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RESEARCH ARTICLE

From a sociology to an anthropology of knowledge in Living Lab systems

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Abstract

The Systems Thinking paradigm relates to three types of structuralism consolidated in the classical epistemology of systems' gnoseology. Accordingly, each time we raise the issue of systems, we have at least one of three fundamental structural models: social structuralism, cybernetic structuralism, and discourse structuralism. The ontology and epistemology of a system are always grounded in no less than one of these categories: social, logical, and linguistic systems. Of all three, the first and the second are widely used when discussing knowledge systems in socioeconomic contexts. Under these circumstances, the prevailing paradigm places social ontology and cybernetic ontology in positions of symmetry. They are especially correlated with defining the constitutive structuralism of a system and providing the epistemological tools necessary to describe it. To conceive of the system in dynamic, adaptive, and highly complex contexts, it is essential to correlate all three models. This is possible by building a consolidated circular 3-dimensional model encompassing all three dimensions, namely, cybernetic, social, and discursive (CSD model). In this study, I apply the CSD model to a series of three-dimensional models that define the main phenomena occurring in a living lab knowledge system: (1) Circular Sustainability and (2) Multi-actor Communities.

Keywords

Sociology of knowledge, Anthropology of knowledge, Systems thinking, Positivism, CSD model

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Argument

Auguste Comte speaks about three stages that appear in the universal evolution of knowledge systems: (1) theological, (2) metaphysical, and (3) positivist Stage (Comte, 1988). When he developed this theory, between 1830–1842, Comte was interested in justifying a new autonomous science, namely sociology, as a positivist project of knowledge. In this respect, any simplification makes sense since we are dealing with a genealogy mainly born of ideological reasons within an epistemology that was supposed to justify positivism as the ultimate stage of understanding the social system and the definitive impact of the constitution of knowledge ecosystems. Therefore, Comte's proposal reveals an easily noticeable desire to substantiate, both methodologically and ideologically, the linear and ascendant cyclicity of the universal knowledge program.

In this sense, positivism continues, criticizes, and overcomes the theological and metaphysical conditions that knowledge had before or still has in an area of unconsolidated epistemologies (epistemological subcultures). Here, we discuss the classic discourse that has had an important educational career. In other words, this is a fundamental concept in textbooks. Even considering the reductions entailed by such an idea, Comte's classification has served as a theoretical pillar in the construction of sociology and, surprisingly, positivism. Any guidebook, dictionary, or sociology course begins with this idea. It has always been integrated within fundamental social theories: the theory of social facts proposed by Émile Durkheim (Durkheim, 1938), the concept of social phenomena suggested by Georges Gurvitch (Gurvitch, 1971), the theory of class conflict founded by Karl Marx (Marx, 1996), the concept of symbolic interactionism theoretized by George Herbert Mead (Mead, 1938), the social value of symbolic goods discussed by Pierre Bourdieu (Bourdieu, 2005), and the theory of social exchanges formulated by John W. Thibaut (Kelley & Thibaut, 1978).

Comte's theory has unquestionable genealogical value. Yet, in a project of systems thinking, I find the delimitations operated by Auguste Comte more appealing than the sequences and connections he proposed. From a different standpoint, I am particularly interested in the cuts and ways of thinking that make up such divisions. For a simple reason, I can observe the dynamics of this epistemology not in the classification as such, but in the way it operates. These observations are significant in Systems Thinking projects conducted within the systems thinking paradigm.

Accordingly, moment sociology is defined as a positive study (scientific, positivist) of social facts in the following order:

- (1) Pragmatics of the description, norming, and strategic design of social actions
- (2) Ideological commitment to the positivist definition of the idea of scientificity and rationality in the conceptual context of modern philosophy.
- (3) A militant epistemology, based on which sociology raises its first pillar of establishment as an autonomous science.
- (4) Sociology of knowledge.

It is one of the rare and significant moments when a certain epistemology actually gives voice to an anthropology of knowledge. The way we order, model, and design knowledge is primarily related to the anthropology of knowledge. Further, the constitution of knowledge systems is associated with radical anthropology, a descriptive and a critical one.

Additionally, the same operation of delimiting some systems in the cyclicality of the general ecosystem of knowledge can be extended and has been extended to other epistemological projects. From this standpoint, I draw on how we can integrate Systems Thinking (from the systems thinking set of theories) into this ordering algorithm.

In line with these arguments, I am keen on critiquing this cyclicality of knowledge stages, particularly in the field of radical anthropology. From an epistemological viewpoint, radical anthropology of knowledge is a sociology of knowledge in which the system of knowledge facts is reduced to its dynamics and ontology, beyond the particularities given by certain histories and geographies. There may be another way to name the anthropology of knowledge in its inherent form. However, I am rather interested in the expression of radical anthropology of knowledge for preserving, at an anthropological level, the project of epistemological radicalization.

A radical systemic anthropology

Any type of radicalization risk of closing windows on systemic interpretation. Generally, systemic thinking does not occur in radical critical projects. The exercise of radicalization, at least from a methodological standpoint, involves an effort at reduction, a concern for simplification, and no less an objective of theoretical consolidation, beyond the dynamics of the phenomena.

In this context, a strategic question arises: How can I come back to systems thinking if the first epistemological step is to precisely reduce the dynamics of systemic thinking?

The question is both meaningful (important) and significant (generates sense). It triggers a crisis of significance within the overall theoretical context, yet it provides new meanings and novel chances of significance: there is the rub; it is here that the systemic matter surfaces. Radical closure is not a reduction in the knowledge system in this case (or any other reference knowledge system). Radical closure is a phenomenon in its own right within a system's dynamic ontology. This cessation does not imply radicalization of the system, but rather reveals one of its stases in a radicalized theoretical hypostasis. The radicalization of a system is a possible variant of any system thinking. This situation is easily understandable,

especially in social systems where radicalization produces destructive effects.

Strategic systemic models

Before moving forward, there is a good chance of introducing the following idea: sociology, as an anthropological system, is one of the three fundamental models by which we conceptualize the idea of system. Accordingly, in the history of thought, generally and particularly in the history of thought defined as scientific or rational, we have favored three fundamental models for understanding systems: (1) the linguistic model, (2) the logical model, and (3) the social model.

By reducing this structure to its oversimplification, I could say that:

- (1) The linguistic model supplies us with a system model centered on the semantics of the systems.
- (2) The logical model primarily focuses on system syntax.
- (3) The social model, especially from the perspective of contemporary developments in sociology, provides an understanding of systems based on systemic functionalism.

From a methodological perspective, this is a series of simplifications. However, precisely because it is a series of reductions, they become operational through methodological counter-reactions. From the perspective of this critical standpoint, I received a series of methodological requests that gave shape to a structuring form. Even if methodologically such ideas do not have major effects, they become reference components in the systems thinking strategy. I dare call them hermeneutic invariables, as in statistics.

Accordingly, when referring to the network of significances of a system, I should consider that the system is a network of languages. However, when I think of the cybernetic dimension of a system, I need to consider its logic. I softly relate to logicism, especially when referring to open and semi-open systems. Again, I need to consider radical logicism when I bring up closed systems, since they tend toward a high degree of axiomatization and internal circularity. Eventually, when I consider the functions and dynamics of the system, I must consider its sociality.

The positivist model

In this configuration, if I were to bring back the issue of knowledge stages as conceptualized by Comte, I noticed that the positivist stage is a biunivocal translation of the logical and social stages. In the logic of knowledge sociology, sociological positivism is translated as the isomorphic relationship between the social and cybernetic dimensions of a system. In the general paradigm, it is believed that scientific rationality in the ecosystem of sociological knowledge becomes operational when we can methodologically align (under the umbrella of methodological positivism) social understanding and algorithmic interpretation of the systems. The political and pragmatic ideal of sociology as social engineering has often been modeled in this epistemological configuration that aligns positivism with the rationality of social fact and the logic of the reference social system. Gh. Enescu always supported it in his lectures: “Social systems and their contradictions can be studied using their antinomies as logical systems models” (Enescu, 1976).

In the 20th century, we dreamt of social systems that could be administered according to operational rationality and strategically designed (in terms of prediction and prevention) in a cybernetic sense. Under this conceptual umbrella, attempts have been made to transform social systems into socially operationalized systems. Implicitly, knowledge systems have increasingly been understood and interpreted within these positivist ecosystems, and phenomena readily observed in procedural and operational contexts rank among the most favored. They can prove useful for first-instance knowledge, particularly in elementary interpretations that substantiate the project of understanding a system and keeping it in permanent reference to its raw data. However, any primary, fundamental understanding must be complemented by a second-order meta-understanding that can only be constituted as dynamic, adaptive knowledge as a way of thinking about the system.

From a sociology to an anthropology of knowledge

In the sociology of knowledge, I can relate to social fact as a constituting part of a system that socially operationalizes knowledge. This is a fundamental dimension that emerges from two essential features:

- (1) It is an isomorphic system of the sociology of knowledge, putting a social model and a cybernetic model in a symmetrical relationship.
- (2) It is a system in which knowledge is the organizational structure of social facts and functions.

Along the lines of isomorphism, I develop a methodology in which sociality is cybernetically thought, and structure is rationalized as a socio-neuronal network. The fact that we express a knowledge system as the sociality of a cybernetic projection makes it possible to build social rules, starting from logicist normalization.

In terms of social structuralism, I am provided with a decision-making strategy that is cybernatically governed in a socio-static and possibly psychosocial way.

These two instruments are momentous and allow doubling a position and provide the opportunity to decentralize one position or another at the moment it becomes dominant, thereby increasing the risk of centralizing systems thinking.

Nevertheless, my interest is additional in this case. As mentioned before, I consider the one-to-one isomorphic relationship between the two dimensions of the knowledge system.

However, I am rather keen on strategic circularity. In this sense, the system, in terms of linguistic organization, provides me with the third dimension on which I can build tridimensional circularity. Accordingly, operationally speaking, I could say I am translating the sociology of knowledge into the anthropology of knowledge systems. Within the new conceptual delimitations, systems thinking becomes a vector for operationalizing systemic circularity, integrating the dimensions of sociality, cybernetics, and discursiveness of systems at a multisystemic (ecosystemic) level. For simplification, we can discuss a three-dimensional Cybernetic Social Discursive (CSD) model of the anthropology of circular knowledge.

For an anthropology of knowledge in living lab systems

Translating the sociology of knowledge into the anthropology of knowledge systems is not just an epistemological project. This epistemological exercise helped me beyond theoretical borders. The suggested CSD model does not involve a decisive (transformative) change in the methodological organization of knowledge ecosystems. In other words, it is not a paradigm shift. In contrast, the analyses conducted in this study are directly and immediately relevant.

However, it is precisely their high relevance that allows me to use them in the strategic modeling of knowledge systems that are operationalized with already consolidated methodologies. Thus, if I return, the living lab methodology will already be consolidated, at least at the European level. Therefore, the knowledge-action system defined by a *living lab* constitutes a highly dynamic and flexible epistemological field for *methodological test-beds*.

The three-dimensional nature of the CSD model allows the exploration and interpretation of other three-dimensional models that operate at the level of a living lab system (LL).

For ecosystems defined by multiple LL laboratories, we will develop another exploratory exercise, since at the level of knowledge ecosystems, additional dimensions and challenges arise from concepts defined by the relationships between systems: infrasystem, trans-system, intersystem, and multisystem. In the context of this speculative exercise and based on the CSD model, I will confine the analysis of the following three-dimensional models within an LL system:

- The circular sustainability model was based on the dimensions of (1) resilience, (2) durability, and (3) sustainability.
- The model of tridimensional multi-actor communities: networks of actors and agents, networks of immediate and mediated values, networks of discourses (immaterial references), and objects (material references).
- The model of tridimensional participatory acts, namely, research, learning, and governance.

I will operate with a "soft" definition of living lab systems. The intricacy of these systems is an asset but also a challenge. Therefore, to avoid complications, I will limit myself to the operational concept of LL laboratories. Therefore, I will refer to how a system works to be considered as a living lab.

What is a living lab?

In the simplest possible terms, a living laboratory is one. In my opinion, this is the only feature that we cannot dismiss from a system if we want to engage with a *living lab*. In general logic, such an attribute is known as a necessary condition, without which a system, process, or result is not possible. Revisiting the idea of a living lab, I could say that, beyond its obvious laboratory dimension, the other attributes can be reduced to the point of elimination and replaced by others with similar effects. A living lab system must be a laboratory because it is defined by processes such as exploration, testing, experimentation, and prime modelling. Therefore, from a knowledge management standpoint, a living lab is a system that we conceptualize and organize as a laboratory for exploring, testing, experimenting with, and modelling certain working hypotheses. If I oversimplified it, I could say that a living lab is a laboratory of a working hypothesis.

The first question anyone could ask is: Why is the concept of a living lab so important? In other words, why do we assign so much importance to this concept? Because of the methodologies and technologies developed in this type of system, and also to a successful European story, it is now believed that the group (community), concept, technology, and structure defined by a living lab respond highly efficiently to challenges brought about by the intricacy of a social-economic system, dynamics of systemic processes and effects, and the high degree of complexity of collaboration networks within a community of practices. At the same time, owing to its inherent nature, a laboratory, such as a living lab, responds well to the need for adaptability, sustainability, feasibility, and resilience through actions and projects aiming at high sustainability. Oversimplifying, I think that LL laboratories are highly dynamic, adaptive, and feasible, with a high degree of systemic and intersystemic communication.

In general, LL laboratories exhibit certain characteristics that give them dynamism and a high degree of operationality. Accordingly, LL systems should engage in experimental actions, starting from specific local problems of the reference ecosystem, in direct and permanent collaboration with beneficiaries, with objectives oriented toward the sustainability and resilience of the system they represent. This is the conceptual context in which any living laboratory can be defined.

However, beyond these descriptive definitions, living lab systems can also be presented in both a constructive and an operational manner. I can more efficiently introduce the idea of a living lab within a knowledge system by defining the necessary conditions for constituting (the constructive solution)

and sufficient conditions for operationalization (the mandatory conditions for functioning). Therefore, constructively and operationally, I need a living lab, which I will build.

- (1) Moment I identifies a specific problem within a reference system.
- (2) The identified problem must be analyzed and formulated into a working hypothesis.
- (3) The working hypothesis must be formulated with all categories of system representatives to ensure pertinence and relevance within the system.
- (4) The working hypothesis formulated for this multi-actor system was tested in a controlled environment.
- (5) The test results were analyzed circularly and shared with the community to formulate a working hypothesis.
- (6) The results of the exploratory and experimentation actions were modeled to test their resistance in economic, social, and governance environments.

The theory and methodology of LL systems are much more complex, yet these minimal aspects can define any real or potential living laboratory.

It should also be noted that living labs are concepts that were initially modeled in the corporatist environment in North America. Nevertheless, this phenomenon has developed exponentially in Europe since 2006 with the establishment of the European Network of Living Labs (ENoLL), an organization under the Finnish presidency of the European Union. It is unanimously agreed that a consolidated concept of the living lab was first defined in a collaboration between William J. Mitchell, Kent Larson, and Alex Pentland at the Massachusetts Institute of Technology. Their contributions are presented in the promotional brochure of the European Network of Living Labs:

> „*The term Living Lab itself is attributed to Professor William ('Bill') Mitchell from the Massachusetts Institute of Technology (MIT). Professor Mitchell used the term Living Lab to describe a unique laboratory setting where volunteers would temporarily reside, allowing researchers to observe and record the daily routines and interactions of home life. These labs were designed as experimental environments to test and refine new technologies for home use, focusing on how well these innovations fit into everyday life, and are now known as Home Labs.*" (Schuurman *et al.*, 2025)

Circular sustainability from the perspective of the CSD model

In the paradigms of the European Commission's programs and current contexts of high ecological, civil, military, economic, cultural, political, and social risks, there is an increasing emphasis on concepts and tools that operationalize transformative ideas for the sustainability of European systems and ecosystems. There is an easily noticeable series of measures and objectives that significantly impact sustainability management.

- (1) New models for decentralizing decisions and opportunities were tested.
- (2) Moving from performance indicator-oriented objectives to impact-oriented strategies as long-term systemic outcomes.
- (3) Models that ensured feasibility were re-evaluated. Creative models are sought in areas previously considered unfeasible, such as artistic creation, local memory, and psychosocial intelligence.
- (4) A single market is increasingly being defined as a knowledge market. However, knowledge is redefined in relation to innovation and economic or technological transfer. Under these circumstances, circularity is quite obvious.
- (5) In line with the principles of equity but also to diversify exploratory perspectives, the interdisciplinarity between technical and socio-human fields is highlighted. Simultaneously, collaboration between emerging (widening) and advanced countries is increasingly encouraged.
- (6) Twenty years ago, digital transformation was an organizational and community objective for governance. Digitalization is currently regarded as a strategic systemic action.

European, regional, and even local governance systems are increasingly geared toward circular, dynamic, and adaptive intervention methods and technologies.

In this context, the CSD model provides an exploratory perspective on circular sustainability. In recent research projects in the field of knowledge ecosystems, I have modeled the concept of circular sustainability to explore ways of biunivocal as well as the three-dimensional systemic correlation between resilience, durability, and ecosystem sustainability. The three dimensions of the system stages were used in a correlated manner. However, they are more often used linearly, without paying special attention to isomorphic effects and three-dimensional dynamics. Based on this novel model, I intend to open up perspectives on two objectives.

- (1) Analysis of the strategic objectives of sustainability in the context of dynamic and adaptive resilience Dynamic resilience is an effect of system actors' adaptation to transsystemic challenges, with complex strategies aligned with the reference system. When an intervention action occurs for sustainability purposes, isomorphic effects appear at the level of resilience, and the two systemic dimensions can be correlated only in a three-dimensional way in a tertiary reference system: that of sustainability.

- (2) Analysis of resilience as an identity value in the context of sustainability, which must be modeled along the lines of systemic sustainability. Resilience is the reference dimension of a system's identity and internal value. In this context, strategies must be designed to correlate added value with sustainability and explore the implicit value along the same lines.

These three dimensions are correlated and imply reciprocal effects when they enter system dynamics. This is precisely why three-dimensional circular strategies must be considered to operationalize intervention objectives at the following three levels: resilience, durability, and sustainability.

Three-dimensional multi-actor communities from the standpoint of the CSD model

Multi-actor models are tools for modelling, researching, and probing knowledge, governance, and communities of development actions under the umbrella of participatory actions. The Quadruple Helix model is an elementary model that defines participatory communities of beneficiaries as stakeholders, namely representatives from academic, entrepreneurial, governmental, and social environments. The basic model remains essentially the same, regardless of the various adaptations. For example, the fourth level can be categorized into communities of private life and civil society. Even at the level of the academic network, we separate the beneficiaries into research and educational communities. In other contexts of systemic analysis, models also consider the community of digital agents to be active parts of the system, even if they cannot be classified as individuals. In other cases, at the threshold between persons and non-persons, there are, from case to case, communities of non-human beings, whether the animals we commonly know are insects or mycobiomes. Depending on the criteria and levels of specificity used, these configurations are structured around chains of knowledge production, intelligence transfer, and consolidation of decision-making technologies. All of these systemic roles constitute nodes of networks with varying degrees of complexity. However, the quadruple helix model (including the derived models) is linear, although it can be modeled using various matrices and lattices. The effects of understanding become quite interesting when roles are clustered into groups that interact in a circular manner. Thus, we can model a circular multi-actor system structured in the following clusters:

(1) **The community of exploratory participatory knowledge:** Research and educational environments share, for example, exploratory methodologies such as learning from errors or trial-and-error cycles.

(2) **The community for real-world experimentation of knowledge data:** Academic and entrepreneurial communities collaborate in joint experimental actions, so that the marketing relationships between economic necessity and technological possibility align and mutually regulate.

(3) **The community for designing development strategies:** The academic community and governance environment join forces to define a general framework for collaborative action in socioeconomic development processes.

(4) **The community for strengthening inclusive polysociality:** Governance and civil society collaborate to define models of inclusion and multiculturalism.

All these clusters can be arranged in 3-dimensional circular configurations to enhance co-creation, innovation, collaboration, assessment, and correction.

Other three-dimensional models

Upon closer inspection, the CSD model can serve as a vector and interpretative catalyst for other three-dimensional models in Research, Development, Innovation (RIA), and Research and Innovation Actions (RIA) systems. This is because three-dimensional structural design produces common patterns of circularity, feedback, isomorphism, spiral dynamics, and relationships among short-, medium-, and long-term effects. The CSD model can be used to conceptualize common methodologies and practices with other 3-dimensional systems.

- For example, they can be applied when formulating actions, projects, and narratives related to the one-health concept. It puts in synergy and systemic correlation three fundamental dimensions for health and quality of life: anthropological health, anthropological health, and ecological health.

- In the case of institutional structures, we can use the CSD model to analyze the relation between education, innovation, and political systems.

- In a different context, we can employ the CSD model to shape the circular systemic relations defined by the iceberg model, managing the levels of events, patterns, structures, and mentalities.

A circular anthropology of knowledge

Classical epistemology favors linear models for knowledge production and transfer. These models are essential to first-instance knowledge. This type of knowledge, namely, first-instance knowledge, emerges under the following circumstances:

- Primary learning processes, especially when we learn rules, vocabulary, principles, models, and norms

- Rational basis of a knowledge structure,

- Argumentation is a strategic tool in epistemological negotiation practices to establish a common code of knowledge and, chiefly, a common culture of interpretation.

- Information flows aim to preserve data in the models and expressions in which they are produced.

First instance knowledge plays a fundamental social role. At this threshold, we can say that it provides elementary conditions for the social constitution of communities. However, first-instance knowledge is not exactly a transformative type of knowledge; it does not change, but merely adapts and integrates.

To make changes within a system, second- and third-instance knowledge processes are required. A 3-dimensional circular model, such as the CDS model, has the potential to serve as a strategic tool for developing systemic correlations among these three types of knowledge (first, second, and third instances). How these processes of correlation and systemic integration are carried out is the subject and objective of future research.

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