ONLINE SUPPLEMENTAL MATERIAL

Appendix A. Measures for Variables in Research Model

Individual performance (Obtained from supervisor ratings); Anchors: 1 = "needs much improvement", 7 = "excellent"

Please rate [team member name] on their performance on the project in terms of:

1. Quantity of work output.
2. Quality of work output.
3. Accuracy of work.
4. Completing work tasks on-time.

Psychological stress (Keller, 2001); Anchors: 1 = "strongly disagree", 7 = "strongly agree"

1. I have experienced tension during this project.
2. Aspects of this project have been a source of frustration for me.
3. There has been no strain from working on this project. (r)
4. I never felt pressured during this project. (r)

Client Satisfaction with Project (Nidumolu 1995); Anchors: 1 = "very poor", 7 = "very good"

1. Ease of use of software.
2. Ability to customize outputs to various user needs.
3. Range of outputs that can be generated.
4. Overall responsiveness of software to users.

Internal Process Controls (Mathieu et al., 2006); Anchors: 1 = "strongly disagree", 7 = "strongly agree"

Transition processes

1. Members of my team discuss our performance vision.
2. Members of my team discuss what we can do day to day to make our performance vision a reality.
3. Members of my team discuss our project team's objectives.

Action processes

1. Members of my team take the time we need to share task-related information.
2. Members of my team actively learn from one another.
3. Members of my team effectively communicate with each other throughout the workday.

Interpersonal processes

1. Members of my team create an environment of openness and trust.
2. Members of my team really trust each other.
3. Members of my team think in terms of what is best for the team.

External Process Controls (Ancona and Caldwell 1992); Anchors: 1 = "strongly disagree", 7 = "strongly agree"

Task coordinator activities

1. When design problems arise, we resolve them with the client.
2. We coordinate our activities with the client.
3. Our team discusses delivery deadlines and schedules with the client.
4. We review the project design with the client.
5. On this team, we ask the client to help us make decisions about the project design.

Ambassador activities

1. Absorb outside pressure for the team so that it can work free of interference
2. Protect the team from outside interference
3. Prevent "outsiders" from overloading the team with too much information or too many requests
4. Scan the internal organizational environment for threats to the team
5. Persuade other individuals that the team's activities are important
6. "Talk up" the team to outsiders
7. Acquire resources (e.g., new members, money/budget, technology) for the team
8. Find out whether others in the organization support or oppose the team's activities
9. Keep other groups in the company informed of the team's activities

Scouting activities

1. Find out what competing teams are doing on similar projects
2. Scan the environment inside or outside the organization for design ideas/expertise
3. Collect technical information/ideas from individuals outside of the team
4. Scan the environment inside or outsides the organization for technical ideas/expertise

IS Project Manager Project-Related Knowledge; Anchors: 1 = "not at all", 7 = "to a great extent"

To what extent does this IS project manager demonstrate knowledge of:

Technical project-related knowledge

1. programming languages
2. detailed technical design
3. technical design constraints
4. code testing and debugging procedures
5. development tools and coding environments

Project management knowledge

1. how to set out project milestones
2. how to estimate the project schedule
3. how to detail key activities for achieving project objectives
4. how to monitor project progress
5. how to manage relationships with clients
6. how to facilitate client interaction

Appendix B. Supplemental Analysis

In underscoring the importance of understanding whether and how IS project managers can influence individual developer performance through process control interventions, we argued that such efforts may very well have implications for IS project success. Complex knowledge-intensive undertakings, such as IS development, are highly task interdependent. Thus, low performance by an increasing proportion of individual developers can derail the IS project as a whole. To determine the extent to which individual task performance impacts IS project success, we computed the average performance of individuals in each IS project team. We also controlled for the within-team standard deviation for individual performance to ensure that we isolated the effects for mean individual performance. These data were used to predict client satisfaction with the IS project, which was measured using a four-item scale by Nidumolu (1995). Clients responded to the scale four months after the system was delivered and implemented. The results of the analysis are shown in Table B1 below. As the results indicate, mean individual performance had a positive relationship with client satisfaction ($\beta = .23$, $p < .001$), supporting the idea that efforts to promote individual task performance can also benefit the IS project overall. Additionally, the within-team standard deviation of individual developer performance had a negative relationship with client satisfaction ($\beta = -.13$, $p < .05$), indicating that disparities in performance between different developers can negatively affect project performance. This further reinforces the importance of examining the implications of various project-level interventions for individual developer outcomes.

Table B1. Multilevel Model Predicting Client Satisfaction with IS Project

	Client satisfaction		
Variable	1c	2c	3c
Level-1 (controls):			
Intercept	.10 (.017)	.05 (.019)	.03 (.021)
Team size	.06 (.020)	.04 (.021)	.02 (.023)
Team experience	.10 (.020)	.08 (.022)	.05 (.025)
Project size	-.17** (.003)	.15** (.004)	-.13* (.005)
Project complexity risk	-.16** (.003)	-.14* (.004)	-.12* (.004)
Requirement risk	-.10 (.010)	-.08 (.012)	-.07 (.013)
Level-1 (main effects):			
Individual performance (team mean)			.23*** (.005)
Individual performance (coefficient of variation)			-.13* (.004)
Internal process control		.14* (.008)	.10 (.013)
External process control		.13* (.010)	.07 (.015)
Level-2 (controls):			
Age (project leader)	.06 (.008)	.05 (.009)	.03 (.010)
Gender (project leader)	.03 (.011)	.02 (.012)	.01 (.013)
Organizational tenure (project leader)	.12* (.012)	.10 (.013)	.06 (.015)
Level-2 (main effects):			
Project management knowledge	.20** (.003)	.17** (.004)	.13* (.004)
Technical knowledge	.17** (.002)	.15* (.003)	.12* (.003)
Random effects:			
Level-1 variance (r_{ij})	.42***	.38***	.32***
Level-2 variance (U_{0j})	.37***	.31***	.25***
Deviance	4008.20	3860.10	3015.51
χ^2	712.39***	662.13***	528.17***
R^2	.19	.25	.32

Notes:

1. Level-1, n = 1,230; Level-2, n = 130; Level-3, n = 20.
2. Standard errors are shown in parentheses.
3. * p < .05; ** p < .01; *** p < .001.

Appendix C. Results of Confirmatory Factor Analysis

Table C1. Fit Indices for Confirmatory Factor Analysis

Model	χ^2	χ^2/df	CFI	GFI	SRMR	RMSEA
A. First-order (8 constructs; 6 controls + 2 outcomes)	462.20	0.90	.96	.92	.05	.04
B. First-order (6 controls constructs)	430.51	1.45	.95	.91	.06	.05
C. Second-order (6 first-order controls constructs + 2 second-order constructs)	481.35	1.58	.95	.91	.07	.06

Notes:

1. Model A included eight freely correlating first-order constructs—i.e., the six process controls constructs and the two individual outcome constructs. Model B included the six freely correlating internal and external process constructs. Model C included two second-order reflective constructs (one for internal process control and another for external process control) and 6 first-order internal/external process controls constructs, thereby gaining eight degrees of freedom relative to Model B.
2. As expected, the first-order loadings were almost identical across models A, B and C. Specifically, all first-order loadings in the models were identical to the second decimal place.
3. CFI = confirmatory fit index, GFI = goodness of fit index, SRMR = standardized root mean square residual, RMSEA = root mean square error of approximation.
4. * p < .05, ** p < .01, *** p < .001.
5. The target coefficient (T) (the ratio of the chi-square statistic of a first-order factor model to a second-order factor model) comparing models B and C was .894, providing further support for the second-order factor models for internal and external process controls (Marsh and Hocevar 1985). As internal and external process controls have three dimensions each, their individual second-order models are just identified with T coefficients of 1 for these models.

Table C2. Item Loadings for Model A

Indicators:	AVE	Square root of AVE	1	2	3	4	5	6	7	8
Individual performance1	.62	.79	.82							
Individual performance2			.80							
Individual performance3			.75							
Individual performance4			.77							
Psychological stress1	.56	.75		.73						
Psychological stress2				.75						
Psychological stress3				.77						
Psychological stress4				.75						
Transition process1	.61	.78			.74					
Transition process2					.75					
Transition process3					.84					
Action process1	.67	.82				.83				
Action process2						.80				
Action process3						.82				
Interpersonal process1	.57	.75					.79			
Interpersonal process2							.77			
Interpersonal process3							.75			
Task coordinator activities1	.67	.82						.76		
Task coordinator activities2								.85		
Task coordinator activities3								.84		
Task coordinator activities4								.80		

Task coordinator activities5								.84		
Ambassador activities1	.58	.76							.75	
Ambassador activities2									.77	
Ambassador activities3									.79	
Ambassador activities4									.80	
Ambassador activities5									.83	
Ambassador activities6									.75	
Ambassador activities7									.77	
Ambassador activities8									.70	
Ambassador activities9									.71	
Scouting activities1	.56	.75								.75
Scouting activities2										.74
Scouting activities3										.76
Scouting activities4										.75

Notes: Loadings shown are for the item loadings on their respective first-order constructs (CFA constrains cross-loadings to 0 as indicated by the grayed cells), AVE = average variance extracted.

Table C3. Loadings of First-order Factors on Second Order Factors in Model C

Indicators:	Internal	External
Transition processes	.80	
Action processes	.82	
Interpersonal processes	.85	
Task coordinator activities		.77
Ambassador activities		.85
Scouting activities		.83

Notes:

1. Loadings shown are for the first-order construct loadings on their respective second-order constructs (CFA constrains cross-loadings to 0 as indicated by the grayed cells).
2. The first-order loadings for Model C were almost identical to those reported in Table B1 for Model A, with a few differences only at the third decimal place.

Appendix D. Results of Tests of Mediated Moderation

Table D1. Results of Indirect Moderating Effect of IS Project Manager Project-related Knowledge through Internal Process Controls

Moderator	Predictor	Individual performance			Individual psychological stress			Support for hypothesis
Technical IS project risk:	IS project manager knowledge:	Point estimate (SE)	95% Confidence interval		Point estimate (SE)	95% Confidence interval		
			CI-low	CI-high		CI-low	CI-high	
Project complexity risk	Project management knowledge	.05 (.04)	.012	.085	-.04 (.04)	-.084	-.011	Yes
	Technical knowledge	.06 (.04)	.021	.105	-.05 (.03)	-.085	-.024	Yes
Requirement risk	Project management knowledge	.05 (.03)	.019	.088	-.04 (.03)	-.074	-.012	Yes
	Technical knowledge	.06 (.04)	.018	.104	-.05 (.04)	-.097	-.010	Yes

Notes: Bootstrap estimates are based on 10,000 resamples, SE = standard error.

Table D2. Results of Indirect Moderating Effect of IS Project Manager Project-related Knowledge through External Process Controls

Moderator	Predictor	Individual performance			Individual psychological stress			Support for hypothesis
Technical IS project risk:	IS project manager knowledge:	Point estimate (SE)	Confidence interval		Point estimate (SE)	Confidence interval		
			CI-low	CI-high		CI-low	CI-high	
Project complexity risk	Project management knowledge	.04 (.04)	.009	.082	-.04 (.04)	-.082	-.007	Yes
	Technical knowledge	.04 (.04)	.008	.082	-.04 (.04)	-.084	-.009	Yes
Requirement risk	Project management knowledge	.05 (.03)	.014	.089	-.04 (.03)	-.071	-.009	Yes
	Technical knowledge	.05 (.04)	.011	.102	-.04 (.04)	-.081	-.006	Yes

Notes: Bootstrap estimates are based on 10,000 resamples, SE = standard error.