in quantitative form, with coupled models from climate, economic, and social research. The layer architecture is their narrative complement: it can incorporate the findings of such models without itself offering a quantitative overall modeling.

8. The ETHOSLAB pre-examination as methodological element

Institutional research would pass through an ethics commission before work begins. Privately financed independent research does not have this institutional anchor. The ETHOSLAB pre-examination in the present project is the methodological substitute: a documented self-pre-examination against a Hansson nine-point catalog, before research begins, with declared harm risks and mitigation strategies.

The model corresponds to the self-pre-examination recommendations for independent research as suggested, for instance, by COPE (Committee on Publication Ethics) and the Open Science Framework. The “Hansson-oriented nine-point list” used in the Main Paper is a self-synthesis from several writings of Sven Ove Hansson on research ethics and epistemic responsibility; it is not published by Hansson himself in this form, but operationalizes his methodological principles as a checklist. The pre-examination is not institutionally certifiable, but it is transparent, reproducible, and documented.

The ETHOSLAB pre-examination should be understood as a methodological component of any layer architecture paper. It makes pre-assumptions, risks, and bias sources explicit instead of leaving them under the rug.

9. The MYZEL knot set as reproducible layer balance

The MYZEL knot set in the present project is the machine-readable form of the layer architecture. It contains: - Definitions of central terms with sources - Claims per layer with sources, confidence,

and falsifier - Bridges between claims with relation type and reasoning - Convergence analysis per layer - Hansson nine-point check - Falsifier list

The purpose of this additional JSON document is not only reproducibility. It is also connectivity for machine further processing — other researchers can import the knot set, replace or supplement individual claims, propose new bridges, without having to alter the narrative text of the paper. This is a specific form of Open Science practice that is missing in most humanistic synthesis papers.

The MYZEL knot set is not the paper. But it is the condensed form in which the paper becomes available for machine and collective further work.

10. The validity claim of the architecture — three stages

This methods reflection raises three graded validity claims:

Stage 1 — Practicability. The Fourteen-Layer Architecture works for an individual person without institutional infrastructure, within a reasonable time (the present project arose in a series of writing tranches over several weeks). It is therefore not institutionally bound.

Stage 2 — Methodological transparency. The architecture makes its methodological steps visible: ETHOSLAB pre-examination, source critique, layer separation, bridge declaration, convergence analysis. Where other synthesis forms leave much implicit, the architecture makes it explicit.

Stage 3 — Epistemic strength. If consilience after Whewell/Wilson is an argument in its own right, then the declared bridge structure is a strong form of this argument. Whoever wishes to disagree must contest concrete bridges — a form of argumentation considerably more concrete and testable than most meta-disciplinary disputes.

11. What is to come next

This methods reflection is v0.1. A v0.2 would need to add at least three things:

First, a systematic reflection on the limits of the architecture. Which research questions are *not* suited to a layer architecture? The architecture probably works only for questions whose natural-scientific, social-scientific, and normative strands all have substantial findings. A purely technical-mathematical question (proving a theorem) needs no layer architecture. A purely normative question (what is justice) needs none either.

Second, a comparison with other practiced examples. Donna Haraway's *Companion Species Manifesto*, James C. Scott's *Against the Grain*, David Graeber and David Wengrow's *The Dawn of Everything* — all three are transdisciplinary syntheses that, in different forms, wrestle with similar problems. A worked-out methodology would have to take them seriously as comparison cases.

Third, a systematic treatment of bias sources in layer selection. Which layer gets included, which gets left out? In the present Animal-Human-Industry paper there were nearly fourteen layers; a study on, say, AI governance would have a different cut. Who decides this? With what criteria? The Companion Paper has no complete answer to this; rather, it makes the question visible.

12. Closing thesis

The Fourteen-Layer Architecture is a specific synthesis form, arising in practice, for transdisciplinary questions. It is *not* a universal methodology. It is *one* tool among several, with nameable strengths (convergence-based strength, methodological transparency, reproducibility) and weaknesses (no original research in single disciplines, no quantitative overall modeling).

It is suited to those questions that cannot be resolved by any single discipline, whose strand-entanglement, however, must be grasped beyond institutional research consortia. It is the

method that a one-person workshop has available for complex questions, without falling into either generalism or disciplinary imprisonment.

Its validity claim is limited but precise. It is good at what it is good at. It is not everything. But it is a form in which serious synthesis work remains possible in non-institutional contexts — which, given the growing incompatibility of institutional research structures with transdisciplinary major questions, is no small argument.

Appendix — Practical steps for applying the Fourteen-Layer Architecture

For other researchers who wish to address similar transdisciplinary questions with this architecture, a pragmatic sequence:

Step 1: Formulate the research question. Clear, as falsifiable as possible. Note: which disciplines would have to touch it for serious engagement to be possible?

Step 2: Sketch the layer list. Which disciplines deliver independent findings? Make a list, from 6 to a maximum of 14 layers. More is usually a symptom of overreach.

Step 3: ETHOSLAB pre-examination. Go through the Hansson nine-point catalog. Declare your own preformation. Name mitigation strategies for bias risks.

Step 4: Per layer: examine the source base. At least five to ten peer-reviewed sources per layer. Document industry funding. Treat marginal positions separately.

Step 5: Write the layers. Each layer in its own right, in the methodology of its discipline. Place disciplinary cleanness above narrative elegance.

Step 6: Declare bridges explicitly. Per bridge: which two claims, which relation type, which justification?

Step 7: Create the MYZEL knot set. Definitions, claims, bridges in JSON, with sources and confidence.

Step 8: Convergence analysis. Where do multiple independent layers converge? Where do they not? What does the convergence or non-convergence mean?

Step 9: Source critique annex. Per marginal and industry source a separate section. What entanglements, what methodological weaknesses?

Step 10: Pamphlet as people's version. If the research is politically relevant: condensed, sharpened version for broader accessibility. With explicit demarcations against right-wing or reactionary appropriations.

Step 11: Companion paper on methodology. This methods reflection itself — it too is part of a layer architecture output.

Step 12: Visualizations. Layer diagram, evidence map, voices topology. SVG, low-barrier.

Step 13: Bilingualization. If the research is to be internationally findable: at least EN abstract and keywords.

Step 14: Submission. Zenodo or comparable Open Access repository, with cover note, checklist, DOI assignment.

These fourteen steps are not prescription. They are the skeleton that the present Animal-Human-Industry project uses and that other projects can adapt.

Mini-ETHOSLAB pre-examination of this Companion Paper

The Companion Paper postulates a method form (Fourteen-Layer Architecture) that itself demands an ETHOSLAB pre-examination as a methodological element (Section 8). It would be inconsistent to apply this element only to the accompanied Main Paper but not to the methods reflection itself. The following mini pre-examination closes the methodological gap.

ME-1 Research subject

Question: What methodical form is suited to the transdisciplinary synthesis of complex major questions outside institutional research consortia?

ME-2 Conflicts of interest

Conflict	Status	Mitigation
The researcher's own layer architecture project is being propagated as a generalization candidate	Present — the researcher developed the tool herself and benefits from its dissemination	Openly declared; validity claim in Section 10 explicitly three-stage limited; relation to competing synthesis forms fairly treated in Section 7
Confirmation tendency for the Main Paper	Present — whoever develops a method tends to defend its application even when it is overstretched	Section 6 names explicitly what the architecture does <i>not</i> accomplish; Section 11 marks open tasks
Institutional affiliation	Not present	—
Economic interests	Not present	—

ME-3 Harm potential

Risk	Probability	Severity	Mitigation
Other researchers adopt the architecture uncritically for unsuitable questions	Medium	Low	Section 11 names application limits; Appendix gives concrete 14-step instructions with sort-out hints
The architecture is positioned as a universal method against institutional research	Low	Low	Section 7 presents the architecture as <i>complementary</i> , not <i>competing</i> with institutional forms

ME-4 Methodological risks

Risk	Mitigation
Methods reflection without its own methods reflection (infinite regress)	Section 12 declares the regress stop: this methods reflection is itself not companion-paper-supported but ends with declarative validity limitation.
Comparison with related synthesis forms superficial	Section 7 names Cochrane, Mixed Methods, Nicolescu, Foucault, sustainability science — a complete systematic comparison is a v0.2 task (see Section 11)
Bias in layer selection in the Main Paper	Section 11 makes the problem explicit; a complete solution is pending

ME-5 Hansson-oriented nine-point self-check

1. Falsifiable? Yes — the architecture can fail in concrete application cases (e.g., for purely technical-mathematical questions, see Section 11).
2. Method-appropriate? Yes — methods reflection is the form appropriate to the question.
3. Data-verifiable? Yes — comparison cases (Haraway, Scott, Graeber/Wengrow) are public.
4. Competing hypotheses? Yes, Section 7.
5. Effect sizes? n/a for a philosophical-methodological reflection.
6. Replication status? n/a; but: the Companion Paper makes the architecture reproducible (Appendix).
7. Own position declared? Yes, Section 10 Stage 1.
8. Reproducible? Yes (Markdown public, CC BY 4.0).
9. HARKing avoidance? Yes — the methodology was developed during the Main Paper, not adjusted retroactively to justify Main-Paper conclusions.

ME-6 Release

Status: This methods reflection is released under the following conditions: 1. Validity claim three-stage limited (Section 10). 2. Comparison with competing synthesis forms explicit (Section 7). 3. Application limits named (Section 11). 4. Own methodology applied to this methods reflection (this Mini-ETHOSLAB section). 5. Mini-MYZEL knot set attached (follows below).

Mini-MYZEL knot set of this Companion Paper

The Companion Paper postulates the MYZEL knot set as reproducible layer balance (Section 9). This methodological element too includes itself. The following condensed form makes the methodological claims of the Companion Paper machine-readable.

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Note on the regress stop

This methods reflection is itself not companion-paper-supported. A methods reflection on the methods reflection would continue the regress without new gain in knowledge. The regress ends here with declarative validity limitation: the Companion Paper makes its own methodology applicable to itself (Mini-ETHOSLAB + Mini-MYZEL above), but claims no further stage.

Footer

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