The Expansion of ICT: A New Framework of Inclusion and Exclusion from the Global Realm

Thomas Mavrofides[1]
Dimitris Papageorgiou[2]

Abstract

The proliferation of Information and Communication Technologies (ICT) and their interaction with certain social systems, led to the emergence of the phenomenon of globalization. Globalization lays on a technological infrastructure that makes it possible, by minimizing the time needed for communication and inter-systemic interactions. This also, has led to a strong support of the global financial system to the ICT industry, so that the latter can provide faster applications at any level of networking, thus putting both globalization and the ICT industry in an accelerating mutual development. This paper, examines the problems certain social systems face into this new environment, due to the structural coupling of those systems with a technological backbone that functions as a system of inclusion (and thus exclusion as well) of those social systems which do not conceive of the ICT as a prerequisite for their own continuation. That situation is challenging the political subsystems, as to their ability to govern the social systems through their way towards a global society. The paper initially presents the state of globalization in a brief way and next introduces some of the basic concepts of contemporary systems theory. At the rest parts, we examine the problems posed to the basic social system-reconstituting functions by the "real-time" communications global network and finally we introduce some preliminary thoughts about the ways the political system (or any other management system for the matter) can try to solve those problems.

Introduction - A new state of affairs

During the last two decades (1990-2010), the intensive proliferation of ICT networks, created a new environment: the global domain. The characteristic of those networks is fast and reliable real-time communications between remote installations, which facilitates the global-wide instant diffusion of information, consistent transmission of multimedia assets, real-time control of remote installations and financial transactions; and of course, real-time communication between people and/or organizations. Therefore, the characteristics of the global domain are analogous to those already described: the importance of spatial proximity gradually decreases, and gives its place to "bandwidth". High bandwidth fully substitutes a variety of means that were considered absolutely necessary for the internationalized society in order to manifest itself. This process though, is quite different from internationalization. To reveal the essence of this difference, one has to elaborate on the phenomenon of functional differentiation of the social systems into the domain articulated by globalization.

[1] Department of Cultural Technology & Communication, Aegean University, blacktom@aegean.gr
[2] Department of Cultural Technology & Communication, Aegean University, d.papageorgiou@ct.aegean.gr

As Niklas Luhmann (1997) points out, phenomena such as religious or ethnic fundamentalisms, "...new problems in planning and controlling innovations in organizations and in production technology…" (ibid: 67), massive immigrations and intensive foreign direct investments (Sassen S., 2007), when conceived as manifestations of one and the same process (i.e. globalization) lead to the assumption that localized social systems (e.g. nations, cities, local communities, local organizations etc.) gradually react to an environment that supersedes the national boundaries and therefore reconstruct themselves as if their environment is the whole of the globe - which we consider to be the case indeed (Mavrofides & Papageorgiou, 2009). So those systems, if trying to adapt to that environment, enact their own functional differentiation passing to their inputs data that is incoming from the globalized context; and, they resort to technical solutions which correspond to the same technical infrastructure that initially triggered the problem they try to resolve: the Internet. To be sure at this point, from a clearly technical point of view, the Internet is nothing more than a network with routing algorithms and heuristics, and the corresponding hardware; what makes that network *the Internet*, is the services and the contingencies that presents to the social systems, and this is exactly what we mean with that term. So, that circular process of adaptation engenders new types of social organization. This is to say that, that process gradually adopted the characteristics of the system which created it: *the expansion of ICT networks entails the expansion of itself;* the technological networks continuously trigger the need of the expansion and evolution (via innovation) of those same networks in an endless loop, where the effect (i.e. globalization) becomes the cause of further expansion of ICT networks. This brings forth a process with a twofold dimension: social systems are confronted with globalization as their own environment and - in order to deal successfully with the new problems they face - those systems are triggering ICT innovation and expansion anew. Put differently and more generally, the global system is upgrading the role of ICT to a level of a sine qua non for its own continuation but also, for the continuation of localized social systems. All these remarks bring in the center of our investigation the theory of autopoiesis.

A primer on autopoiesis and its incorporation in social systems' theory

The term autopoiesis (Greek, auto: self, poiesis: creation) was coined by the Chilean biologists Humberto Maturana (1980) and Francisco Varela in an endeavour to define rigorously the characteristics of living systems. They came up with the conclusion that a system can be considered as living, if and only if that system continuously recreates itself; they called it an "autopoietic system". By definition, "*An autopoietic machine is a machine organized (defined as a unity) as a network of processes of production (transformation and destruction) of components that produces the components which: (i) through their interactions and transformations continuously regenerate and realize the network of processes (relations) that produced them; and (ii) constitute it (the machine) as a concrete unity in the space in which they (the components) exist by specifying the topological domain of its realization as such a network*"[3] (ibid: 72). Autopoietic machines are autonomous and "subordinate all changes to the maintenance of their own organization" (ibid: 80), they have individuality, they always function as unities *and their autopoietic network is strictly internal and circular*: the living machine continuously regenerates itself, and therefore autopoiesis triggers autopoiesis in a circular process.

So living systems do not remain unchangeable; on the contrary, it is exactly the change - a *continuous* process of becoming - that guarantees the continuation of the living system as such. Therefore, *autopoiesis is a continuous process of becoming that conserves being (identity)*. We need to emphasize here, *that in no way autopoiesis is governed by the living system's environment*: autopoiesis remains autonomous or else there is no autopoiesis

---

[3] Emphasis by the authors.

and the living system disintegrates. Putting it another way, we can say that the living system changes in a circular homeostatic procedure, which *is triggered but not specified by its environment*.

An important aspect of the theory of autopoiesis is that of the system's auto-catalysis: the living system due to its autopoietic procedure *destroys* its very own components and creates new ones; at any given moment, the only thing that's really important is the ability of the components to participate supportively in the autopoietic cycle, despite other characteristics they may hold (which of course could signify their own autonomy). Autopoietic machines - or living systems - are in fact relation-static systems rather than homeostatic (ibid). And it is only through continuous catalysis/recreation that the system achieves the continuous reconstitution of its own self, namely *the confirmation and manifestation of its identity*.

Niklas Luhmann paved the way to a new theoretical apparatus that brings the notion of autopoiesis into sociology, placing the people (the psychic systems) at the environment of social systems. Social systems according to Luhmann are constituted from communications (i.e. communicative actions), manifested by communications, and owe their coherence and continuation to the production of meaning. That is, psychic systems (persons) do not communicate to each other directly (as if their nervous systems were interacting directly), but through the social system; and doing so they reproduce it. Every communicative action is inherently social and communication is a sine qua non: there can't be any communication outside the social system (Luhmann N., 1986; 1995).

Therefore, were we to rewrite the original definition of autopoiesis in a Luhmannian way, it would read like this: *An autopoietic social system is a system organized (defined as a unity) as a network of processes of production (transformation and destruction) of communicative actions that produces the communicative actions which: (i) through their interactions and transformations continuously regenerate and realize the network of processes (relations) that produced them; and (ii) constitute it (the system) as a concrete unity in the space in which they (the communicative actions) are manifested by specifying the conceptual domain of its realization as such a network.*

In order to realize the incorporation of the autopoietic theory into sociology, one has to conceive of the communicative action as an *event*, and examine it that way. That is, events (i.e. communicative actions) have informative value only if they are not repetitive. From a systems theoretical point of view, a repetitive event is a non-event. Initially, a communicative action that disrupts the certainty of the receiver has an informative value (Shannon C., 1948) but if the same event is repeated, it gradually loses its importance and becomes irrelevant: it becomes a *predictable* part of the systems' environment. It follows that every communicative action *must be catalysed* in order to give place to the next action and allow communication to solve (albeit temporarily) its main problem, i.e. "what comes next and how to connect it to the previous". So, communicative actions are concurrently autonomous and interdependent. And what connects them together in the process we call "communication" is, of course, *meaning*.

For Luhmann, meaning is an evolutionary achievement due to the interaction between psychic and social systems: "Psychic and social systems have evolved together. At any time the one kind of system is the necessary environment of the other. This necessity is grounded on the evolution that makes these kinds of systems possible. Persons cannot emerge and continue to exist without social systems, nor can social systems without persons. This co-evolution has led to a common achievement, employed by psychic as well as social systems. Both kinds of systems are ordered according to it, and for both it is binding as the indispensable, undeniable form of their complexity and self-reference. We call this evolutionary achievement 'meaning' " (Luhmann N., 1995: 59).

So meaning offers the ground upon which both social and psychic systems emerge. This assumption though, does not imply "intersubjectivity" except in a very limited way; to the contrary, every system retains its autonomy by means of a basic, ever present negation: "I am not you". So, the environment is necessary for the system, in order for it (the system) to define which its next ontogenesis will be; the environment must remain always "the other"

and moreover it has to *be* "other" – otherwise the system cannot define itself. This way, the autopoietic system reconstructs itself and redefines its boundaries in an endless cycle that concurrently reconstructs its environment too: as the self-referential changes in order to remain the same (i.e. to retain its coherence and indentity) the other self-referential systems at its environment employ the same autopoietic process. This situation is not exceptional for the autopoietic systems: they continuously exchange their being for a perceptual process of becoming. And, when it comes to social systems, the whole autopoietic process is triggered solely by communication and manifested only by communication.

Problems emerging in the new realm and old processes facing new difficulties

Social systems being constituted by communications, it becomes obvious why a technical network that facilitates remote communications became indispensable; but the recent developments of "real-time" communications took place in a comparatively small period of time and this is a problem for the self-referential systems which are characterized by their pertinent recovery times (Ashby R., 1957).

It should not go unnoticed anyway that, the analysis we unfolded hereto implies the emergence of a critical problem: if autopoietic systems are autonomous with respect to meaning construction, how can any systemic form of organization be possible? The available answers, in rigorous systemic terminology are: internal differentiation, double contingency, structural coupling. Let us try to explain those terms albeit shortly. *Internal differentiation* signifies the process where a system organizes its own structure in a way suitable so to manage incoming signals or other perturbations of a certain kind; that is, the system – based on the assumption that what already has happened is more probable to happen again in comparison to something that did not happen yet - develops internal (sub)systems to handle those events; each one of those subsystems reflects the way the system perceives of its environment. Accordingly, the system learns by experience that every other self-referential system in its environment is contingent and that co-existence is the outcome of *narrowing* the contingencies. Since those kinds of systems are autonomous, the only way for them to co-exist is to suppress their own contingency by their own means: and exactly this is the meaning of *double contingency* – each system suppresses its own contingency due to the recognition of the contingency of its environment. Unavoidably, every self-referential system does the same. So, when a number of systems interact with each other in a long period of time, and because of the functions we already outlined, their structures reflect the history of their relation(s). And this sheds light on the somewhat cryptic meaning of the term *structural coupling*.

But, a critical factor is needed for all those functions to take place: we refer to *time*. Let us elaborate on this. Self-referential systems, consume time in order to *redesign* themselves, or, put in another way, in order to create new descriptions of themselves into their changed environment. Therefore, time is vital for autopoietic systems; for if not enough time is available at their disposal they cannot recover from perturbations. This is particularly true for management systems, such as the political systems of modern democracies for example; as Niklas Luhmann (1995: 45) points out, self-referential systems use constructively the events they encounter at their environment "… if enough time is at their disposal to do so…" and Stafford Beer (1973: 4) argues that, "…Any homeostat takes a finite time to re-establish its new stable point". This is described as 'the relaxation time of the system'. Stafford Beer following Ross Ashby (1957) conceives of a homeostat as a compound machine that rests upon a *dynamic* equilibrium. And, to be sure, the "stable point" is the point (in time) where the system is able to reconstruct a new description of itself (i.e. re-establish its dynamic identity).

The rapidness of the development and pervasion of ICT networks suppressed the recovery time of the social systems affected and eventually seems to lead to new patterns of inclusion/exclusion of those systems, with respect to the global domain. This is to say that

social systems that did not ride from the beginning the wave of ICT technologies faced the dilemma of a contingent marginalization or a profound perturbation (in fact a shock) from which they had to recover quickly. Put another way, certain social systems did not have the time to design adaptation strategies preserving their autopoietic networks. This situation of course, led to what today we identify as a condition of world-wide deregulation; and one of the manifestations of that deregulation, is the 2008 crisis (Krugman P., 2009).

To understand the aspects of the problem, we need to clarify the relation between social systems, the global system and the ICT networks: "Communication and transportation technologies, the globally inter-related media, and the worldwide diffusion of the Internet and other computer networks, as well as the spread of wireless communication, are the material backbone of a global interdependence that, of course, was not technologically driven but technologically mediated" (Castells M., 2004: 10). What Castells seems to maintain is that the situation of global interdependence - which *we do not yet call a self-referential system* - was *socially* driven; that is, some social systems, conceived of the ICT networks as the backbone of a contingent expansion of their activities (this is especially the case with large enterprises); consequently, other social systems that did not have the same initial conception with respect to the Internet - or access to state-of-the-art ICT services, quickly faced a fluid environment with changing characteristics and perturbations (events) they were not prepared to confront. The way ICT technologies suppressed the time in the latter's environment, suppressed also their internal time and posed to them the need of a quick (as never before) recovery. This of course, is a problem to their systemic identity, and under this light, it is not difficult to understand why some social systems oppose to "globalization".

Concurrently, the process of ICT development became self-amplified. Speed became the hallmark of ICT systems. As Luciano Floridi (1999: 47) puts it, "…the computational power of computers depends entirely on the design of their instructions and the physical speed at which they can execute them. The amount of time-space resources available and the quality of the algorithms are therefore crucial". The increasing speeds of communications realized by ICT networks, led to an unforeseen financial support to the relevant ICT companies, with one obvious goal: to develop as-fast-as-possible faster ICT networks and to deploy them of course. So, the ICT industry entered a feedback loop that lies on a continuous increment of the data transfer speeds. Proximity became synonymous to bandwidth and wealth started to detach from the concept of "production" and moved towards the unconditional access to "real time uninterrupted communication".

So, many regulatory systems, which emerged as outcomes of the historical evolution of society, are now confronted with an unforeseen situation – they do not have enough time at their disposal. The most typical case of a general regulatory system is probably the modern national state itself: up to its border, its law is powerful - beyond that point, it is simply irrelevant and it is incapable to control any processes thereafter. Of course, inter-national entities were gradually formed with their only raison d'être being the conformation of deviating national legislations, so to facilitate trans-boundary exchanges of goods and people; and also to find effectual processes so as to work around inter-national conflicts. That scheme seemed to work - albeit with problems and inefficiencies - until the communications were de-localized by the rise of the Internet. From that point on, local social systems and regional networks established their own communicational networks (Mavrofides & Papageorgiou, 2009) based on the processes reconstructing their own systemic meaning (i. e. autopoiesis); and that meaning, gradually starts to couple with the global environment and events that take place "out there" - nevertheless, not within the national boundaries enclosing the systems affected. Therefore the notion of proximity shifts to a different level which is drawn by the ICT networks; the importance of locomotives, cars and airplanes is somehow reduced, following a shift in the meaning of proximity: what is proximate in time need not be proximate in space. This triggers a self fulfilling prophecy: the effect (technology) now becomes the cause (of globalization) which enters again into the social system as a solution that gives birth to new contingencies and entails more technology in order to deal with them.

This is a recursive process of reconstructing a local-to-global identity; put another way, it is a process of corroboration of the niche of a local social system into the global realm.

The grounds for exclusion

One main problem of the globalization process is the absence of a feedback loop. A feedback loop in cybernetic terms can be reduced to a simple "if": this "if" implies that the system which takes feedback, has certain goals that it tries to achieve, and also it has different strategies at its disposal - else "if" is meaningless.

But globalization is a spontaneous process; there are of course international organizations that try to upgrade their role in the new situation (cf. Willke, 2007), but those systems are not yet coordinated to each other. And *it is coordination that forces systems' emergence* initially (Maturana H. R., 2005). On the contrary, globalization spreads deregulation, and to be sure: it deregulates existing social structures, questioning meaning reconstructing processes that have deep historical backgrounds. At the same time, the only clue globalization can offer at the moment to the deregulated systems as to a contingent inclusion into the global realm is the installation of high-tech ICT networks; and this of course is not something that can be considered a priori a prerequisite for systemic meaning reconstruction: social systems are communication systems - and *communication qua communication is not a matter of technology but a pure matter of langue* (Willke H., 2007: 136). This means that a social system does *not* necessarily need ICT networks in order to reconstruct its identity - but the lack of such a technology, in the globalized context will narrow its potential and will lead it to marginalization. At this point we need to keep in mind that social systems *do* have feedback loops and that those are manifested in the various governing subsystems they employ.

This draws - albeit roughly - the problem of exclusion: social systems need to choose between marginalization and globalization. Marginalization can create problems to their identity, and globalization jeopardizes it: every selection is problematic, and quiescence is not an available option.

Where to look for solutions

The conditions outlined above, resemble closely Gregory Bateson's (2000: 206) *double bind* theory: a "loose – loose" situation where not to select an option (i.e. tolerance) is impossible, and selecting seems hazardous. But the fact that deregulation is an inherent property of globalization (as we know it), *does not mean that social systems need to be necessarily deregulated* in order to get their own niche in the global environment. Social systems do have their own feedback loops and there is no need to abolish them: they can reconstuct them, in order to reflect their new environment. In a cybernetic manner of speaking, this means to enrich their feedback loops with new sensors that monitor globalization as well as the ICT developments. It also means new challenges for internal differentiation processes that will reflect those new events, and will guarantee adaptation while preserving critical systemic variables (such as the locality of culture) within acceptable ranges. This is not to say to "preserve a culture" or a "tradition" in a static manner, but to preserve the *local* characteristics of culture: as those characteristics change, culture changes accordingly, but it still remains a manifestation of a *localized* identity.

Those assumptions eventually *convey the problem of inclusion to the inherent processes of political structures* functioning within the localized social systems. From a technical point of view, any solution ends up to technical installations; but from the point of view of the social systems involved, it refers to meaning reconstruction processes. And at the modern society, the institutions charged with the preservation of those processes (and therefore the continuation of the identity of the social systems) are the political ones.

So, a new field enmeshing sociology, political management (and by reduction political theory) and ICT disciplines is emerging as a necessity imposed onto society by

society's own selections. This of course presupposes the self-observation of society; this is to say that, society as an observer needs to observe its own reconstructing processes, thus turning the problem of inclusion to a second-order cybernetics problem or a problem of self-reflection (von Foerster H., 2002; 2003; Bourdieu P., 2005; Latham R., 2005).

Conclusions

All those remarks, end up to the conclusion that society cannot turn any more exclusively to technology for solutions: technology engenders new problems that are not of technical nature. Technology of course overlooks those problems, since they fall out of technology's scope. But technology qua technology is meaningless, for meaning is an attribute imposed on technology by pure social (and social only) processes. So, society turning to technology in order to deal with those problems is actually "recycling" the problems and expanding the grounds for the emergence of new contradictions that challenge the communicational potentiality of certain social systems. Put another way, this would challenge the whole idea of communication, positioning it to the level of an attribute of ICT networks; and thus, the very idea of society would be challenged.

Post-modern society seems to overlook these problems and opt for two parallel societies: the inter-connected globalized world (inclusion) and the rest of the globe (exclusion). From a systemic point of view, this could lead to a reduction of variety and redundancy in the social systems, and eventually bring globalization to a halt. Only the self-observation of society can guarantee the continuation of society qua society i.e. as a system of communications.

Self observation is a problem that repeatedly re-enters the discussions about social systems, but at the present time still remains to a level of pure theoretical inquiries. This reveals a chasm separating emergent (and rather urgent) social needs and the capabilities the social systems can claim having at hand - their historical experience in the form of knowledge is not enough any more.

Globalization lies upon quick - almost instantaneous - communicative actions which suppress the time needed for the modern (i.e. created through modernization) social systems to compensate. Compensation and adaptation are the main potentials in question and the subsystems charged with the general problem of future handling, are the political ones. The only viable solution for the political system in order to reconfirm its role in the new environment seems to be to turn to technology for solutions - but that could lead to a re-entrance of the problem that was tried to solve initially. Consequently, the political systems (and to be sure: *national governments*) need to take into consideration the available technological options *in combination* with the design of the future of the national states they represent and the unavoidable participation of those states (as states or even otherwise) into the global realm. Detachedness is not an option: a wider than never before information pool is needed, in order for the governments to elicit knowledge about the new needs. This of course underlines the importance of technology for it is the latter that can offer the capabilities of accessing that information. But our analysis sets forth the salient role of social management systems (i.e. governance systems) and emphasizes their crucial responsibility to design and endow new, global-wide regulative systems that would guarantee the course of globalization as a global-wide system that has the ability to observe its own self qua self by virtue of technology driven by social analysis tools.

References

Ashby Ross W., 1957, *An Introduction to Cybernetics*, CHAPMAN & HALL LTD.
Bateson Gregory, 2000, *Steps to an ecology of mind*, University of Chicago Press.
Beer Stafford, 1973, *Fanfare for Effective Freedom*, The Third Richard Goodman Memorial Lecture, delivered at Brighton Polytechnic.

Bourdieu Pierre, 2005(2001), *Science de la science et réflexivité, Cours du Collège de France 2000 - 2001*, Athens, Patakis. Th. Paradellis (trans.).

Floridi Luciano, 1999, Philosophy and Computing: An introduction, London, New York, Routledge.

Krugman Paul, 2009, *The return of depression economics and the crisis of 2008 (Greek edition)*, Kastaniotis. Alavanou Ariadne (trans.).

Latham Robert, 2005, *Networks, Information, and the Rise of the Global Internet* in *Digital Formations - IT and New Architectures in the Global Realm*, Latham Robert, Sassen Saskia, (eds.), Princeton University Press: 146-177.

Luhmann Niklas, 1986, *The Autopoiesis of Social Systems* in *Sociocybernetic Paradoxes*, F. Geyer, J. van der Zouwen, (eds.), London, Sage: 172-192.

Luhmann Niklas, 1995, *Social Systems*, Stanford University Press.

Luhmann Niklas, 1997, *Globalization or World Society: how to conceive of Modern Society?*, International Review of Sociology, American Sociological Association vol. 7 (1): 67-80.

Maturana H. R., 2005, *The Origin and Conservation of Self-consciousness, Reflections on four questions by Heinz von Foerster,* Kybernetes, vol. 34 (1/2): 54-88.

Maturana H.R., Varela F.J., 1980, *Autopoiesis and Cognition: The Realization of the Living*, Reidel Publishing Company.

Mavrofides Thomas, Papageorgiou Dimitris, 2009, *The participation of a region in the global network: integration or exclusion as consequences of the use of ICT*, conference proceedings: *2nd Greco-Russian Social & Scientific Forum*, 14-18 June, St. Petersburg, Russia.

Sassen Saskia, 2007, *A Sociology of Globalization*, W. W. Norton & Company, Inc.

Shannon Claude E, 1948, *A Mathematical Theory of Communication*, Part I, Bell Systems Technical Journal, 27, pp. 379-423

Viskovatoff Alex, 2004, *The Market as an Environment,* Journal des Economistes et des Etudes Humaines, vol. 14 (2): 55-70.

von Foerster, Heinz, Poerksen Bernhard,, 2002, *Understanding systems - Conversation on Epistemology and Ethics*, Carl-Auer-Systeme Verlag.

von Foerster, Heinz, 2003, *Understanding understanding - Essays on Cybernetics and Cognition*, Springer.

Wiener Norbert, 1961, *Cybernetics: or control and communication in the animal and the machine*, New York, London, MIT Press - John Wiley & Sons, Inc.

Willke Helmut, 2007, *Smart Governance - Governing the Global Knowledge Society*, Campus Verlag.