

THE SPIRAL ECONOMY

A Recursive Systems Architecture for Economic Freedom,
Regenerative Capacity and Voluntary Social Organization

Core proposition

A coherent higher-order human system increases useful relational capacity while preserving the viable agency of the systems from which it emerges.

Martina Willis

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*The axis is stable. The form is free.
The system is open. The flows return.
Life is the purpose.*

Teaser: What if the problem is architectural?

What if the central economic problem is not simply capitalism versus socialism, markets versus planning, or growth versus degrowth - but the architecture through which value, power, resources and capacity move?

The Spiral Economy proposes a different starting point. Human systems can form higher-order structures without requiring the lower-order units to surrender their viable agency. A person can enter a household without ceasing to be sovereign. Households can form communities without becoming subordinate components. Communities can coordinate through regions and states while retaining meaningful local capacity.

$$\{S_n^1, S_n^2, \dots S_n^k\} + \text{relationship} \rightarrow S_{n+1}$$

The test is not whether the higher layer becomes powerful. The test is whether its emergence increases useful capability at the higher level while avoiding systematic degradation below.

$$\Delta C(S_{n+1}) > 0 \quad \text{and} \quad \Delta C(S_n^i) \geq 0$$

The stronger form requires return. Higher-order organization should not merely pull resources, information and authority upward; it should return capability downward so that constituent systems become more resilient and capable of entering the next cycle.

$$S_n \rightarrow S_{n+1} \rightarrow S_n' \quad \text{with desired condition} \quad C(S_n') > C(S_n)$$

In one sentence

The Spiral Economy asks what economics and society would look like if every higher layer had to demonstrate that it increases the capability of the whole without systematically diminishing the viable agency of the parts.

The framework does not abolish markets, enterprise, ownership, government or technology. It redesigns their relationships so value, authority and capability circulate rather than terminate in permanent accumulation or dependency.

Executive Summary

This paper presents the Spiral Economy as a conceptual systems architecture for regenerative economics and social organization. Its central concern is the relationship between local autonomy and higher-order capability: how can people, households, companies, communities and institutions cooperate to create capabilities unavailable individually without progressively making the underlying participants weaker, more dependent or less sovereign?

The generator

The framework begins with a six-part generator:

$$G = \{ Z, A, T, C, R, I \}$$

Element	Meaning
Z	Local coherent reference or organizing centre
A	Organizing axis or stable purpose
T	Transformation of matter, energy, information, capital, labor or relationships
C	Closure, completion or phase boundary
R	Return and re-expression: outputs become useful inputs to a subsequent cycle
I	Invariant relation preserved through change, especially viable agency and relational capacity in human systems

The recursive Z proposition

Coherent systems are modeled as locally organized nodes, each capable of maintaining a meaningful identity while participating in a larger system. Several nodes at level n can enter relationship and generate a higher-order system at $n+1$. The higher layer is justified when coordination creates useful capabilities unavailable below.

$$\{S_n^1, \dots, S_n^k\} + \text{relationship} \rightarrow S_{n+1}$$

$$\Delta C(S_{n+1}) > 0 \quad \wedge \quad \Delta C(S_n^i) \geq 0$$

The return-of-capacity condition

A higher layer should not merely extract. It should return capability to its constituents. Education should increase the learner's future capacity to learn; healthcare should ideally restore functional capacity; government should increase civic capacity rather than permanently replacing it; capital should remain productively connected to the systems that make future value creation possible.

$$S_n \rightarrow S_{n+1} \rightarrow S_n' \quad \text{and ideally} \quad C(S_n') > C(S_n)$$

Economic implications

- Economic freedom becomes partly a question of material optionality: resilient access to shelter, energy, water, food and community reduces the degree to which survival depends on continuous submission to a single income source.
- Capital accumulation is assessed by circulatory function, not condemned simply because it is large. The relevant question is whether accumulated capital continues to generate useful capacity or becomes terminal extraction.
- Growth can be qualitative: the system crosses a threshold and becomes more capable, not merely larger in throughput.
- Markets remain valuable as distributed exchange mechanisms, but outputs should be designed to become inputs where useful - materially, financially, informationally and socially.

Social and governance implications

- Autonomy without isolation: resilient local nodes voluntarily participate in larger systems because relationship expands capability.
- Subsidiarity: functions should remain at the lowest level capable of performing them coherently and rise only when a higher level demonstrably adds capability.
- Delegated power should include closure and return mechanisms; temporary concentration of authority should not automatically become permanent.
- Collective capacity cannot be maximized by pushing individuals below a protected floor of rights and viable agency.

The demonstrator

SpiralHome is proposed as the smallest practical demonstration unit. Its physical metabolism - energy, water, food, material and waste loops - and its social architecture - presence, relationship, creation, renewal and return - provide a bounded environment in which the theory can be measured rather than merely argued.

Scientific status

The Spiral Economy is presently a conceptual framework and design hypothesis, not an established economic theory or physical law. The equations define proposed relationships and evaluative criteria. Their value depends on whether they produce falsifiable predictions, useful measurements and better designs in real systems.

Abstract

Modern economic and social systems are often organized through linear flows: resources are extracted, transformed, consumed and discarded; labor is exchanged for access to basic security; capital and authority can accumulate; and institutions may gain capability while the individuals and communities beneath them become more dependent. This paper proposes a recursive alternative derived from the generator $G = \{Z, A, T, C, R, I\}$, where Z is a local coherent reference, A an organizing axis, T transformation, C closure or phase boundary, R return and re-expression, and I an invariant relationship preserved through transformation.

The core proposition is that coherent systems can organize recursively across scales without requiring destruction or subordination of the coherent systems from which they emerge. For constituent systems $S_n^1 \dots S_n^k$, a higher-order system S_{n+1} is considered coherent when it gains useful capability while the viable agency of its constituents is not systematically degraded. A stronger condition requires return of capacity: interaction with the higher-order system should ideally leave the constituent system more capable of entering its next cycle. The paper explores implications for economics, markets, capital, governance, social organization and resilient settlement design, and proposes SpiralHome as a bounded demonstrator for empirical testing.

Keywords: recursive systems architecture; regenerative economics; autonomy; subsidiarity; distributed agency; circular value; resilience; SpiralHome; recursive Z; social systems

1. The problem may be architectural

Economic debate is commonly framed as a contest between mechanisms: markets versus planning, public versus private ownership, growth versus degrowth, centralization versus decentralization, capital versus labor. These distinctions matter, yet they may sit one level below a deeper design problem: what is the architecture through which value, resources, information, responsibility and power move?

Many systems remain broadly linear. Resources are extracted, transformed, consumed and discarded. Capital is invested, returned and often accumulated. Authority is delegated to institutions that can persist long after the condition that justified the intervention has changed. At the level of the individual, access to shelter, food and security is strongly mediated by continuous monetary income.

Research question

Can human systems create greater higher-order capability while simultaneously strengthening - rather than progressively weakening - the

autonomy and capacity of their constituent parts?

The Spiral Economy treats this as a systems-architecture question. It does not begin by selecting a political ideology. It begins by examining flow, transformation, closure, return, scale and preserved agency.

2. The Spiral Generator

$$G = \{ Z, A, T, C, R, I \}$$

2.1 Z - local coherent reference

Z is the local organizing reference of a coherent subsystem. It is not necessarily a physical point. In human systems it can describe the maintained organizational identity of a person, household, enterprise, community or institution. The important claim is not that there is one universal centre, but that coherent units can generate and preserve local organizing centres while entering relationships at larger scales.

$$Z_1, Z_2, \dots, Z_n$$

This allows nested organization without requiring nested domination. A person does not cease to be a person because a household exists. A household need not become administratively hollow because a community exists. A municipality can participate in a state without every meaningful competence being centralized.

2.2 A - organizing axis

A is the stable organizing relation or purpose around which transformations remain intelligible. For deliberately designed human systems, the proposed constitutional statement is: Life is the purpose. Money, institutions, technology and GDP are therefore instruments, not the final reference. This is a normative design choice rather than a discovered physical law.

2.3 T - transformation

Economic and social systems transform matter, energy, information, capital, labor, time, skill and relationship. The framework does not oppose transformation; it asks what the transformation leaves behind and whether it creates capacity for a subsequent cycle.

$$X_n \xrightarrow{T} X_{n+1}$$

2.4 C - closure and phase boundary

Processes eventually reach a point at which continuing under the same rule becomes wasteful, destructive or meaningless. A product reaches maturity; an emergency ends; a programme succeeds; an organization completes a mission; a growth regime reaches physical or social limits. Coherent systems require the ability to recognize completion rather than turning every successful intervention into a permanent institution.

2.5 R - return and re-expression

Closure is not termination. Outputs can become inputs for another process. Material waste can become feedstock; profit can become productive investment; knowledge can become shared capability; public revenue can become infrastructure; expertise can become mentorship. Return therefore means recurrence with transformation, not repetition of the same state.

$$\text{output}_i \rightarrow \text{input}_j$$

2.6 I - the invariant

In human systems, the proposed invariant is not equal outcomes or preservation of every existing institution. It is the maintenance and development of viable agency and relational capacity through transformation. Visible structures may change while the underlying condition - that coherent units remain capable of meaningful participation - is preserved.

3. Recursive Z Architecture



Figure 1. Recursive Z Architecture: emergence upward, return of capacity downward.

Let $S_n^1 \dots S_n^k$ represent locally coherent systems at level n . Their relationships can generate a higher-order system S_{n+1} . The higher layer is not assumed to be superior; it is justified when coordination creates useful capabilities unavailable below.

$$\{S_n^1, S_n^2, \dots, S_n^k\} + \text{relationship} \rightarrow S_{n+1}$$

A conventional hierarchy may increase capacity at the top while reducing capacity below. The Spiral condition asks for a more demanding outcome:

$$\Delta C(S_{n+1}) > 0 \wedge \Delta C(S_n^i) \geq 0$$

C denotes functional capacity for the function and time horizon being measured. It is not physical energy. The relation does not imply that every local metric must improve continuously; trade-offs and temporary costs can exist. The claim is that higher-order capability should not depend on systematic long-term degradation of constituent viability and agency.

4. Return of Capacity

Formation of a higher-order system is only half of the proposed cycle. The higher layer should return useful capability to the systems from which it emerged.

$$S_n \rightarrow S_{n+1} \rightarrow S_n'$$

desired: $C(S_n') > C(S_n)$

Education offers a simple example. The learner enters with a certain capacity, participates in a higher-order relationship involving teachers, institutions, peers and knowledge, and ideally exits more able to learn and act without continuous dependence on the educational institution. Healthcare ideally returns a patient with greater functional capacity. A community may return households with greater resilience through shared infrastructure. Government should ideally return citizens and local systems with greater civic and practical capability rather than simply absorbing functions permanently.

Key distinction

Higher-order systems are not coherent merely because they coordinate. They are coherent when coordination creates capabilities that return to strengthen the systems participating in the coordination.

5. Economic Architecture

5.1 Freedom as material optionality

Freedom has legal and political dimensions, but it also has a material dimension. A person whose access to shelter, food, energy and basic security depends completely on continuous monetary income has less practical optionality than someone with a resilient baseline. The Spiral model therefore treats resilience as an enabling condition for meaningful choice.

This does not imply isolated self-sufficiency. The design principle is autonomy without isolation: households and individuals should possess enough resilience to negotiate participation from a position of meaningful agency while remaining deeply connected to markets, communities and specialized social systems.

5.2 Capital: accumulation versus circulation

The framework does not define capital accumulation as inherently incoherent. Large pools of capital can finance research, manufacturing, infrastructure and innovation that smaller units cannot. The relevant question is circulatory function: does accumulated capital continue to create productive capacity and future optionality, or does it increasingly extract capacity while terminating flows in passive concentration?

coherence test: $C_{\text{after}} > C_{\text{before}}$ for the relevant productive system

This reframes inequality as an incomplete diagnostic. Distribution matters, but a second variable becomes central: whether value remains connected to productive transformation and returns capability to the systems that generated it.

5.3 Growth through qualitative transformation

Conventional growth metrics often privilege quantity: more output, more transactions, more consumption and more GDP. The Spiral model allows another form of growth in which a cycle

reaches closure and reorganizes into a more capable state. The next cycle need not be physically larger; it can be more adaptive, resilient, knowledgeable or efficient.

cycle → closure → phase transition → more capable cycle

This offers a conceptual bridge between ecological limits and continued development. Growth can mean increasing capability and complexity rather than increasing material throughput without limit.

5.4 An ecology of economic nodes

Rather than imagining the economy only as a machine, the model treats it as an ecology of locally coherent nodes. Individuals, firms, households and communities exchange matter, energy, information, money, knowledge, labor and care. Higher-order structures emerge where relationship creates additional capability. No single node needs to contain the intelligence of the whole.

6. Social Architecture

6.1 Autonomy without isolation

The model rejects both atomized independence and compulsory absorption into the collective. Local units should remain meaningfully self-organizing while using relationship to gain capabilities unavailable alone. The goal is not independence from everyone; it is freedom to enter relationship without survival requiring submission to a particular gatekeeper.

6.2 Coherence is not sameness

A coherent society can contain different lifestyles, wealth levels, ambitions, cultures, forms of ownership and community structures. The architecture requires relational compatibility rather than homogeneity. In social terms, the foundational rule becomes: the axis is stable; the form is free.

6.3 Recursive scale

A practical social hierarchy can be described as person, household, community, municipality, region, nation and international coordination. The Spiral model does not assign fixed functions to every level. Instead, a function should remain at the lowest level capable of performing it coherently and rise only where a higher level demonstrably creates additional capability.

perform at S_n unless $C_{\text{required}} > C(S_n)$

This parallels subsidiarity, with an added condition: higher-order capability should return downward whenever possible rather than becoming exclusively concentrated upward.

7. Governance as a Flow of Delegated Capacity

Government is treated as an implementation rather than the centre of the system. Its legitimate function is coordination of shared affairs, especially where one actor's choices create consequences for others or where capabilities require collective scale.

Authority therefore becomes a flow:

citizens → delegated authority → coordination → implementation → review / return

- Subsidiarity: decisions remain at the lowest capable level.
- Explicit closure: extraordinary interventions define the conditions under which they end.
- Return of authority: temporary concentration does not automatically become permanent.
- Capacity building: public systems should increase local and civic capability where feasible.
- Protected agency: collective capacity is constrained by a floor of rights and viable autonomy.

The generator does not determine policy content. Competing interests still require voting, courts, negotiation, rights, expert delegation and other decision mechanisms. The model describes system architecture, not a complete political philosophy.

8. SpiralHome as the Demonstrator

Civilization-scale claims should begin with bounded experiments. SpiralHome is proposed as the smallest demonstrator because it combines physical metabolism and human/social organization in a measurable unit.

8.1 Physical metabolism

- Energy flows through the system; energy is not assumed to cycle perfectly.
- Matter and water are cycled where physically, hygienically and economically appropriate.
- Outputs from one subsystem are designed to become useful inputs to another wherever this improves total performance.
- Passive geometry, shade, thermal mass, ventilation and landscape reduce dependence on continuous mechanical input.

8.2 Human architecture

The home is also organized around human transitions: arrival, presence, relationship, creation, renewal and return. The aim is not to manufacture a particular human state but to create conditions in which rest, agency, voluntary relationship and meaningful participation are easier to sustain.

8.3 Scaling experiment

person → home → cluster → community → settlement → region

At each transition, the question remains identical: what new capability emerges at the higher layer, what does it cost the layer below, and what capacity returns?

9. Toward a Measurement Framework

For the Spiral Economy to move beyond philosophy, coherence must eventually be measured. A single metric is unlikely to be sufficient because capacity is distributed and multidimensional. A future framework might model a capacity vector:

$$\vec{C} = (C_{\text{human}}, C_{\text{economic}}, C_{\text{knowledge}}, C_{\text{resource}}, C_{\text{agency}}, C_{\text{social}})$$

Interventions can then be evaluated through changes in the vector at both system and constituent levels. Candidate operational metrics could include household resilience, material recirculation, productive reinvestment, local decision capacity, energy intensity, learning capacity, health functionality and dependency concentration.

Candidate metric	Conceptual form	Question
Material return	$R_m = \text{reused outputs} / \text{recoverable outputs}$	How much material remains useful after the first cycle?
Capital recirculation	$R_c = \text{productive redeployment} / \text{available surplus}$	How much surplus remains connected to future productive capacity?
Agency resilience	$A_r = \text{optionality under disruption}$	Can participants refuse or change relationships without immediate loss of basic viability?
Capacity return	$C(S_n') - C(S_n)$	Does participation in the higher-order system strengthen the constituent afterward?
Dependency concentration	share of critical needs controlled by a single node	How vulnerable is the system to one gatekeeper or failure point?

10. Testable Predictions

The framework becomes scientifically interesting only if it generates predictions that can fail. Candidate tests include:

- Households with lower mandatory fixed-resource costs should exhibit greater labor-market optionality, all else equal.
- Organizations that systematically return capability to participants should show lower destructive dependency and stronger adaptive capacity over time.
- Governance arrangements with explicit closure and subsidiarity should preserve more local capability without necessarily sacrificing system-level coordination.
- Economic networks with higher material and productive-capital recirculation should show greater resilience to selected supply disruptions than otherwise comparable linear networks.

- Higher-order structures that repeatedly increase their own capacity while reducing constituent capacity should eventually display fragility, dependency concentration or loss of adaptive diversity.

These predictions require operational definitions, comparative datasets and careful control of confounding variables. The model should be revised or rejected where evidence does not support it.

11. Boundaries and Falsification

Several boundaries are essential. The Spiral Economy is not an established economic theory. The equations specify design propositions, not discovered natural laws. "Self-generating" does not mean producing physical energy from nothing; all economic, biological and architectural systems are open systems subject to thermodynamics. Energy flows and dissipates, while some matter and information can cycle or recur.

The model also does not assume that every higher-order improvement can occur without local cost. Real systems contain trade-offs. The coherence condition therefore requires defined functions, time horizons, protected floors and explicit tolerances rather than rhetorical claims that everyone always wins.

The 12-to-13 closure model developed in the associated geometric work is treated as a specific architectural hypothesis, not a universal law of economics or ecosystems. The more general system principle is recurrence, threshold and reorganization.

Anti-bias rule

Do not move Z, redefine the invariant, or change the success criterion after observing the result. Record mismatches. A framework that cannot fail cannot teach us whether it is true or useful.

12. A Different Architecture of Civilization

The Spiral Economy ultimately asks whether societies must choose between individual freedom and collective capability. Centralized systems often create collective capacity by absorbing decision power from constituent nodes. Highly decentralized systems can preserve autonomy while failing to create capabilities that require coordination. Recursive coherence proposes a third architecture:

local autonomy + voluntary relationship → higher-order capability → return of capacity

In this model, Z_1 does not disappear into Z_2 . Z_2 exists because coherent Z_1 systems can relate, and the higher layer is judged by whether it strengthens the conditions under which the lower layer can continue to act, adapt and participate.

The result is not a promise of utopia. Humans remain ambitious, emotional, competitive, cooperative, contradictory and diverse. The objective is not to perfect the human being. It is to design the surrounding systems so that survival requires less submission, cooperation requires less

coercion, prosperity requires less extraction and higher-order coordination does not automatically imply lower-order dependency.

Conclusion

The central proposition

A coherent higher-order human system increases useful relational capacity while preserving the viable agency of the systems from which it emerges.

From that proposition follow a family of design rules: the axis is stable and the form is free; systems remain open; useful flows return where physically and economically possible; local autonomy is preserved while relationship creates new capability; higher-order structures should return capacity downward; and life remains the purpose against which human institutions are ultimately judged.

The Spiral Economy therefore does not begin by asking whether capitalism or socialism is correct. It asks a prior systems question: what would economics and society look like if every new layer of organization had to demonstrate that it increased the capacity of the whole without systematically diminishing the viable agency of the parts?

If that condition can be made measurable, designed into bounded experiments and reproduced across scales, the result would be more than a new policy instrument. It would represent a different architecture for organizing human civilization.

Appendix A - Formula Reference

$$G = \{ Z, A, T, C, R, I \}$$

Z = local coherent reference; A = organizing axis; T = transformation; C = closure / phase boundary;
R = return / re-expression; I = invariant relationship.

$$\{S_n^1, \dots, S_n^k\} + \text{relationship} \rightarrow S_{n+1}$$

Higher-order system emergence from lower-order coherent systems.

$$\Delta C(S_{n+1}) > 0 \wedge \Delta C(S_n^i) \geq 0$$

Proposed human-system coherence condition: higher-order capability increases without systematic degradation of constituent capacity.

$$S_n \rightarrow S_{n+1} \rightarrow S_n' \quad \text{desired: } C(S_n') > C(S_n)$$

Return-of-capacity condition.

$$I_{n+1} < I_n \rightarrow \text{degeneration} \mid I_{n+1} = I_n \rightarrow \text{maintenance} \mid I_{n+1} > I_n \rightarrow \text{regeneration}$$

A useful evaluative distinction when I is explicitly defined and measured. This is a design criterion, not a universal law of nature.

Appendix B - Foundational Design Statements

- The axis is stable. The form is free.
- The system is open. Useful flows return where possible.
- Autonomy without isolation.
- Higher-order organization exists to create capabilities unavailable below it.
- Higher-order capability should return downward rather than accumulate exclusively upward.
- The human remains sovereign; relationship should be as voluntary as practical reality permits.
- Life is the purpose.
- Geometry gives structure. Ecology gives metabolism. Humanity gives meaning.

Author Note

This paper is a conceptual working paper by Martina Willis, developed through iterative systems design work within the SpiralHome project. It is intended as a basis for discussion, modeling and empirical testing rather than as a claim of established economic science.