ADL

Architecture of Life

Application Examples

Operationalization, Calculation Procedures, and Test Designs

Companion volume to the Mathematical Foundation, Version 2.0

Observation	Relationship	Effect	Evaluation	Feedback

Elements - Relationships - Effects - Time - Feedback

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14 July 2026

Project DOI: 10.5281/zenodo.21209954

1. Purpose of This Companion Volume

The mathematical foundation defines the architecture. This volume shows how that architecture can be turned into concrete, computable, and testable applications.

Core response to the most frequent criticism

ADL is not a completed universal theory. It is a model architecture. Its scientific robustness emerges only when variables, relationships, references, boundaries, data, and test rules are specified in advance for a concrete field.

Each example therefore separates four levels:

Level	Question	Mathematical object
Observation	What was measured or encoded?	x_t or y_t
Relational model	What acts on what within the model?	A_t and Psi
Evaluation frame	Against what is the situation assessed?	Theta_t = (z, w*, G, scales, weights)
Decision	Which real change is permitted?	Order A proposes; Order M selects u_t

Unless explicitly stated otherwise, the numerical values in the following examples are synthetic demonstration data. They illustrate calculation logic and test design, not already established empirical effectiveness.

What an application example can prove - and what it cannot

- It can show that the quantities can be operationalized and that the calculations are reproducible.
- It can show which assumptions must be made visible and which alternatives must be compared.
- It does not yet prove that the selected variables are causal, complete, or transferable to other fields.

2. The ADL Application Cycle

An application does not begin with the formula, but with an epistemic contract.

Step	Mandatory question	Result
1. System boundary	What belongs inside - and what explicitly does not?	V, time period, responsible parties
2. Variables	How are states observed or estimated?	x_t, units, uncertainty
3. Relationships	Does an edge represent correlation, prediction, mechanism, or design?	A_t and edge legend
4. Reference frame	Which goals, limits, scales, and weights apply?	Theta_t
5. Evaluation	How large are state, effect, boundary, and instability deviations?	J and B
6. Candidates	Which interventions, including doing nothing, are admissible?	U_t and costs
7. Feedback	Did the system, the model, or only the frame change?	D^x, D^A, D^Theta

Core calculation

$J = \alpha r_x^T Q r_x + \beta r_w^T R r_w + \gamma P_G(x) + \delta r_{\Delta}^T T r_{\Delta} \quad | \quad B = 1 / (1 + J)$

Reading rule

A smaller J only means that, under the disclosed frame Theta, the situation fits the chosen reference more closely. It does not automatically imply truth, justice, or moral correctness.

Minimum comparison

Every serious application must compare ADL with at least one simpler baseline, such as the status quo, a persistence model, independent single-variable models without a relational graph, or an alternative network or dynamical model.

3. Application 1 - Learning and Exam Preparation

Question: How can we distinguish whether a learning problem results from missing knowledge, loss of energy, or insufficient focus?

Element	Meaning	Measurement idea (0 to 1)
Knowledge	Mastered subject matter	Share of standardized tasks solved
Energy	Available capacity	Self-rating plus working duration
Focus	Goal-directed attention	Share of uninterrupted learning time

Initial state and reference

x_t = (0.40, 0.70, 0.30)^T z = (0.80, 0.60, 0.70)^T

The relationship matrix models how knowledge, energy, and focus influence one another. It is not an automatically proven causal structure, but a hypothesis to be tested.

A = [[0, 0.3, 0.5], [-0.2, 0, 0.2], [0.4, 0.3, 0]]

Block	Before intervention	After intervention
State deviation J_x	0.485000	0.285600
Effect deviation J_w	0.101800	0.066976
Boundary violation J_G	0	0
Instability J_Delta	0.003750	0.008400
Total J	0.590550	0.360976
Balance index B	0.628713	0.734767

Interpretation
The simulated intervention improves the modeled total value even though short-term instability increases. This is plausible: a targeted restructuring may initially create movement while still reducing the distance from the reference.

4. Test Design for the Learning Application

Intervention

Order A simulates several candidates. Order M may select, for example: more repetition (+0.08 knowledge), slightly lower total load (-0.02 energy use), and a clearer focus structure (+0.10 focus).

u_t = (0.08, -0.02, 0.10)^T x_(t+1) = (0.48, 0.68, 0.40)^T

What would have to be tested in reality?

Hypothesis	Measurement	Indication of refutation
Focus affects learning success	Task performance after focus blocks	No difference from randomized scheduling
Energy is non-linear	Performance across load levels	Same slope without saturation
ADL ranking helps	Prospective comparison of candidates	Simpler baseline repeatedly selects better
Relationships are stable	Several weeks and exam types	Edges change without control

Concrete benefit

ADL forces the statement “I cannot study” to be decomposed into distinguishable causes. This makes interventions comparable: more material, less load, better structure, or doing nothing.

Boundary
A high B value does not automatically mean that the person is healthy, motivated, or successful. It only shows a closer fit to the selected learning references.

5. Application 2 - Conflict Within a Family

Question: How can a conflict be examined without prematurely declaring one person to be the problem?

Variable	Initial	Reference	Observation rule
Clarity	0.45	0.80	Statements are reproduced accurately
Respect	0.35	0.80	No devaluation or threat
Trust	0.40	0.75	Commitment and behavior correspond
De-escalation	0.30	0.70	The response reduces rather than increases tension

Metric	Before	After structured discussion
J_x	0.607500	0.125000
J_w	0.059656	0.015250
J_Delta	0.022500	0.093750
Total J	0.689656	0.234000
B	0.591836	0.810373

Why instability increases
A conflict may initially move more strongly when unspoken points are clarified. ADL does not automatically treat change as negative; the instability term measures only its magnitude.

6. From Dispute to Testable Intervention

ADL step	Example
Observe	“You deliberately embarrassed me.”
Separate	Observation, interpretation, effect, and desired boundary are separated.
Examine relationship	Which statements increase or reduce respect, trust, and de-escalation?
Form candidates	Respond immediately; pause; ask a clarifying question; rule-based discussion; do nothing
Costs and risks	Time, loss of face, renewed escalation, power imbalance
Order M decides	The parties or a responsible person choose the real action.

Possible correction

“I first want to make sure that I understood you correctly. Then I will explain what reached me. We stop as soon as either of us becomes demeaning.”

No moral automaton
The model does not decide who is “good” or “bad.” It makes visible which relationships and effects, under the agreed frame, intensify or reduce the conflict.

Refutation criterion

If ADL-generated candidates repeatedly reduce conflicts less effectively than a simple conversational rule, the additional architecture is not justified for this field.

7. Application 3 - Team Workflow and Case Processing

Question: Is a backlog a quantity problem, a quality problem, or the result of a burdensome relational structure?

Variable	Initial	Reference	Example measurement
Case clarity	0.50	0.85	Complete data at intake
Throughput	0.45	0.75	Completed cases per unit of time
Quality	0.70	0.85	Inverted error and return rate
Load balance	0.35	0.75	Distribution relative to capacities

Metric	Before	After intervention
Total J	0.562790	0.144420
B	0.639881	0.873805

Intervention as a bundle

- Mandatory intake fields increase case clarity.
- Complex cases are distributed by competence rather than only by count.
- Quality is not displaced by pure throughput.
- After two weeks, the actual system movement D^x is checked.

Added value over a single metric
A pure throughput target may improve case numbers while simultaneously worsening quality or workload. ADL keeps several effect blocks visible at the same time.

8. Application 4 - Order A as Decision Assistance

Order A is not the decision-making authority. It generates transparent candidates, forecasts, costs, and uncertainties.

Phase	Order A	Order M
Definition	Detects data gaps and proposes variables	Confirms meaning and system boundary
Simulation	Calculates candidates, baselines, and uncertainty	Defines admissible alternatives and costs
Selection	Shows a ranking or Pareto set	Selects, modifies, postpones, or rejects
Feedback	Updates forecast errors and model indications	Evaluates real side effects and stops if necessary

L_hat_t(u) = E[J(q_tilde_(t+1)(u); Theta_t) | I_t] + lambda_c * Cost(u) + kappa * SD[J | I_t]

Example: Three candidates for a backlog

Candidate	Expected J	Cost	Uncertainty	Note
A: Add capacity	0.31	high	medium	Fast, but expensive
B: Standardize intake	0.35	low	low	Slower, structural
C: Lower target only	0.22	low	low	Apparent improvement through frame shift
0: Do nothing	0.48	0	medium	Baseline

Why candidate C is problematic
A lower value may arise solely because the target is lowered after the fact. Drift decomposition reveals whether the system improved or merely the standard was shifted.

9. Application 5 - Drift Without Moving the Goalposts

The total change is decomposed into three sources: system movement, model update, and frame shift.

D_total = D^x + D^A + D^Theta = -0.08 + 0.06 - 0.23 = -0.25

Component	Meaning in the example	Interpretation
D^x = -0.08	The real situation moves somewhat closer under the old model and frame.	Small genuine improvement
D^A = +0.06	The updated relational model evaluates the same situation more critically.	Earlier structure was too optimistic
D^Theta = -0.23	The target or weighting is lowered.	Most of the improvement is a frame effect

Distinct practical point
ADL prevents organizations from reporting progress when primarily the target definition has been adjusted. Its accounting forces system, model, and standard to be reported separately.

10. Application 6 - Multiscale Modeling and Compression

A stable partial order may become a macro-element - but only if the resulting information loss is measured and accepted.

$$x^{(l+1)} = C\,x^{(l)} \qquad A^{(l+1)} = C\,A^{(l)}\,D \qquad \varepsilon_C = \frac{\|CAx - A^{(l+1)}Cx\|}{\|CAx\| + \varepsilon}$$

Example: Three teams are compressed into one department

Test criterion	Question
Internal dispersion	Do cases within a team behave sufficiently similarly?
Temporal stability	Does group membership remain stable over the validation window?
Out-of-sample error	Does epsilon_C remain small on new data?
Minority structure	Is a rare but decision-relevant case type concealed?

Practical benefit

ADL allows movement between micro, meso, and macro levels without silently assuming that every aggregation preserves the relevant structure.

Boundary
Compression is not neutral. A convenient macro-element may erase exactly those exceptions that carry legal, ethical, or operational significance.

11. Application 7 - Model Learning Under Human Responsibility

A relational matrix may be learned from data, but the meaning of its edges must not be inferred automatically from numerical fit alone.

Layer	Machine contribution	Human responsibility
Estimation	Fits parameters and forecast relationships	Defines admissible data and uncertainty
Interpretation	Suggests recurring dependencies	Determines whether an edge means correlation, mechanism, or design
Validation	Compares out-of-sample errors	Checks whether the model remains legitimate in context
Intervention	Ranks candidate actions	Authorizes or rejects real-world action

Failure mode

A model can become numerically better while becoming conceptually worse: for example, if it exploits a proxy that predicts well but encodes an illegitimate distinction.

ADL requirement
Every learned relationship must carry a declared semantic status, a confidence measure, a validation window, and a responsible human owner.

12. Reproducibility Package

A scientifically reviewable ADL application should disclose enough information for another person to reconstruct the calculation and challenge the choices.

Required component	Minimum content
Data dictionary	Variable name, unit, scale, source, missing-value rule
Graph specification	Node list, edge list, edge meaning, sign, and uncertainty
Reference frame	Targets, boundaries, weights, scales, and responsible authority
Calculation	Equations, parameter values, software version, and random seed
Baselines	At least one simpler competing model or decision rule
Evaluation	Prospective metrics, validation window, and refutation criteria
Decision log	Which candidate was chosen, changed, postponed, or rejected - and by whom

Minimum reproducibility claim

A third party should be able to obtain the same numerical result from the same declared inputs. This is weaker than empirical truth, but stronger than an unverifiable narrative.

13. Pilot Study Design

A first pilot should remain narrow. Its purpose is not to prove universality, but to test whether the additional architecture produces measurable value over simpler alternatives.

Phase	Task	Output
Pre-registration	Define variables, frame, candidates, baselines, and refutation criteria	Frozen protocol
Calibration	Estimate scales and relationships on historical or training data	Initial model
Prospective run	Generate candidate rankings before outcomes are known	Decision record
Outcome measurement	Measure effects, costs, uncertainty, and side effects	Evaluation dataset
Comparison	Compare ADL against baselines	Relative performance
Revision	Separate system drift, model update, and frame change	Versioned model

Recommended success criteria

ADL should only be retained when it improves at least one relevant dimension - prediction, intervention quality, transparency, error detection, or accountability - without creating disproportionate complexity.

Negative result
If simpler methods perform equally well and remain easier to explain, the additional ADL layer should be rejected for that application.

14. Conclusion

ADL becomes a serious application model not through large claims, but through precise specification, numerical reproducibility, and repeatable testing.

In brief

ADL does not automatically describe the world. It provides a testable language in which observation, relationship, effect, reference, boundary, time, model learning, and human responsibility can be separated and reconnected.

The examples demonstrate three levels of usefulness:

Level	Use
Practical	Complex situations are decomposed into testable subquestions
Technical	Effects, deviations, uncertainty, and candidates become computable
Scientific	Assumptions, baselines, and refutation criteria become visible

Division of roles
ADL provides the syntax. Order A simulates and proposes. Order M defines the context and remains responsible for the real decision.

Citation

Yildizhan, M. Selman (2026): *ADL - Application Examples. Operationalization, Calculation Procedures, and Test Designs.* Companion volume to the Mathematical Foundation, Version 2.0. Epoch Creation, Hamburg.

Foundation

Yildizhan, M. Selman (2026): *ADL - Mathematical Foundation of a Multiscale Relational Model of Order.* Working Paper, Version 2.0. Project DOI: 10.5281/zenodo.21209954.

End of Companion Volume - Version 1.0 (English Edition)