The concept of organization learning in human history or the value of historical registers: can a nation or continent actually learn?

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***Abstract*—**The concept of the learning organization and organization learning as a natural derivation of knowledge management has proven itself to be useful in academia, industry, and administration. The idea of an extension to a higher level in the hierarchy of sociotechnical systems within the framework of Ludwig von Bertalanffy's general system theory does not appear to be yet clear. Organization learning in the context of a region, a nation, or a continent would have to deal with problems like prostitution regulation and war management.

***Keywords*—**Human history, organization learning, prostitution regulation, terrorist attacks, war management

I. Introduction

The current situation of international instability may make us wonder what best responses are to threats like terrorist attacks. When analyzing what actual responses have been to them, it is clear the French military attacks have been very direct in the short run.

A quick analysis of the current status displays an immediate action led by the French military forces. Two days after the terrorist attacks, an emergency state was already declared, and an airstrike operation was launched. The Spanish response in 2004 after equivalent attacks is uncertain.

It should be discussed to what extent previous military attacks constituted actually the cause of these dramatic incidents – the terrorist attacks – and also whether this kind of response would be appropriate in the long term. It is, however, within this kind of scenario where systems thinking can actually be applied.

While it is true that great wars have definitely finished in Europe the way they were known during the twentieth century, two localized military conflicts have taken place that question the suitability of political measures in the continent. Ukraine and Kosovo is probably the best couple of examples.

In the meantime, tension between Europe and Africa exists due to migratory movements. It is questionable whether the best signal we can give the African people is to leave them come, but it is also true that it is not reasonable to stop expecting arrivals if structural measures are not implemented in Africa.

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II. Baseline

A good starting point for the discourse of this paper is the above-mentioned general system theory advocated by Ludwig von Bertalanffy (1969) [1]. It is in the context of this conceptual framework that differentiation among different levels occurs. This is explicitly represented in Table 1 as it appears in his book for illustrative purposes.

HIERARCHICAL DEGREE OF AGGREGATION	DESCRIPTION AND EXAMPLES	THEORY AND MODELS
Static structures	Atoms, molecules, crystals, biological structures from the electron-microscopic to the macroscopic level	E.g. structural formulas of chemistry; crystallography; anatomical descriptions
Clock works	Clocks, conventional machines in general, solar systems	Conventional physics such as laws of mechanics (Newtonian and Einsteinian) and others
Control mechanisms	Thermostat, servo-mechanisms, homeostatic mechanism in organisms	Cybernetics; feedback and information theory
Open systems	Flame, cells and organisms in general	(a) Expansion of physical theory to systems maintaining themselves in flow of matter (metabolism). (b) Information storage in genetic code (DNA). Connection of (a) and (b) presently

		unclear
Lower organisms	"Plant-like" organisms: Increasing differentiation of system (so-called "division of labor" in the organism); distinction of reproduction and functional individual ("germ track and soma")	Theory and models almost lacking
Animals	Increasing importance of traffic in information (evolution of receptors, nervous systems); learning; beginnings of consciousness	Beginnings in automata theory (S-R relations), feedback (regulatory phenomena), autonomous behavior (relaxation oscillations), etc.
Man	Symbolism; past and future, self and world, self-awareness, etc., as consequences; communication by language, etc.	Incipient theory of symbolism
Socio-cultural systems	Populations of organisms (humans included); symbol-determined communities (cultures) in man only	Statistical and dynamic laws in population dynamics, sociology, economics, possibly history. Beginnings of a theory of cultural systems.
Symbolic systems	Language, logic, mathematics, sciences, arts, morals, etc.	Algorithms of symbols (e.g. mathematics, grammar); "rules of the game" such as in visual arts, music, etc.

Table 1 an informal survey of main levels in the hierarchy of systems. Partly in pursuance of Boulding (1956)[1] [2]

The list is not exhaustive. For example, socio-cultural systems may be further divided into different levels of populations, from bacteria to human beings, as well as different levels of symbol-determined communities, from organizations to nations.

Symbol-determined communities may form higher-level institutions, by means of e.g. inter-organizational information systems. Following the idea that analogies may exist among the different levels outlined in Table 1, it is possible to think of an information system in the organization as an immune system in an organism.

However, it seems to be the case that immune macro-systems exist even if the way they work is not completely clear. For example, according to Willigis Jäger [3], Rüdiger Dahlke[2] quotes the following experiment performed by the Russian army [4]: with the aim of proving the development of news free from interferences, the following brutal experiment was performed: a female rabbit was taken away her offspring and these were taken in submarines to distant parts in the world. In certain stipulated times, the rabbits were actually killed, while physiological measurements were performed in the mother. These data permitted to prove the female rabbit noted the death of her young rabbits in the same moment in which this happened.

Equivalences of immune macro-systems in the organizational world may correspond to inter-organizational information systems. The work performed by María del Mar Criado Fernández on characterization of cooperation models among organizations as a basis for the acquisition of competitive and flexible structures would be somehow illustrative with regards to this [5].

Flexibility seems to be one of the main characteristics identified by Crawley et al. (2004) as desirable in a given architecture [6]. The complete list is as follows:

- Robustness: "the demonstrated or promised ability of a system to perform under a variety of circumstances."
- Adaptability: "the ability of a system to change internally to fit changes in its environment."
- Flexibility: "the property of a system that is capable of undergoing classes of changes."
- Safety: "the property of being free from accidents or unacceptable losses."
- Scalability: "the ability of a system to maintain its performance and function, and retain all its desired properties when its scale is increased greatly, without causing a corresponding increase in the system's complexity."

Architecture here is probably applicable to all the different levels of Table 1. It would actually be good exercise to analyze to what level exemplary structures in this hierarchy ensure adaptability, flexibility, and robustness.

Adaptability then would not only be applicable in the biological world but also in different sociotechnical systems, from engineering systems of systems to learning organizations [7]. In fact, all the technical side has been somehow forgotten

[1] Quoted by Ludwig von Bertalanffy (1968)

by Ludwig von Bertalanffy and is a domain where a great amount of work needs to be performed from the perspective of the author of this manuscript. It has to do with how to humanize engineering and technologies in all their different manifestations: aeronautics, civil, military, naval, telecommunication, etc.

The idea of an ordered society can be traced to Aldous Huxley (2007). In his own words, "assuming, then, that we are capable of learning as much from Hiroshima as our forefathers learned from Magdeburg, we may look forward to a period, not indeed of peace, but of limited and only partially ruinous warfare." [8] It seems "this warned against the dehumanizing aspects of scientific and material progress." Is that really a learning society?

Psychohistory, as defined by an author like Isaac Asimov in his Foundation, is a "branch of mathematics which deals with the reactions of human conglomerates to fixed social and economic stimuli." [9] "Implicit in all these definitions is the assumption that the human conglomerate being dealt with is sufficiently large for valid statistical treatment," and "a further necessary assumption is that the human conglomerate be itself unaware of psychohistoric analysis in order that its reactions be truly random."

Within this context, a valid question would be: what is the role of psychohistoric analysis in socioeconomic learning, in terms of the adaptations needed by an ordered society to prevent war?

III. Immigration

It is clear that one of the main reasons of the current crisis is the immigration that has taken place in Europe. Signals being launched by the developed world to Africa constitute a call effect. It is uncertain this is really the best way of solving a problem that may have structural reasons coming from lack of industrialization in the South of the Mediterranean. This is the kind of dichotomy called "shifting the burden" by Senge (2006). It consists on addressing a symptomatic solution instead of the fundaments, and is depicted in Fig. 1.

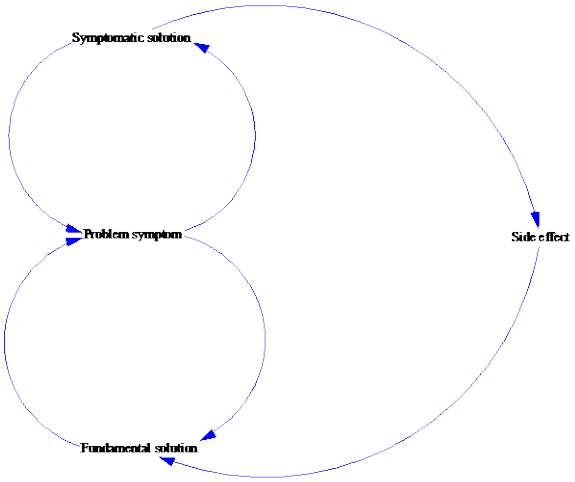

Fig. 1 shifting the burden [10]

Here, the problem symptom can be addressed by both a symptomatic solution and a fundamental solution. In case the symptomatic solution is chosen, this worsens the fundamental solution by means of a side effect. The immigration example would include a problem symptom, which is immigrants coming to the shore. The symptomatic solution would consist on safeguards rescuing them. And the fundamental solution would be the African industrialization. Finally, the side effect would be the loss of intellectual capital provoked by African workforce abandoning their homeland, which would have a negative effect on the African industrialization. All of this is depicted in Fig. 2 graphically.

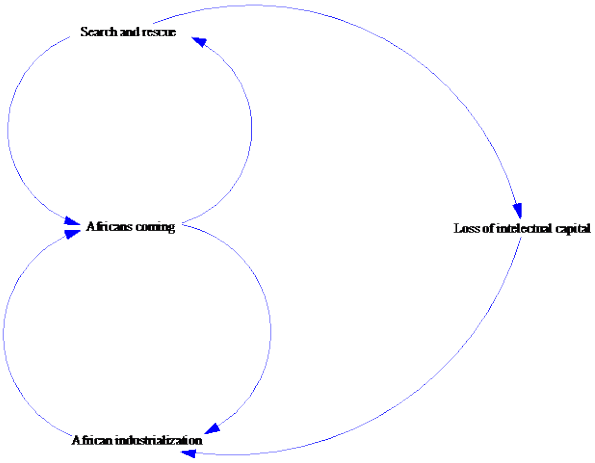

Fig. 2 The African case

However, the loss of intellectual capital departing from Africa implies other unintended and undesirable consequences.

[2] Quoted by Willigis Jäger (1998)

This would correspond to emergent and undesirable behaviors in the terminology of Crawley et al. (2004). For example, one has to think about what a mass of people coming from the South means in terms of diffusion of sexually transmitted infections like the human immunodeficiency virus.

Understanding why countries like Italy and Spain have not yet implemented serious measures with regards to prostitution regulation is not understandable. The appearance and proliferation of the radical feminist movement has made it very difficult for men to start or sustain a sentimental relationship and may make prostitution to appear as necessary for the satisfaction of basic emotional needs. It seems to be very likely that a part of the people that will be coming from the South will dedicate to work in activities like this. But it is also very probable that mafias will take advantage of the situation, and the spreading of sexually transmitted infections will surely happen if no routine control checks are carried out.

Another more serious threat for the survival of our occidental world is the appearance or existence of jihadists among the people coming to Europe. If these come to us, they are a big incentive for the appearance of insurgent behavior potentially leading to acts like the last attacks in Paris. This can lead in turn to further acts of war commanded by France, any country attacked, or the whole North Atlantic Treaty Organization altogether. If these acts of war extend themselves in time, it is very likely that more terrorist attacks will happen in Europe. The corresponding interrelations are depicted in Fig. 3 graphically, following the diagrams advocated by Sterman (2000).

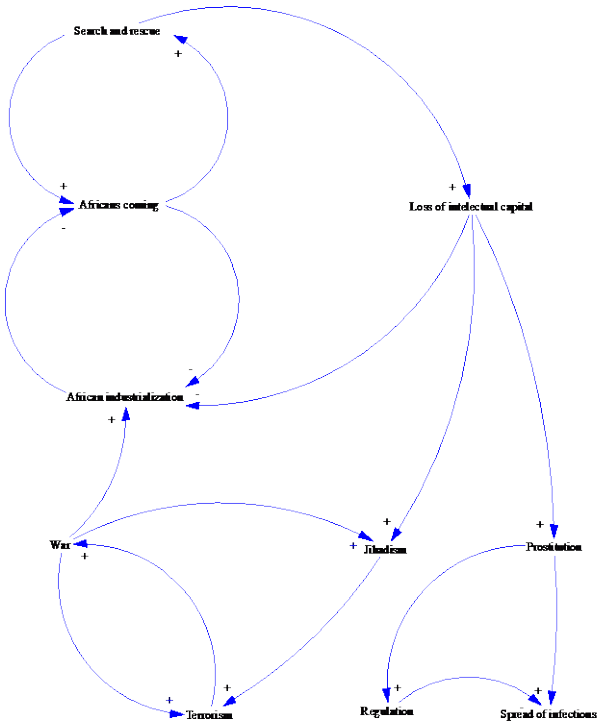

Fig. 3 long-term effects of the African case [11]

The final consequence of the reasoning behind Fig. 3 would be quite sad [12]. In fact, prostitution and war would have to be contemplated as necessary human behaviors for the satisfaction of both affective and economic problems, respectively [13]. Whether this has to remain hidden from our children or not and until what age is another issue; war can indeed be a boost for the African industrialization.

The regulation of these mechanisms would indeed mean that psychohistorical statistics would have to be applied to the analysis of human populations behavior. Questions like the following would need to be addressed:

- What would be the likeliness of populations falling under the control of a gangster?
- What would be the consequences of the lack of sensitivity of this gangster with regards to the spread of infections?
- Will this gangster be sensitive to people below him struggling and suffering?
- How does the implementation of regulation attenuate the spreading of diseases?
- What percentage of the coming population would make jihadists appear or evolve?
- How jihadists will develop and perform their terrorist attacks and what will be their impact?
- How these attacks will translate into war counterattacks and will these transform into long-term wars?
- How these counterattacks will affect proliferation of jihadists and terrorism?
- How the industry of war will promote African and European industrialization?

It is within this framework that statistical analysis would have to be applied in order to analyze if the cost in terms of human lives, both in the war scenario and the civil population, really compensates economic benefits derived from having access to cheaper petroleum. In fact, such a model could be somehow depicted as an information system where a decision support system function is implemented taking into account all these constraints [14].

A war declaration statement could be then derived from such a system, as depicted in Fig. 4. According to this analysis, war would be understood as an answer to terrorist attacks. It is understandable that a first immediate response to those would be reasonable, but it is possible that much war could provoke an increase in terrorism.

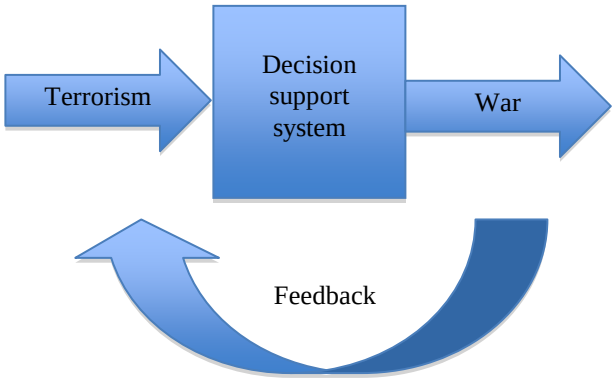

Fig. 4 Decision support system function in response to terrorism [15]

The decision support system would implement internally the best war strategies based on inputs coming from places where the resources to fight for are located as well as terrorist attacks and threats. A good utility function representing the response of such decision support system would surely have to include as a benefit the cheapening of petroleum and the higher expertise that soldier troops involved in a conflict would acquire. On the other hand, it would have to be counted as a cost number of human lives lost in conflict as well as due to terrorist attacks.

IV. Alternatives

One of the main issues behind the war is usually that scarce resources exist for which there is no alternative way of acquisition. When this is the case, it should be analyzed to what extent it is possible to find alternative products that can actually substitute the original sources. For example, is it possible to find ways of energizing that do not depend on petroleum? How can these be further exploited? Nuclear energy typically depends on carbon dioxide in the British nuclear centrals and water in the Russian ones [16].

There are different reactor types. What seems to be frequent among them is the amount of power generated: 3,000 calorific MW, which result in 1,000 electric MW. A summary appears in Table 2.

Reactor	Fuel	Coolant	Moderator
Water	Enriched uranium	Light water	Light water
Water	Enriched uranium	Light water	Light water
Water	Natural uranium	Heavy water	Heavy water
Gas	Enriched uranium	Carbon dioxide	Graphite
Magnesium	Natural uranium	Carbon dioxide	Graphite
Graphite	Uranium	Carbon dioxide	Graphite

Table 2 types of reactors of the majority of nuclear centrals currently under operation around the world [16]

There are around 438 nuclear centrals that operate in the world. The percentage of electricity generated by nuclear centrals in the world is, according to the International Atomic Energy Agency, the one that is detailed in Table 3.

Country	Centrals	Power	Percentage
United States	104	100,322	19.4
France	59	63,260	78.1
Japan	55	47,587	30.0
Russia	31	21,743	15.9
Germany	17	20,339	31.8
Korea	20	17,454	38.6
Ukraine	15	13,107	47.5
Canada	18	12,589	15.8
United Kingdom	19	10,222	18.4
Sweden	10	9,034	48.0
China	11	8,572	1.2
Spain	8	7,450	19.8
Belgium	7	5,824	54.4
Czech Republic	6	3,538	31.5
Switzerland	5	3,220	37.4
India	17	3,779	3.1
Bulgaria	2	1,906	43.6
Finland	4	2,696	28.0
Slovakia	5	2,034	57.2
Lithuania	1	1,185	72.3
Brazil	2	1,795	1.4
South Africa	2	1,800	6.7
Hungary	4	1,755	37.7
Mexico	2	1,360	3.9
Argentina	2	935	6.9
Slovenia	2	666	40.3
Romania	2	1,308	9.0
Netherlands	1	482	4.0
Pakistan	2	425	1.7
Armenia	1	376	42.0

Table 3 nuclear centrals by country with electric power generated [16]

One of the main problems of nuclear energy seems to be the scarcity of available resources for its operation. This is clearly the case for other energy sources. Yet, nuclear energy would clearly decrease the dependency of Occidental nations with regards to the Islamic State when dealing with petroleum. Although not proven, the question of how many deaths in Occidental attacks like the ones in Madrid, New York, or Paris are partially due to actions of war in the Arab world is legitimate. However, nuclear accidents are also costly when it

comes to lives lost due to insufficient safety measures.

An alternative to nuclear energies is the concept of renewables. This would also surely decrease the dependency of the Occidental world with regards to the Islamic State, and would probably not provoke the same degree and amount of accidents as nuclear energy. Renewables include wind and solar. The best proof that results are effective is the fact different means of transportation traditionally powered by petroleum are now energized by renewable sources. For example, high altitude platform stations can be powered by solar energy. Some of these are depicted in Fig. 5, Fig. 6, and Fig. 7.

Fig. 5 Balloon [17]

Fig. 6 Unmanned Aerial Vehicle [17]

Fig. 7 Manned aircraft [17]

Zephyr represents clearly a proven solution to the problem of energizing a flight without recurring to petroleum. It is able to fly during 11 days nonstop, and its power sources are solar. It can be seen in Fig. 8.

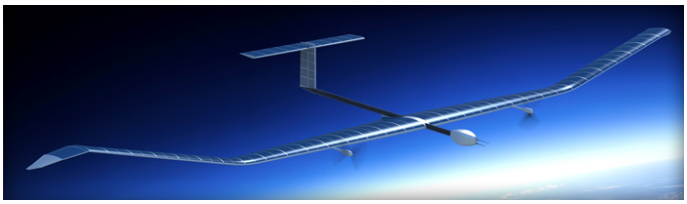

Fig. 8 Zephyr (http://militaryaircraft-airbusds.com/Aircraft/UAV/Zephyr.aspx)

Maybe the best example of application of electric nonpetroleum power is new cars in Paris as depicted in Fig. 9.

Fig. 9 Electric automobiles (http://untappedcities.com/2014/03/14/adorable-electric-car-sharing-autolib-street-sign-in-paris/)

REFERENCES

[1] L. von Bertalanffy, *General System Theory: Foundations, Development, and Applications*. New York: George Braziller, 1969.

[2] K. E. Boulding, *The Image*. University of Michigan Press: Ann Arbor, 1956.

[3] W. Jäger, *Search for the Meaning of Life: Essays and Reflections on the Mystical Experience*, Missouri: Liguori, 2003.

[4] R. Dahlke, *Disease as the Language of the Soul*. Munchen: Goldmann, 1992.

[5] M. Criado, Characterization of models of cooperation among organizations as a basis for the acquisition of competitive and flexible structures. Madrid: Technical University of Madrid, 2000.

[6] E. Crawley, O. de Weck, S. Eppinger, C. Magee, J. Moses, W. Seering, J. Schindall, D. Wallace, & D. Whitney, *The Influence of Architecture in Engineering Systems.* Massachusetts Institute of Technology: Engineering Systems Division, 2004.

[7] TM: A Development Technique for E-government 2.0 Portals, F. Z. M. Mohamed, S. S/O Muthaiyah, & A. K. Nassirtoussi, *TM: A Development Technique for E-government 2.0 Portals.* WSEAS

TRANSACTIONS on INFORMATION SCIENCE and APPLICATIONS, Issue 2, Volume 8, February 2011.
[8] A. Huxley, *Brave New World.* London: Vintage Books, 2007.
[9] I. Asimov, *Foundation.* New York: Bantam Dell, 1951.
[10] P. Senge, *The Fifth Discipline: The Art & Practice of the Learning Organization.* New York: Currency Doubleday, 2006.
[11] A. C. Cagliano, A. De Marco, C. Rafele, *System Dynamics Modeling to Study the Diffusion of a Supply Chain Management Mobile Application*, Volume 9, 2015.
[12] J. Sterman, *Business Dynamics: Systems Thinking and Modeling for a Complex World.* Boston: McGraw-Hill, 2000.
[13] J. M. Arias, *Wars and whores.* Madrid: BIT 198, October 2014.
[14] M. Scott-Morton, *The Corporation of the 1990s: Information Technology and Organizational Transformation.* Oxford: Oxford University Press, 1991.
[15] R. Myskova: *Economic Information Systems for Small and Medium Businesses and Evaluation of Return.* WSEAS TRANSACTIONS on INFORMATION SCIENCE & APPLICATIONS, Volume 8, 2011.
[16] M. Lozano, *Nuclear, why not? How to face the future of energy*, Barcelona: Debolsillo, 2011.
[17] Centre for Communication Systems Research, *High Altitude Platform Station: A Promising Infrastructure for Delivery of 3G and Beyond 3G Services.* University of Surrey.

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