

## **S.7 Methodologies and Tools for Governance of World System**

### ***Système bancaire et systèmes vivants : dilemme des prisonniers alive and banking systems comparison: prisoners' dilemma***

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**Abstract**— To survive that is 'to eat and not to be eaten' to live on [1]. Any living system, to survive and live on, whatever its spatial and temporal level of organisation, owns 7 invariant qualitative degrees of freedom [2]. Any alive system is formed by embedding and juxtapositions of pre-existing systems [3]. The same is true for man banking systems! How are the local quantitative laws of the spatial-temporal structuring and functioning of banking systems associated with the basic law of survival of living systems ? How do the local actors become mutually integrated into their global whole? And reversely (systemic constructal law [2, 4]), why and how is the global whole reciprocally integrating the local parcellers [3, 5]? Is victory as strategic success? What are the roots of interdependence, conflicts and strategic order challenges? How is emerging a new power balance? Can banking systems survive as parasitic systems [6]? Is a "money chain" a way of violence escalade, like a "food chain" [1-5]? The evolution of living systems [7] is often seen as a "cooperative evolution" [8]; resulting from altruist behaviours [9] it could be modelled and simulated using games like the "prisoner's dilemma" (or prisoners' dilemma !) game [10], a canonical example of a game that shows why 2 individuals might not cooperate, even if it appears that it is in their best interests to do so. In what manner is the "prisoners' dilemma" game justifying extrusion [11]? What can we learn from Reinforcement Learning Dynamics in Social Dilemmas? In reality, humans display a systematic bias towards cooperative behaviour, much more so than predicted by models of "rational" self-interested action. Models based on different kinds of payoffs and driving forces, where people forecast how the game would be played if they formed coalitions to maximise their forecasts, are shown to make better predictions that resemble reality [12].

**Key words:** *agoantagonism, "Associations for the Reciprocal and Mutual Sharing of Advantages and DisAdvantages" (ARMSADA <http://armsada.eu>), commensalism, money chain, Nash equilibrium, parasitism, Pareto equilibrium, prisoners' dilemma game*

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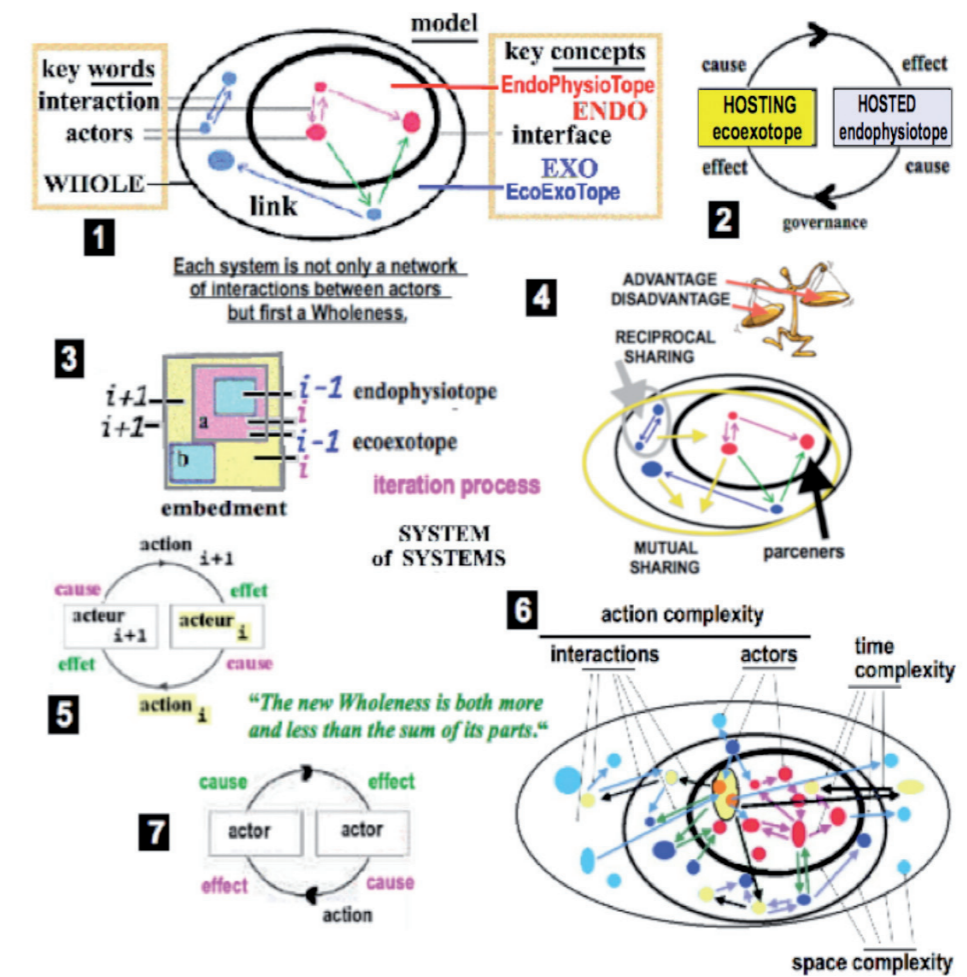


Figure 1. Cooperating Interactions Governance for Emergence of a New System.

1. System of systems: **integration and organization** (juxtaposition and embedment), **the model and keywords**.

Every living system is always made of 3 kinds of entities: **actors, interactions, a Whole**. Whatever its level of organization, it is **integrated into an ecoexotope of survival (EXO: external, tope: space-time, eco: of inhabitation)** which gives the system's **endophysiotope (ENDO: internal, tope: space-time, physio: of functioning)** an **hosting capacity (HOSTING)** what it can use depending on its capacity to be hosted (**HOSTED**).

2. **"interaction is integration and integration is interaction."**

Each EXO hosting capacity change results in a ENDO capacity to be hosted change, and **mutually**. Each living system-of-systems is integrated into an ecoexotope within which it is more adapted to the interactions network than other systems-of-systems are. *Systemic Constructal Law*: each effect has a cause and each effect is a new cause for a new effect. Climate or communities changes of the ecoexotope, and endophysiotope changes are overlapping in a loop. The changes of the ecoexotope hosting capacity, in quality or in quantity, particularly due to recycling, are controlling the growth and constrained changes in the functional, spatial and temporal organization of the capacity to be hosted. This feedback is controlling the growth and



development of the network through the limits of the HOSTING EXO and limitations of the HOSTED ENDO with  $(\text{HOSTING}) \times (\text{HOSTED}) = k$ . Step by step, by cycling through amplifying loops, “**a threshold of growth is a requisite for development, a threshold of development is a requisite for growth**”.

### 3. System of systems: emergence and organization.

During the life evolution process, new endophysiotoxes of living systems are emerging through an *iteration process of juxtapositions and embedment* of ancient pre-existing systems. Each living system is a system-of-systems. An endophysiotope of a  $i$  level of organization is the ecoexotope of survival of an endophysiotope of  $i-1$  level and, mutually, a  $i-1$  level ecoexotope is integrated into a  $i$  level endophysiotope. That allows the emergence, with an effective great diversity, of new modular blueprints which wholes are always more and less than the sum of their parts.

The juxtapositions and embedments of the parts into their Whole are known but the functioning of the Whole is not predictable from the functioning of the parts. The modularity of the actors and interactions is the source of exaptations.

### 4. Associations for the Reciprocal and Mutual Sharing of Advantages and DisAdvantages ARMSADA.

To survive that is “**to avoid advantages turn to disadvantages and to transform disadvantages into advantages**” through the *reciprocal sharing* of advantages and disadvantages -at the local level all that is an advantage for a partner is a disadvantage for another one- and their *mutual sharing* -at the global level between the partners and their whole, for the benefit only for the whole-. For the survival of a partner, and the whole, each other partners must survive first. The paradigm of ARMSADA is independent from dimensional scaling: **the local and global quantitative laws of space-time structuring and functioning are the same**. Depending on how they become mutually integrated into their global whole, the local actors are more and less dependent from the new global level of organization. Reversely (systemic constructal law), the global whole reciprocally is integrating the local parcellers.

### 5. actors' actions are both causes and effects between organization levels.

The juxtapositions and embedments of the parts into their Whole are known but the functioning of the Whole is not predictable from the functioning of the parts, so, obviously, “*a Whole is both more and less than the sum of its parts.*”. The modularity of the actors and interactions is the source of exaptations. How to define the parameters of this complexity?

### 6. parameters for the qualification and quantification of complexity.

The stability and resiliency of a system, while facing to changes of its ENDO and EXO, is depending on the number of actors and the percolation process of their interactions. Emergence is always a spatial and temporal, structural and functional, metamorphosis. We must first qualitatively identify and quantitatively characterize all the system's parts, by deconstructing it (reductionism). But through reconstructing the whole from the parts (holism) we cannot explain new properties (emergence) only from the ancient ones. So we have to define 3 parameters

for measuring the system's complexity: **action complexity** which is given both by the numbers of each kind of actors (a colored “point” for each type) -all numbers will give the total actors number (we can also define actors quantitatively by the surface of the point)- and the numbers of each kind of **interactions** (a colored arrow for each kind) -which all will give the total interactions number (we can also define interactions quantitatively by the thickness of the arrow)-, **time complexity** which is given by the **durations** of each interaction that take place during a period (a **time** cycle of survival) and **spatial complexity** which is given by the absolute and relative surface limits (**interfaces**) of the ecoexotope (EXO) and endophysiotope (ENDO). The emergence of an ARMSADA depends on the ecological, economical and genetical histories of every actor, on its place into the system, on the global context of interaction and on its local fate. Integration is depending both on the actors' age and stage, their interactions and the Whole. Time schedule is very important but, soon or late, only small structural changes in space may be sufficient to trigger the reciprocal interactions that allow the emergence of an ARMSADA.

### 7. actor's actions are both causes and effects within a level of organization.

An action is the effect of all the strengths exercised by an actor (or a system) on another one. Every actor (of a system) is an “entity endowed with potentialities of actions”, that may exercise an action on another actor (of the same system or another one). The actor is the initiator of the action (that transforms, modifies), the cause which produces an effect. This effect (the answer) is measurable, qualitatively or quantitatively. The action can allow to pass from a state to another one, only if the supplied and received stimulation, is enough, beyond a threshold of intensity. The effect produced by the initial cause becomes a cause of a new effect back on the initial cause (systemic constructal law). Connectedness in a network often shows a threshold behavior. At some point, the addition of a just a few more connections can cause a substantial fraction of the network to be connected.

From individual to collective actions (associations) and conversely from organizations actions (lobbying) and societies (lawing) to individual actions: from ago-antagonism to symbiosis [<http://emcsr.net/book-of-abstracts/>], actors are parcellers, “*There are never advantages without disadvantages.*”

How are the laws of spatial-temporal structuring and functioning of banking systems associated with the basic law of survival of living systems? How do local actors become mutually integrated into their global whole? And reversely, why and how is the global whole reciprocally integrating the local parcellers? Is victory a strategic success? What are the roots for interdependence, conflicts and strategic order challenges? How is emerging a new power balance? Can banking systems survive as parasitic systems? Is a “money chain” a way of violence escalation, like a “food chain” is? Is not the ARMSADA paradigm the best way to improve the survival of our societies?