Lessons for IT Project Manager Efficacy: A Review of the Literature Associated with Project Success

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ABSTRACT ■

In the maturing IT project management space, there are still many debates about the skills needed to achieve success. This article presents a review and synthesis of project management literature that highlights the potential conflict in goals and the measurement of "success" from three perspectives: project outcomes, project management processes, and the project manager's influence. Our review indicates that each perspective of success, defined by various stakeholders at various points in time, shifts the focus onto different skills and knowledge. Drawing upon this tri-focal lens, we propose a shift in focus on success to the intersection, or "sweet spot of project manager efficacy."

KEYWORDS: project success; project management success; project manager success; efficacy; project outcomes

INTRODUCTION ■

Project management and IT project management have matured significantly over the past two decades; however, there remain conflicting findings on which factors result in successful projects. A trend in both the public and private sectors is an increase in demand for practitioners with advanced certifications that demonstrate proficiency within a certain body of knowledge (Gabberty, 2013; Daniels, 2011). In addition to published research, the 2011 *Project Management Salary Survey*, Seventh Edition, of over 30,000 respondents from 29 countries supported the value placed on certification through an average 16% compensation variance in favor of certified practitioners when compared with non-certified practitioners (Project Management Institute, 2011). This growing demand for certified professionals is further evidenced by the increasing demand for certification preparation programs in higher education (Gale & Brown, 2003; Alam, Gale, Brown, & Khan, 2010; Daniels, 2011). This trend is diametrically opposed to Williams' (2005) findings that project management methodologies have not provided the expected benefits. In fact, for this statement to be accurate in the context of this article, the expected benefits would need to be limited to factors influenced only by effective project management techniques.

Scholarly research provides clear evidence that there is much more to project success than mastering the project management body of knowledge, or continued study of that same body of knowledge. While there are demonstrated benefits related to earning a project management certification (Müller, 2013), empirical research provides evidence that the structured approach to learning the project management body of knowledge is only the foundation of a project manager's professional journey.

We highlight the gaps between the research on success factors associated with project success, project management success, and project manager success and explore the question: What combination of skills contributes to IT project manager efficacy? After reading and synthesizing hundreds of articles, we report here on 59 relevant and influential articles about "success" in the project management context. We identified these articles through a rigorous citation chain and bibliometric analyses of over 200 articles, published over the past ten years in seven top IT journals, and the past three years in two top project management journals.[1] There are few recent articles on success, suggesting that the focus has shifted to specific problems, or a complacent view that certification equates with success.

[1]See the Appendix for additional details on search and selection criteria. Additional details on methodology can be obtained from the authors.

Lessons for IT Project Manager Efficacy

Despite the maturity of the discipline, published research and conceptual articles reflect inconsistencies in definitions about what successful project management is all about, what skills are needed by project managers, and little focus on IT project managers (those working in IT-centric environments). In addition, our review identifies conflicts in goals and measurements of success (success metrics) from these three different perspectives, as they focus on project outcomes, the process of project management, or the project manager. Each of these perspectives overlaps in importance and focuses on the skills and knowledge that are most relevant (see Figure 1)

Drawing upon this tri-focal lens, we offer a new definition of what we call "the sweet spot of project manager efficacy." We are not proposing that the "sweet spot" is a constant. On the contrary, the literature suggests the definition of success is constantly shifting based on stakeholder perspectives and the project life cycle (see Ika, 2009; Pinto & Slevin, 1998a). The following sections provide the context in which these success debates are taking place in the general and IT-centric project management spaces. We close with revised definitions and implications for practice and directions for future research.

The Context of Skills of the IT Project Management Practitioner

The information technology (IT) industry spans the commercial, non-profit, educational, government, and military sectors, and is a ubiquitous and often strategic aspect of nearly all organizations. As such, project management is similarly a critical element in most organizations, be they large or small, because IT solutions must be in place to realize the benefit the project was undertaken to provide. Accordingly, certification in the project management discipline was one of the top certifications in the IT arena for 2013 (The Top Five In-demand IT Certifications, 2012). Similarly, Global Knowledge, a worldwide IT and business skills training organization, lists project management certification first on their list of the 15 top paying certifications in 2013 based on high demand (Müller, 2013).

Hiring managers frequently seek certified IT and general project management practitioners. A quick search on any job search engine will demonstrate that most job postings for project manager jobs indicate project management certification as either required or preferred. One of the leading reasons that project management certification is valued is that the effort required to earn a certification demonstrates a project management practitioner's depth of understanding of the project management processes and tools. Simply, the implication of certification is a standard set of accredited skills and knowledge.

Seeking certified IT project managers also influences a manager's decisions related to his or her professional development budgets, because certification may be a condition of employment. Once a practitioner earns a project management certification, he or she must maintain his or her certification through continued education. Not all organizations fully sponsor the recertification requirements; however, whether the individual or the employer pays for recertification, professional development costs must be weighed against the benefits to both the individual and the organization.

Project management certifications also serve to set expectations on the parts of hiring managers and their organizations about the more appropriate project management skills and knowledge. In addition to the pre-screening of potential job candidates after a hiring decision has been made, hiring managers and IT leaders expect certified practitioners to join their teams prepared with the skills needed to effectively lead projects within their organizations. Earning a certification may provide evidence of experience and knowledge; however, holding a certification does not always provide evidence of an IT project manager's skill *or his or her efficacy*. This is not a subtle difference when considering which skills should
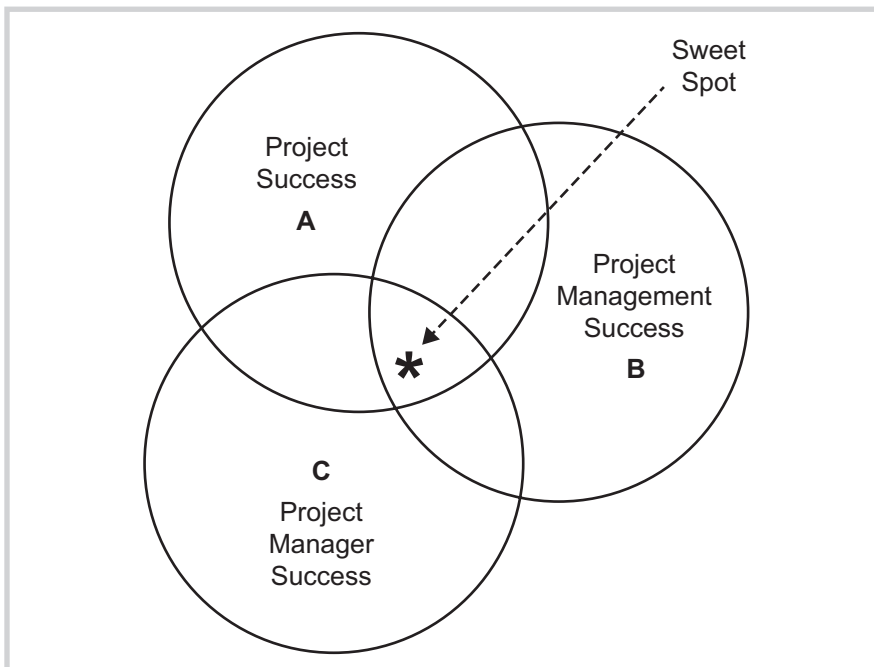

Figure 1: Tri-focal lens interrelationships (source: Millhollan, 2015).

be invested in; it speaks to the root issue of the differences between having project management skills/knowledge, having a successful project management outcome, or having an IT project manager who knows what to do and when.

Hard Versus Soft Skill Sets and Skill Acquisition

We are not questioning that earning a project management certification provides evidence of baseline knowledge; however, holding a certification does not necessarily mean that the project management practitioner is more efficient. Research indicates that there are indeed certified project management practitioners without the advanced or enhanced abilities needed to lead projects successfully. The contrary is also true in that there are non-certified project management practitioners who do possess advanced skills and abilities that contribute to their efficacy throughout the project management process (Starkweather & Stevenson, 2011). In effect, organizations may experience no significant difference in project success rates between certified project management practitioners and project management practitioners without a certification.

Earning a project management certification demonstrates mastery of the hard skills or technical competencies related to project management that can be measured through testing. Similarly, traditional computer science or information technology training provides hard skills relevant to the IT professional and IT project manager. These hard skills are teachable abilities that practitioners can learn in a classroom setting. As has often been argued, however, the "soft" or interpersonal skills are also important.[2] While there isn't a clear, agreed

	Hard Skills	Soft Skills
Blooms Taxonomy of the Cognitive Domain	Knowledge Comprehension Application	Analysis Synthesis Evaluation
Adaptations for Project Management	Project management hard skills are those skills and knowledge outlined in the *PMBOK® Guide* or other technical training that are teachable and measureable through testing. (This includes in-situ testing).	Soft skills are those abilities that a project manager must possess *to apply effectively* the project management tools and techniques within an organization, across stakeholder groups, and over the project life cycle (Building on Pant & Baroudi, 2008; Gillard, 2009; Alam et al., 2010)

Table 1: Adapting Asplund's (2006) version of *Bloom's taxonomy for project management*.

upon definition for the term "soft skills," practitioners we spoke with from both senior IT leaders and project management groups regularly used that term. It is also important to note that project management standards and the scholarly literature related to both project manager success and project manager skill sets uses the broader, more general term "soft skills." One generic definition of soft skills is those qualities necessary for a practitioner that *do not* depend on acquired knowledge, or hard skills (*Collins English Dictionary*, 2013). We argue that this definition is incomplete and requires further refinement in the project management context. Drawing upon the project management literature, we define *soft skills as those abilities that a project manager must possess to apply effectively the project management tools and techniques within the organization, across stakeholder groups, and over the project life cycle* (building on Pant & Baroudi, 2008; Gillard, 2009; Alam et al., 2010).

If we turn to traditional theory on skills acquisition, and apply the six levels of learning from *Bloom's Taxonomy of the Cognitive Domain* (Asplund, 2006), we see a clear separation between hard and soft skills. The first three levels are knowledge, comprehension, and application; these levels are aligned with the project management hard skills demonstrated through certification or the other technical skills required for IT

projects. The next three levels are analysis, synthesis, and evaluation; these levels are aligned with the soft skills associated with critical thinking and decision making (see Table 1).

So then, what combination of skills, hard *and* soft, contribute to IT project manager efficacy, and how are those skills developed? This debate about skills for success in the IT project management space returns us to what we feel is a central divergence in how "success" is defined by the project management community and related stakeholders. The understanding of IT project manager efficacy is enhanced by a review of these perspectives of success, specifically understanding the differences among (1) project success, (2) project management success, and (3) project manager success; or *outcome, process, and person*, respectively. Project success and project management success appear to be well-researched topics, specifically in the project management publications; however, this does not imply a universal definition for, or agreement on, the primary factors that influence either project success or project management success.

The next section presents our review and lessons learned.

Factors Associated with Project-Related Success

Experience, supported by scholarly research, indicates that perceptions

about project-related success are potentially a moving target, or at the very least influenced by when, who, and what is being measured (Baker, Murphy, & Fisher, 1988; de Wit, 1988; Wateridge, 1995; Baccarini, 1999; Lipovetsky, Tishler, Dvir, & Shenhar, 2002; Jugdev & Müller, 2005; Müller & Turner, 2007; Ika, 2009). Our long list of references highlights that this phenomenon is confounded by the fact that reference to "project success" is often a comprehensive term that includes factors related to project *outcomes,* the project management *methodology*, and the project manager's (*person's) proficiency* in using project management techniques, and efficacy in managing across this entire range of issues. In addition, many of the articles cited above attempt to address factors that impact success as well as the outcomes. This is particularly relevant in the IT realm where there may be considerable differences between success of the project and success of the system (see Markus, Axline, Petrie, & Cornelis, 2000). As such, one of our key findings highlighted in the literature is the repeated adage that *the only agreement on definitions of success as related to projects and project management is that there is* no *agreement* on the definitions (Wateridge, 1995; Shenhar & Levy, 1997; Cooke-Davies, 2002; Hyvari, 2006; Basten, Joosten, & Mellis, 2011; Mishra, Dangayach, & Mittal, 2011). An additional complicating factor is that different stakeholder groups may define success differently for the same projects (de Wit, 1988; Wateridge, 1988; Shenhar, Dvir, Levy, & Maltz, 2001; Hadaya, Cassivi, & Chalabi, 2012).

Among the first to argue that we should distinguish between project success and project management success, De Wit (1988) pointed out that the objectives for projects are not the same as objectives for the project management activities, and may even have a hierarchy of priorities. De Wit, along with several authors since then (see Ika, 2009), have argued that we need to distinguish between project success factors that impact success

and project success criteria that are an evaluation of the outcomes of the project. This raises the interesting question: Are the skills or knowledge needed by IT project managers based solely on those factors that might influence success (traditional project management methodology), or should they include abilities to engage with the stakeholders evaluating the outcomes?

The following sections discuss the literature and the convergence or inconsistencies in the literature associated with the skills and abilities needed for successful project management.

A Review of Project Success Literature

Meeting schedules, budget, and technical performance measures—referred to as "the iron triangle" (de Wit, 1988) or "the triple measures" (Kloppenborg & Opfer, 2002)—are the traditional success metrics referred to in many studies on project success. Yet, even some of the earliest research dedicated to project success identified that focusing on *more* than these three factors was an absolute necessity, often extending into the strategic goals of the project (Baker et al., 1988; de Wit, 1988; Pinto & Slevin, 1988a). For example, de Wit argued we should view "time" in multiple dimensions—short, intermediate, and long term—as well as considering every phase of the project development life cycle (exploration, development, and production). Despite almost 30 years of lessons learned, his advice for post-implementation audits should be heeded "not so much to determine if absolute terms the success or failure but to identify what went right and what went wrong and why (p. 169)."

Others have argued that the three factors of time, cost, and quality relate more to the project management *process* than meeting the stakeholder expectations associated with true project outcome success (Munns & Bjeirmi, 1996; Atkinson, 1999; Shenhar & Dvir, 2007). Since understanding stakeholder perceptions and expectations is necessary for defining project success, and projects are

by definition unique, it makes sense that there is not a single definition of project success or a universal set of criteria that one can use to predict project success or the associated skills that lead to it.

As shown in Table 2, this debate has been implicit (if not explicit), in most of the research on the many *potential* factors that lead to project success. A weakness of many of these studies is that they present lists of success factors without sharing context-specific elements. We feel this lack of contextual focus is itself a crucial factor, as noted in several studies (Wateridge, 1995; Belassi & Tukel, 1996; Jugdev & Müller, 2005; Ika, 2009; Ika, Diallo, & Thuillier, 2011); it is also worth comparing perspectives on project success from the way they look at time and the interaction of factors. The idea of interacting but divergent factors is reflected in other studies in which the authors suggest specific criteria but conclude that success means different things to different people or that it applies to different groups, as highlighted by the diversity of factors that reflect on the personal growth of team members versus their technical performance.

We observed that this subjective view has evolved, leading to *categories* of factors. Echoing parts of de Wit's list, Freeman and Beale (1992) took an investment view of projects, arguing that these project 'ventures' should be evaluated based on seven criteria needed for project success:

1. Technical performance;
2. Efficiency of execution;
3. Stakeholder satisfaction;
4. Project team member personal growth;
5. Project termination completeness;
6. Identifying and overcoming technical (includes procedural) problems; and
7. A combination of the project product's ease of use and performance. Belassi and Tukel (1996) clustered project success factors based on levels, for example the project, project manager and team, the organization, and the external environment.

Taking a different view of roles, Shenhar and Levy (1997) presented project success factors in three general categories with different metrics based on design goals, the customer impact, and benefits to the organization. This apparently broadly based emphasis is actually more relevant in terms of addressing project outcomes, in that they address the management of organizational risks, costs, and attainment of benefits, but exclude specific focus on the project team members. For example:

1. Meeting design goals that tend to be objective and based on documented specifications and project constraints, such as budgetary limitations and schedules; factors measured through product verification, actual costs, and actual completion dates
2. The impact on the customer, such as meeting their needs and solving their problems; factors measured by satisfaction surveys or utilization rates
3. Benefits to the organization in the form of meeting a strategic objective such as increased market share and new product development

In a later study, Shenhar et al. (2001) grouped project success measures into four outcome dimensions; (1) project efficiency, (2) customer impact, (3) business impact, and (4) preparing for the future; each of these present different temporal influences—during the project, after implementation, and looking to the future. This is perhaps to be expected of IT projects that may be longer-term initiatives with significant infrastructure, software, and data investments. As such, this fourth category extends the assessment of project success into the longer project life cycles, continues bridging both the factors that influence success, and the eventual assessment of the success of the project.

Other valuable articles have compared project success factors across several studies, including within IT-centric project environments. In particular, Lally's (2004) study on contributors to IT system project failure (the flipside of project success) compared eight studies conducted between 1983 and 2002. Although there are commonalities in the lists for generic project success and IT project success (for example, top management support and clear requirements or objectives), there is neither agreement on any one set of factors, nor is there a single factor that appears consistently in each set of findings. Again, this suggests that identifying project success factors is a moving target that may vary not only by stakeholder, but may also shift over time or with the nature of the project.

Considering time-based or temporal factors in a different way, focal aspects of project management have shifted over the decades, including definitions and those skills or abilities that underpin them. Jugdev and Müller's (2005) analysis of the literature proposes distinct trends over four specific eras. In the first era—from the 1960s through the early 1980s—they argue that project success literature focused on project delivery and transitioning the product or service into operations. They observed a shift in focus during the second era— the 1980s through the 1990s—to things that "must go right" or "critical success factors" for a project to be considered successful. Examples include understanding of the project management processes, executive commitment to those processes, and the project manager's approach to leading the project and project team. Their proposed third era—from the 1990s through the 2000s—shifts to developing frameworks to measure project success based on stakeholder expectations. This included interfaces between the internal organization delivering the product or service and the external organizations, such as vendor relationships and customer groups. They consider literature from the fourth era—labeled the 21st century—to have expanded research related to project success to include elements from ideation through product or service retirement. The latter element implies a more end-to-end product life cycle view of the project undertaken to produce the product. While Jugdev and Müller's (2005) analysis suggests an evolution in project success related research, they still highlight that project success has both an objective and subjective component and different stakeholder groups interpret project success differently.

We summarize the above studies in Table 2 (including those covered in Lally's 2004 review) and provide a brief comment on our interpretations. It is noteworthy that some of the included studies focus on the hard skills or process issues (such as involving end users), whereas others suggest the importance of keeping diverse stakeholders happy and avoiding politics.

Lessons from the Literature on Successful Projects

It is interesting to note that the most influential articles identified in our search for articles specific to project success haven't been published in the past decade; this can be interpreted as having greater longevity and therefore greater impact. We disagree with this view and ironically repeat de Wit's (1988) caution that we need to separate the success of the project and the success of the project management activities. The blended view evidenced in research in recent decades shows that we continue to make the mistake of ignoring the differences behind definitions; fail to parse out process criteria factors versus those that contribute to outcomes; and, therefore, creating confusion about the skills that project managers need to support both (see also Ika, 2009). It is evident from the evolving literature on project outcome success that success is dependent on balancing differing expectations and perceptions (Shenhar et al., 2001; Jugdev & Müller, 2005). Perceived IT project success is defined not only by meeting technical

Baker et al., 1983	Morris & Hough, 1987	Pinto & Slevin, 1989	Freeman & Beale, 1992	Turner, J.R, 1993	CHOAS Report, 1994
Clear statement of requirements Proper planning (i.e., cost estimations) Competent staff Clear vision and objectives (business case and scope) Hard-working, focused staff Leadership Adequate resources and funding Minimum start-up difficulties Absence of bureaucracy and politics	Clear statement of requirements Proper planning Focused and competent staff Adequate resources and funding Minimum start-up difficulties Absence of bureaucracy and politics	User involvement Executive management support Competent staff Hard-working, focused staff Delivered to budget, on schedule, and to technical specifications Satisfies needs of owners, users, project team, and stakeholders Leadership Communication and teamwork Absence of bureaucracy and politics	Technical performance Efficiency of execution Stakeholder satisfaction Project team member personal growth Project termination completeness Identifying and overcoming technical (includes procedural) problems Product's ease of use and performance	User involvement Executive management support Focused and competent staff Delivered to budget, on schedule, and to technical specifications Satisfies needs of owners, users, project team, and stakeholders Leadership and teamwork Absence of bureaucracy and politics	User involvement Executive management support Clear statement of requirements Proper planning Realistic expectations Smaller project milestones Competent staff Ownership Clear vision and objectives Hard-working, focused staff
Implied focus on hard project management skills, yet raises absence of stakeholder conflict	*Similar to Baker et al.*	*Focus on hard and soft metrics; multiple stakeholder groups*	*Introduces problem solving related to application of hard skills*	*Similar to previous studies*	*Introduces "realistic expectations" and "ownership"*

Waterridge, J., 1995	Shenhar & Levy, 1997	Whitaker, B., 1999	Shenhar et al., 2001	Boehm, 2002	Jugdev & Müller, 2005
Project achieves objectives Provides benefits to owner Satisfies need of owners, users, stakeholders Meets pre-stated objectives Produced to specifications, within budget, on time Satisfies needs of project team	Three broad categories: 1. Meeting design goals such as time, budget, quality constraints 2. Impact on customer satisfaction 3. Benefits to organization in increased market share or new product development	Good project planning Strong business case Top management support and involvement Schedule time keeping Within budget Good estimates Strong definition of requirements Vendor's ability to meet requirements	Four dimensions: 1. Project efficiency 2. Customer impact 3. Business impact 4. Preparing for the future	Complete requirements User involvement Resources Executive support No scope extension	Four eras: 1960s–1980: Project delivery; transitioning product/service into operations. 1980s–1990: Critical success factors 1990s–2000: Developing success frameworks based on stakeholders 21st century: From product ideation to retirement
Introduces satisfaction of diverse stakeholders, including project team	*Implies metrics to be applied based on future*	*Implies degree of attainment (good, strong), and introduces vendors*	*Extends the time frame of factors for project success assessment*	*Focus on hard skills*	*Introduces temporality*

Table 2: Summary and our interpretation of project success factors (Adapting and extending Lally's 2004 summary).

requirements and providing a product, service, or result—as defined in the project objectives—but also by achieving high levels of satisfaction from the stakeholder groups (Baker et al., 1988; Pinto & Slevin, 1988a; Wateridge, 1995). When considering project manager efficacy, three challenges relate to these different sets of outcome success factors:

1. Some of the factors that contribute to project success are realized *during* a project, including meeting project-related constraints such as budgets and schedules and creating new products or services.
2. Other project success factors might not be realized *until long after* project completion, such as customer satisfaction or commercial success, which can be outside the project manager's control.
3. The factors influencing project success *measurements and perceptions are often in conflict*. For example, meeting a budgetary or schedule constraint can have a negative impact on satisfying technical or functional requirements.

For success at both the individual project and portfolio levels (see Ika, 2009), it is important for the project manager to understand not only factors that influence project-related success, but also the varying stakeholder perceptions of their most important project-related outcome success metrics. We noted that none of the project success factors or metrics addresses specific soft skills, but they strongly imply the need for skills in stakeholder analysis, decision-making, negotiation, conflict resolution, change management, and organizational politics.

A Review of Project Management Success Literature

The literature treats the project management process as a contributing factor to project success (Pinto & Slevin, 1988a; Pinto & Mantel, 1990; Freeman & Beale, 1992; Shenhar & Levy, 1997;

Baccarini, 1999; Cooke-Davies, 2002; Müller & Turner, 2007; Prabhakar, 2008; Nicholas & Hidding, 2010; Han, Yusof, Ismail, & Aun, 2012); however, there is less published research specifically dedicated to "project management success." One exception mentioned earlier is an early article by de Wit (1988) that purposefully addressed the differences between project success and successful project management, holding that *project management can contribute to project success; however, effective project management cannot prevent project failure*. Where the literature does agree is that successful project management focuses on *the process* or what people do, rather than their interactions with others, and emphasizes the methodology by using the term project management. Pollack (2007) refers to this as emphasis on skills associated with delivery efficiencies, leadership by an expert in the *application* of project management tools and techniques, and control skills related to keeping the work on track to deliver on pre-existing, agreed upon goals. This implies agreement on and stability of these goals.

If project success and project management success are assessed separately, the implication is that there must be more targeted factors related specifically to project management success than those presented for the more holistic, but confounding, view of project success. Munns and Bjeirmi (1996) presented a list of project management success factors that focuses on the methodology and typical project constraints, such as schedule, budget, and quality requirements. This narrowed list of factors relating specifically to project management success includes:

1. Project manager assignments, implying that the assigned project manager must be versed in applying the project management processes, tools, and techniques;
2. Organizational support for the project management *methodology*, specifically executive leadership;

3. Effective task definition; a planning process; and
4. Reliance on established project management methodology or project management techniques

There is a quantifiable benefit in focusing on the delivery state of a project (Atkinson, 1999). Leveraging metrics such as schedule, budget, and quality requirements allows the project manager or other stakeholders to determine if the project tasks have been completed according to plan. A project methodology alone cannot guarantee project success; however, identifying gaps in project identification, planning, and execution processes, and dedicating effort to understanding how those procedural risks contributed to a project's failure, can help identify enhanced project management processes that a project manager can apply to future initiatives (Sarantis, Smithson, Charalabidis, & Askounis, 2009). This claim is supported by both Azim, Gale, Lawlor-Wright, Kirkham, Khan, and Alam (2010) and Massis' (2010) research, which revealed that "hard" project management skills can help with success factors related to planning and organizing effort, tracking, and managing throughout a project.

On the topic of IT project management success, Bannerman (2008) takes a different approach by focusing on risk management in software projects. He argues that the ability to react proactively to risks is an important factor, which requires more of project managers than simply updating the project register that is part of project management methodology. His concluding argument, however, is that better risk management *practices* are important to project management hard skills.

The overarching argument across these articles is that project management methodology can support a project manager with a library of tools and provide a blueprint for project success when considered from a process perspective; these tools are only loosely

related to the short or long-term views of actual project success.

Lessons from the Literature on Project Management Success

It is not uncommon for stakeholders to place blame on project management practices when projects fail; however, for this perception to be true, the failure would need to be rooted in the ineffective application of the project management methodology (see Munns & Bjeirmi, 1996); Azim et al., 2010; Lacerda, Ensslin, & Ensslin, 2011). As such, we conclude that:

1. Effective project management methodology can contribute to project success because it provides a structured approach and standard tools or procedures.
2. Effective project management provides a structured approach, but *does not ensure* success of the project.
3. The absence of effective project management methodology contributes to project failure.

A second surprising conclusion from the literature on project management success is that determination of standards is rarely within the individual project manager's control. Rather, successful project management may require assessment by project managers of the best methodologies at the individual project and portfolio levels. What is noticeably missing from the literature on successful project management, however, is explicit acknowledgment of the decision-making process associated with the tools and techniques in a multi-stakeholder, IT-centric environment. As indicated in Table 2, there are skills that tie back to various project success metrics; so, why do the project management literature and the most reputable project management standard not focus on this? For example, *A Guide to the Project Management Body of Knowledge (PMBOK® Guide) –* Fifth Edition, identifies interpersonal skills as valuable assets for developing and

managing a project team and managing stakeholder engagement (Project Management Institute, 2013). Interestingly, neither the research nor the project management standards provide guidance on how or when to acquire or develop these valuable skills. We might infer from this and the above studies that project management tools and/ or techniques are needed throughout a project's life cycle; however, there seems little consideration that some tools may be more relevant than others at different times.

A Review of the Project Manager Success Literature

Project manager success is a much more elusive topic, since perceptions related to project manager success are often intermingled with how the project management methodology is applied and to the perceptions of overall project success (which may vary over time and stakeholders). Our review of the literature revealed little research dedicated specifically to project manager success until the past decade or so. There is agreement that project manager competencies are an essential ingredient for project success (Müller & Turner, 2010), and a project's success or failure is *influenced by who manages that project* (Patanakul, 2011). Pinto and Slevin (1988a) argued that a project's success or failure is *dependent upon* who is selected to manage the project; this, along with other research, emphasizes the complex, multi-disciplinary teams that project managers often manage (Gillard, 2009).

Project managers have long been acknowledged as being "different" from regular managers and requiring different skills sets. Project managers are also often the scapegoats when projects fail, which may explain the emphasis on methods as contributing factors and success criteria or metrics. Despite this, the rare literature on project managers or IT project manager success still focuses on project management skills, specifically the project manager's depth

of knowledge about project management tools and techniques, despite findings that these do not necessarily make a project manager successful (Muzio, Fisher, Thomas, & Peters, 2007; Pant & Baroudi, 2008; Gillard, 2009; Fisher, 2011). In addition, a growing list of required abilities have emerged because of the overlap with project success and expanding project management tools.

We have adapted an early list from Gale and Brown (2003) and labeled these skills as specific to project management "hard skills," "soft skills," skills dependent on stakeholder influences, or implying a temporal component over the project life cycle:

1. Project management skills (hard skills; temporal)
2. Business and management skills (hard skills; perhaps soft skills; temporal)
3. Knowledge of the project technical disciplines (hard skills)
4. Interpersonal skills (soft skills; stakeholders' influences; temporal)
5. Managing the project sponsor (soft skills; stakeholder influences)
6. Situational awareness (soft skills; stakeholder influences; temporal)
7. Integration management, or integrating the previous skills and knowledge (soft skills; temporal)

We also see later literature that highlights the complementary relationship between a project manager's mastery of project management tools and techniques, business and general management aptitude, and interpersonal skills (Muzio et al., 2007; McHenry, 2008; Pant & Baroudi, 2008; Gillard, 2009). Leadership skills, particularly, are emphasized for team, project, and stakeholder management. For example, Geoghegan and Dulewicz (2008) measured leadership dimensions with a combination of the practitioner's management, emotional, and intellectual competencies. They compared these measurements with project results using Pinto and Slevin's (1988b) project success questionnaire,

and found that leadership competencies correlated with 'assessments of project success.' While this is a somewhat subjective concept, it suggests that good leaders may be less likely to be viewed as poor project managers.

Looking specifically at IT-centric environments, studies support that project managers require a combination of project management acumen, disciplinary, and business management acumen, technical knowledge or familiarity, and interpersonal skills (including personal integrity) (Napier, Keil, & Tan, 2009). When contrasting across a variety of industries and types of projects, however, the emphasis is still on a deeper understanding of the project management tools and techniques as enabling project management practitioners *to leverage* more effectively their soft skills to manage their project teams (Alam et al., 2010). This seems more consistent with practice, as noted in the opening discussion about the importance of project manager certifications that emphasize hard skills.

Studies have also demonstrated that project managers tend to have certain personality traits compared with the rest of the population, and people with those personality traits tend to function well in a project environment with partial data and higher ambiguity. For example, a survey of 280 project managers using the Myers-Briggs Type Indicator® (MBTI®) personality inventory revealed that there were significantly more NT (Intuitive, Thinking) project managers than represented in the general population (Cohen, Ornoy, & Keren, 2013). The authors postulated this is due to the fact project managers must make decisions in ambiguous situations and rely heavily on their intuition. These more recent observations have evolved since the older literature on project and project management success, which didn't address project manager proficiencies, specific leadership styles or their impact on the project, or the softer skills and abilities required of a project manager.

Despite the growing research on soft skills, few studies have detailed the exact soft skills that project managers should possess, perhaps because of the ambiguity and shifting challenges managers face throughout the project life cycle, evolving contexts, and increasing technological complexity (Cohen et al., 2013). Through a combination of literature reviews, interviews, and focus groups, Fisher (2011) identified an extended list of soft or interpersonal skills perceived as most important for project managers working with their project teams, including (1) managing emotions, (2) building trust, (3) communication, (4) motivating others, (5) influencing others, (6) cultural awareness, (7) leading, and (8) team building. We believe these soft skills are equally important outside the project team, beyond the IT context, and regardless of industry but need to be supplemented with industry-specific knowledge (see Chipulu, Neoh, Ojiako, & Williams, 2013). Table 3 provides our comparison of the few studies specifically focused on project manager success.

Lessons from the Literature on Project Manager Success

These studies highlight the complementary relationship between a project manager's soft skills as critical to enhancing their ability to apply their knowledge of project management tools and techniques. These interdependencies were highlighted in a recent discussion with a senior IT leader, who stated: "*Interpersonal skills, without project management skills and knowledge, would be as*

Categories	Gale & Brown (2003)	Napier, Keil, & Tan (2009) (IT)	Fisher (2011)	Chipulu, Neoh, Ojiako & Williams (2013)
Project Management Acumen	Project management skills Integration management	Planning and control		Budget management Time management Methodology experience
Business Acumen	Business and management skills	General management		Commercial awareness Industry knowledge
Technical Acumen	Technical knowledge	Systems development		
Interpersonal Skills/ Traits	Interpersonal skills Managing the sponsor Situational awareness	Leadership Communication Team development Client management Problem solving Personal integrity	Managing emotions Building trust Communications Motivating others Influencing others Cultural awareness Leading Team building	Communication Team management Leadership Stakeholder management Teamwork
Interpretations		***Elaboration on soft skills and personal attributes***	***Focused on understanding soft skills in team leadership***	***More clustering of soft skills, but emphasis on the iron triangle of hard skills***

Table 3: Project manager skill set comparison and our interpretations.

ineffective as a project manager with advanced project management knowledge without interpersonal skills."

The perceptions of success are heavily dependent upon project outcomes and how project management tools and techniques are leveraged to assist in producing expected outcomes; hence, many of the competencies outlined in the literature related to project manager abilities are *soft skills* that require flexibility throughout the project life cycle (temporal aspects) and responsiveness to diverse stakeholders. Project managers in IT-centric environments increasingly must have the abilities to elicit, understand, and manage stakeholder expectations throughout a project life cycle, and often even into the *product* or system life cycle. Similarly, the project manager's opportunity to influence perceptions about project success lies in his or her ability to understand what stakeholders value; manage the real-world factors that influence how the project delivers value; and ensure that expectations and the reality delivered are aligned. At the same time, however, research needs to expand its focus beyond a single definition of success, or even worse, the co-mingling of definitions.

The literature has evolved over time as the project management discipline has matured. It is clear that the simple application of project management techniques will not make a project manager effective, nor ensure his or her overall efficacy in IT-centric environments. Rather, an additional set of soft skills associated with technique application are the critical skills for project manager *efficacy*. The literature highlights the following:

1. Skills associated with interpersonal interactions to elicit stakeholder expectations related to a specific project so that one can use this information to identify and prioritize factors that will influence perceptions of success.
2. Ensuring alignment of expectations between different stakeholder groups

through communication, negotiation, and conflict resolution skills, because these expectations could not only be in conflict, but also evolve over time (temporal influences) as the project progresses from early planning through execution and delivery.
3. Decision-making and negotiating skills to develop strategies that actively manage not only the project, but also stakeholder expectations about agreed upon end-state goals.

The main paradox here is that, if the research indicates that a specific set of skills, or range of skills, is necessary to being an effective project manager, why do the standards not provide descriptions that are more detailed or the guidance for procuring and developing these skills?

Limitations in How We Know What We Know

Both researchers and practitioners need to understand "how we know what we know" about project success, project management success, and project manager success to make sense of why we find divergent and overlapping skills, and how this leads us to the importance of the *overlapping sweet spot of IT project manager efficacy*. Each method used to conduct research has its strengths and limitations. Other than the published literature review articles that summarized prior research (empirical and conceptual), the empirical studies included in our review were dominated by quantitative questionnaires and surveys, or qualitative interviews and focus groups. The majority of research on project success used positivist, quantitative methods with questionnaires and surveys of larger samples, but less understanding of context. This is consistent with the fact that most projects are measured using quantifiable metrics such as schedule, budget, and compliance to requirements. The majority of research on project manager success used constructivist, qualitative methods

with interviews and observation with smaller samples. This is consistent with seeking to understand life experiences in a practical project environment and factors that influence how people applied the project management methods in context. To a much lesser degree, researchers used case studies with both qualitative and quantitative data (mixed method studies).

The challenge here is that the important distinctions between the definitions of success or integration points haven't been captured in these studies nor can easy comparisons be made. As noted in Figure 1, that "sweet spot" where project success, project management success, and project manager success overlap has been largely overlooked in terms of contextual issues such as temporal or stakeholder influences. While some researchers have tried to define or describe this intersection, we argue that it is a moving target, which is largely contextual. We conclude that rather than studying what constitutes project success, project management success, or even project manager success, research should focus on what contextual factors or attributes influence project manager *efficacy, considering the importance of both the hard skills and soft skills over time as the make-up of the sweet spot shifts*.

It is also important to note that many of the articles we reviewed have theoretical background sections; however, the studies are largely *atheoretical* and not based on specific academic theories. Instead, scholars outline the seminal research related to project management, or combined project management theory and refer to contributing theories. Of the research with atheoretical basis, there are trends in using organizational theories, management theories, or leadership theories, which support the observation that project managers must be generalists in management and leadership and specialists in project management application (McHenry, 2008). This is also consistent with claims that theory in

project management is implied through the combined body of knowledge that outlines the multiple processes, tools, and techniques a project manager must apply in his or her profession (Williams, 2005; Pollack, 2007). For example, Cleland (2004) links management theory to the web of interpersonal relationships a project manager must maintain in a matrix organization. Separate from discussions on success, Anantatmula (2010) highlights the distinctions between classical management functions, situational leadership theory, and their application in project management, while claiming that a project manager's role is more complex than most functional management roles. Supporting our findings across the literature, Williams (2005) argued that the project management profession and related body of knowledge *lack* a comprehensive underlying theory, but does not suggest what a unifying theoretical framework might be. To make progress in our understanding, we may need to turn to other bodies of theory such as stakeholder theory and theories that include temporality (such as actor–network theory, design theory), or socio-technical theories that consider context and the shifting sweet spot presented by the overlap in perspectives of success.

Discussion and Implications for Practice and Research

We began our exploration of the literature seeking insights for defining the skills associated with project-related success in the IT project management space. Our review of the literature highlights that it has both divergent views and explicit overlaps yet to be addressed. Nonetheless, this review leads us to that important "sweet spot" and a new focal area of research on *project manager efficacy* where these three areas converge and shift over time.

One message that has been consistent as research has evolved is that project managers and IT project managers must understand that project success is a perception. Satisfying a single stakeholder group's expectations may not address either process or outcome expectations. For example, we see many studies in which authors reveal that projects are delivered on time and within budget yet perceived as failures by the end-user if the product, service, or result hasn't provided the desired outcomes. Similarly, a project can produce the desired outcomes; however, stakeholders can perceive the project as a failure when the cost exceeds either the anticipated or the realized benefit.

The most effective project managers are able to identify where the "sweet spot" resides in the Venn Diagram at any point in time; they understand the trade-offs between managing to project constraints and meeting stakeholder expectations; and they understand that the "sweet spot" moves based on the stakeholder group and where they are in the project life cycle. In short, the "sweet spot" is not a constant (see Figure 2). As such, the skills necessary to manage for success will shift with the sweet spot. We argue this "sweet spot" is the crucial area of attention and propose we focus on this new definition of *project manager efficacy* that explicitly acknowledges the overlap of factors that influence IT project outcomes, process, and the people best suited for a project.

In addition to accepting the distinct definitions of success, we need to define and focus on the intersection of which skills and knowledge contribute to project manager efficacy in the IT-centric environment and beyond. Based on the literature, Table 4 provides our definitions of project success, project management success, and project manager success, but also reiterates our definition of project manager efficacy. Based on our review, we link the key skills suggested in the literature to these four definitions. It is important to note that "related soft skills and abilities" aren't intended to be a comprehensive list but a representation of the reviewed literature.

The literature is clear that a focus on acquiring project management skills
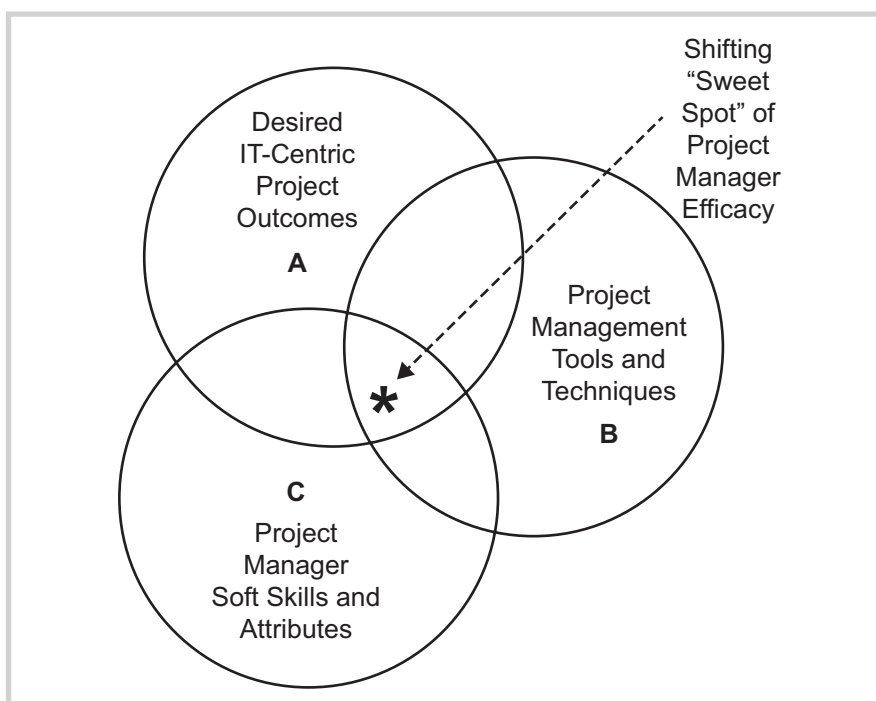

Figure 2: The sweet spot of project manager efficacy.

Terms	Definitions	Related Hard Skills or Knowledge	Related Soft Skills or Abilities
Project Success (Varies at individual project and portfolio levels)	Project success = Outcomes meet planned or desired business objectives	For Individual project success: Clearly defined requirements or project objectives	Change management Communication Conflict resolution Decision making Expectation management Negotiation Stakeholder analysis and management
	Project portfolio success = A pattern of successful projects that meet strategic outcome objectives	For portfolio project success: standards for program management and standards for portfolio management[3]	Adaptability Strategic leadership Senior stakeholder management
Project Management Success	Accomplishment of cost, time, and quality objectives	Knowledge of project management methodology and tools; technical knowledge	Decision making Leadership
Project Manager Success	Successful application of project management methodology	Industry knowledge Organizational knowledge Disciplinary knowledge	Motivating others Leadership Negotiation Communications Conflict resolution Team development
Project Manager Efficacy	The sweet spot that integrates factors that influence IT project outcomes, process, and the best people to be assigned to a project	Matched to needs of the specific project (e.g., some projects need more technical knowledge than others)	Ability to draw upon skill and knowledge areas as needed based on the desired outcomes as they evolve over time, given the unique context and stakeholder combination

Table 4: Relationship between definitions of success and hard or soft skills.

means neither effective application of those skills nor successful outcomes. Possessing the necessary skills needed to effectively utilize project management techniques is a different issue—one that requires understanding of the stakeholder group, the ability to illicit expectations of stakeholders, and versatility in the ability to communicate with diverse groups of people. The literature also supports that project managers must possess advanced interpersonal skills to be effective, but we lack research that details how project managers' interpersonal skills link with contextual issues of stakeholder perceptions of project success or with project management success through the project life cycle (temporal influences). The lessons and gaps identified in the literature lead to our implications for

practice, for academic programs, and directions for future research.

As depicted in Figure 2 (our modified tri-focal lens), project manager efficacy is influenced by the project manager's ability to work with stakeholders to identify the various perceptions of success, and then apply a combination of soft skills and project management tools and techniques to produce the desired outcomes. This does not mean that project success is an unattainable myth, or that it is so subjective or complex as to not be worth studying. Nor should we throw our hands in the air and claim that project management methodology does not matter. We know from the research that this is not the case. Rather, we argue that research has advanced enough that we can see the importance of successful synthesis of project objectives, good methodology, and understanding of stakeholders. By shifting our research and practitioner focus from specific skills groups (such as what

factors influence project success), to a holistic view of project manager *efficacy*, we may be better able to not only match project managers to projects, but also guide our hiring and training.

Consistent with our discussion of the importance of stakeholders and temporal influences on project manager efficacy, we have organized our practice implications based on different stakeholder groups. Following, we present implications of our review for senior IT leaders/executives, project management practitioners, hiring and resource managers, those tasked with academic or project management curricula, and researchers seeking to address the paradoxes of success in the IT-centric project management space.

Implications for Practice

Implications for Senior IT Leaders/ IT Executives

IT executives are often members of the senior project–leadership stakeholder

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[3]We refer to this generically, although PMI has published standards in these areas.

group as either the executive sponsor or IT sponsor. Given the literature, IT leaders need to acknowledge the variances in perceptions about project success, the lack of a clear definition of project success, and the multiple factors that influence project efforts over time. To contribute to positive project-related outcomes, we highlight three specific challenges that IT executives may need to address related to skills and project manager efficacy:

1. Articulating project-related expectations and metrics for success at different stages in the project life cycle so that context-specific skills can be identified
2. Understanding their executive role in project sponsorship to include ensuring the IT project manager has the necessary skills to lead projects within the specific organizational context
3. Selecting IT project managers who have good relationships with the specific set of project stakeholders or those who support the IT project managers in building such rapport. This may involve individuals who are not certified or pairing them with certified project managers.

Implications for Project Management Practitioners
Scholarly research provides clear evidence that there is much more to project manager efficacy than mastering the project management body of knowledge, or continued study of that same body of knowledge. While there are demonstrated benefits related to earning a project management certification (Müller, 2013), empirical research provides evidence that the structured approach to learning the project management body of knowledge is only the foundation for a project manager's professional journey.

The key implication for project management practitioners is the need to clarify which skills will contribute to their overall efficacy over time in

different contexts of stakeholders, as noted in Table 4. The challenge is identifying the necessary skills and related approaches to developing those capabilities so they can adapt to the shifting sweet spot of skill requirements. Recent research supports this observation as it relates to applying agile project management processes and the related barriers to realizing the benefits of agile methodologies (Gandomani, Zulzalil, Ghani, Sultan, & Nafchi, 2013). Likewise, practitioners may benefit from investing in the development of their interpersonal skills and understanding the impact of their personality traits, more so than seeking to enhance their project management acumen.

Implications for Hiring and Resource Managers
As such, our findings should influence thinking about hiring decisions, training, or other developmental investments in IT-centric project spaces. This requires a focus on understanding the candidate's personality and interpersonal skills and their fit within the context of the organization and types of projects. Our review supports that static checklists of skills or knowledge miss the point. The skills sweet spot for project manager efficacy may shift throughout the length of a project or changing stakeholders (including team members and vendors). As such, demonstrated project management skills that worked in one environment do not ensure the same skills will work in every organization. Identifying contextual considerations in relation to desired skill sets will increase the likelihood of successful hiring or project allocation decisions and encourages hiring those with greater skill diversity.

A second implication of our synthesized findings relates to continued investments in professional development. Our findings support that resource managers should assess the value of focusing professional development on softer interpersonal skills that will contribute the most to project success,

which may require seeking development opportunities outside of the traditional project management skill-based training.

Implications for Academic and Project Management Curricula
Our review of the literature on "success" in the IT-centric project space leads us to conclude that project management development and training is still missing a key focus on the set of skills that contribute to IT project manager efficacy, and hence to project success. Project management curricula typically include courses on project finance; risk management; cost estimating and management; schedule management; and project execution and control, blended with other management, leadership, and organizational theory courses. Curricula that develop the skills necessary for students to apply project management tools and techniques in practice must include approaches for developing interpersonal skills, such as managing a diverse set of stakeholders, managing conflict, and leading an organization through change. Further study has the potential to provide valuable guidance in the development of project management certification standards and academic curricula.

Implications for Future Research
Based on our analysis of the literature, we believe there are four areas that provide rich avenues for future research in the project management field: topic integration, methodological diversity, perceptions of necessary soft skills, and the politics of curricular metrics:

Topic Integration: We argue that despite implicit and even explicit overlap between the factors associated with different definitions of success, research has not explicitly addressed the sweet spot of project manager efficacy in IT-centric project environments. There is clearly more room for richer, qualitative studies that seek to understand this "sweet spot" or complex interaction between metrics for project success; the

process of project management; and the unique skills and experiences brought to projects by successful (and unsuccessful) project managers. Equally as important, we need to understand this complex interaction across multiple stakeholders over time.

Methodological and Theoretical Diversity: Studies that focus on quantitative analysis add to our understanding by providing large-scale, cross-project, or cross-firm comparisons; however, we lose the nuances of the unique organizational contexts and the people involved; there is much to be learned from studies with greater depth (see, for example, Shenhar, Dvir, Levy, & Maltz, 2001). As noted earlier, there are also new theoretical lenses that can be brought into the IT-centric project space, which will contribute to the understanding of project manager efficacy.

Soft Skills: We have a wealth of research on hard skills or hard metrics, but a shortage of literature on soft skills and how business managers, IT managers, and project managers perceive them. Regardless of the methodologies used, simply repeating studies about project outcomes or project management techniques will add little to our understanding if we ignore the decision-making, interpersonal abilities, and contextual challenges in applying various techniques that are often missing in current research.

The Politics of Project Management Curricular Development and Standards: Separate from recommendations for increased focus on soft skills and decision making in professional certification programs are the challenges, economics, and politics of change. Many business and other schools in the university environment can tell you that employers are always looking for employees with soft skills, yet their job advertisements ask for specific programming languages, such as C++ (a software programming language), and other technical abilities or project management certification. How do we

generate change in professional certifications to include the so-called softer skills that are critical to successful people, successful practices, and successful outcomes? Based on our review of the literature, we argue that we need to move beyond the artificial boundaries of different definitions of success to understand the sweet spot where these intersect in project manager efficacy in IT-centric project environments. To further advance the discipline, we also encourage exploration of this "sweet spot" in other contexts.

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1. *Project Management Best Practices: Achieving Global Excellence*, 3rd Edition, John Wiley & Sons, New York (2014)

2. *Project Management Metrics, KPIs and Dashboards,* 2nd Edition, John Wiley & Sons, New York (2013)

3. *Project Management Metrics, KPIs and Dashboards*, John Wiley & Sons, New York, (2011)

4. *Project Management Best Practices: Achieving Global Excellence*, 2nd Edition, John Wiley & Sons, New York, (2010)

Chuck is a member of the International Institute of Business Analysis (IIBA), a senior member of the American Society for Quality (ASQ), and a member of the Project Management Institute (PMI), and Kentuckiana PMI Chapter.

Chuck earned a Doctorate of Professional Studies in Information Management from Syracuse University in 2015, a Master of Science in Project Management from the University of Wisconsin in 2003, a Master of Business Administration from the University of Florida in 2000, and a Bachelor of Science in Management in 1993 through Southern Illinois University.

Chuck's holds the following PMI certifications: Project Management Professional (PMP)®, Program Management Professional (PgMP)®, and the PMI Agile Certified Professional (PMI-ACP)®. Chuck also holds the following certifications: Certified Business Analysis Professional (CBAP) through the International Institute for Business Analysis (IIBA); Certified Six Sigma Black Belt through the American Society for Quality (ASQ); Certified Manager of Quality/Organizational Excellence (CMQ/OE) through ASQ; Certified Software Quality Engineer (CSQE) through ASQ; and Certified Managed Healthcare Professional (MHP) through the Health Insurance Association of America

In October 2011, Chuck was the recipient of the 2011 Kerzner "International Project Manager of the Year" Award. You can find additional information about Chuck via his online business card at www.millhollan.net. He can also be contacted at chuck.millhollan@gmail.com

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Michelle Kaarst-Brown, FLMI, MBA, PhD, is tenured faculty at the School of Information Studies, Syracuse University, Syracuse, New York. She is a former Program Director for the Doctorate of Professional Studies in Information Management, and former Interim-Program Director for the Masters in Information Management program.

Dr. Kaarst-Brown's professional work with culture, symbolism, risk, and security has included compliance and financial risks associated with quality business practices in the financial services sector. Other experiences include developing and managing emerging marketing technologies, IT integration during a major merger and acquisition, organizational development initiatives for a national company, and consulting to smaller enterprises on market development and enterprise risk management.

Dr. Kaarst-Brown's prior work experience became the foundation for her research interests in how the perceptions of risk and opportunity shape strategic and individual action, including IT governance and IT workforce/STEM issues. After entering academia, her research into "IT culture" and perceptions of IT risk and opportunity have resulted in diverse projects with other scholars, doctoral students, and practitioners. An overarching theme in her research has been to look beyond traditional views to understand how to gain traction for organizational change associated with better risk and opportunity management. She has presented her work at international conferences and published in a number of top academic and practitioner-focused journals including *MIS Quarterly*, *MIS Quarterly Executive*, *CIO Canada*, *Information Technology and People*, the *Journal of Strategic Information Systems*, and the *Journal of Organizational Change Management*.

Dr. Kaarst-Brown's research has been widely adopted in practice and higher education. IBM's West Coast Compliance Division adopted her early research (with Shirley Kelly) on Sarbanes Oxley's potential impact on the CIO and IT function. Dr. Kaarst-Brown's papers on her theory of "IT Cultures" have been reprinted in several IT textbooks, and are required reading in international undergraduate, masters, and doctoral programs; and have been integrated into training materials in practice. She can be contacted at Mlbrow03@syr.edu

Appendix: Review methodology.

With the hundreds of articles available today on the various aspects of projects and project management, it was not possible to cite each article that mentioned project management. Instead, we used a structured methodology to identify articles most cited or reprinted that met our search criteria from within key journals in the project management and information technology (IT) space. We also did a separate search based on key terms that focused on research published within the last ten years in the project management journals and the last three years within selected IT journals. We acknowledge that we have not recognized every study that readers may feel should have been included, and apologize for any oversights. We feel the articles represented here provide the coverage and evidence that supports the purpose of our review. We also encourage any researcher whose perspective wasn't presented to bring it to our attention. An overview of our search methods and criteria for inclusion follow.

Citation Chain Analysis:

We began the review with a Citation Chain[4] approach, starting with top project management journals, books, and educational texts viewed as expert subject matter. The goal for the citation chain analysis was to identify the most enduring and influential articles that are used in practice and relevant to the topic of project management, project outcomes, project managers, and "success." Books included textbooks used in project management undergraduate and graduate courses, books published by the Project Management Institute (PMI) and included as references for *A Guide to the Project Management Body of Knowledge (PMBOK® Guide) – Fifth Edition* (2013), and professional books written by expert practitioners. While not a traditional

approach (most would start with academic literature), project management is a certified practice with an established reading list that includes scholarly research, and as such, we began there.

Traditional Literature Search and Bibliometric Analysis:

Our review then progressed to a traditional search of scholarly articles, leveraging ProQuest Central and EBSCO host databases, and supported by privileges associated with PMI membership. To narrow the search and ensure a focus on current research, the search was limited to work published within the last three years, focusing on keywords within titles and abstracts that implied the central focus of articles were on project success, project management success, or project manager success. Given our focus on "IT-centric" project environments, and IT project managers, we further cross-checked by searching publication trends over the last ten years in seven IT-specific scholarly journals.

Selection Criteria:

In addition to seminal articles identified from the citation chain analysis, we used similar search criteria for the bibliometric analysis, with the following search constraints:

1. **ProQuest Central Database**
2. **Scholarly Publications only, Article Type (Journal), and Peer Reviewed**
3. **Journals:**
   a. *Journal of Information Technology (JIT)*
   b. *MIS Quarterly (MISQ)*
   c. *Information Systems Research (ISR)*
   d. *Computer Information Systems*
   e. *Communications of the ACM (CACM)*
   f. *Journal of Information Management Systems*
   g. *Project Management Journal® (PMJ)*
   h. *International Journal of Project Management*
4. **Years**: The search was limited to the previous three years (up to August 2015) in *PMJ* and *IJPM*, and ten years for IT journals (up to August 2015).

5. **Abstracts** to ensure articles were primarily focused on the research topic and more accurate than relying on titles.

Search Terms:

Using generic terms such as Project, Success, Management, or Information Systems (IS) and Information Technology (IT) proved too broad and produced results unrelated to the research topic. Research then focused on the following exact word combinations:

- Project management
- IT project success or IS project success
- Information technology/systems project success
- Project success (removing the IT/IS constraint)
- Successful IT projects or successful IS projects
- Successful projects (removing the IT/IS constraint)
- Project management success
- Successful project management
- Project manager success
- Successful project manager

To ensure the exact word combinations weren't too constraining, especially for the IT journals, the following word combinations were added to the search:

- Information technology or information systems + project management
- Project manager + success
- Project management + success
- Project + success

We removed duplicate articles represented more than once if the abstract contained multiple search terms. After reading and analyzing 214 potential publications, we identified 59 articles included as key references cited in our analysis. These articles focused specifically on factors leading to success in the project management space, with particular relevance to IT-centric success considerations. As noted above, it would be impossible to include very article written on the subject of project management success, but feel our structured approach is replicable and would yield the same seminal articles.

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[4]Citation chain analysis follows references used in articles back to the original source articles, seeking those articles that were the foundation studies or supporting evidence. This is a well-accepted method for identifying seminal works.