

# Systems Based Adaptive and Preemptive Theory for Improving Pervasive IT Project Failure Trends (“AdaPIT” Theory) -“Preemptive and Adaptive Project Management”<sup>1</sup>

*Rosana Roncatto Stoica*

Faculty of George Mason University

4400 University Drive, Fairfax, Virginia, U.S.A.

E-mail: rstoica@gmu.edu

*Rosana Roncatto Stoica* (Correspondence author)

School of Systems Engineering and Operations Research, George Mason University

4400 University Drive, Fairfax, Virginia, U.S.A.

E-mail: rstoica@gmu.edu

**Abstract:** Evidence displays staging statistics reporting IT projects failure: a trend unchanged to date despite the multitude of attempted corrective measures. Challenging the rigid IT project management structures to date from a theoretical perspective leveraging Grounded, Systems and Social Theories, the authors uncovered a new (Complex Adaptive System (CAS) rooted) IT Project Management theory (AdaPIT Theory). This paper presents how the new theory emerged, presents its fundamental associations to CAS and sets the stage for a CAS based IT Project Management Framework and associated prescriptive measures already in progress.

**Keywords:** Complex Adaptive Systems, IT Projects, Project Management

## 1 Introduction

Concern about high project failure rates has been raised for at least 40 years (Jenkins and Naumann 1984). There is an evident need to re-evaluate the project management practice hence a systems thinking perspective analyzing “soft” aspects of project dynamics is proposed including their interdependencies and respective cause-effect outcomes.

This paper moves away from traditional analysis where reductionist methods separating the individual pieces. The word “analysis” itself comes from the root meaning “to break into constituent parts”. The authors propose a systems thinking approach focusing in contrast on how the issue being studied interacts within the other constituents Intangible Soft Factors (ISF’s) within the system (a set of elements that interact to produce the system behavior). This method was first introduced over 40 years ago in 1965 by MIT professor Dr. Jay Forrester and further published by his renowned student

---

<sup>1</sup> The research is sole initiative of Dr. Rosana Roncatto Stoica, who has been compiling data from large, medium and small projects for over two decades. Multiple Subject matter experts have been engaged in this initiative as well as interviewed as validation for the results hereby consolidated.

John D. Sterman (Boyd 1972). It enables researchers and practitioners to make their understanding of social systems explicit and to improve their methods similarly to the way engineering principles have been leveraged to improve the understanding of mechanical systems.

Furthermore, this paper presents the research outcomes conceptualized and defined by the authors as Adaptive Experimentation methodology: a composition of contextual, holistic, systems thinking with its foundation in Grounded Theory under the framework of the Social Theory lens. The research outcomes as it will be depicted in subsequent sections reveals the critical need to shift the IT project management paradigm into more adaptable structures (Complex Adaptable Systems (CAS). Complex adaptive systems theory arose early in this century are applied primarily to physics. The authors extend the principles to the IT Project domain. It moves away from earlier reductionist theories (Newtonian) as a means to explain the behavior of smaller and smaller atomic particles not fitting any of the conventional “cause and effect” or reduction of objects and their components to pieces). The authors extend these principles to IT project management as their research findings support. This research challenges the very foundations of the IT project management theory (which remains unchallenged to date). Complex adaptive systems, self-organizing, adaptable for survivability (“success”) are scientific descriptions. In terms of IT Project Management, the authors extend these fundamental principles to researching organizations and projects teams not as machines as they have been long viewed, but living organisms.

Fig. 1 below provides a graphical depiction of the proposed and implemented research philosophy, comprised of 3 fundamental pillars, followed by the four-phased methodology in which it has been operationalized. Detailed overview of the Research Philosophy and Four Phased Methodology can be found in the earlier publication by the author (1, 2). The fundamental research hypothesis is based on the premise that IT project failures can be traced from a root perspective to “soft factors” with chief influences rooted on lack of adaptability.

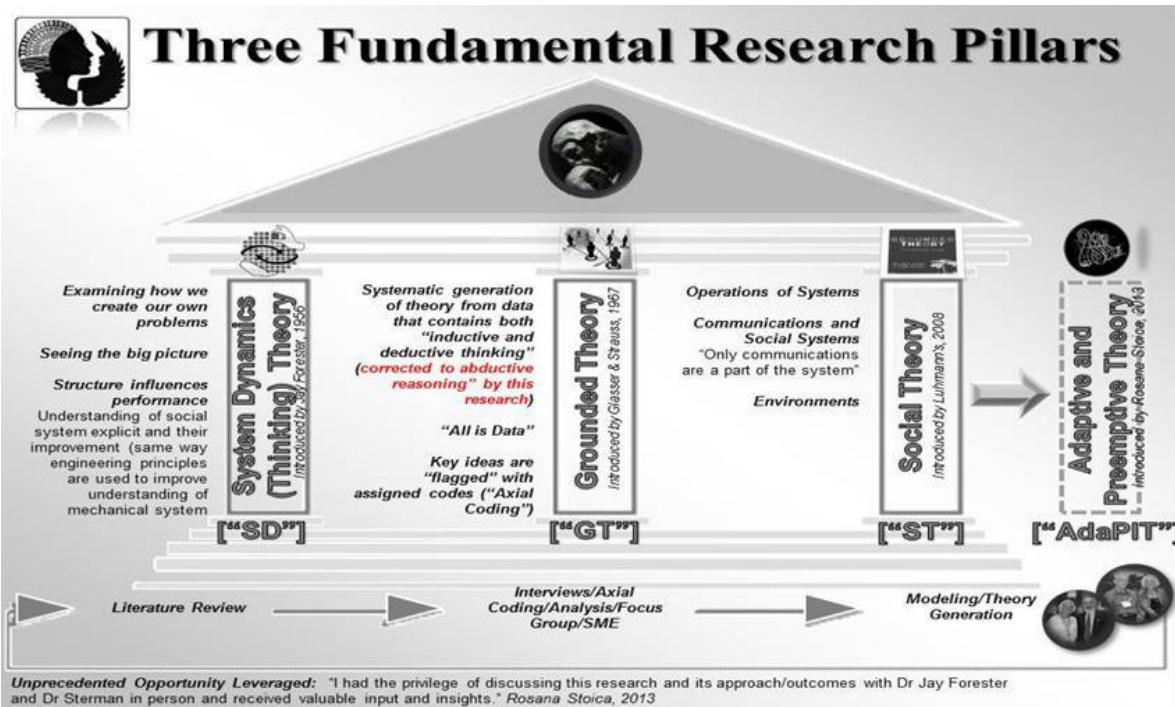


Figure 1. Three Fundamental Research Pillars

## 2 Method

The interview method was leveraged in conjunction with data identified through literature review, personal experiences, 2 interactions with a selected focus group representation, 3 Grounded Theory Subject Matter Expert reviews under the oversight of a very experienced researcher and Project Manager (and research Principal Investigator) and other relevant documentation. Many challenges associated with the initial data collection plan were faced, hence highlighting the criticality of generating alternative data collection strategies upfront for research initiatives of this nature.

Just as IT project outcomes are unpredictable, so are the environments in which they exist. Researchers must be aware that securing support for data collection – especially when this is done on a voluntary basis – may bring forth many unexpected surprises. One of the surprising outcomes from this research initiative was a new theory that precedes prescriptive recommendations and maturation that may revolutionize the way that technology projects are managed. This paper will briefly summarize mostly through models the research methodology, findings and uncovered theory. Detailed descriptive and interpretation of the factors, categories and theory can be found in the author’s work (referenced in this paper).

### 2.1 Four Phased Methodology

“We don’t need better solutions; we need better thinking about problems.” (Russell Ackoff, source unknown) is well stated. To overcome the project failure trend, particularly afflicting the IT domain, research endeavors must first and foremost seek to understand the key forces influencing its outcomes. As presented by the authors, regardless of the evidence recognizing the costly IT project failure trend, the multitude of current project management frameworks, and tools, have not to date positively altered this outcome nor assessed/incorporated the true influence of soft factors on project constructs. The author has investigated the limitation in the number of studies exploring the IT project failure trend as well as integrated systems approach. Fig. 2 below provides a summary depiction of the Four Phased Multi-Method Research methodology (1, 3).

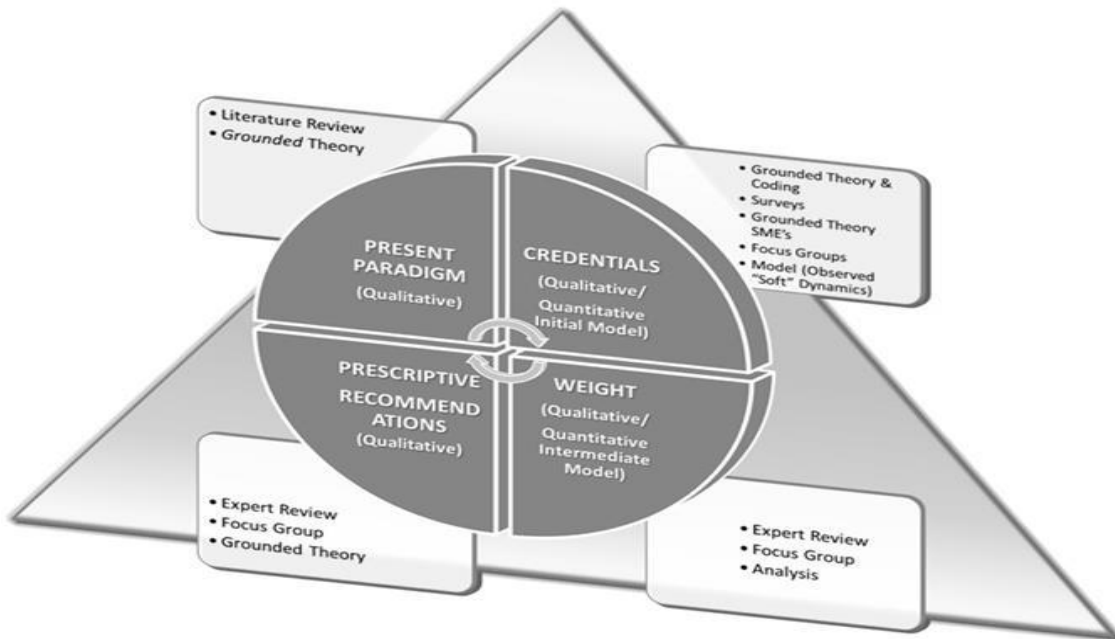


Figure 2. Four Phased Multi-Method Methodology

### 3 Research Background and Key Summary Outcomes

Although originally targeting the Small IT projects domain, during the data collection the opportunity to collect data from all 3 project size domains, Large, Medium and Small) was presented. From a project role perspective, 3 key categories were incorporated, Management, Technical and Business and/or Customer). Semi structured, open-ended interviews and a subset of closed ended questions, demographics and background, were also leveraged. Within this stratification the authors have also examined how each project member perceptions, as well as the intangible forces, act as contributors and/or triggers for IT project success and/or failures. Suggestions, preventive measures were also solicited from the Expert Practitioners.

In addition, participants were asked to provide feedback regarding methods currently used to manage their initiatives, conflict resolution, communication, mission dissemination, team building strategies, major challenges, and other relevant questions. Within a total of 54 questions saturation was achieved within the first 12 interviews (i.e., total number of identified factors and categories (classified and grouped “factors”). For detailed experimental approach and saturation achievement please refer to Fig. 3 below and Identified “categories” impacting the IT project failure have been named Intangible Soft Factors (“ISF’s) by the author (3, 4).

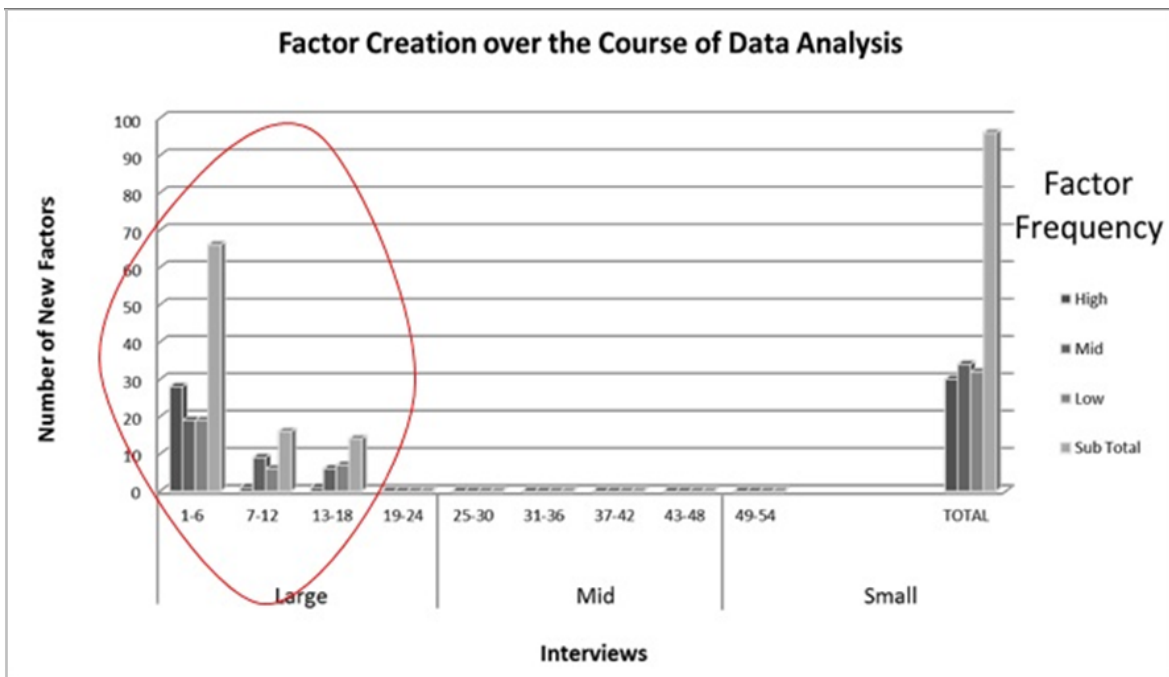


Figure 3. Factor Prevalence

#### 3.1 Analysis Summary

This section presents the summary of the main emerging categories (ISF’s) as well as the frequency in which they have been present and later on rates within a scale from 1 through 5 (5=critical, 4=very high, 3=high, 2=moderate and 1=low). Fig. 3 depicts the factors identification frequencies. Detailed graphics containing a summation of all data collected the open ended interview have also been collected as well as open ended interview questionnaires outcomes. Although not in direct support to the hypotheses with this study, the authors have also analyzed the relevance of the identified ISF’s (previously described in this paper) against the project life cycle phases, a current gap in literature.

Further investigation regarding project phase relevance is warranted. The Emerging Categories

have also been mapped against the Social Theory and the Key Factors classified during the focus group interaction. A Mind Map view provided a natural setting for discussions – especially during the focus group exercises. This section highlights the prevalence of soft categories uncovered versus hard factors (10 categories total, 9 soft and 1 hard). I summary graphic is provided below on Fig. 4.

Please note the predominant prevalence of the Adaptability category. The Categories are aggregated factors uncovered during the research initiative, subsequently coded and classified during focus group discussions with a subgroup of subject matter experts. Please note the relevance of the adaptability ISF.

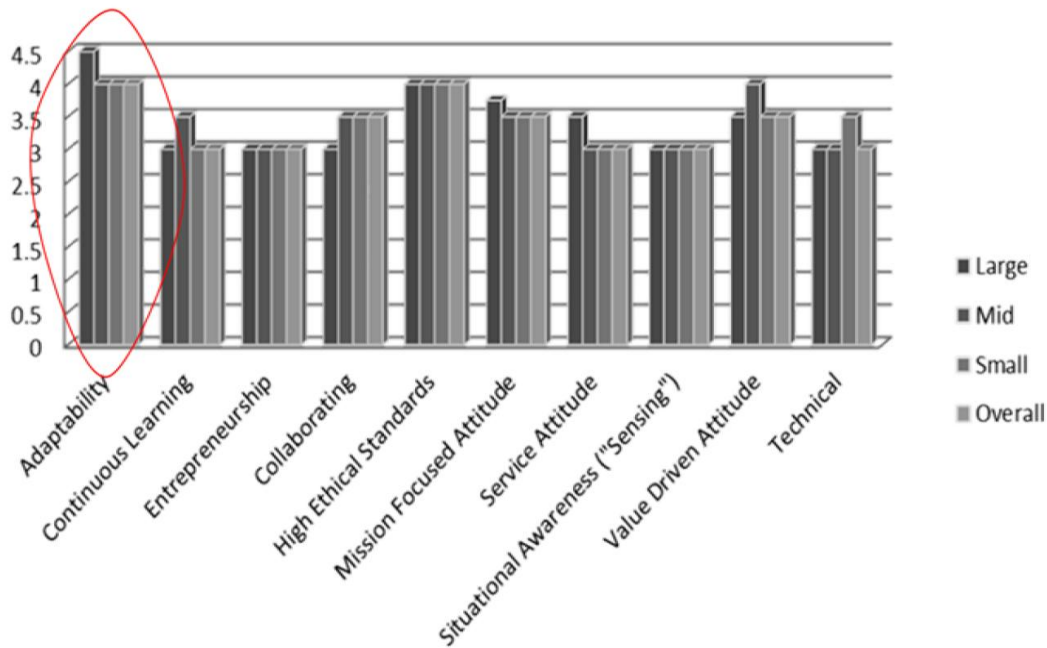


Figure 4. Emerging Categories

For instance, for the uncovered prevalent Adaptability category, the consensus definition was the ability to adapt to change, from all domains. Based on research findings, even highly technical and modernized organizations have a natural resistance to change. Lack of flexibility was quoted by all Expert Practitioners as chief cause for the IT project challenges. This Category has received the highest scores, frequency and emphasis during the interview (Expert Practitioner representation) process irrespectively from the project role and project size in question.

All factors within the Adaptability code were high frequency ones (quoted by each of the 54 Expert Practitioner representations within the interview process). The project sizes (Large, Small and Medium) were also stratified and require further analysis in future works since it was not the primary focus of the first phase of this research initiative (the key focus was the identification of the key factors impacting the prevalent IT Project failure).

## 4 Emerging Theory

The author calls the audience’s attention to the conjunction point of this emerging theory and CAS. This unexpected outcome (the emergency of a Theory) highlights the urgent need of revising the project theory in itself. Redefining success metrics and above all assessing flexible and adaptable management frameworks are mandatory in order to overcome the IT Project Failure trend. I name this emerging paradigm “Adaptable and Preemptive IT project Management” (“AdaPIT”).

In essence AdaPIT does not replace any existing IT project Management framework: it simply incorporates the ISF's into the applicable project construct. It hypothesizes that by doing so the IT project failure paradigm will be changed: less failure. During discussions with Dr. Jay Forrester this past year regarding this pervasive issue an important point was also brought up: in order for resources to think systemically they must rid themselves of their mind maps which can be nearly impossible for resources who have been entrenched in the system for most of their lives. Hence Dr. Jay Forrester's recommendation lies primarily on training K-12 and any resources still reaching out to learning the critical tool kit of System Dynamics and Systems Thinking. The authors also advocate that additional tools are not necessary and that we must focus on retraining the workforce to think differently about problems at hand.

The main theory unveiled through this research has been modeled and presented through multiple views. It encompasses my representation from all data points collected throughout this research inclusive the authors own experiences. In summary, as pictorially depicted in Fig. 5, the IT Project Management core structure must be continuously aware and responsive to multiple dimensions. The key is adaptation in a time continuum to the project environment's Social Order from which requirements, chain of command, priorities and other associated environmental criteria may change. It is necessary and sufficient management structure responsive to (now) an adaptable schedule, budget and scope.

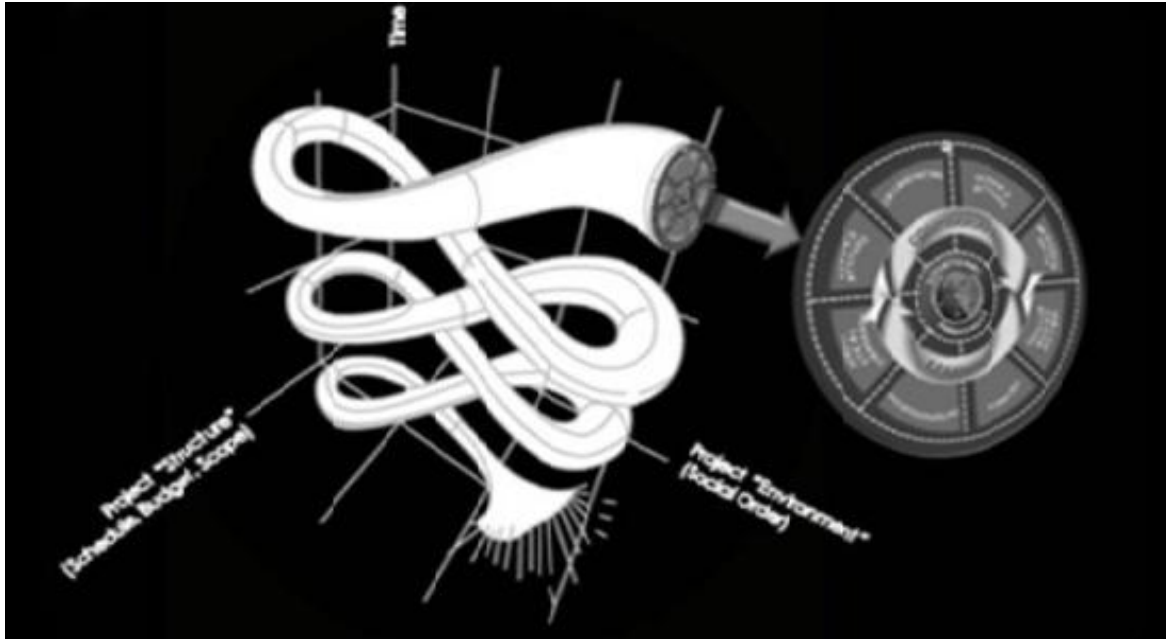


Figure 5. Three-Dimensional “AdaPIT” Theoretical Model

#### 4.1 “AdaPIT” Theory

“AdaPIT” stands for Adaptive and Pre-emptive IT Project and Program Management Theory. This is in essence a genome structure and its inner fabric will be discussed via a different view in the subsequent paragraph to this section. The Pre-emptive terminology places emphasis on the need for a greater situational awareness need due to the rapid pace of today's environments – especially as it pertains to IT projects and/or programs.

The actual “AdaPIT” structure contains a series of connected sections which represent in essence virtual gates from which a full reassessment of the original project parameters are re-evaluated and

adjusted accordingly to changes and approval chains at that point in time.

Fig. 6 represents a slice of the AdaPIT structure. Its inner fabric is composed of all categories, themes, identified during this research and the glue, flexible cement, among them is represented by the adaptability theme itself. The situational awareness theme occupies the center of the slice and touches every other theme – and must be a continuous effort. Continuous Learning is also a continuous effort and surrounds all other factors. The dotted lines represent paths where a bridge Agent monitors all evolving and dynamic themes. In essence, adaptability is a bonding element, situational awareness a scanning and signaling element and continuous learning an expressing element while all other ISFs represent genes within the “AdaPIT” genome model. The new IT project management theory then emerges as a “living” adaptive and complex system.

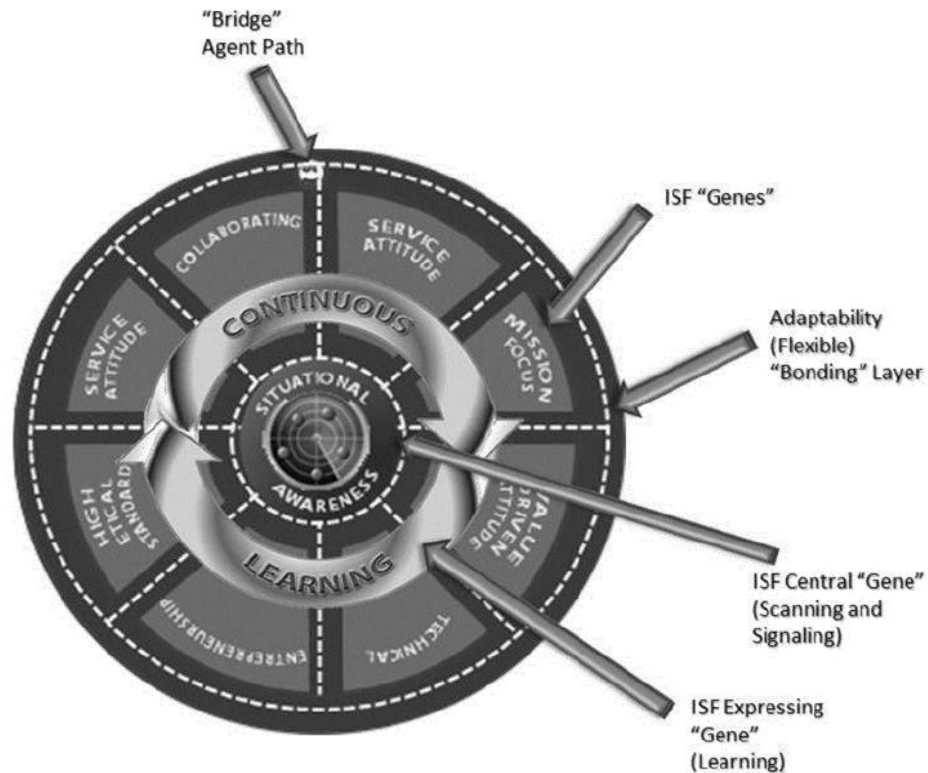


Figure 6. AdaPIT “Slice” of the Three-Dimensional Model

It was also uncovered during this exercise the need to implement a “Bridge Agent” sort of a Story Teller that must be an independent and active listener across the project organization. Please note on Figure 6 a slice of the 3D model depicting how the categories identified interact within this proposed model. Figure 7 displays in more details the inner fabric of the “AdaPIT” genome structure. As time and social construct evolves – as well as the context of each project, this inner structure may change with certain factors become less or more relevant. Additional investigation within a case study setting and agent based modeling is a suggested approach for such a study.

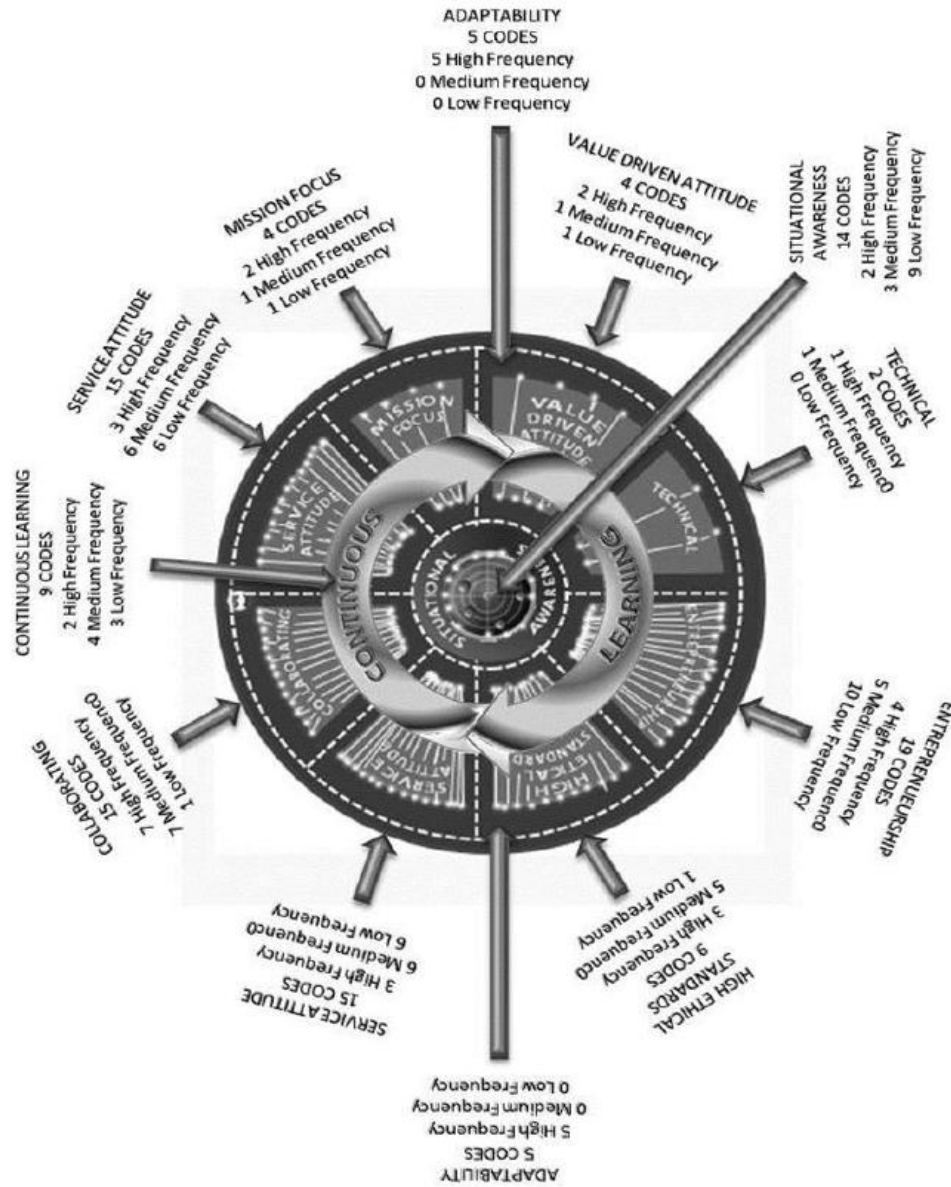


Figure 7. “AdaPIT” “Genome” Detailed Inner Fabric

Another perspective from a theoretical representation is depicted in Fig. 8 below. This is a 2 dimensional representation of all identified categories by criticality levels also depicting a bonding element, flexibility category, encompassing all other categories and the bridge agent path. Additional studies are required to refine the components within this emerging theory as well as to support its efficacy. It is however evident that something has to change in order for organizations to break away from the IT Project failure gridlock, trend.

The authors further assert that this Theory is applicable to any project irrespectively of their industry, size, budget and scope.



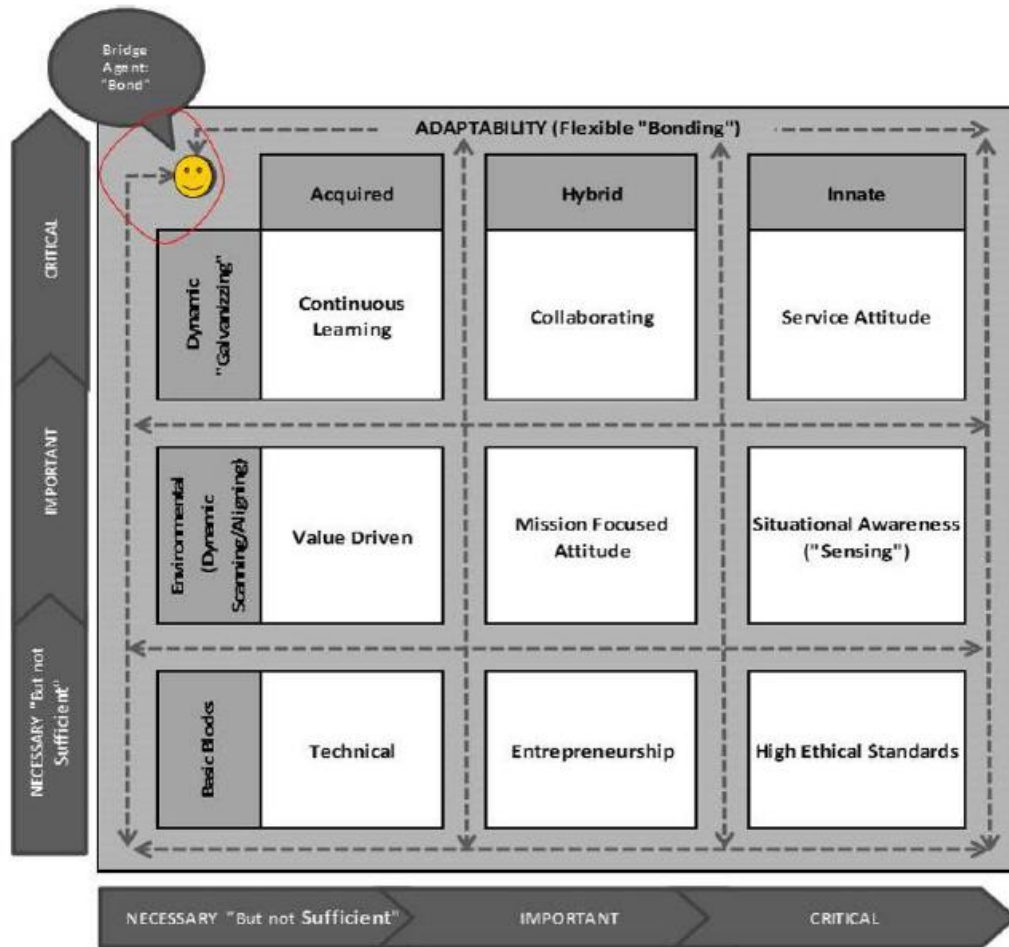


Figure 8. "AdaPIT" Bi-Dimensional Model

## 5 Conclusion and Key Research Contribution(s)

The research contributions can be summarized as follows: Contributed to the Theoretical Breakthrough and Broadened the Understanding of the IT Project Failure Pervasive Trend and its fundamental link and need to re-evaluate IT project management within a CAS construct; Highlights the critical significance of searching for new approaches - lens to investigate issues; Project Observed within a "Social" Construct unveiled a fresh perspective; Provided a Supported Holistic Grounded Theory Methodology; Breaking Ground on Engineering Domain with Grounded Theory; Structured Sampling Size Guidelines for Future Researchers; Presentation of IT PM Systems Archetypes; Grounded Theory Definition Review.

Undoubtedly the key contribution of this research is the unveiling of a New Theory as it pertains to IT Project management. In addition, the identification of the most relevant Intangible Social Factors (ISFs) within the IT Project contributed to the theoretical breakthrough highlighting adaptability as a chief influencer of project success and/or failure. This outcome challenges the theory of project management itself and requires further evaluation within a CAS construct as it pertains to prescriptive measures and their operationalization as well as the support of its applicability within other project domains. The multi-method methodology itself also offers a robust framework for the

expansion of this study. Another contribution of this study pertains to the reliability study of sampling size within qualitative research as well as the relevance of ISF's mapped against the project life cycle.

Most importantly, the key message to researchers and practitioners alike lies in the critical importance of looking into problems from different lens, in our case considering Projects within a CAS construct. Adaptability requires openness to new ways of assessing and overcoming problems. This concept is as relevant within the living project organizations as they are on other domains in life.

## 6 Future Work

The Author is current expanding upon a CAS based IT project management framework along with a practical case study application. Prescriptive measures will follow the completion and validation of the unveiled theory.

*“It Is Not the Strongest of the Species that Survives But the Most Adaptable”* (Charles Darwin). This research outcome supports the critical need to approach IT project as an adaptive process viewing project teams themselves as living organism as means to adapt and successfully manage the extreme IT project environments. Approaching IT projects as an adaptive process and viewing the project team as a living organism rather than an impersonal entity will provide an adequate construct to more adaptable and successful project management frameworks.

**Acknowledgments:** To wonderful mentors who have touched my life in the most profound and impactful ways, who unselfishly and passionately envisioned and dedicated their lives the betterment of systems within and all around us, in special: Father Gheorghe Dumitreasa-Calciu (deceased), Dr. Andrew Sage (deceased), Dr. David Schum, Dr. Jay Forrester and Dr. Michael Casey (who despite life-threatening health challenges remained committed to my research to the very end) among others who carry on their commitments with perseverance, honor and who understand the impact that of their actions and/or omissions. These are the people who hold our families, societies and ultimately civilizations together catalyzing positive changes. I can only strive to follow in their footsteps.

## Reference\*

- [1] Stoica R. S., Brouse P. (2013a), “A proposed four-phased adaptive multi-method approach”. In: 11th Annual Conference on Systems Engineering Research (CSER), *ELSEVIER*, Georgia.
- [2] Stoica R. S., Brouse P. (2013b), “Pioneering Grounded Theory Exploring the IT Project Failure Trend - Saturation Experimentation”; *JCSTA (Journal of Computer Systems and Technology)*.
- [3] Stoica R. S., Brouse P. (2013c), “Information Technology (IT) Project Management Failures: Pioneering Grounded Theory Exploring the IT Project Failure Trend from a Holistic Framework - Data Saturation and Variability - Data Sampling Selection Methodology.” 23rd Annual INCOSE International Symposium, Philadelphia.
- [4] Stoica R. S., Brouse P. (2012), “Information Technology (IT) Project Management Failures: Historical and Evolutionary Walk through from a Social Dynamic Perspective – A Primer to “Preemptive and Adaptive Project Management”. In: 22nd Annual INCOSE International Symposium, Italy.

*\*Please note that dozens of other publications included in the papers cited above are encompassed in the summation of nearly 9 years of research culminating in this paper.*