

GUTS: A proposed Grand Unified Theory of Systems for the Prediction of Behavior in Business Organizations

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ABSTRACT

This paper proposes a theoretical Grand Unified Theory of Systems (e.g., a system of systems) that can potentially be used to predict and understand some of the ways in which business organizations behave. Such a GUT of systems would enable us to view such organizational behavior not as chaos nor rigid rule control, but as the dynamic product of the systemic interaction of the people and the infrastructure that support such systems. Such a GUT must, however, take account of the prior structure that has been erected (especially in physics) and the ways in which such prior structures can help us to understand and to create a useful (e.g., predictive) theory and model.

To this end, this paper proposes a potential model to aid in understanding the complexity of our human organizational systems by applying concepts taken from field theory in physics. The model proposed provides a frame of reference for discussing aspects of the human organization that this model represents.

Keywords: field theory, organizational model, organizational simulation, learning theory, group dynamics, psychology, physics, GUT

1. DESCRIPTION OF THE MODEL

The concept of General System Theory was first postulated by Ludwig Von Bertalanffy in 1947 [35], when he recognized that specific "models, principles, and laws" can apply to generalized systems, no matter what the specific systems may be composed of or what the relations among the specific systems may be.

In Newtonian physics, the whole world was a clock, a mechanical construct. If you knew enough about how the clock was made, you could predict precisely what it would do. Einstein saw things differently, and in his special and general theories of relativity, made the speed of light an absolute "do not exceed" value, but showed that identical clocks will keep different times, depending on how closely their speed approaches that of light. More recently, Heisenberg, Bohr and others have proposed the concept of quantum mechanics, where the basic structure of matter is discontinuous, light is both a particle and a wave, and uncertainty rules. For physicists, their Philosopher's Stone has been to construct a GUT that elegantly

and seamlessly combines Einstein's relativity physics and Bohr's quantum mechanics into a system that can precisely predict any action that may occur. So far, they have not succeeded.

People who work with systems, and management systems in particular, will see many parallels between the theoretical systems of the physicists and those systems that are needed to understand and manage business organizations. And, just like the physicists, people in management hope for some kind of GUT to help them predict the outcome of various management directives. Without such a system, business management directives may have just the opposite effect from that intended. These "unexpected consequences" are the bane of a manager's life. If we examine current day business management, we will find some managers modeling Newton (everything is clockwork), some modeling Einstein (everything is relative), and some modeling Heisenberg and Bohr (skating the edge between chaos and immobility). In actuality, because of wide diversity within the workforce and, in particular, the wide diversity of ideas held by the workforce [39], all three models are likely true (i.e., predictive), just as is the case with the original physical models. However, these models (when an attempt is made to apply them to organizations) are not very predictive and certainly are not "elegant" in the mathematical sense. If a GUT can be created that encompasses all of the various elements present, then business can enter a new phase, with *scientific* management being just that (as opposed to the more narrow scientific management of Taylor [32]).

As a way to begin to explore this parallelism, Figure 1 is a modification of Maxwell's right hand rule model, which showed energy as the integral of electric and magnetic field inputs [7]. In Figure 1, energy can be considered analogous to symphysis (growth together) or some other product. Limited proof that the merging of diverse ideas, approaches and cultures could work to the synergistic advantage of the entire larger organization can be seen in a case study involving three defense contractors, the United States Air Force, and the United States societal culture (that is, taxpayers) [3]. In this case study of an F-22 aircraft IPT (Integrated Product Team) it was found that merging these various cultures resulted in a whole that was stronger than the individual parts. While this analogy to the

Maxwell field theory is a simplification, it is conceptually appealing. This field model representation of an organization appears to be feasible, especially considering the rapid increase in electronic communication. Hierarchies are no longer necessary, according to some, and flatter organizations are possible [24]. In theory at least, information and processes can be made available to all people, easily and instantly. It can now be considered a matter of the *individual* deciding, picking, and choosing what might be necessary to perform a particular individual task, and accessing the correct processes on-line.

Now, we know that we are pushing beyond the boundaries of strict science at this point, but this line of reasoning does produce a series of interesting questions. As described above, this concept appears to be consistent with Capra's [10] nodes in his network web--as a way of characterizing elements within systems and systems. However, this model also raises interesting questions related to the role of free will. Burke [8] ties in the concepts of Capra's web of life to the relations in organizations as follows: "Capra is therefore discussing relations of abstract particles. These relations constitute a

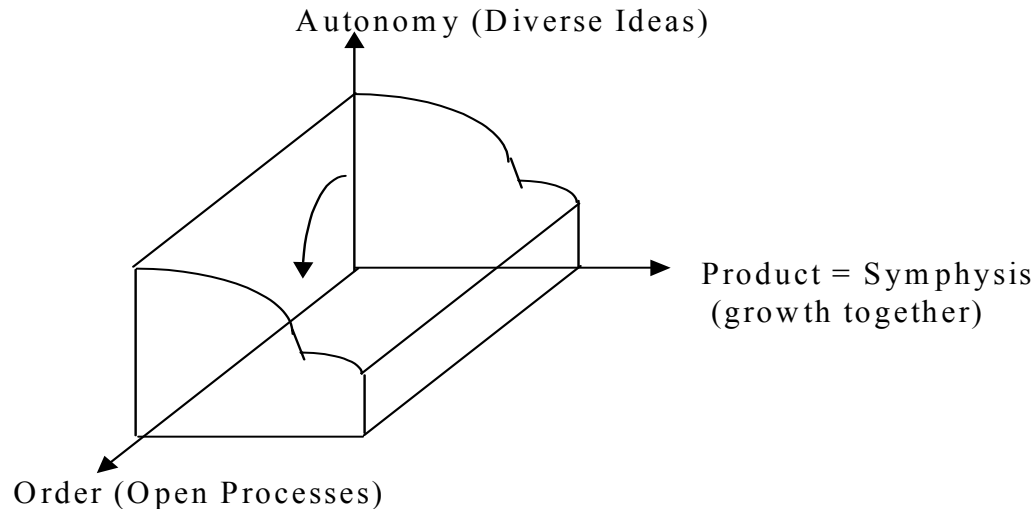


Figure 1. Organization node with seamless integration of diverse people with open processes results in symphysis.

Wheatley [38] also proposed the potential application of a field model to organizations, as follows: "In a field view of organizations, clarity about values or vision is important, but it's only half the task. Creating the field through the dissemination of those ideas is essential" (p. 55). Adding additional concepts can extend this field model of organization further. For example, we might assume that this field model represents one node of a complex web of interfaces [11] where the product can be characterized as symphysis or "growth together" [27] on the organizational level. For example, if we apply Etzioni's terms [16], where order is based on understood processes and autonomy is based on the perception of the acceptance of diverse ideas, then growth together can occur--*order and autonomy can reinforce each other*. Additional levels of this web can be conceptualized where the products are self-actualization [23] [27], plant or animal life [5], one world [26], cosmic consciousness [29], and ultimately even the universal mind of Davis [13] or the collective unconsciousness of Jung [23]. This raises additional questions: Could the general system theory that Bertalanffy [5] sought and the unified field theory of Einstein [15] be one and the same theory? Could the elements of the system and the particles or waves of the field be one and the same? Would that mean that a valid representation for any element in the system or particle in the field--including people--could be a momentary perturbation in an 11 dimensional [31] space time continuum?

unified whole... To achieve equilibrium is to gain comfort, yet this victory may bring us closer to stagnation and death than to vibrancy and life" (pp. 169, 170). This statement implies that the preferred state for an organization might be one of constant change. Organizations in flux, particularly when the environment is in flux, are organizations that might have a better chance of survival. Organizations at rest or in equilibrium may not be responding well to a changing environment. Burke [8] describes this concept as follows: "These perturbations, activities of dis-equilibrium, are signs of positive change that lead to self-organization rather than to decline. Thus, out-of-the-ordinary events may be more significant for organizational understanding than ordinary ones" (p. 170).

Borrowing another concept from physics provides additional insight through an analogy between our proposed field theory of organization and the light cone of space time theory [20] (see Figure 2). Here autonomy (from Figure 1) might replace the time axis and order (from Figure 1) might replace the space axis while symphysis could be analogous to the light cone. Equations based on the physical counterpart can be developed relating these three organizational variables, with an unknown constant necessary to produce equality. While this line of reasoning is highly speculative, it appears to be in line with the thinking of some scientists related to how theories progress,

most notably, Einstein [15]: "The physical scientist only arrives at his theory by speculative means. These assumptions, moreover, are philosophical in character" (p. 4).

The general field theory proposed here is based on the following premises: that there exists within nature a balance between chaos and order; that this balance applies to organizational systems; and that this balance can be modeled using existing models from physics. For example, two ways of depicting this model are shown in Figure 1 and Figure 2. While complexities of human organizations make it extremely unlikely that all of the variables contributing to this model will ever be identified or measured, this has not stopped physicists and engineers from developing our current level of technology based on highly incomplete models of little understood (if they in fact exist) 'fundamental particles'. In fact, some maintain that we are not able to prove that the entire universe does not consist of one electron.

In terms of psychology and human behavior, a general field theory related to ideas and concept transmission would be in line with Jung's [23] collective unconsciousness and archetypes [9] and Maslow's concept of self-actualization [27]. There are also consistencies with basic physical theory indicating that most of the universe, including humans, can be viewed as "empty space" held together by "fields" that can exert influences at distances--via the inverse square law--and these "fields" are given various names, such as, gravity, magnetism, and electricity. So, is there a potential to include "fields" with names such as collective unconsciousness, archetypes, and so forth? There also appears to be a connection with what has come to be

called quantum logic, as presented by Zukav [40]:

A state of being is an *experience*. A description of a state of being is a *symbol*. *Symbols and experience do not follow the same rules...*

Quantum logic is not only more exciting than classical logic, it is more real. It is based not upon the way that we *think* of things, but upon the way that we *experience* them. (pp.271-277)

A perhaps clearer way of stating this is that the map is not the territory [22]. In fact, organizational theory (for large organizations in particular) may follow quantum logic more closely than it follows classical logic. From the statistical analysis necessary to describe group organizational behavior, it is clear that current theories related to human organizations cannot predict individual events, only the probability of events occurring. Gilder [18] presents arguments that current trends in microelectronics can be viewed as part of the larger, gradual cultural movement of quantum theory into economic and business organizations. Further support for a general field theory of "ideas" can be found in Zukav's [41] writing related to the new paradigms in business as follows:

"In terms of commerce, this means that intuition will replace rationalization as the primary source of data in the development of long term strategies, the means of implementing those strategies, and in the resolution of everyday challenges...." (241). And thus this cycle of logic, or perhaps more correctly, this spiral of logic, may be returning us to pre-Taylor concepts where intuition ruled over logic [24]. "The emerging paradigm," according to Capra [10] (p. 232), sees "the world as

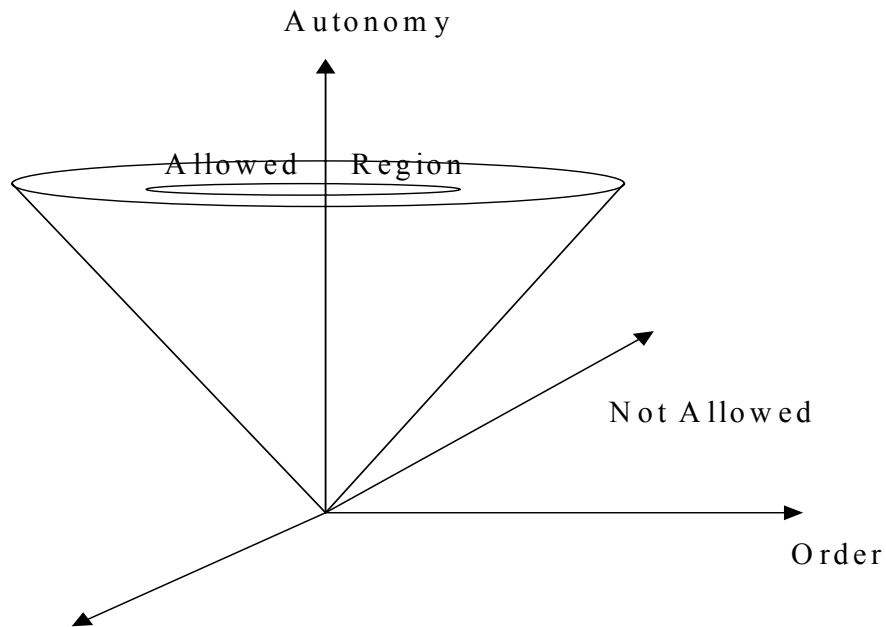


Fig. 2. Organizational Order / Autonomy analogy to Space / Time

an integrated whole rather than a dissociated collection of parts" (e.g. Gestalt) and is now "being promoted by widespread grassroots movements" (p. 237). The use of a field model to represent human and organizational interactions appears to be no more mysterious than the use of the field model in physics as a way of explaining phenomena that scientists do not truly understand, such as gravity, magnetism, and electricity.

There is no question but that massive changes are occurring in organizations. There are, however, differences of opinion on the size and impact of the changes. Some express concern related to organizations not changing sufficiently. For example, Drucker [14] states: "Not to innovate is the single largest reason for the decline of existing organizations" (p. 226). Some express optimism related to organizations. For example, Sahlman [2] states: "We will look back on this period as a golden age of entrepreneurial management in the United States" (p. 154). Some express concern related to the magnitude of change. Blanchard [6] states: "Empowering people without giving them any boundaries will lead to disaster and failure" (p. 10). Some experts express concerns related to multiculturalism and pluralism producing dangerous fractionalization of organizations and ultimately society [16] [34]. However, some believe that there is a current wave to move the multicultural debate inside organizations and that this will ultimately strengthen organizations [25]. Jaffe and Scott [21] identify what they believe will be the greatest organizational challenge as the "rekindling of organizational commitment after a massive change and the development of an empowered workplace" (p. 190).

2. POTENTIAL FOR VERIFICATION OF THE MODEL

The method being developed to test aspects of the proposed model includes (a) the development of a computer simulation of an organization, and (2) an extension to the research design used in "Acceptance of Diversity of Ideas in a Segment of the Defense Industry" [39]. The process for the development and verification of GUTS is outlined in Figure 3. The simulation of an organization is being developed using object-oriented programming in Turbo Pascal 7. An object (person.obj) will represent each individual (case) in the organization. Input data for the simulation will come from (1) Psychological evaluation test PF 16 (16 Personality Factor), (2) An individual questionnaire similar to that developed by D. Wicker [39], (3) Comparative measures of the state of the organization, and (4) Data on how the organization operates (i.e. processes). A pilot study will be conducted to validate the simulation. The measure of the organizational status will be a multiple factor definition of success (i.e. profitability, etc.) validated by a panel of experts. Psychological profiles will be incorporated into the model because it is felt that any organizational model involving the interactions of people with people cannot be valid without strong consideration being given to the psychological makeup of the individuals within that organization.

The research design of D. Wicker [39] will be extended to analyze a wider range of organizational types requiring a large degree of interaction among people as a way of looking at the relationship between *Perceived Acceptance of Diversity of*

Ideas (PAD) and *Job Satisfaction (S)* and the resultant impact on the organizations.. If the data show that as acceptance of diversity of ideas increases, job satisfaction also increases up to a maximum and then decreases--and the relationship of acceptance of diversity of ideas to job satisfaction is a nonlinear, two-tailed relationship, then this can provide evidence for a two-tailed acceptance of diversity curve. Either tail of the curve would be bad for an organization or system. On the left tail with little acceptance of diversity, the organization can be characterized as rigid, autocratic, "dead" (heat death or entropy). On the right tail with too much diversity, too many processes, no consensus, and no closure, the organization would be "behind the power curve" where the laws of diminishing returns begin to apply and where the organization could be potentially approaching a chaos bifurcation point. On this part of the curve, additional acceptance of diversity of ideas could produce less job satisfaction, and in the larger context, potentially generate diminishing returns for the organization. This could be the part of the curve that affirmative action may have reached in U.S.A. [28]. The effect that may contribute to a two-tailed outcome could be backlash effects [17]. The study by D. Wicker [39] may have been uncovered some of this backlash effect as seen in the gender relationship of PAD and S for organizational stability as compared to examples of organizational instability. This two-tailed effect also appears to be consistent with Etzioni's [16] emphasis on the need to find a balance between "order" and "autonomy" in organizations and the larger society.

The ultimate direction that this research might take could be to provide quantitative support for the graphical conceptualization model shown in Figure 1 which depicts how an information age organization might be modeled. As was pointed out previously [4]: "Current trends to implement Integrated Product Teams can be viewed as part of the larger, gradual cultural movement of quantum theory into economic and business organizations" (p. 262). As a further example, Gilder [18] states, "Rather than pushing decisions up through the hierarchy, the power of microelectronics pulls them remorselessly down to the individual". However, in another sense, this is similar to the concept of the Black Hole with microelectronics (e.g. increased bandwidth) acting as the force of gravity acts in black holes. As informational bandwidth increases, carried by ever more powerful microelectronics, the possibility exists that the individual will reach an event horizon state, where everything comes in and no information comes out--a state seen in some forms of schizophrenia--another two-tailed curve with excess on either end being detrimental. [36]. Clearly, balance is needed [37].

The proposed model is obviously very complex with many confounding variables. For example, one factor determining which aspect of the model (Newtonian, Relativistic, Quantum) works best (most predictive under certain circumstances) is company size. A two person CPA (Certified Public Accountant) office is quite different from a 35,000 person defense industry company. For example, a small to moderate size company may be willing to take risks that a large company will pass by. That is, the small company may be best served by modeling Bohr and skating the thin edge between utter chaos and immobility. The management of a number of the smaller

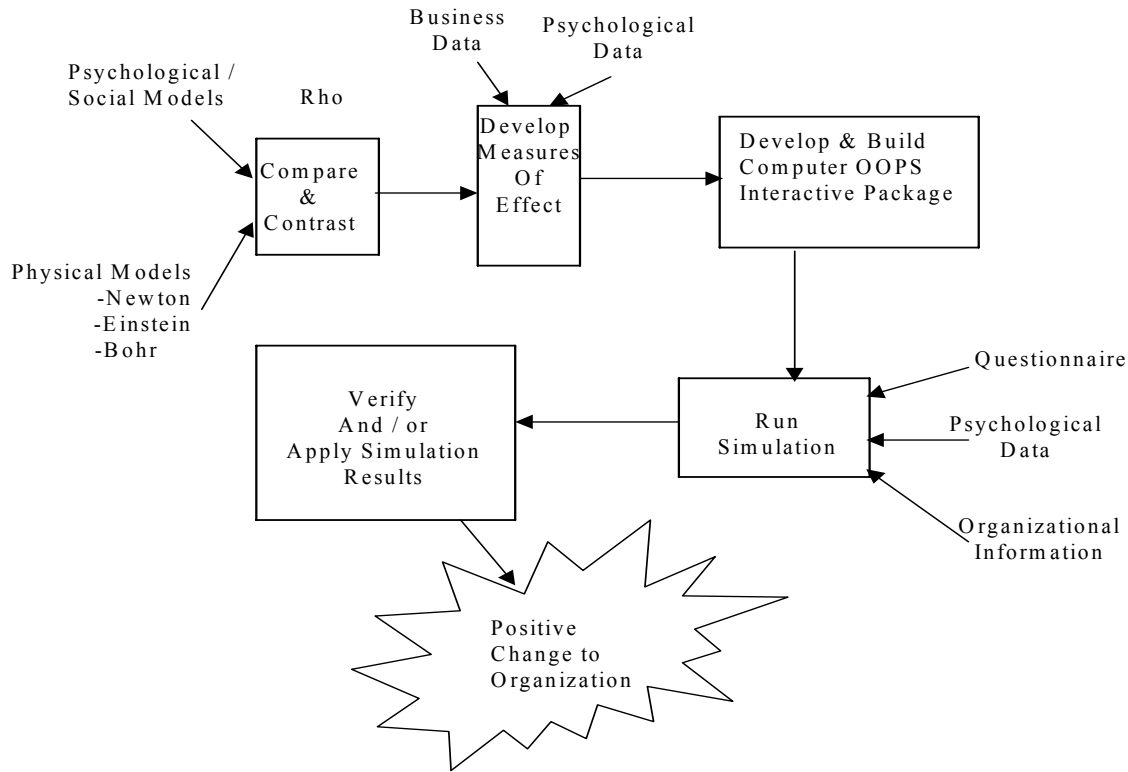


Fig. 3. GUTS Development / Verification Process

dot-com companies can be best understood in this light. On the other hand, a very large and conservative company, such as a utility, may model Newton and assume that because they have done things that way for the last hundred years, that the same management style will serve for the next hundred. Finally, middle size companies may find Einstein's relativity a useful model, where everything is relative and management decisions are made by consensus.

Unfortunately for management science, human beings are very complex entities and are diverse at many levels. Prediction of human behavior is very difficult, but especially so for individuals and small groups. However, individuals have some similarities to electrons: the behavior of a large group of electrons is predictable, but the behavior of one is not.

3. CONCLUSIONS

Times of rapid change require new approaches and new models to characterize the changing world. The authors have attempted to integrate a wide range of world views, in contrast to the current trend to pursue relatively isolated specialty areas. The current trend has been to understand more and more about less and less with little true integration of knowledge. This lack of systems thinking often results in unexpected consequences (a prime example being unexplained and unexplainable computer failures). Unfortunately, renaissance philosophers (e.g., System Gurus) are rare today.

This field theory of organization has the potential to ultimately produce enough historical data to predict when

information age organizations are approaching a bifurcation point [12] and potentially aid in strategic planning [30]. While the results in a specific case could not be predicted [19], in the aggregate, the data could prove enlightening. As Tetenbaum says [33]:

The next steps in the application of chaos theory, and its off-shoot complexity theory, involve developing lifelike simulations followed by testing the theory in real time on actual human problems. Chaos theory may not be a viable model for understanding organizations as yet, but it is an intriguing way to think about the world. (p. 32)

Further, a possible key to linking acceptance of diversity of opinion to the bottom line may exist in Arthur's [1] description of his positive-feedback economics model, particularly for information-based organizations. One key to the potential success of the proposed GUTS model is the incorporation of people as part of the model. This is meant to partly address the "...fundamental paradox in the search for such a complete unified theory..." [20] (p 12), i.e., that people are, of necessity, part of any theory. However, just as the behavior of one electron cannot be predicted, but the behavior of electrons in the aggregate can be (and this has allowed the development of current technology), the behavior of the components (e.g. people) of an organization may not be predictable, but studying aggregate behavior does lead to an understanding of the effect on people of complex interaction processes that occur in information based organizations. The model proposed here has a strong potential for predicting when large changes are imminent, and with prediction comes the potential for positive

intervention, as well as a more fundamental understanding of how to allow organizations to function for the betterment of menschen (people of good intent) without obliterating the individual.

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