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Reexamining Information Systems Success through the Information Technology Professionals Perspective

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Abstract

In this study, I applied “appreciative inquiry” to enhance understanding of the organizational environment, management practices, and sociocognitive determinants that are associated with successful information systems projects. In a series of 31 interviews and seven focus groups, IT professionals from various ranks and organizations followed an appreciative inquiry method to identify critical success factors of information systems projects. In addition to the traditional factors revealed by previous research on project success, the crucial impact of positive affect among IT professionals on overall project success was discovered. The findings have immediate implications for the management of information systems projects. The study shows that IT organizations need to pay careful attention not only to project management practices and socio-cultural issues. They also need to enhance positive affect among the individuals who are entrusted to design, build and maintain information systems. In addition, the study demonstrated how the affirmative perspective provided by appreciative inquiry can contribute to research.

Keywords

Success factors, positive affect, appreciative inquiry, IS projects, systems developments, IT professionals

1. Introduction

Regardless of their origin, information systems must be integrated into the business process and incorporated into the social fabric of their host organization. Generally, this process is managed and executed by IT professionals who refer to such a process as a *project*, or an IS project. In spite of the apparent maturity of the technology and the extensive body of related knowledge, IS projects often turn into bumpy rides. In response, most researchers and practitioners suggest a clear set of success factors as a remedy. Furthermore, they both tend to blame unresolved hurdles on uncontrollable externalities such as the complexity of systems, the idiosyncrasies of each particular environment, human errors, the continuous mutation of the technology, and organizational politics (Sauer 1999).

The main objective of this study was to reveal new insights about organizational environments that are conducive to successful information systems ventures. I conducted the study using *appreciative inquiry* (Cooperrider & Srivastva 1987), which is a form of investigation that has never been used in the context of information systems research. Guided by the premise that the questions we ask are the seeds of the insights to come, I hoped that the

fresh form of inquiry would be instrumental in revealing new understanding of IS projects success. More particularly, using appreciative inquiry, I asked IT professionals to reflect about and probe into the conditions that have been conducive to IS projects success.

Appreciative inquiry was introduced by Cooperrider and Srivastva (1987) as a form of action research and an approach to management of organizational development. Appreciative inquiry is an affirmative form of inquiry that both challenges and complements the problem-oriented view inherent in current information systems research. The initial insight to apply appreciative inquiry stemmed from the observation that, although we generally aim in our research to enhance information systems projects, we focus much of our inquiry on their problems, failures, and features that can be fixed, improved, or eliminated. One explanation of this paradox may be the explicit or implicit assumption that IS projects will be successful if all the possible pitfalls are circumvented. Rhetorically speaking, should we examine and analyze what went wrong in order to learn how to make them successful? After all, “success” is not necessarily the logical opposite of “failure.” Of course, the two are related, but examining one does not guarantee to teach us about the other. In other words, the study of what went wrong may serve those who aim to avoid failure, but constitutes poor foundations for those who strive to be the best¹. In this study, I consciously chose to explore what leads to successful information systems projects rather than prescribing failure prevention tactics.

2. Current Perspectives on Systems Development Success

Though information systems development methods come in many flavours, they all aim to provide a framework for successful system design and development. Two inherently different approaches dominate the various frameworks to provide a recipe for success—a managerial perspective and a human-relations perspective. One stems from the deterministic stance and the other echoes the voluntaristic stance² (Hirschheim & Klein 1989).

2.1 Managerial Perspective

As of the early 1980s, the *critical success factors* approach has become the dominant framework of those who adopt a top-down value-chain-based view of organizational life for dealing with questions such as what contributes to IS projects success and how to extract top-rated returns from IT investments. Working mainly with and for top executives, this approach was popularized by Rockart (1979) who defined success factors as “the limited number of areas in which results, if they are satisfactory, will ensure successful competitive performance” (p. 91), or as key areas where things must go right in order to successfully achieve objective and goals.

Based on a survey of 365 IT executives and 8380 projects, the Standish Group (1995) identified the most prevalent success factors of IS projects and their relative contribution to project success. Table-1 summarizes their findings and shows that information systems success can be attributed almost equally to both project management practices and social-organizational modalities.

¹ In the same fashion, psychologists differentiate between the study and measurement of positive emotions and negative emotions. For example, studies about how to prevent feelings of sadness and depression are inherently different from studies about how to sustain a sense of happiness (Fredrickson 2001).

² Deterministic views focus on the functional and structural properties of a system, and regard people and their actions as being completely determined or governed by their environments. However, the voluntaristic views focus on the social and humanistic properties of organizations, and consider people as voluntary participants who are “autonomous and free-willed.” According to the voluntaristic views, people are the source of change (Astly & Van de Ven 1983, Burrell & Morgan 1979).

<i>Success Criteria*</i>	<i>Relative Contribution to Overall Success</i>
Project Management Practices	
Proper Planning and Smaller Project Milestones	20%
Clear Statement of Requirements & Clear Vision and Objectives	18%
Competent and Hardworking Staff	11%
Social-Organizational Modalities	
User Involvement and Ownership	25%
Executive Management Support	16%
Realistic User Expectations	10%
Total:	100%
*Source: The Standish Group (1995)	

Table 1. Critical success factors in large information systems projects and their relative contribution to project success

The aforementioned success criteria were confirmed in at least 31 studies (see Sauer 1999) and can be found in most systems development and project management textbooks (e.g., Schwalbe 2001). Success factors enable us to reduce a messy problem into a set of clean and easy-to-discuss criteria. They provide researchers, consultants and managers with a direct and immediate certified diagnostic tool that allows them to identify the problems and prescribe remedies.

2.2 Human Relations Perspective

Subsequent to some high-profile failures, and with the ever increasing variety of people interacting to build, operate, maintain, and manage computer information systems, it was realized that successful IS development and management requires careful attention to not only to the technical facets but also to human action and needs (Rouse 1991). Following the Tavistock School's tradition, the human relations view of management information systems was born out of the realization that the procedural-deterministic perspective is too narrow and fails to recognize the critical effect of human factors on systems development and use (Bostrom & Heinen 1977).

The proponents of the human relations perspective perceive IS projects as system-wide participatory acts that are designed, managed and evaluated through the eyes of the human participants (Clarke & Lehane 1998). Human relations perspective positions come in many flavors, for example, *ETHICS* (Mumford & Weir 1979), *Soft Systems Methodology* (Checkland 1981), and *Joint Application Development* (Wood and Silver 1989). These socio-technical methodologies strive to maintain a humanistic spirit while catering to the technical facets of systems. At various degrees and through a voluntaristic perspective, each of these approaches to system development addresses both features of project management and the social-organizational modus operandi.

2.3 Deficit-Driven Rationality

In spite of the ongoing paradigms war, the bulk of IS research on system development has one thing in common—it is virtually grounded in *deficit thinking*³. In other words, whether explicitly or implicitly, the common drive or thrust of the mainstream research of systems development stems from a need to fix, correct, or avoid something. Deficit thinking resides in the foundation of many icons that underlie theories of system development such as problem-solving rationality, gap analysis techniques, value chain theory, and the best-practices model.

Deficit thinking is ingrained in our reasoning and decision making processes (Seligman & Csikszentmihalyi 2000.) In all, deficit thinking has served us well. It drives science, technology, and competitive business—the cornerstones of progress and prosperity. Nevertheless, this kind of rational thinking is not capable of guiding all aspects of life and, particularly, it does not provide help in dealing with relationships and other related social affairs. To make this assertion vivid, try to recall a time in which you had to reason with your child, parent, or significant other. I maintain that problem solving rationality is not favorable approaches for dealing with systems' users, developers, and other stakeholders. In spite of its wide applicability, techniques such as gap analysis cannot be expected to successfully guide every aspect of system development and management.

So far, attempts to learn from failures improved our understanding, but have not yielded the anticipated panacea. In a paper about learning from failure in IS development, Lyytinen and Robey (1999) wrote: “We doubt that massive ISD failures could be attributed solely to the personal weakness or stupidity of individuals,” and added, “We believe the reasons for learning failure are more deeply rooted in organizational structures and processes that cause smart people to do stupid things.” Their diagnosis was correct—failure is not accidental and it is not necessarily the fault of individuals, it is rooted deeper.

3. Appreciative Inquiry: An Affirmative Alternative

As a product of the socio-rationalist paradigm, appreciative inquiry builds on Lewin's (1951) conviction that social existence is governed by our interpretation of the circumstances, and Gergen's (1982, 1994) notion of a socially constructed reality. Appreciative inquiry holds that through our presuppositions, choice of method, and language we largely create the world we later discover. At this point, I would like to suggest that appreciative inquiry could help us to refocus on the human factors of information systems development. Appreciative inquiry can make a difference in the “way we know” by providing us with a fresh look at the organizational *mélange* that produces and is reproduced by information systems. The initial outlook of appreciative inquiry is reflective and explicitly affirmative—we seek to learn what works best and what is conducive to success. The underlying premise is that in human systems there is always something that can be appreciated and built upon. Then, grounded in our aptitudes and lifted with positive affect, we search for an array of ideal possibilities, of which we pick and pursue that which is most desired.

Appreciative inquiry stems from Cooperrider and Srivastva's (1987) work in the context of organizational change and development. Appreciative inquiry is part of a larger paradigm that focuses on a positive way-of-knowing and explicitly defines itself as theoretically counter to deficit thinking. *Appreciative studies* examine and enhance positive human dynamics,

³ Deficit thinking, or deficit-driven thinking, refers to a simple causal argument: If not X then Y, whereas X is a deficient mode and Y is a desired state (e.g., if you eradicate *resistance to change*, then the *project will be successful*). Deficit thinking has to do with deeds such as removing obstacles, solving problems, working around constraints, avoiding troubles, and preventing catastrophes.

positive forms of organizing, positive relationships, and positive modalities of change (e.g., Seligman & Csikszentmihalyi 2000). An inherent part of appreciative inquiry is its positive stance with respect to the world. This is not to say that there are no more problems to be solved in information systems, flaws to be fixed, recurrent misguided behaviors, and other cracks to be patched up. However, following the appreciative approach, we explicitly and intentionally put all these caveats aside and focus our attention on seeking and building upon what we consider to be strengths, capacities, possibilities, goodwill, modalities of cooperation, and the grace of human spirit.

The alternative approach offers an appreciative inquiry-based discourse that reveals core capacities, opens dialogue, and encourages co-creation of desired futures. Appreciative inquiry, as a methodology, can provide IS research with an additional new perspective—a collaborative, optimistic, inspiring, and thought provoking new standpoint. Table-2 provides an overview of the main unique features of appreciative inquiry in contrast to deficit thinking.

	Appreciative Inquiry	Deficit Thinking
Method Archetype	Generative inquiry	Problem solving
Drive	Boundary spanning	Gap closing
Focus	What is best	What is wrong
Tactical Objective	Enable success	Prevent failure, fix problems
Actors	Whole systems	Varied, usually isolated entities
Guiding Paradigm	Voluntaristic	Mainly deterministic

Table 2. Distinct features of appreciative inquiry

4. Research Scope and Objectives

The study was designed with two interrelated objectives: to enrich our understanding about what environment is conducive to IS projects success and to examine appreciative inquiry as a research approach in the IS context. Hence, two basic research questions guided the study:

- What are the main capacities that enable and drive successful IS projects?
- Can appreciative inquiry contribute to IS research?

The first question prompted examination of what enables a successful IS project and the second question referred to the unique research methodology taken in conducting this study. Although the first question has been long on the agenda of the field (Keen 1980), applying appreciative inquiry set this study apart from earlier work. Furthermore, whereas previous studies drew data mainly from managers, I consciously chose to include the bottom-up perspective of IT professionals who are entrusted with the work.

5. Data Collection via Appreciative Inquiry

I designed a two-pronged study constituted of appreciative inquiry interviews and focus groups. First, I carried out interviews that took a close look at a *mélange* of themes and insights. Then, I conducted a series of focus groups that sharpened my findings and revealed patterns and commonalities. The two phases reinforced and enriched one another by having different perspectives and different kinds of data bearing on what makes IS projects successful.

Guided by the appreciative inquiry cycle (Cooperrider & Whitney 2000), both the interviews and the focus groups began with a reflection on personal experiences, which set the stage to

envisioning and theoretical generalization grounded in concrete events and an authentic context. The sessions started with a discovery of core personal and organizational capabilities. It then gradually developed into the envisioning of an ideal environment for information systems projects and drawing trajectories toward this preferred world. While exploring the far-future, the participants opened a wide array of desired possibilities, and while scrutinizing the near-future, they revealed core issues and set underlying propositions for action.

We did not focus on a retrospective clinical analysis, but rather sought to surface stories, episodes and incidents attributed to the success of a particular project. Much as in the critical incidents approach (Flanagan 1954), the interactions with participants were designed to probe for perturbations of the status quo and to build on the personal experiences of the interviewees. However, in contrast to the critical incidents approach which tends to focus on the negative interruptions of a status quo, the interviews were designed to take a positive spin and to explicitly seek success stories. One way to phrase it would be that I was looking for “appreciative critical incidents.”

Throughout the inquiry, I made a conscious effort to make the conversations with the participants affirmative, collaborative and applicable to their lives, and yet, at the same time, I made sure that the interactions would include thought provoking, theoretical and reflective interactions. I focused on the appreciative essence, but did not take much for granted and kept asking questions.

The first phase included 31 appreciative inquiry interviews and the second phase included seven focus groups that accommodated 44 IT professionals. Interviews and focus groups lasted about one and two hours respectively. They were recorded and transcribed for subsequent analysis. Participants were IT professionals in various organizations and levels, from rank and file to Chief Technology Officers. By including a broad cross-section of individuals, I attempted to control significant contextual differences relating to responsibility or position as well as differences among organizations.

6. Findings and Analysis

In all, the appreciative inquiry yielded a large set of factors, many of which are not seen traditionally as directly related to the success of information systems projects. The common thread among many of those “new” success factors was their relatedness to the participant’s personal affect, aspiration level, self-esteem and general sense of well-being.

6.1 Interviews

I treated the interviews as a series of kaleidoscopic conversations, that obtained diverse views of IS projects as seen through the eyes of IT professionals, who taught me what they value about their work, what they consider a successful project, and what they perceive as the enablers of success. In the analysis of the interviews, I looked for stories, expressions, and insights that explained project success. In the iterative process prescribed by thematic analysis (Boyatzis 1998), I sorted the success factors into categories or themes. Aided by N5, a qualitative analysis software application, I identified and created a catalog of themes, classified them into groups, and counted frequencies to assess their prevalence. As a pruning criterion, I set a 30% threshold, and disregarded marginal themes that were not addressed by at least 10 participants. The interviews yielded a diverse set of success factors, or key areas that play a role in IS projects success. The findings are illustrated in Figure-1, and a complete

list of the success factors themes, classified by category and sorted by prevalence in the interviews, is detailed in Appendix-1⁴.

Further analysis revealed three top-level domains that provide a framework for classifying the diverse set of success factors obtained through the interviews (Figure-2). Each of the following domains represents a unique array of success factors that must be carefully considered in cultivating an environment conducive to successful project outcomes:

- **Project Management Practices and Resources:** The “classic” success factors of project management. For example, top management sponsorship and commitment, managing scope and priorities, focus on business objectives, competent planning, meeting milestones, and experienced project management.
- **Communication and Relationships Culture:** The social, cultural, and communal milieu. For example, ongoing communication among all stakeholders, partnership between IT and business, users’ involvement, teamwork, and mutual trust.
- **Personal Affect:** The IT professionals’ mental and emotional state, their mood, disposition, feelings about their job, sense of self-worth, and level of aspiration. For example, personal affect was associated with having the ability and opportunity to make a difference in the organization, and consequently, being recognized and appreciated for their contributions; Being part of an organization that values learning, and promotes personal and professional growth; Working in a challenging job that routinely requires solving puzzles, and allows exploring new horizons and playing with new ideas.

⁴ The space constraint prohibits rich data descriptions here.

Communication and Relationships

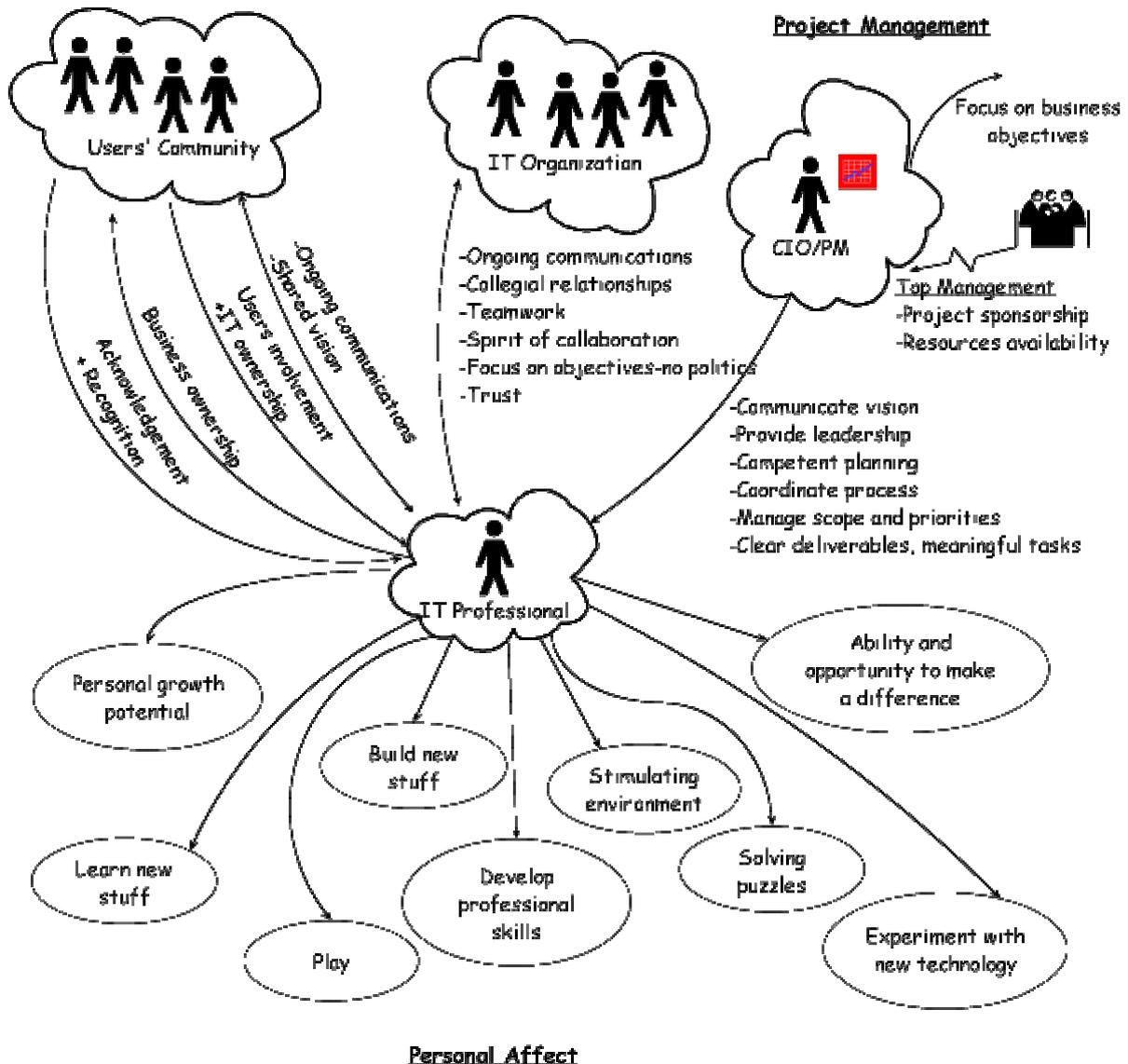


Figure 1. Success factors based on it professionals' view

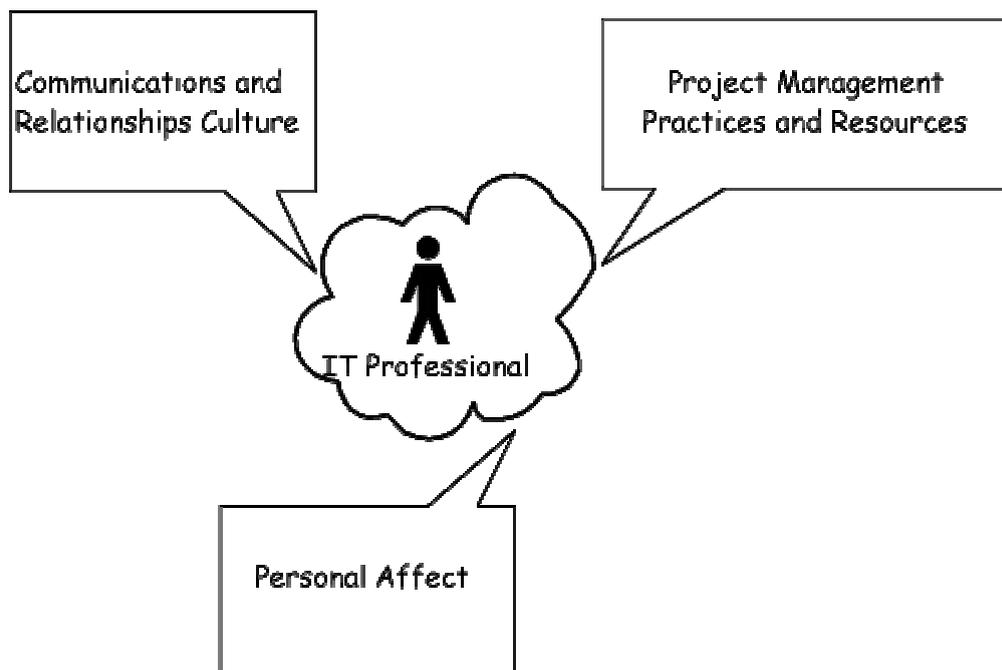


Figure 2. Key facets of information systems projects success

6.2 Focus Groups

The main objective of the focus groups was to validate, refine and solidify the interview findings. I designed the focus groups as appreciative inquiry workshops that sparked and guided a conversation about the success factors of IS projects. During the two-hour workshops, we explored what contributes to project success, reframed the success factors in higher-level categories, and looked for their indicators.

For each group, I made an attempt to match each of the items (i.e., identified success factors) with the master list (i.e., the list that was compiled in the interviews). As a pruning criterion, I set a 30% threshold, and disregarded marginal items that were not mentioned by at least two groups. The complete list of the success factors that were uncovered in the focus groups is detailed in Appendix-1 vis-à-vis the interviews' findings.

The focus groups confirmed the findings of the interviews. The combined count of both the appreciative inquiry interviews and focus groups provided 69 success factors, of which 33 were dominant (i.e., items in at least 70% of the interviews or 70% of the focus groups), and 18 were consensual (i.e., items in at least 50% of both). Table-3 details the counts distribution. The comparison between the two sets of success factors—those that were revealed in the interviews and those that were specified in the focus groups, provided both a measure of validity and a level of test-retest reliability.

The personal affect items had a significant weight among the overall success factors specified by the respondents. They were the most dominant but the least consensual among the overall set. Clearly, the IT professionals were passionate about personal affect matters, but did not have the established vocabularies and mental models to express their feelings in a consensual fashion as they could with the traditional success factors.

Theme	Number of Success Factors		
	Overall	Dominant	Consensual
Project Management Practices and Resources	29	11	8
Communication and Relationships Culture	18	10	6
Personal Affect	22	12	4
Total number of success factors:	69	33	18

Table 3. Summary of the revealed success factors count

7. Discussion and Implications

The interviews and focus groups yielded a diverse set of success factors that included all of those we already know and many new ones. At a glance, it was evident that the new set reframed success factors not only in organizational terms, as customary, but also in individual terms. This led to one of the core findings of this study concerning the absence of individual-level factors in traditional research on project success.

The framework of success factors (Rockart 1979) is mirrored and extended by the core competence view of the firm (Prahalad & Hamel 1990), which treats the collective core competencies of an organization, and not merely its discrete resources, as the source of success and competitive advantage. The core competencies span over multiple organizational units, projects, or markets. The success factors of IS projects should be viewed as a special case of organizational core competencies.

The top-level perspective, represented in Figure-3, depicts how our three key domains of IS project success can be attributed to an interaction of key organizational core competencies: *Project management practices* refer to the interaction between professional and structural-organizational competencies; *Communications and relationships culture* refer to the interaction between social and structural-organizational competencies; And *personal affect* refers to the interaction between professional and social competencies.

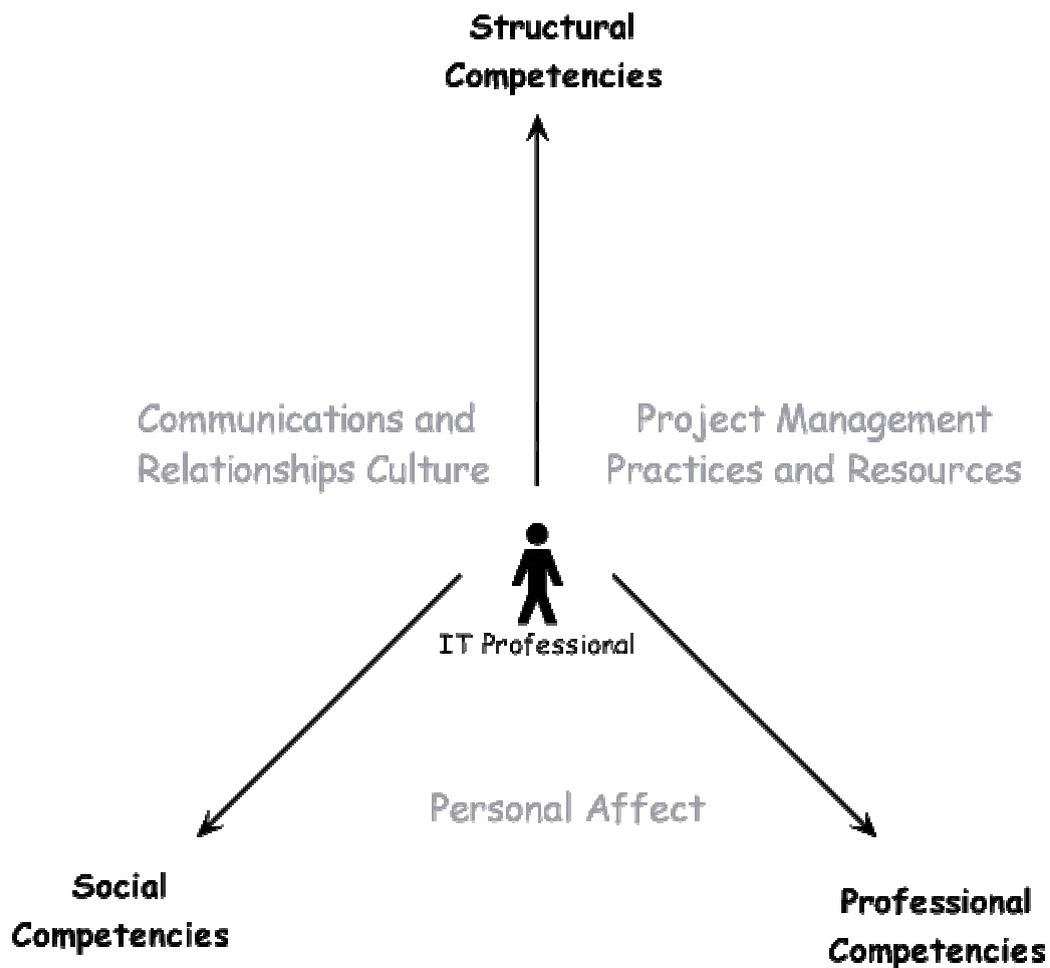


Figure 3. Key facets of IS projects' success and organizational core competencies

Overlaying the domain represented in Figure-3 with the classic success factors listed in Table-1 shows that the current body of knowledge neglects personal affect considerations (Figure-4). A review of the rich picture in Figure-1 indicates that personal affect factors, or more precisely, *positive affect*, had a significant direct effect on project success. This contribution could have been expected considering the results of emerging psychological studies (Fredrickson 1998, Isen 1993). However, in spite of the nomological evidence, positive affect has not been discussed so far in the context of information systems.

While the common body of knowledge pursues mainly managerial-organizational and social-cultural antecedents, appreciative inquiry revealed the significance of individuals in determining project success. The findings suggest that optimized structures and processes alone cannot guarantee action, let alone success—it is the emancipated, creative, caring, and striving actors who may provide the necessary competence and resilience. The power of appreciative inquiry not only sheds light on the new class of success factors, but also surfaced both the known and the new facets as one complete array. The subtle effect of using the newly found vocabularies of success factors has the potential to help us think “outside the project management box.”

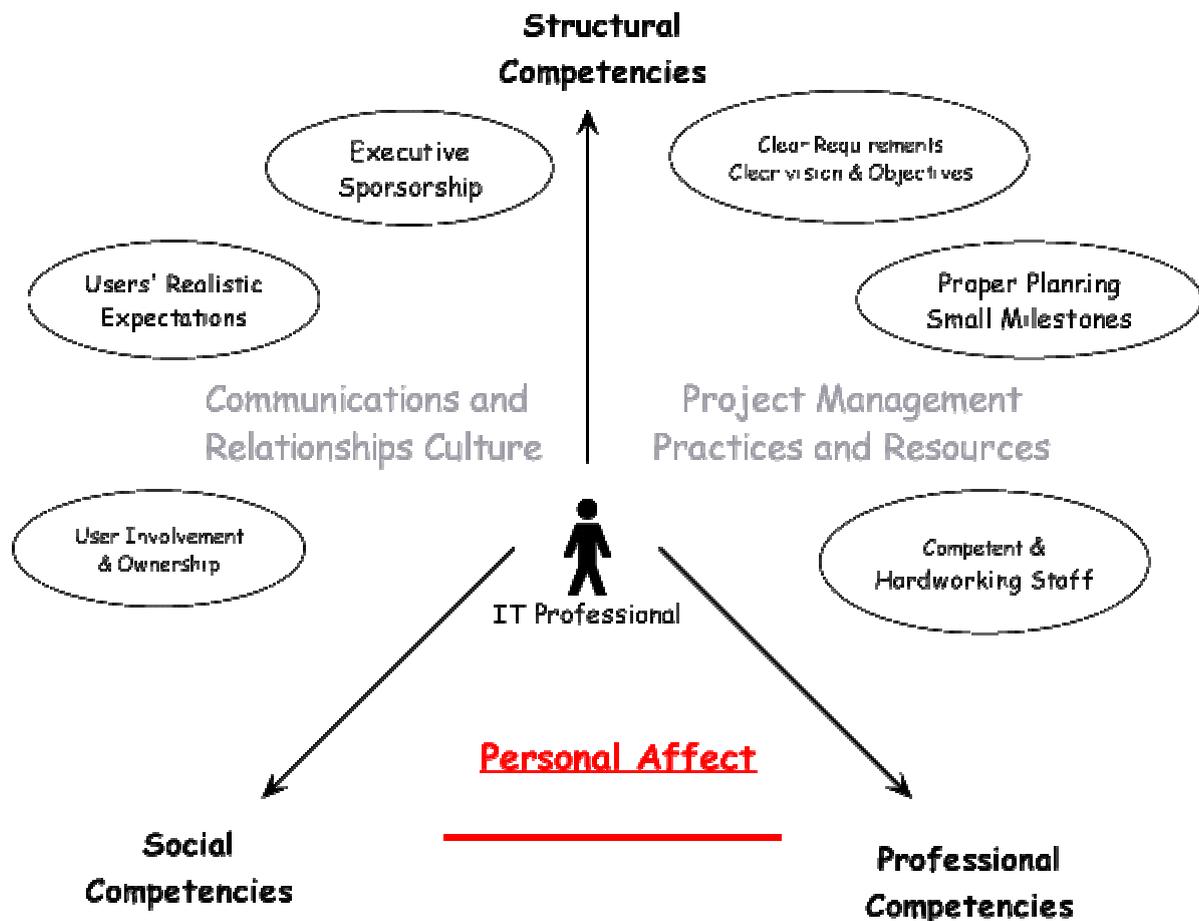


Figure 4. The classic success factors in the context of the three critical facets of IS project

8. Conclusion

The study provided a plausible and insightful answer to the two underlying research questions. The interviews and focus groups provided rich insight into which personal and organizational capacities enable and drive successful information systems projects. Furthermore, the study as a whole demonstrated how appreciative inquiry could contribute to the IS research agenda—in this case, it enabled me to surface a new set of success factors that have not been revealed through other, deficit-based methods.

The study was not without limitations. The single-snapshot method limited the reliability of data collection. Furthermore, although the available time enabled me to guide the participants through a reasonably effective appreciative inquiry session, the relatively short duration of each engagement (1-2 hours) hampered the method's ability to bring out even deeper and richer thoughts.

Throughout the entire study, I explicitly took a positive stance, and at the same time, attempted to preserve the original expressions. Maintaining the original voices of the participants was critical for the success of this study and its ability to yield useful insights. Future research is likely to focus on demonstrating how appreciative inquiry can make contributions to the practice of information systems. For example, how appreciative inquiry

can be applied to the process of IS development, how it can be used to guide systems design, and how it can affect the partnership between users and IT professionals.

It is alarming that the personal affect factors are simply ignored, or left for others to handle. In addition to the concrete findings, the study suggests that regardless of the systems development methodology of choice, the IT organization should give proper attention to the in situ human environment and aim to enhance positive affect among its IT professionals. There is no substitute to attention that should be paid to the prerequisite human conditions of those who are entrusted to design, build and maintain information systems.

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Appendix 1.

Categories and Frequencies of Success Factors in Interviews and Focus Groups

Theme: Project Management Practices and Resources ⁵	Frequency in...	
	Interviews	Focus-Groups
Success Factors	%(raw)	%(raw)
Focus on business objectives (as opposed to technical objectives)*	70 (22)	100 (7)
Managing scope and priorities*	68 (21)	71 (5)
Knowledge of the business process affected by the project*	68 (21)	71 (5)
Structured process/competent planning*	65 (20)	71 (5)
Top management sponsorship and commitment*	55 (17)	100 (7)
Dedicated hard-working staff*	52 (16)	86 (6)
Well-defined and bounded task having clear deliverables*	52 (16)	57 (4)
Task has a clear and explicit contribution or impact on the business*	52 (16)	71 (5)
Clear a-priori requirements	45 (14)	29 (2)
Time line and meeting milestones tracking	42 (13)	57 (4)
Competent knowledgeable professionals	42 (13)	57 (4)
Knowledge of the technology in use	42 (13)	86 (6)
Funds availability	42 (13)	71 (5)
Deliverables tracking	42 (13)	43 (3)
Task has a clear connection to overall project	42 (13)	29 (2)
Top management involvement	39 (12)	86 (6)
Diverse skill sets, experiences, backgrounds	39 (12)	X
Clear objectives and strategic goals	32 (10)	86 (6)
Coordinating project	32 (10)	57 (4)
Integrated change-management process	32 (10)	X
Infrastructure in place to support the developers	32 (10)	71 (5)
Task Challenging and requires creativity	32 (10)	43 (3)
Proper space conducive to work	X	100 (7)
Clear IT frameworks and methodologies	X	57 (4)
Task definition is focused on deliverables, not a work process	X	57 (4)
Small milestones or a limited scope	X	43 (3)
IT management leadership and support	X	43 (3)
Focused approach—not spread too thin	X	43 (3)
Access to experts (consultants or homegrown)	X	43 (3)

⁵ Frequency or prevalence of an item is expressed in percentage of occurrences in both interviews and focus groups respectively. (The values in parentheses are the raw number of occurrences). Consensual items (over 50% in both the interviews and the focus groups) are marked with * and bold type. Dominant items (over 70% in either the interviews or the focus groups) are marked in bold type. "X" signifies no occurrence.

Theme: Communication and Relationships Culture	Frequency in...	
	Interviews	Focus-Groups
Success Factors	% (raw)	% (raw)
Ongoing communication between IT and users *	90 (28)	100 (7)
Ongoing users' involvement and IT ownership*	90 (28)	100 (7)
Working together as a Team*	70 (22)	71 (5)
Ongoing communication among and within IT teams*	68 (21)	86 (6)
Management of relationship with users	68 (21)	29 (2)
Spirit of mutual support, sharing, and collaboration (Espirt de corps)*	65 (20)	86 (6)
People getting along with likeable coworkers*	58 (18)	86 (6)
Focus on objectives to get job done (beyond personal agenda/ politics)	48 (15)	86 (6)
Common understanding among stakeholders	45 (14)	43 (3)
Users' buy in, organizational-wide commitment	45 (14)	100 (7)
Sense of partnership between IT and business	39 (12)	100 (7)
Information is shared, not held	39 (12)	43 (3)
Trust among stakeholders	35 (11)	71 (5)
All feel "commitment from the other side"	32 (10)	57 (4)
Shared vision organizational-wide (IT-Users)	32 (10)	57 (4)
Freedom to question, challenge or disagree	X	71 (5)
Being recognized as valuable by users	X	71 (5)
Freedom to "be who you are, say what you think"	X	43 (3)

Theme: Personal Affect	Frequency in...	
	Interviews	Focus-Groups
Success Factors	% (raw)	% (raw)
Being able to make a difference*	77 (24)	57 (4)
Overcoming a challenge, solving puzzles, solving problems*	74 (23)	71 (5)
Build new stuff	52 (16)	43 (3)
Personal growth potential *	52 (16)	57 (4)
Stimulating environment, continuous stimulation*	52 (16)	71 (5)
Career development opportunities	48 (15)	100 (7)
Learning new things	48 (15)	71 (5)
Having a sense of satisfaction and achievement	48 (15)	71 (5)
Diversity of roles and responsibilities, doing something "new"	45 (14)	71 (5)
Being recognized as valuable for and needed to the company	42(13)	71 (5)
Experiment with or explore new technology	42 (13)	71 (5)
Excited about job	42 (13)	X
Empowered to be creative	39 (12)	57 (4)
Being part of a respected organization, having organizational pride	35 (11)	X
Play, have fun, enjoy	35 (11)	57 (4)
Ongoing training and professional skills development	32 (10)	100 (7)
Learning of any kind is encouraged and supported	32 (10)	71 (5)
Working on latest technologies	32 (10)	43 (3)
Working with smart people	32 (10)	43 (3)
Creative, innovative, visionary thinking is encouraged	X	86 (6)
Work-life balance	X	43 (3)
Time to reflect, not being spread too thin	X	43 (3)