

The Abandoned Center: the impact of complexity and scale on organizational systems; making the case for a design approach.

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Introduction

Organizations are challenged by levels of complexity and scale they have never experienced before. New materials, new technologies, new demands and restrictions plus a constantly increasing stream of new knowledge flood their daily operations. At the same time the social environment they are embedded in is also undergoing dramatic change. Newly emerging cultural expressions colliding with the globalization of people, ideas and markets create an unstable and unpredictable environment within which to make decisions and commit resources. Despite this *complexified* reality, organizations still need to be able to carry on, not only with their day-to-day work, but their creative and innovative activities as well, even though they experience ambiguous, risky and uncertain conditions for their undertaking.

In these extremely complex environments, many organizations are forced into situations where they experience not only the loss of control over stable operations but also their creative and innovative work. As complexity and uncertainty grows, the normal reaction is to engage ever more intensely in rational behavior—manifested as a quest for control, reduced risk, and certainty. Examples of characteristics of this reaction include imposing more methodological processes, techniques, guidelines and structure.

As businesses and governmental agencies become larger and more complex they often lose the focal point of their work—their center of gravity. Leaders, managers and administrators are unable to control the operations of the organization because specialization and diversification have created an *abandoned center* at the heart of their system. The challenge is to find a strategic approach for replacing the abandoned center with a *whole center*. In this paper we present three strategies for doing this, two of which are primarily based on reductionistic science and one of which is based on an approach integrating both design and systems science. The focus of this paper is to argue for the latter approach, which focuses primarily on enabling creativity and innovation in organizational systems.

Case Study #1 — The Abandoned Center

In a study of a software development department in a large international company we found that complexity, as described above, was recognized as a problem, both by managers and engineers. The study consisted of twelve interviews with project leaders and engineers and five interviews with higher management. The study will be presented in full elsewhere, in this context we will only draw on some of our major findings without going into any details.

The part of the organization we studied has as its main task the design and development of a complex software product, a software platform for other large companies. There are about 200 designers and engineers involved in the project. Based on the interviews we constructed an overall image describing the situation as it was presented to us (see Fig. 1). The theme we found in their answers was that their work consisted in a constant struggle to keep the process under control. In order to maintain control they described the project organization as ‘forced’ to broaden their domain of knowledge and information—to be more expansive and *inclusive*. This ‘expansion’ put a lot of pressure on how they organized their work, and created many problems within the project and its sub-projects.

At the same time they saw themselves as ‘forced’ to deepen their knowledge and competence within each specialized area. This led to *exclusiveness*, i.e., each person had to become more exclusionary when it came to other facets of the project apart from their immediate concerns. This was equally true for any problematic situations they encountered—they only tapped a narrow domain of knowledge in response to emerging issues.

They all reported that they had feelings of increased difficulties in holding the project together—to be in control. In addition they were not sure who had responsibility for the overall design in any project. Some even had doubts that there was anyone with such an overview or accountability. Most of them had difficulties seeing the project as creative or innovative, even though that was the initial impetus behind the project. The consensus was that the necessity for *inclusiveness* and *exclusiveness* led to a situation where the overall or core design competence of the organization was withering away. It was further believed that control over new designs and innovations of new services or products was compromised.

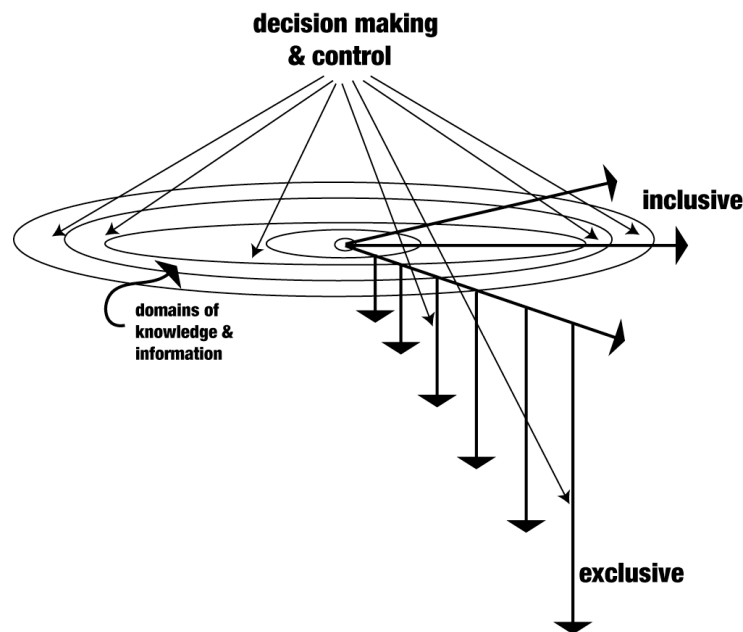


Figure 1: Dealing with Complexity

As a result of the processes and mechanisms presented in Fig. 1, organizations end up with a situation we call the *abandoned center* (see Fig. 2). The cause behind this is the belief that complexity is a condition that must be approached by becoming more comprehensive and specialized. This means that an increasing effort is needed from the organization to be both inclusive (comprehensive) and exclusive (specialized). It also means that each person in the project becomes more narrowly focused in her own domain—segregated from the whole. This means more people—specialists—are needed and, concomitantly, more effort must be devoted to the management and integration of a rapidly growing number of specialized experts.

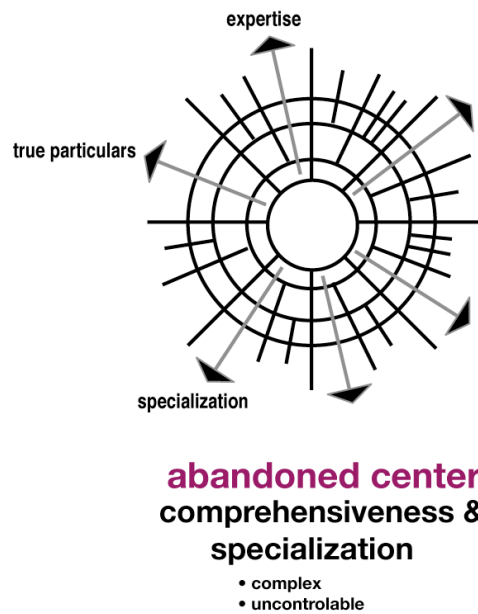


Figure 2. The Abandoned Center

The presence of an *abandoned center* would seem to ‘instinctively’ call for increased planning, administration, and organization—a ‘common sense’ approach. This was felt to be the case by management who characterized the issue as primarily a problem of needing to assert more control. Among those interviewed, several related ideas on what should be done emerged. Some suggested “more of the same”, i.e., more and better organizational management. Some saw the problems as the result of lack of competence. It was common among the older engineers to blame the young ones for not having the right skills and abilities. Some managers championed more abstract ideas grounded in organizational systems theory. For example, it was suggested by one of the top-level managers that the problems could be dealt with if a consistent systems approach was used focusing on “sub-systems, de-composition, etc.”

It was apparent that the approach used to managing complexity had a far-reaching impact on the organization’s overall *design competence*—the ability to be creative and innovative. Ironically this approach exacerbated the condition we have called the *abandoned center*—the situation where there is no overall understanding of the organizational system as designed, no overview or

big picture of its projects, and no capacity for intentional self design—a re-designing of the organization through its own agency. For example, attempts at self-designing were based primarily on ‘requirements’ coming from anonymous user groups that were ‘filtered’ by ‘requirement analysts’. The result was that at the same time the system was growing in scope and complexity, the intentional composition of the system—its architectonic whole—was disappearing.

We argue that almost all the suggestions from the persons we interviewed on how to deal with the situation, even though appearing to be different, share the same broad normative strategy for dealing with unfamiliar or unknown situations. This strategy draws heavily from the tradition of science and the principles of scientific method.

Two Science Based Approaches to Managing Complexity

There are several strategic approaches used by decision makers for coping with complexity and change in today’s multifaceted organizations. Behind each of these approaches is an implied guarantee that a leader’s, manager’s, planner’s, designer’s or decision maker’s intentions can be realized (Churchman 1971). The operationalized presence of a reliable *guarantor* of decisions and actions is the key factor that makes it possible to confidently face situations that are complicated, interconnected and ill defined. The *guarantor* guides the formation of a *center* from which control over an organization’s direction and development is exercised. The quest for a dependable *guarantor* has led organizations down different paths in their quest for a stable core or *center* from which to control their enterprise. Examples of two science based *guarantors* result in what we characterize as organizations with *soft centers* and *hard centers* (see Fig 3).

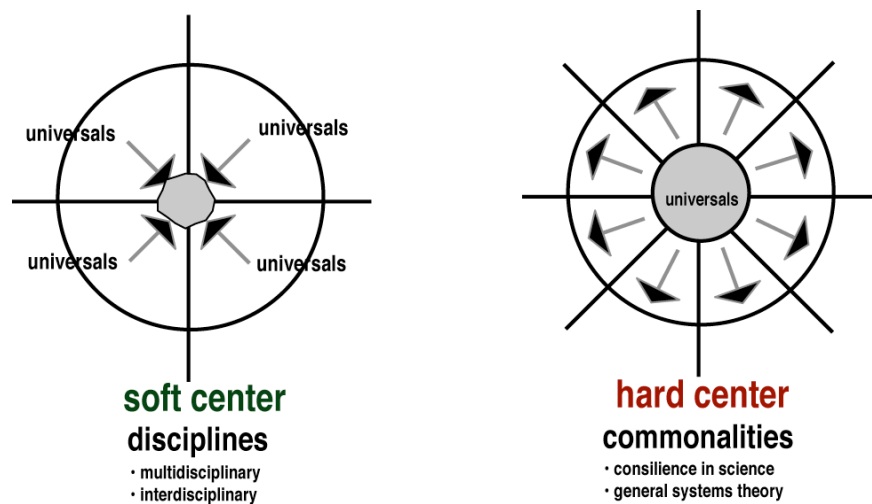


Figure 3. Two Science Based ‘Centers’ for Control

In the first—the *soft center* approach—the fundamental belief is that a common core is formed by the fusion of different discipline-based areas of expertise and professional practice. Each individual contribution is grounded in its own core set of universal principles and laws or

contingent necessities. This is commonly characterized as an interdisciplinary, multidisciplinary or cross-disciplinary approach to decision-making, management or design. The value of a *soft center* derives from its accumulation of specialized knowledge from diverse fields into a larger, more comprehensive pool from which choices can be defined and decisions made. The *center* in this case is not an integrated compound but is more likely to be merely a mediated aggregation.

A related systems approach strategy that avoids the problem of mere aggregation is based on the theory of multiple perspectives. In this case different ways of seeing the same events or particular elements contributes to a richer more comprehensive description or explanation of that which is being observed. For example the same event can be observed from an organizational, technical or personal perspective leading to dramatically different description and explanations (Linstone 1984, 1999)—different not only in contrasts and comparisons but in the very substance of the observations themselves.

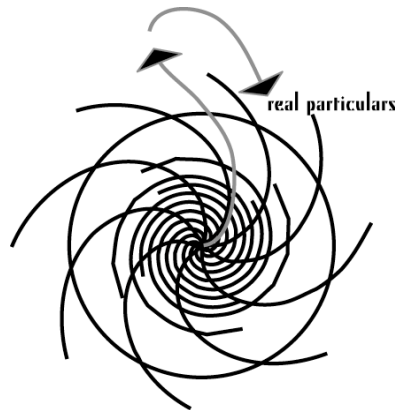
Within the second approach—the *hard center* approach—the belief is that there is one common core of universally valid principles and laws from which different domains, fields, disciplines or perspectives draw. The concepts of *consilience* (Wilson 1998) and *general systems theory* (Bertalanfy 1964) are two examples of this approach. The assumption is that choices and decisions can be made in any particular situation with the confidence that, no matter what the specialized or particularized conditions are, the universal or general certainties hold. By applying simple, universal or contingent general understandings to complex and large-scale situations they can be adequately managed. The ultimate *hard center* for many scientists is the elusive unified theory of all fundamental forces of nature, i.e., all the major forces from gravity to magnetism, from weak to strong force are explained in such a way as to show they are really extensions of the same phenomenon.

These two science based approaches, i.e., the *soft* and *hard center* approaches, are effective in complex situations that can be reduced to constituent problem areas that are separable from the operation of the organization systemically. However the most critical challenges to organizations do not fall into this category. This is especially true for situations that call for action based on creativity and innovation. Organizations that need to remain competitive and viable in rapidly changing environments need to be competent in both creative and innovative behavior—to be *design competent*.

In the case study introduced above the organization is representative of a version of the *hard center* approach. In our study we found evidence of a strong belief within the organization that there exists a set of universal principles applicable to any type of problem or opportunity that may arise. We also found that the consequence of that approach resulted an *abandoned center*. However there were no indications that decision makers understood that the emergence of an *abandoned center* was the consequence of their approach and fundamental beliefs on how to engage with complex situations. It seemed rather that their ‘solution’ to the problem was to reinforce the approach already in use, i.e., to embrace even more the idea of singular comprehensiveness based on their fundamental belief in a *hard center* approach.

A Design Based Approach

Intentional action leading to creative and innovative change needs to arise from strategies that can deal with ambiguous contexts and complex environments. A strategy for managing complexity from such a unifying core is, we argue, based on the concept of an amorphous center—a *liquid center*—(see Fig. 5) flowing from a *guarantor-of- design*.



liquid center composition

- limits / frames
- judgment
- interpretations
- meaning making

Figure 5. A Design Based ‘Center’ —The Liquid Center

Our understanding of design in this setting is based on earlier work (Nelson & Stolterman, 2003). Within that framework, design as a form of inquiry and action, is distinctly different from other traditions of inquiry or action. Design processes and affiliated methods are inclusive of those processes and methods utilized in science or art, but are not defined by them.

The *liquid center* approach is animated by the discernment and application of *real particulars*. This is in contrast to the discernment of universal principles or contingent generalities by analytic reasoning that are applied to particular situations through the synthesis of deductive understanding. In this approach, complex, dynamic situations are characterized, metaphorically speaking, as *solutions*, specifically *super saturated solutions* (using a metaphor from chemistry). These solutions are compositions of diverse forms of information and types or ways of knowing. They are mixed and molded together consistent with the unfolding stages and phases of a design process. By utilizing a design approach supported by design methods, the enriched liquid compound crystallizes into *real particulars*.

Because complex situations are most often fluid, unformed and difficult to apprehend in terms of form and structure, the image of a *liquid center* is a good representation of the situation. But there

is a need for an equivalent method of intervention to that of the scientific method associated with *soft* and *hard centers* (i.e. the scientific method: analysis and synthesis). For example, a teleological method defined by successive stages of intended outcomes (Nelson 1993)—the consequences of a design quest—is such an approach (see Fig. 6).

SEEKING:

- **competence in design**
- **agency**
- **commitment**
- **complexity**
- **limits**
- **unity**
- **form**
- **realization**

Figure 6. Liquid Center Design Process as Method

In this example the first task is to seek the development of design competence in the organization itself such that it can redesign itself in addition to designing services and artifacts for others external to the organization. The second task is to seek agency—the right to act on behalf of others who may be considered clients, stakeholders, end users, stockholders, decision makers and others. The third task is to seek to establish a contract—implied or actual—that defines the exchange of value and expected outcome in the process of intentional change. The fourth task is to seek to determine the systemic interconnections and the interrelationships involved in the situation. The fifth task is to seek to define limits—conceptual systemic boundaries—so that things can be accomplished pragmatically within the accepted confines of time, resources, and space. The sixth task is to seek a unifying image that can be used to give conceptual form, the seventh task, to the diverse and complex elements of a situation. The final task is to seek realization—to make the designed change a real part of the world.

What makes this approach so different from the other two—*hard center* and *soft center*—is that it is based on the tradition of design—a form of strategic intent—in place of normative science. A design tradition brings forward unique aspects of competence and process. Rather than focusing on finding a *guarantor* in the realm of universals as externalized knowledge, the design tradition acknowledges that designers are the loci of knowledge—a knowing that is inseparable from the knower. Dealing with complexity in design can never be successfully accomplished through comprehensive specialization, or by inductive analysis and deduction synthesis.

From a design perspective, where knowledge is revealed through action, other concepts become fundamental. From within the design tradition there is a different appreciation for the human capacity to deal with complexity—a capacity we use all the time. Aspects of that capacity are exposed through the concepts of *judgment*, *interpretation*, *meaning making*, and *composition* (see Nelson & Stolterman 2003, for an extensive discussion of these topics). These concepts explore the human ability to deal with complex, contradictory, fuzzy, and situated information. They are concepts that are intentional and holistic. They focus on the composition of a whole at the *center*

of the organization, which is the missing quality of the abandoned center. These capacities characterize design competence in a way that opens up an approach to dealing with complexity without losing diversity and compromising unity. They also facilitate the management of creativity and innovation without resorting to reductive planning, administrative or organizational control.

Case Study #2 — Concept Center

In another study of a very large business organization, their efforts to create an appropriate answer to the demands of complex systems design led to the creation of a *concept center* where new forms of design thinking, design communication, and design composition could be tried—where a *liquid center* could be established.

The design and implementation of the concept center was based on such basic ideas as individual design skills, the design capacity of the organization as a whole, the concept of a ‘design studio’, specific management styles suitable for design work, the understanding of the situatedness and uniqueness of each design project, the need to ‘live’ with complexity and uncertainty, etc. We found that these ideas were not explicitly formulated as design principles guiding the operation of the concept center. Having followed the development of the center for several years we have observed that, despite the lack of explicit principles, the concept center has been able to handle extremely complex tasks such as designing complex socio-technical systems. During this time there has also been a change in the way the center is perceived by the organization as a whole. Rather than being considered as unusual and strange it is now being studied and copied by other divisions of the larger organization.

As a consequence of our study of the concept center we believe that any significant change to an organization’s fundamental behavior in relationship to creativity and innovation needs to be based on a carefully thought through understanding of what characterizes design competence in complex organizations. Any improvement in an organization’s design competence is difficult to make since it often means making fundamental changes to its dominant intellectual approach to change. Such a shift is itself a demanding design task.

The necessity for the capacity to be a self-designing organization in order to successfully remain viable in complex dynamic environments is a key proposition. In the two cases described above this capacity was a limited or nonexistent part of the organizational strategies. What we found was that their understanding of how to engage in self-design was based on fundamentally different ideas. For example in the first case, self-designing consisted only of an ongoing attempt to become more and more aligned with the *hard center* approach. Rather than adopting a design process, the self-designing process merely became a search for more efficiency and greater control.

Our suggestion in both cases was that the organizations needed to initiate a genuine design process, based on the concept of the *liquid center*. They must critically examine their present assumptions concerning how they ought to engage with complex environments and systems. Of course this requires a deeper understanding of what organizational design competence is all about, how it relates to complexity, and how it can be manifested in the particular instance of

each organization.

Conclusions

Based on our studies we argue that there is a need for a broader understanding of organizational design competence, and that such a competence needs to be based on a well-developed philosophy of design. In this paper we relate and interpret our empirical findings by using such a theoretical foundation (as presented in Nelson & Stolterman 2003).

Based on our studies we conclude that complexity cannot be dealt with by relying on the ideals and principles of science alone. The scientific approach is based on the assumption that reality is there to be analyzed by picking it apart in the search for new insights into its inner workings. The design of complex systems in complex environments requires a completely different approach. It involves creating meaning by making judgments on the character and qualities of systems as wholes in relation to the intentions of change agents. Complex organizational systems design needs to be grounded in a tradition that embraces concepts such as *judgment*, *interpretation*, *meaning making*, and *composition* as elements of the core of organizational design competence.

We conclude that there is a critical need for more research into the development of advanced design approaches that are inclusive of the intentional, systemic and compositional aspects of design. The increasing complexity of the day-to-day work of organizations, especially in regard to creative and innovative work, makes such a development necessary.

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