Enterprise Architecture and Information Technology: Coping with Organizational Transformation Applying the Theory of Structuration

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Abstract

Developing large-scale information systems (IS) is never easy or implemented without controversy and impact on an enterprise’s stakeholders. Organizational transformation, typically the by-product of new technology and its accompaniment of new processes, frequently manifest itself in ways unforeseen by enterprise management. In many cases, this results in project failure. Historically, enterprises approached IS on a one-domain-one-system at a time solution. This approach has now been supplanted with an enterprise-wide approach to technology with Enterprise Architecture (EA) as the framework used for both requirements and software engineering systems design and implementation. EA embodies a business and technology alignment process aimed at producing an EA plan (EAP) that guides and drives IS development. EA frameworks provide the structured methodologies to support the EAP, yet many EAs fail due to the poor quality in the design requirements used. This paper progresses earlier work analyzing stakeholder behavior and resistance to change proposing a sociologically-driven approach to manage and govern EA design.

Keywords: Enterprise Architecture, Stakeholder Behavior, Resistance to Change, Organizational Transformation

Introduction

In Information Technology (IT), many large organization lean towards a wide range of computer science and computer oriented (techno-centric) frameworks to solve the design and implementation of large-scale information (application) systems (IS) [25][27]. These decades old ontological and epistemological techniques continue to embrace the typical approach to IT from a single domain, one system at-a-time, and on an as needed basis [18]. However, the emergence of a new concept, Enterprise Architecture (EA) and its frameworks (EAF), is slowly replacing the historical IT procedures with a new set of frameworks geared more towards the strategic view and use of information and technology by an organization [18].

As an alternative program to the traditional single IT solution, EA views IT from an enterprise-wide point-of-view moving away from defining and managing a single application domain to a more encompassing and comprehensive strategy that focuses on aligning key corporate IT initiatives with strategic organizational business goals and objective [18][19].

Under the guidance of an Enterprise Information Architect (EIA) that may or may not include participating organization stakeholders, an EA plan (EAP) is produced that contains a detailed description/blueprint of which enterprise functions will be guided through to IT implementation. One of the key components of the EAP is a high-level macro-oriented abstraction of the design artifacts (requirements) defining the various architectures, resources, and infrastructure needed to guide and implement new IT strategies and technology [9][18]. Thus, the EAP contains a synopsis of the organization’s “as is” operating model and knowledge (explicit and tacit) base and the guidelines needed for developing and providing strategic information for organizational use to support and implement a “to be” future business environment [9][12]. For many organizations however, EA can be a difficult process that frequently ends in failure.

The organizational context surrounding the transition from an organization’s “as is” to a “to be” state means organizational change brought about by new processes and procedures to be learned by, and the assignment of new roles, duties, and responsibilities to stakeholders. This brings up the typical questions of user (stakeholder) acceptance of EA change and their possible resistance to change. However, a question frequently omitted from this process is the collective impact of EA on the organization.

Simply stated, EA also means change to the organization’s character, culture, and structure. Usually hierarchical, each organization arranges its lines of authority, communication, rights, duties, and relationships with internal and external environments which determine the “norms” of how the enterprise does business. Given this context, organizations allocate resources defining which roles, duties, responsibilities, and power are delegated to stakeholders. Thus this activity determines the status of the stakeholder within the enterprise. This, in effect, establishes their power.
base, political hierarchy, and societal position within the organization [2][3][20]. As can be seen, these factors affect organizational structure and thus the status quo, equilibrium, and stability organizations strive for and as a result can adversely affect EA design and implementation if not planned for during EA.

In our analysis of literature related to both EA and IT failure, many projects failed for non-technical reasons [5][7][11][24][28]. In fact, the statistics are astronomical in both the number of failed projects and the resources expended in terms of both dollars and time. For example, in the private sector [5][23][28], the failure rate ranges between 66 and 84 percent with the public sector faring even worse [7][11][28] with the failure rate up to 86 percent. Lost dollars are estimated into the hundreds of billions of dollars annually [11][28]. No estimates for time were available.

In this analysis, failure means any project that: is partially implemented, requires extensive rework, exceeded budget and time estimates, and/or is completely abandoned. The factors associated with failure include [5][7][11][23][28]:

- Inadequate executive sponsorship for strategies and associated IT initiatives
- Failure to communicate strategies in a way stakeholders understand
- Lack of stakeholder understanding of what EA represents
- Incomplete/inaccurate stakeholder input of EA design requirements and specifications
- Stakeholder technological incompetence
- Unrealistic time frames and project schedules
- Unclear expectations and objectives for EA.

Clearly, these factors are related to human behavior of one sort or another with blame typically assigned to “poor architecture.” In the literature, poor architecture means nebulous, incorrect, and/or ill-defined design requirements [6][15]. Of interest, the literature cited technology as only accounting for between 4 and 10 percent of the failures [5][28]. In analyzing stakeholder behavior in relation to EA failure, the factors are about evenly distributed between organizational management and the average rank-in-file employee (collectively stakeholder).

Given this premise, our approach to the failure problem considers the possibility that the intersection of organizational transformation, user acceptance of new technology, and resistance to change are inextricably interrelated and intertwined. Our approach to the subject includes accounting for the interaction of the: organization and IT, and how stakeholders will react to EA design and implementation accompanied by organizational transformation.

This paper progresses earlier work by delving deeper into the impact technology has on stakeholder: behavior, acceptance of new technology, and resistance to change. We believe successful EA depends on a stakeholder behavior driven approach that draws attention to stakeholder participation, commitment, and involvement in the EA project. Such an approach encourages and fosters a feeling of stakeholder ownership of EA. In essence, the aim for such an approach is to anticipate, plan for, and identify negative stakeholder behavior and, in effect, implement an avoidance program that allows for corrective action to be initiated early in the process.

In Section 2, we discuss EA, technology, organizational transformation, and their relationship to stakeholder behavior. Section 3 discusses and ties stakeholder behavior and resistance to change using Giddens’ Theory of Structuration as a lens to guide EA design and implementation. In Section 4, a multi-disciplined stakeholder-driven EAF paradigm is proffered for EA that includes principles and practices from the fields of sociology, psychology, organization theory, and management behavior. In this section, the rules and guidelines are outlined needed to govern, align, and manage IT design through the EA life cycle. Section 5 concludes this paper by discussing the future direction of our work towards a more behavioral-driven solution to EA design and IT implementation.

2. Enterprise Architecture, Organizational Transformation, and Resistance to Change.

Over the past twenty-five plus years, Enterprise Architecture (EA) has emerged as one of the prime frameworks to design and implement complex, multi-dimensional, and large-scale information (application) systems (IS) [9][18]. Given this context, EA represents the genesis for IS and Information Technology (IT) design and implementation. Given this context, EA defines what IT is to do and IT is doing EA [15].

In earlier work, deficiencies in existing EAFs are identified from a stakeholder behavioral perspective [15][17]. Though comprehensive and well disciplined from a techno-centric point of view, the current EAF processes pay little or no attention to the impact EA has on organizational and thus stakeholder behavior during any aspect of EA. However, the behavior of both the organization and its stakeholders are inextricably intertwined such that the behavior of each is iterative and recursively reflected in the behavior of the other [8][20].

Given this context, EA can be viewed from both the subjective and objective aspects of human behavior and action and as such affects both the organizational transformation (change) process and the final end-product of EA, the EA plan (EAP) [2][13]. In the case of EA, it can be argued that the requirements contained in the EAP are best understood as contested and negotiated as iterative interactions between project stakeholders and thus the by-product of their behavior and their feelings.
about the new technology. Therefore, the veracity of IT design requirements depends on how stakeholder participate, commit, and get involved during EA to adequately capture, verify, and validate the design artifacts provided EA [24][27]. As can be seen, if these requirements are compromised either intentionally and/or unintentionally, overly and/or covertly by negative stakeholder behavior, EA and all subsequent IT activity will inevitably fail.

In considering the organization, organizations reflect the culture and character of its stakeholders, from top management through to the lowest stakeholder level (collectively stakeholder). As such, it is more than just the traditional definition of individuals and/or groups of individuals working together to achieve a commonly agreed upon set of business goals and objectives [2][3]. Organizations represent an open system with open boundaries (subsidiaries, divisions, sub-divisions, entities, etc.) and thus a homogenous social-technological (socio-techno) community made up of stakeholders that typically react to internal and external stimuli [2][10]. In essence, it is a unique living system/organism that continually strives to evolve, redefining, and maintaining its own recursive identity, character, culture, society, attitudes, beliefs, and hierarchical political and power structure [13][20].

As a stimulus, EA and the technology it introduces into an organization often effect changes to either or both the organization and/or stakeholder. For example, if EA is unexpectedly introduced by management into the organization, the behavioral effect can negatively influence the behavior of all involved stakeholders [3][15][17][20]. However, if adequately planned for and with stakeholder participation and involvement, stakeholder behavior can be positive with stakeholders committed to the process.

While few would argue that stakeholder behavior can be interpreted either subjectively or objectively, the social implications of organizational transformation can result in negative behavioral patterns that often upset the status quo and thus the equilibrium of the enterprise. The predominant logic behind results from forcing stakeholders to accept, adapt to, and take on new roles, duties, and responsibilities without proper preparation can be devastating [4][20].

As part of an EA planning and organizational transformation process, the following questions should be asked and addressed: What happens when stakeholders are confronted with new and/or enhanced technology (new processes and procedures)? How will stakeholders react to the assignment of a new job, duties, role; and a new set of responsibilities; and to a new societal, power, and political status within the organization?

The first impression one gets from an initial perusal of these questions is the lack of any detailed treatment in providing an answer to any of these questions in existing EAFs. First, organizational transformation is best viewed as both a contradiction and a paradox. For example, let’s consider for a moment that EA is a complex phenomenon that requires a pluralistic approach that takes into account not only technology but more importantly the human behavioral components needed for EA design. EA and its EAP then represent the end-product of human action [1][3][20]. Yet, social theorists posit that the technology introduced by EA can stifle and limit human creativity and innovation [2][3][20]. Thus, the change brought about by EA can be contradictory.

Second, EA can be influenced by human behavior with behavioral patterns that affect:

- The effectiveness of the EAP and the Information System (IS) that depends on the interaction between organizational goals and objectives and the methodologies, principles, and practices (frameworks) used to design the technology
- The implicit and explicit practices, attitudes, beliefs, and values organizations and people typically take for granted, all of which may be overlooked in standard systems (software and requirements) engineering processes.

These actions can be dynamic and lead to four fundamental, interrelated, and intertwined human activities:

- How people create technology
- How people use that technology to accomplish some predefined purpose and/or task
- How technology is introduced into the enterprise
- How people perceive the effect technology will have on their daily lives.

These factors are behavioral and their interpretation by stakeholders form a paradox that has the potential to either positively and/or negatively affect how stakeholders react to the changes brought about by and how they participate and get involved in the design of EA and its EAP.

As can be seen, the usefulness of EA depends on the derived EAP document and the reliability of stakeholder input to that document [14][15]. Given this point of view, the EAP represents a deterministic strategic IT plan based on the sociological and psychological actions and behavior of stakeholders. Therefore, recognizing any activity that can possibly affect the quality of the end-product becomes of paramount concern. Finally, recognizing negative behavioral patterns such as those described above must be considered of prime concern during the EA design life cycle and thus the following questions to be asked:

- How can user acceptance and resistance to change be recognized?
- How can it best be dealt with and handled?
- Can the occurrence be turned to an advantage?
First, resistance to change (resistance and user acceptance) is natural and a part of human nature [6][13][22][30]. It exists in every organization and happens at all levels of the enterprise. Second, if resistance is pervasive or demonstrated by key stakeholders, the result of this behavior will have a detrimental impact on EA. Third and most important, it cannot be ignored or dismissed. Fourth, resistance can come from both the organization and its stakeholders.

From an organizational perspective, resistance can be recognized when management acts by [2][10]:
- Installing structural mechanisms to maintain the status quo and existing equilibrium of the organization
- Implementing procedures and rules that direct people to perform in historical ways
- Maintaining the previous habits, rules, norms, character, culture, and structure of the enterprise.

From the stakeholder point of view, stakeholder resistance includes [6][12][30]:
- Stakeholders acting as creatures of habit continuing to perform and do tasks from existing cognitive behavior without thinking about their actions.
- Coping with change and the complexity associated with new processes and procedures by responding in known ways that lead to resistance.
- Fear that job stability, security, and income will be jeopardized by the new way of performing work.
- Loss of power, influence, and status within the organization.
- Acting in ways that serve their own parochial self interests.

With EA dependent on production of a verifiable EAP, recognizing resistance early in the EA process becomes a critical element in EA design and implementation. However, there is a positive side to resistance to change.

3. Stakeholder and Organizational Behavior: Applying the Theory of Structuration

Enterprise Architecture (EA) and Information Technology (IT) leads to organizational transformation [30]. Given this context, individual stakeholder behavior, including their beliefs, culture, and cognitive life experiences, directly link to that of the central and distinctive characteristics of the organization. These ideas can be expanded and allow resistance to change (resistance) to be treated as a natural and normal human behavioral trait, then organizational transformation can be posited as either a positive and/or negative major shift in the enterprise’s operating paradigm, character, culture, and structure. In effect, a change in the way it does business [18].

The result of this phenomenon can be emotionally devastating to stakeholders as it can alter behavioral patterns that could upset the social, economic, and political hierarchy and structure within the organization. Thus it can be the genesis for failed EA [1][20]. However, if resistance is treated as human nature and a normal behavioral phenomenon that must be taken into account during EA design, it can be anticipated, planned for, and made a part of any framework(s) desired for EA design that includes aspects of social theory.

Building on the insights of this interpretative approach can lead to increased stakeholder participation, involvement, and thus commitment during the EA life cycle. However, this requires that resistance be planned for and recognized early in and addressed as reality in the EA process. Given this premise, resistance and organizational change can be handled as a means for successful information discourse and exchange.

Given this perspective, Giddens’ Theory of Structuration allows us to explore stakeholder resistance using several key components of social theory, organization theory, information technology, and communication to analyze resistance from an organization (i.e., structure) and human agency perspective and thus construct a conceptual EA framework. First, knowing what is causing a particular behavior and what is maintaining it must be recognized. Stakeholders are responsible for providing the input and thus the production of output from EA, the EAP [18][19]. Therefore, more attention must be paid to the people involved in EA and perhaps less to the processes associated with the technology. Second, only stakeholders can change stakeholder behavior (manager to worker). Stakeholder attitudes, beliefs, and/or cultures cannot be changed as these are integral traits resulting from the cognitive life experiences of the stakeholder [8][12].

Organizations and humans represent living systems and are each the products of their respective historic life experiences and the environment in which they function. Thus, the way stakeholders interact with the EA process will determines how their commitment to and what they will contribute during EA [3]. Third, what is perceived as resistance is an integral part of the living system that might not be understood [21][22][30]. Thus, helping stakeholders understand the rationale for change and to accept, adapt to, or at least not oppose it, makes stakeholder resistance a critical component that must be reckoned with for successful implementation of IT strategies. Finally, stakeholder beliefs, culture, and values, some of which might be implacable, must be recognized early and dealt with [4][6]. In some cases, stakeholders may be unreasonable. Therefore, mechanisms that either control and/or contain may be
required. From an EA and requirements engineering perspective, our solution addresses resistance with an EA framework tied to and that’s formulated, planned for, and designed around stakeholder behavior.

Giddens’ Theory of Structuration differs from earlier sociological works and dualisms positing a highly complex and abstract property of social systems [8]. We submit at this point that social systems are not structures though they exhibit structural properties that are instantiated as social practices. In this same context, resistance is not a structure but, yet, exhibits structural properties that are implicit, deterministic, and instantiated in daily stakeholder behavior. From this, we can conceptualize resistance as a duality from two dynamically interrelated perspectives: an explicit perspective where resistance is observable and a deeper implicit perspective, recursively linked through the modality of interpretive human actors’ actions.

In EA design, the theory can be associated in context with the subjective human experience in the interpretation, creation, and modification of the social world, his structure (i.e., organization) [8]. In this case, structure is not something concrete but maintains a virtual existence situated in time and space. In addition, though it lacks material characteristics, it cannot exist without human actors who interact in a recursive manner while interpreting its dimensions [8]. In essence, structuration theory represents a social framework where human actors live, work, and interact creating and recreating social culture.

At the same time, and though Giddens doesn’t address technology, the theory can be applied to technology depending on how it is perceived and used claiming that social structure can constrain and limit stakeholders’ ability to be innovative and creative. Both culture and structure form Giddens’ duality of structure [8]. In this context, stakeholders allow the shared abstractions of social structures to constrain their action and induce behavior influenced by authority relationships and other organizational change. Hence, the absence of material constraints attests to the power of those socially constructed abstractions to elicit behavioral patterns of compliance and conformity. Therefore, Giddens’ theory can be applied to EA by recognizing that both structure and agency represent a duality and, at the same time, that each is iteratively dependent on each other.

Orlikowski applied IT to the theory formalizing her Structural Model of Technology (SMT) [20] as “in its constituted nature – information technology is the social product of subjective human action within specific structural and cultural contexts – and in its constituted role – information technology is simultaneously an objective set of rules and resources involved in mediating (facilitating and constraining) human action, and thus hence contributing to the creation, re-creation and transformation of these contexts” [20].

4. Mitigating Resistance to Change: Coping with Stakeholder Behavior

Enterprise Architecture (EA) and Information Technology (IT) have come to be synonymous with organizational transformation [2][3][20]. Sometimes this transformation can be easy and in other circumstances, it can be extremely traumatic. However, organizational transformation has become the new norm and certainly a way of life in today’s technologically-driven world.

This paper progresses our process of designing and developing a behavior-driven framework for EA that emphasizes a hermeneutic, iterative analysis of social, organizational, and management influences that affect EA design. In this case, exploring and analyzing the effect resistance to change (resistance) has on organizational and stakeholder (collectively stakeholder) behavior during EA and in this ,the hermeneutic analysis. From this point of view, the focus can be directed to the constructive aspects of resistance to alter stakeholder behavior. In this case, altering negative stakeholder behavior means first and foremost recognizing that human stakeholders are emotional beings and creatures of habit [8]. Therefore, recognizing behavioral patterns that exhibit resistance provides a way to change behavior such that accepting change can be healthy.

Given that resistance is constituted behavioral acts that take place from both human and social interaction, these behavioral tendencies and acts can be mitigated by:

- Bringing change to the forefront of the process by explaining the need for change.
- Providing a vision that stakeholders can relate to that helps them to understand why change is necessary for the organization.
- Utilizing those stakeholders as role models who want to “own” and drive the change process. These kinds of stakeholder can help in getting other stakeholders to embrace and accept, or at least not oppose, change.
- Helping stakeholders deal with the emotional aspects of change. Perhaps answering the question “What’s in it for me?”
- Creating an environment that appeals to stakeholder self-interest. In effect, waking the talk, not just talking the walk.
- Providing skills training. EA means new processes and procedures that stakeholders must adapt to, accept, and learn. Providing stakeholders with the skills/training they need to work with the new processes and procedures and be successful can negate negative behavior and thus mitigate resistance.

While it might not be possible to control all of the factors affecting EA, we can control the design and implementation processes by instantiating how we will
arrive at a viable IT solution. For example, frameworks can be controlled and allow features to be incorporated that include conducting open-ended interviews, an ongoing examination of stakeholder interpretations and expectations, continual analysis of social and work practices to identify risk, and thus avoid approaches that pay little attention to social issues and context.

First, structurally, identify and involve stakeholders that want to get involved and make them part of the planning and decision-making process. This means asking them for their thoughts about the future technology plans, soliciting their suggestions and then incorporating their ideas in the solution. In effect, listen and act to what’s going on.

Second, clearly define the strategic and business-oriented need for change, communicating this information through the organizational levels and soliciting stakeholder thoughts about the plan. Expect there to be defiance – some people will not openly speak about the change but rather ignore it and speak to others about how detrimental the change could be.

Third, plan to deal with the emotional needs of stakeholders by being open and honest about the impact change will have on their place in the process. In effect, handle the soft people needs of the stakeholders by involving them and changing only that which needs to be changed. In essence, identify the source(s) and reasons for negative reactions and perhaps modify your assumptions, clarify what is being done, and thus reinforce the rationale for change.

Fourth, resistance should not be confronted from a defensive position. Design flexibility into change by allowing stakeholders to participate in the design process and assimilate new behaviors and redefine their roles during implementation of the EA change process. What we perceive as resistance is really a part of the system we don’t understand.

Fifth, do not allow for stakeholders to modify, abuse, or misuse the new technology and thus revert to the previous way of doing work. Focus on the specific positive aspects of change without committing to the process until the organization is ready for implementation.

From this, we can build a sociologically behavioral-driven framework for EA design using Giddens’ Theory of Structuration that leads to stakeholder participation, involvement, and commitment. For EA to be successful, we need to: 1. know what is causing a negative behavior and what is maintaining it; 2. change behavior recognizing you cannot change attitudes, beliefs, and/or cultures; and, 3. only change behavior that is understood and only if you understand human behavior.

One of the most important outcomes expected from EA organizational transformation [3][18]. The importance of this aspect of EA manifests itself in the translation of EA design requirements into a manifesto containing the planning, alignment, guidelines, and rules for governance leading to a Software Requirements Specification (SRS), document that will be used throughout the IT design and implementation life cycle [24][31]. Yet, the EA process highlights one of the most difficult and arduous tasks confronting the Enterprise Information Architect (EIA), ensuring organizational transformation takes place in an orderly and controlled environment focused on organizational expectations [7][11][22].

5. Discussion, Future Direction and Closing Remarks

The initial stages of Enterprise Architecture (EA) design today are more concerned with the how the technical aspects of Information Technology (IT) design activity is conducted rather than with preparing the organization for EA. This approach differs from traditional approaches in that EA is examined from an organizational and stakeholder behavioral perspective with an EA framework that includes and takes into account these behaviors.

In earlier work [16], we proposed a framework that includes several principles and practices from the fields of sociology, psychology, organization theory, and management behavior. This framework is incomplete. Future work planned continues more research into the behavioral aspects of EA design and to enhance our framework with features that include:

- Establishing and understanding organizational boundaries, domains.
- Choosing a preliminary IT design concept.
- Organization and delegation of EA design activities based on stakeholder skills.
- Coordination of the IT design activities into a single strategic EA plan (EAP).
- Integration and consolidation of IS design efforts into a single comprehensive overall.

6. References


