Information System and its Users as a Single System

A Discussion on its Nature and Level of Granularity

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Abstract— **The possibility to define information systems and their users in a single frame of reference as one summation system and, separated from the inclusive organization, may provide a better perspective for analyzing and designing them. It is also expected to have advantages for dealing better with human issues during adoption and usage courses. According to some psychodynamic interpretations, the study strives to propose a level of appropriate granularity to define such single system synthesized from psychic contents. A provision of basic definitions is also targeted for the single summation system in terms of equilibrium conditions and equilibrating mechanisms.**

Keywords: Information Systems, General System Theory, Equilibration

I. INTRODUCTION

Information systems (IS) can be considered in different levels of abstraction, from a pure software system to a comprehensive organizational system. However, in this place, they are almost nothing without their users. These users usually are human beings (by now, very limited degree of importance can be endowed to external systems, software agents or hardware devices as system users). Generally and from a software system point of view, they (i.e. people) are only actors that are limited to follow the predefined *use cases* of the system. From a higher, organizational level, they are part of a social (or socio-technical [1]) system as organizational actors. Hence a pre-question is what is the summation of the information system and its users, possibly minus the inclusive organization? In other words, does this summation have any specific identity/nature for its own that can be added to the organization l (probably as a subsystem)?

In this formulation, the current study intends to look for such summation of both, but from users' point of view as they perceive and act inside the system. So that, how they force IS to be appeared to reflect their minds content and, how IS, inversely, do this to them to follow its rules. Although, this can be speculated as mutual influence of IS to contort people's status quo and vice versa, the remarkable point is, these two sides do not have the same nature. In fact, IS are not a true reflection of their designers and developers' mind processes and, merely show a logical plan for the required services. Thus, IS are originally assumed to be drained from psychic contents.

To define a single (*summation*) system, determining a proper level of granularity is a must to answer a range of questions such as user-system adaptability, user resistance, work collaboration, and other human issue. In fact, the level should initially be determined and delimited whereby, for such a single system what extra properties of the users should be incorporated in (and to what degree of details) and what organizational properties should be excluded from (and leave them to the whole organizational system). However, it seems that those users' personal/psychological backgrounds are required to be (or can be) related to organizational properties e.g. the organization's work practices and organizational culture. In other words, it is expected to some extent shows that the findings are general patterns, in terms of not being very personal (i.e. general patterns which are potential to be found in all organizational situations).

In fact, this study follows a previous work [5], to employ that conceptualization to render a redefinition of the term *system* where it applies to IS in their organizational settings including people.

To avoid misinterpret about term system, some clarifications are made here. Term *system*, as lonely, refers to the information system under consideration as an enterprise system [2]. "IS" stands for information systems (as a general plural noun). Although, the whole organization is considered as an *inclusive* or *comprehensive* system; the targeted or resulting system (or, system pattern or framework), comprising the information system *and* its users, is called "single" or *summation* system. Moreover, the *nature* of the resulting system is assumed to be a composition of people' minds *content* and *processes*.

II. PROBLEM AND PURPOSE

The core problem which leads to this study is expressed as follows. IS are supposed to serve organizations. They *reassign* new/modified organizational roles to organizational actors as *system users*. Afterward, these users become *system actors* and must follow the prescribed *use cases* of the system. However, people not always are the exact actors of the system. They potentially have an active role to define, design and develop an information system; they can (reasonably or unreasonably [5, 6]) resist to (and possibly reject) a system implementation project [7, 8, 9]; they are able to properly and acceptably use the system, individually

or by means of forming social collaborations [10]; and, finally they are potential to make some workarounds intending to ease or defy running systems.

Negatively, all these reactions may have drastic consequences [7, 8]. On the contrary, positive attitudes are not only very potential to end up with high performances [7, 9], but also can redefine and improve the system appropriately [11]. Therefore a positive attitudes and cooperation form users have always been demanded.

However, people usually act on their mind contents which are very difficult to change. These should be considered as a *status quo* for people [12]; and traced back to their personality (or *personal history*). Occurring change is even more troublesome from a psychodynamic point of view; due to the fact that those mind contents are always act in the form of ongoing processes. These processes are originated from early childhood and adapted to the existing environment (specifically e.g. the current organizational settings). Consequently, the major obstacle for change can be hypothesized so that these mind contents, in terms of processes, form some (circular) habits that are be threatened to break by a new system's work flows and procedures [13]. Such a break (in usual habits) potentially interferes with working *ego defenses* (a defensive look on mind's processes [3]) and in its turn, can bring about anxiety. Anxiety here is a sign of threat for which specifically, those ego defenses are adopted and utilized to control and alleviate it (i.e. the anxiety). Threats can be real (in case of positive functioning of ego defenses) or imaginary (in pathogenic cases) [3].

Based on this formulation of the problem, its effects and the proposed view for its causes, the purpose of this study can be stated at this point. As it is generally known, people have a crucial role for success of IS, mostly because they should choose to use them. On the other hand, they have their own mind contents which stand for, individually *and* socially [20]. Then, at the time of introducing a new system, these mind contents are going to be influenced by it; an influence that is potentially *mutual,* thereby finally, they are expected to proceed to equilibrium [14]. Therefore, if the users and the system can be considered in one single system of reference, we have a richer frame to see how the new system affects the people and vice versa, *as it is perceived* by *people* (also cf. [5]). In other words, as a consequence of combining original mind contents *and* those suggested by the system, the *nature* of the *alterations* may be conceptualized and viewed in the form of people's mind contents (along with or without taking into account changes in the *logic* of work structure and procedures).

Hence, with applying this conceptualization, analyzing human issues should be much easier, because researchers would be able to view the problems in their original/social forms; and find out what has happened to the previous conditions of the people under consideration; particularly, through taking away the whole organization (with still keeping it in mind as the mere *environment*) and focusing on the user-system interactions from users point of view; something which is usually overlooked so far.

In another phrasing of the significance of this study, in this conceptualization, we can observe user mind processes relatively independent of the whole organization. These processes are inclined to incorporate and digest novel alterations as is introduced by a new system in terms of procedures and regulations for users. As such, the *summation* system can be defined and studied in terms of human mind processes, whether individually or in groups (i.e. *shared* [5]), and their relationships with the imposed regulations of IS.

Moreover, due to mutual modification relationship between the information system, roughly remind a general system pattern, in which both sides influencing each other over the course of time and the total still is persistent, then before all, the thesis is how to conform to system rules and properties.

As is mentioned, the study intends to find an acceptable and usable level of definition for this conception i.e. defining a single system comprising IS and the related people. Such a level of definition can be effective for several purposes. The direct harvests are to find equilibrations and functionalities. It can resolve organizational dysfunctions; define some kind of ergonomic for system design and finding the ways to design more effective system.

III. FORMULATION AND SCOPE

In this paper, particularly we are looking for such level i.e. determining a level of comprehensiveness to incorporate IS and people in one single system. Then based on that and an earlier work [5] define a system (framework) in a general form. However, investigating the functioning of such system within real settings is beyond of focus here.

Hence, the main question is how such composition can be a system. The question implies the nature, level and complexity of such system. Therefore, the main properties of a general system, such as equilibration processes, equilibrium conditions and equilibrating mechanisms should be investigated. The point is how people and system can be merged into one single system, whereas people neither simplified system actors nor complicated psycho-systems. It implies an intermediate level of incorporation of peoples' roles. As such, the final system is neither a social system nor complies with the abstract definition of the information system in which people are only actors as is prescribed for and within the system.

Moreover, the resultant system is not considered to be a socio-technical system. What can be understood of this term is a social system in which the relationships are defined or patterned within the technical work procedures [1] with the main idea that the forms of work arrangement can impact the social system. For why the summation system is not so, we will return to the issue in the following sections.

The whole formulation and outline of the subject is articulated as follows.

As the first idea, this study strives to show those aspects of system that mostly inclined to restore the past forms of work and use (or even misuse) the system flows as workarounds. Though, in a trial and error equilibrating mechanism, people can be influenced (perhaps fully) by the system as well. The need to change their mind content appeared to be obvious, but how they do this, via e.g. changing their mind, changing and adapting the system,

employing workarounds and unofficial routines or a combination of all is a matter of question.

This question leads us to the second idea which is the granularity of a system in such level. More precisely, an information system and its users how can be related to the organization as a social system, a socio-technical system with its logical work procedures, the information system in its abstract definition, in its functional and operational view, individual and group dynamism, individual psychic systems, the consisting groups culture and the organizational culture. Moreover, the prospect modified relationships with the whole organization, including work structure and procedures and, cultural issues are noticeable to be studied as well.

The third underlying idea is, rather than other technical systems e.g. manufacturing or product line systems, due to its uniqueness, IS are under considerable efforts to be contorted to reflect people's current minds. This attribute can be traced back to historical expectations and development of IS.

Therefore, to delimit the current study, some points should be carefully taken into account.

Firstly we assume that organizations are system. Secondly they are system as is shown to [5]. Thirdly, regardless of two previous assumptions, IS are systems (by definition and obviously according to their design and usage views).

Fourthly, however, IS cannot be system in the same manner where are working within organizational settings (i.e. as running systems, and not as have been defined). Actually they scarcely can be one subsystem of the organization, because IS spread out to all aspects and levels of the organization's work and control and then hardly the whole organization minus the information system can be considered as a system; so if the reminder could not be a system, then by definition, subtrahend (i.e. running information system inside the organization) is not a system as well.

The argument can be strengthened by adding that, the information *system* (as is literally called) is only *system* when it is being presumed in its logical and abstract form; but during its running, it cannot preserve itself by its own (equilibrating) mechanisms and vitally needs other factors' assistance (i.e. from people and the organization as a whole) to run. In fact, it may be system only if, people perpetually work as system actors as is prescribed within the system's definition, that is, a logical/abstract model of people. This cannot usually be realized in sophisticated enterprise systems practically and hence, it is the core challenging idea for the current study. Thus, it may be posited that IS, in their course of system running, actually act as parts of equilibrating mechanisms for the whole organization, whereas they (i.e. IS), themselves can be assumed to be system, only in an abstract manner (e.g. for their creators like the designers). One considerable point should be added that, there is a room for *relatively* automatic IS, in which, they act as a system, almost *independently*, in terms of their activation, running periods, gathering information, showing results, controlling other (organizations') activities and even self-adaptability with other inter-organizational (or external) factors, including work stuff. In this frame, IS should be counted as system by their own means, though, this kind of software systems, as enterprise systems, are not much popular yet and then, are beyond of the scope this study. Nonetheless, it is merely pointed that, in such imaginary cases, there is an expectation for people to conceive IS as (relatively more) external objects and then, the following discussion may need some modifications.

Fifthly, IS including their users can (and should) be defined in a wider context. In this frame, the intention is to define the *summation* system under consideration by putting together the information system plus an intermediate level of conceptions of its users. This intermediate or moderate level is the one that, people are neither merely actors in system's *use cases* nor as full psychological phenomena.

Sixthly, the independency assumed for this level of conceptualization should not contradict the fact that they strongly influenced by organizational settings including work logic and practices as well as organizational culture.

And finally we refer back to a previous work [5] to show all phenomena in such frame, as a psychic system [5, 14], are stipulated consistently.

IV. DISCUSSION AND ARGUMENT

As was earlier mentioned, this study goes through a few connected ideas to reformulate the interpretation of IS within organizational settings. This section provides some conceptualizations and relevant arguments to solidify the proposed ideas.

The main thesis is to find and delimit a general pattern to consider the IS and their systems in a single term of reference, *system*. Hence, the main question is how such composition can be a system. The question implies the nature, level and complexity of such system.. Since, the point is how people and system can be merged into one single system, whereas people neither simplified system actors nor complicate psycho-systems.

To define such system (by now, in fact, as a general framework), we need to determine the equilibrium conditions and the boundary and subsequently, the main equilibration processes and equilibrating mechanisms that maintain such conditions and boundary. Such clarification, impliedly leads to identify the granularity level of the resulting system as well.

The argument and conceptualizations are provided in three parts. Firstly we review IS properties respecting the subject. Later, an analysis of concepts according to psychodynamic literature is produced. And finally, based on this analysis and interpretations the resulting conceptualization for the targeted system is proposed in terms of assumed definitions.

A. Mutual Influences of Users and System on each other

IS rather than other technical systems e.g. manufacturing and product line, due to its uniqueness are more potential to be contorted to reflect people (users)' mind. This is because of historical user expectations from one side and flexibility of its development methods and techniques from the other side. However, both are, to some extent, a function of intangible nature of software systems. IS are usually

equipped with sophisticated methods of communications and knowledge processing, storing and sharing. So they are more potential to connect with people's personalities than other kinds of technical systems.

Therefore, it can be argued that generally, users much more expect the system reflect their mind contents than others. From the other side, though software systems are often initially designed to be flexible, but they are originally and traditionally are not so very much. In fact, there has been a lot of pressure on them that result in something that is known in literature as "software crisis". Thus, such so-called crisis can mainly be an effect of that high expectation of people about IS to be formed and aligned according to their minds' contents. In fact, this intangibility (independent of the inherent capabilities of software to incorporate unnumbered ways to do things) cause people to do not observe any physical limitations for their requirements demanded from the system. These high expectations also may exist because they initially supposed to face an intelligent machine (computer).

There is no purpose in this study to find underlying causes of this matter; yet the argument is, if this is so i.e. a very high expectations for flexibility of software systems, which appeared to be inherent to software nature, then it unavoidably leads to firstly, software crisis (even as a major – not sufficient – cause) and secondly, the fact that users intentionally or unintentionally require the system (' analysts, designers, developers) to adapt with their mind contents and processes. Significantly, these processes are much more unconscious according to psychoanalysis literature [3, 4, 15].

As a result, this expectation of reflecting mind content, individually and socially *suggests* the level of granularity that is suitable to define both side (i.e. the system and its users) in single frame of reference as a summation system. The system can be assumed to be open or close, depending on the scope of a specific problem.

As such, users expect the system's work structure and routines be aligned with their mind contents and processes. "Mind contents" here is the term to refer to a more static view of mind processes [3, 4] concentrating on individual's world perceptions and values *rather than* actions and reactions over the course of time. Consequently, people demand the system simply reflects their world, individually and socially which is usually beyond of their organization's business context.

Another related perspective is to contemplate the system as a media for connecting people. It can also be considered as some kind of psychic entity for projection and introjection [13] and simply includes various types of control and social norms, which people are able to introject, project [13] and identify [6] with them. The point here is the system for its users does not seem to be as is; it is perceived to be as expected.

Based on these premises, people automatically resist to such mind change, not only because of a static set of beliefs, but also due to dynamism of work habits and flows. It can be argued that this phenomenon (resistance to change of mind contents) is much more expected (and actually is) in IS [7, 8, 16].

To conclude for this subsection, people much more expect and really can make effort to compel the system to be reflected by their mind content than other technical systems. Nevertheless, it should be added that, the *expectation* of change and adaptation for software systems *and* the *actual realization* of those expectation are two different matters, and this study *does not* presume a considerable degree of the realization for the credibility of the proposed conceptions. In fact, such high expectations show a *tendency* and *serious efforts*, which are considered to be effective here for the proposed conceptions; whereas actual realizations mostly depends on *provided opportunities* to reflect users' expectations throughout different stages e.g. requirement analysis, development, customization, implementation, configuration and usage. Though, it seems obvious that these two (need for flexibility and the actual flexibility) are related causally i.e. more expectation means more flexibility; After all, through advancing technology, software systems nowadays are extremely flexible permitting much more users' mind reflection in terms of fulfilling their expectations (even unconscious ones!)

B. Psychoanlaytical Interpretations

The first assumption is that people conceive the new system as a set of rules and regulations which remind them super-ego contents [13]. Moreover, it contains some kind of knowledge usable for people so that, sometimes they have been motivated to gain it, sometimes not.

It should be an acceptable argument that the provided knowledge (partially) defines the commensurate world i.e. workplace. Almost the same perception (of the knowledge) can be shared with others to define a common external world. Therefore the commensurate world as well as the enacted interpretation of that world can be shared universally. Such world is clearly a mixture of rules, goals and motivations. As a result, merely, this perceived world can provide a ground for identification processes [6]. It implies a comprehensive set of levels and values which are able to motivate people (see again [6].)

The adopted values, through unwittingly making connection to ego-ideals [3, 4], are potential to form motives and, motives in their turn, result in goals. This kind of motives and goals are different from work official incentives and benefits and, are powerful and effective, because they have become connected to unconsciousness.

Another innovative interpretation is about the possibility of shaping the *levels of power* directly based on the morality which is imposed by the *system values* (i.e. what is an acceptable belief or act according to the system's recommendations about e.g. organization's interests). *Social power* in a psychodynamic view is the *levels of values* for which people need to suppress their drives [17]. This kind of *assumed* power is different from (though should be related to) officially defined power indicators within the system e.g. access levels to systems services and information.

As a negative (deterrent) sight on the same concept, a possible justification is that any *limitation* essentially would be connected to suppressed psychic drives to use their contained psychic energy, and consequently, will connect

and identify with the extant elements of super-ego. And such super-ego elements (e.g. patriarchy signs) are true sources of psychic power that form the levels of superiority, which in its turn, sustain and preserve the structure of psychic entity, whatever it is e.g. an individual, group, organization or the whole society.

Therefore, people are able to build their internal values based on the morality that has been enacted by the organization and specifically, as is intended in this study, those that are recommended or enforced by the information system and, more specifically, those that are the components of the system itself.

So far, the resulted interpretation for this subsection is as follows. A produced world, an enacted interpretation of that world and, the enforced rules and regulation, all brought about by the information system, will develop users' values through connecting to and then, activating corresponding ego ideal elements. These values (about the *perceived* system) are socially shared with others.

C. Proposed Conceptions

According to the given discussion, the proposed conceptualization is in a very psychic nature. In fact, the assertion is this is the exact image that people (mostly, *unconsciously*) perceive. So, based on this assertion, the current subsection attempts to provide a few essential definitions, from General System Theory [14] perspective, for the summation system.

Firstly, *equilibrium conditions* should be the values that are directly extracted from the information system (cf. [13]).

Secondly, in this view *equilibration processes* are generally background mind processes (e.g. in terms of practicing identification processes, cf. [6]). However in this study's formulation, they are a composite of a few distinct states, starting from threatened values, raised tensions and subsequent motivations to react and alleviate those tensions. In their nature, they should be ego defenses realizing in a social group as *shared defense mechanisms* [5] to provide means of equilibrating mechanisms.

So, thirdly, with referring to the previous work [5], defense mechanisms generally and, in social settings in shared forms, are considered as equilibration mechanisms for the summation system. More specifically, those defense mechanisms are pointed which are related to the information system under consideration whether as a source of activating threats [3, 15] or as a medium of connecting people (to realize their *shared* defenses). From another point of view, these are those assumed defense mechanisms that are originally adapted to or, dedicatedly adopted for, alleviating the system's raising threats [7]. In this articulation, the single summation system is the composition of people, the system and those mechanisms.

Fourthly, the *level of granularity* corresponds to the psychodynamic of people and the system, including interactions of people with the system *and* with each other by means of the system [13] and, excluding irrelevant issues of the inclusive organization as well as *not very rational* issues [5, 6] *or* depth personal histories *of* people. Nonetheless, the level and the scope of the summation system definition is to some extent arbitrary, on the condition that taking into account its psychic nature and dynamism.

Finally, the *boundary* may be defined based on the given level, as a set of moral values which are rendered by and, (as was mentioned earlier) related to, the system. These values (as are *equilibrium conditions* as well) can be criteria of the boundary because they provide a means of judgment to decide what is inside the system and what is not. As another view, the common patterns of execution of the mechanisms (as usual routes or habits) may show the boundary as well.

V. Implications, Benefits and Limitations

For the sake of the mind processes related to IS (it is referred to here as equilibrating processes), a major limiting assumption is that *nothing* can be created from scratch. All assimilated contents (initiated with *stimuli* in lower, unconscious levels or, *incentives* in a higher, conscious level of psychic personality, *both* from the system) are actually effective only if they can connect to and activate some aged mind contents, mostly originated from early childhood. However, in spite of such usual originations, this assumption does not affect naming the *processes* as the summation *system's* (equilibrating) processes.

Defining a single system as a combination of human (the users) and the information system has the advantage of providing a view of it in its entirety. Therefore, it is an acceptable thesis that, the functionality of the system is a product of such entirety and not only as the prescribed interactions between the user-side and the system-side (see comprehensive case studies, e.g. [7, 8, 9]). Moreover, it provides a better opportunity to use General Systems Theory' principles and analysis methods (e.g. see [14]).

This conceptualization is expected to have direct impacts on several fields and applications. From means of design, implementation and usage of IS, to reconsideration of socio-technical theories.

For instance, it can be argued that designing IS with taking the proposed conceptions into account has a better chance to comply with to their users' mind processes, and consequently, are more potential to end up with a better system's performance and effectiveness.

From a socio-technical point of view, it can be posited that through contemplating these conceptions, the assumed nature of socio-technical systems will change to a very psychic one. As a result, it will affect the mechanical and rational performance criteria for such systems. The detailed discussion is out of the scope of this study.

VI. Conclusion and Further Studies

This study refers to IS and their users in one single frame of reference i.e. as a summation system. Moreover, here, it is attempted to render a conceptualization based on a psychodynamic analysis of interactions between people and IS and, among people *through* the system.

Therefore, the focus here (in contrast to [5]), is on a composition of users, the system and their relationships. As is argued, people mentally joined to and be influenced by IS' proposed knowledge, procedures and regulations.

As a future study, those properties and values of IS that ease the system adoption processes may be investigated.

Moreover, how to design IS *and*, scheduling and arranging their implementation projects for the sake of a better success rate regarding the proposed conceptualization are other questions that should be answered. This list may be completed with other questions like, how people perceive the changes imposed by the system, how they automatically try to react (from an unconscious view, though; cf. [18]) and how the *summation* system finally will have been developing over the course of time.

From a change management point of view, possible problems for prospective research may be mentioned as follows. How people (mostly, in an unconscious manner) attempt to change the proposed/current system for reflecting their mind content and processes and, how the system changes theirs. How these mutual influences affect the *final* resistance/acceptance and usage of the system. In this regard, a possible hypothesized proposition is if the system has been purposely designed in compliance with their mind contents and processes in terms of individual personalities, group values and organizational culture and, habitual and ritual (work) practices [19, 20], then they will be more able to assimilate the imposed changes.

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