



# Overcoming resistance to change in engineering and construction: Change management factors for owner organizations

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## Abstract

For owner organizations in the architecture, engineering, and construction industry, successful implementation of new processes for procuring, contracting, and managing requires a concerted change management effort. The objective of this study was to empirically measure the impact of individual change management factors on minimizing resistance from organizational members during implementation, which is often cited as a major reason for organizational change failure. Project team resistance to the implementation of a new project delivery system was tracked across sixteen owner organizations. Findings include identification of six change management factors that contribute to minimizing resistance to change, including certain aspects of project scope, size and duration, organizational expectations of change implementation speed, the establishment of formal change agents, and the level of change agent involvement with implementation activities. Implications for change leaders and practitioners are discussed to recommend strategies for reducing resistance to change.

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## 1. Introduction

Owner organizations that frequently purchase services from the architecture, engineering, and construction (AEC) industry have continually sought to improve project performance by enhancing their standard sourcing and project management practices (CERF, 2000; Rahman, 2014). Typical owner goals are to improve internal process efficiency in the face of increasing resource constraints as well as to improve performance and consistency in their management of hired external AEC firms (Sullivan, 2011). These goals are often accomplished by implementing changes in major areas of AEC project delivery. One major area is alternative procurement methods, which

include different evaluation practices aimed at minimizing the owner's risk of procuring low-performing AEC firms (Chan and Kumaraswamy, 1997; Iyer and Jha, 2005; Wardani et al., 2006). Innovative approaches to risk transfer are another major area, where unconventional contracting methods are intended to improve the identification, mitigation, and transfer of potential project risk factors (Lines et al., 2014a; Witt and Liias, 2011). Third, new project management processes are intended to enhance project control such that owner organizations are better able to measure project performance and increase accountability of hired AEC firms to deliver expected levels of quality (Perrenoud et al., 2013; Rahman and Kumaraswamy, 2004).

Implementation of new practices in the procurement, contracting, and management of AEC projects requires a concerted change management effort to assist organizational members who must learn new approaches while simultaneously

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disengaging from traditional practices, which often have been built up over decades of operation (Migliaccio et al., 2008). The change management literature emphasizes the difficult and complex nature of change implementation and often cites high failure rates (Ahn et al., 2004; Balogun, 2005). One major cause of change effort failure is resistance from organizational members (Foote, 2001), where resistance to change is defined as any dissenting actions that slow, oppose, or obstruct a change management effort (Armenakis and Harris, 2009; Giangreco and Peccei, 2005). Previous research has noted resistance from organizational members as a barrier to change implementation (Mabin et al., 2001; Piderit, 2000), yet little empirical data has been recorded for the AEC industry specifically.

## 2. Literature review

### 2.1. Resistance to change

The concept of resistance to change is rooted in Lewin's (1947) unfreezing, moving, and freezing model of organizational change, which stated that there are driving forces that seek to either bring about or resist change. Research in the areas of resistance to change often describes it on the individual level as three dimensions: cognitive, affective, and behavioral (Erwin and Garman, 2010; Isabella, 1990). The cognitive dimension refers to how employees think about the change, including their perceived capability to be effective in new work roles (Giangreco and Peccei, 2005). The affective dimension is defined as the emotional and psychological reactions employees experience in how they feel about the change (Denhardt et al., 2009). The behavioral dimension examines resistance in terms of employee action responses, and whereas the first two dimensions are often accepted as the sources or reasons causing resistance, the behavioral dimension is the actual manifestation of resistance in the form of observable conduct, deeds, and events (Fiedler, 2010; Giangreco and Peccei, 2005; Lines et al., 2014b). This study focuses exclusively on behavioral resistance to change due to the fact that it is the only directly observable dimension. Twelve specific types of resistive behaviors, shown in Table 1, were observed in this study based upon definitions from the literature (Bovey and Hede, 2001a,b; Emiliani and Stec, 2004; Fiedler, 2010; Giangreco and Peccei, 2005; Hultman, 2006; Mishra and Spreitzer, 1998; Van de Ven and Poole, 1995).

### 2.2. Change management factors

The AEC industry presents unique challenges for change practitioners; for example, its project-based nature necessitates that change be implemented on the level of individual projects. Since individual projects can be viewed as "temporary organizations" (Gareis, 2010; PMI, 2009), specific factors within the project and associated project team are important to consider from a change management perspective (Whelan-Berry and Alexander, 2007). Critical factors include the project scope, size, and duration (Cooke and Williams, 2004; Loosemore et al., 2006) as well as personnel hierarchical position and experience levels (Smollan, 2011; Yun et al., 2011).

**Table 1**  
Resistive behavior types.

Type of resistive behavior	Definition of the resistive behavior
Reluctant compliance	Doing the minimum required, lack of enthusiasm, guarded and doubtful
Delaying	Agreeing verbally but not following through, stalling, procrastinating
Lack of transparency	Hiding or withholding useful information during implementation
Restricting education	Avoiding or restricting the spread of the change message
Arguing & open criticism	Verbally opposing and/or finding fault with the change implementation
Obstructing & subverting	Openly sabotaging, blocking, undermining the change implementation
Spreading the negative word	Spreading negative opinions and rumors, appealing to fear in resistance
Termination	Voluntary or involuntary removal from the project or organization
Reversion	Changing back to traditional practices during the implementation
Misguided application	Changing the implementation beyond the stated process, goals, methods
Forcing the change	Striving for perfection at expense of implementation effort
External influence	Behavior in response to negative feedback from external sources

The organization's approach to change implementation is also important to consider. Unrealistic expectations that underestimate the amount of time and effort required to accomplish the change may lead to resistance (Ankrah et al., 2008; Armenakis et al., 1999; Sullivan, 2011). Previous research has also reported a directly proportional relationship with change message delivery (in the form of change-related education and training received by organizational members) and change management success (Alvesson, 2002; Schneider et al., 1994). The formal designation and involvement of change agents to lead change implementation is another critical factor, and many organizational change researchers have specifically called for the establishment of a "transition team" to guide the change (Hunsucker and Loos, 1989; Kanter, 1983; Kotter, 1995). These factors, along with the project and personnel factors previously discussed, were measured within this study and are summarized in Table 2.

## 3. Main research questions and hypotheses

Although the literature reveals a considerable amount of work done in the area of resistance to change, the existing research covers a wide range of industry sectors (e.g. manufacturing, technology, business services) as well as a variety of change efforts (e.g. planned change, continuous improvement, mergers and acquisitions, restructuring, response to emergency, technology integration). Little research is specific to the implementation of planned change within the architecture, engineering, and construction industry on the level of sourcing, contracting, and project management operations. In response to this research gap, the research question

**Table 2**  
Change management factors.

Characteristic	Change management factor	Factor subcategory	Definition
Project	Scope	Construction	Scope for construction services
		A/E	Scope for architectural or engineering services
		FM Service	Scope for facility- and business-related services
	Size	<\$1M	Less than \$1 million
		\$1M–\$25M	Greater than \$1 million and less than \$25 million
		\$25M+	Greater than \$25 million
Duration	<1 year	Less than 1 year	
	1–3 years	Longer than 1 year and less than 3 years	
	3 years+	Longer than 3 years	
Personnel	Position level	Frontline	Project-level (contracting officer, project manager)
		Supervisor	Manager (director, associate director)
		Executive	High-level (vice president, associate vice president)
	Career stage	Early	First 10 years of career
		Mid	Between Early and Late
		Late	Last 10 years of career
Organizational expectations	Implementation speed	None (N/A)	No intent to fully adopt the change (single project only)
		Accelerated	Approx. 1 year effort and 1–5 project implementations
		Longitudinal	Multi-year effort, 5+ projects, continuing education
	Organizational shift	Minimal	Perception that already do much of the change process
		Moderate	Gaining new project tools and processes
		Large	Revolutionary approach to project delivery
Implementation approach	Change message received	None	No formal training prior to change implementation
		Limited	Project-specific training (min. 2 h lecture-based)
		Immersive	Project- & org-level (min. 1 day, participative)
	Formal change agents	Experience	Direct previous experience implementing the change
		No	No formal change agents within the organization
		Yes	Formal change agents identified for implementation
	Change agent involvement	None	No formal change agents within the organization
		Irregular	Participate less frequently than once per month
		Regular	Participate more frequently than once per month
	Direct role	Change agent is performing a lead project role	

addressed is whether different change management factors present on AEC projects have an effect on the frequency of resistance that is encountered on the individual project level. And if so, this paper seeks to identify which change management factors correspond to greater and lesser resistance, which has practical application implications for change practitioners within the AEC industry.

Hypothesis testing was conducted via one-way ANOVA and Tukey post-hoc testing to determine whether resistance to change was impacted based upon different change management factors present on individual AEC projects. The hypotheses were tested to determine whether the frequency of resistance encountered was different based upon project characteristics (scope, size, duration), project personnel characteristics (position level, career stage), the organization's expectations (change implementation speed, organizational shift required), and implementation approach (change message delivery, establishment of formal change agents, and level of change agent involvement in project-level change implementation). Ten hypotheses are defined in Table 3. The following sections will cover the data sample demographics, method of data collection and analysis, results, and findings, and discuss lessons for change practitioners along with conclusions and recommendations for future research.

## 4. Methodology

### 4.1. Data sample & research context

Sixteen owner organizations from across the United States and Canada participated in this study. Fourteen were public sector organizations, including state, city, and county governments as well as school districts and post-secondary educational institutions. Two were private owners representing a defense contractor and a private educational institution. Among these sixteen owners, 52 individual AEC projects were observed to document the amount of resistance encountered. On each project, two key individuals from the owner's project team participated: the lead contracting officer and lead project manager (N = 104). Of the participating individuals, 69 were frontline personnel, 27 were supervisor-level, and 8 were executives. Regarding career stage, 18 of the participating personnel were early career stage, 55 were mid-career, and 31 were late career.

### 4.2. Change implementation context

Each of the sixteen participating owner organizations independently implemented the same organizational change,

**Table 3**  
Summary of hypothesis testing.

Characteristic	Hypothesis label	Change management factor	Hypothesis
Project	H1	Scope	Construction, A/E, and FM Service scopes will encounter different amounts of resistance, with A/E encountering the most resistance and Construction encountering the least.
	H2	Size	Projects of different size will encounter different amounts of resistance, with large project (<\$20M) encountering most resistance and small projects (<\$1M) encountering the least.
	H3	Duration	Projects of different duration will encounter different amounts of resistance, with long duration projects (3+ years) encountering the most resistance and short duration projects (<1 year) encountering the least.
Personnel	H4	Position level	Personnel of different hierarchical position levels within the organization will display different amounts of resistance, with frontline personnel displaying the most resistance and executive personnel displaying the least (and supervisory personnel somewhere in between).
	H5	Career stage	Personnel at different career stages will display different amounts of resistance, with late career personnel displaying the most resistance and early career personnel displaying the least.
Organizational expectations	H6	Implementation speed	Organizations with different expectations of change implementation speed will exhibit different amounts of resistance, with organizations expecting an accelerated pace of change adoption displaying the most resistance and those expecting a longitudinal pace displaying the least.
	H7	Organizational shift	Organizations with different expectations of the overall shift in practices the change would require will exhibit different amounts of resistance, with those expecting a minimal shift displaying the most resistance and those expecting a high shift displaying the least.
Implementation approach	H8	Change message delivery	Organizations that place different emphasis on communicating the change message to their project teams will encounter different amounts of resistance, with greater emphasis corresponding with lower resistance.
	H9	Formal change agents	Organizations that do not establish formal change agents will display higher resistance than those that do.
	H10	Change agent involvement	Organizations that have different levels of change agent involvement in project-level change implementation will encounter different amounts of resistance, with higher involvement corresponding with lower resistance.

which consisted of three processes that were new to each organization. First, an alternative procurement approach was used to evaluate and select AEC firms on each of the 52 projects in the data sample. The procurement approach consisted of a best value approach where contractor evaluations were based on both price and performance criteria (e.g. firm capability, project risk assessment, references, and project team interviews). Second, an innovative contracting method was implemented that required the procured AEC firm to complete three deliverables to be added to the owner's traditional contract documentation: a project milestone schedule, a formal and project-specific risk management plan, and detailed list of action items requested of the owner's project team during project execution. Third, a new project management process was incorporated to track, communicate, and measure the impacts of risks encountered during project execution. Every risk event on the project was formally documented on a weekly basis for the contract duration along with quantitative impacts on project cost, schedule, and owner satisfaction. Each of these processes was completely new to the participating owner organizations.

#### 4.3. Action research method

An action research methodology was utilized, which is defined as a collaboration between researchers and practitioners on a selected project to collect data about what is happening within the organizational system while simultaneously addressing the practical concerns of the organization (Cowan-Sahadeth, 2010). Action research is characterized as being change-oriented with a focus on

addressing a particular problem by changing the organization system (Alvesson, 2002). It is process-oriented and commonly follows a cyclical process of planning, acting, observing, and evaluating that is aimed at increasing the understanding of change processes and social systems (Altricher et al., 2002, Hult and Lennung, 1980; Sexton and Lu, 2009). The action research method was selected for this study due to its emphasis on three research elements: first, the research is based on actual conditions rather than theoretical models; second, the direct collaboration between researchers and organizational members presents a rich data collection opportunity; and third, the data collection occurred in "real time" during change implementation rather than relying upon post-change survey instruments (Bommer, Rich and Rubin, 2005; Cowan-Sahadeth, 2010; Powell Jr., 2002).

Action research is an established scientific approach that has been used in the fields of social science (Lewin, 1947), management (Argyris et al., 1985), operations management (Meredith, 1998), and manufacturing (Jorgensen et al., 2003), to name a few. A small but growing number of proponents state that it is appropriate for AEC research due to the industry's need for "a reliable, structured, and rigorous research approach" that is useful in addressing "applied settings" and "practical problems" (Azhar et al., 2010; Barrett and Barrett 2003; Sexton and Lu, 2009; Styhre et al., 2004). Recent change-related studies in the AEC industry have utilized action research; Abrahamse and Lotriet (2011) studied social issues that impact mobile technology adoption and diffusion in small-to-medium construction companies, Love et al. (1998) determined optimal procurement approaches for public sector infrastructure projects, Sunding and Odenrick (2010) facilitated

enhanced problem-solving capacity for construction project teams, and Rezgui (2007) investigated effectiveness of information and communication technology for virtual collaboration in construction projects.

This study utilized the *emancipatory* type of action research, defined by Zuber-Skerritt (1996) as having the goal of transforming organizational systems through collaboration with the researchers acting as “process moderators.” Within the 52 individual AEC projects selected (based upon availability) and the organizational systems being transformed were the AEC owner organizations’ procurement, contracting, and project management processes. Owner participation on each selected project was led by two key personnel: the owner’s lead contracting officer and lead project manager. As per the characteristics of the action research method, researchers collaborated with practitioners as both co-researchers and subjects of the research (Love et al., 2010). Data collection for resistance to change was based upon observation of participant behavior, review of project documents (e.g. requests for proposal, completed evaluation forms, contract documents, risk reports, project closeouts), project meetings, and informal conversations with project participants. Resistance to

change was defined as personnel actions that displayed any form of the behavior types in Table 1. This was also consistent with previous literature recommendations to assess personnel’s individual reactions to organizational change (Huang and Shih, 2011; Liao et al., 2009).

## 5. Results and analysis

Results for resistive behavior frequency hypothesis tests and Tukey post-hoc analysis are described below. A summary of ANOVA results for each of the ten hypotheses is provided in Table 4. Levene’s test was used to determine homogeneity of variances. Tukey post-hoc testing identified significant relationships between individual change management factors and results are summarized in Table 5.

### 5.1. Project scope (H1)

When considering the relationship between project scope and resistance to change, construction projects were found to have a statistically significant lower mean frequency of

**Table 4**  
ANOVA results for change management factors and resistance frequency.

Hypothesis	Factor	df	df2	F	Sig.	Sub-factor	Mean	95% CI	
								CI-L	CI-U
H1	Project scope	2	101	4.343	<b>.001</b>	Constr.	2.63	1.31	3.95
						A/E	4.79	−0.44	10.01
						FM Service	6.45	4.44	8.47
H2	Project size	2	101	7.870	<b>.001</b>	<\$1M	1.83	0.97	2.69
						\$1M–\$25M	5.59	3.06	8.11
						\$25M+	7.32	4.37	10.27
H3	Project duration	2	101	5.243	<b>.002</b>	<1 year	1.64	0.48	2.79
						1–3 years	5.00	2.74	7.26
						3 years+	7.58	4.55	10.61
H4	Personnel position level	2	101	1.570	.213	Frontline	5.12	3.49	6.74
						Supervisor	2.70	0.99	4.41
						Executive	5.75	−0.89	12.39
H5	Personnel career stage	2	101	2.764	.068	Early	1.39	0.41	2.37
						Mid	5.24	3.54	6.93
						Late	5.13	2.32	7.94
H6	Expected implementation speed	2	101	24.125	<b>.000</b>	None (N/A)	2.44	0.53	4.36
						Accelerated	8.88	6.53	11.23
						Longitudinal	1.25	0.54	1.96
H7	Expected org. shift	2	101	0.357*	.702*	Minimal	4.75	2.27	7.23
						Moderate	5.31	2.80	7.83
						High	4.08	2.42	5.75
H8	Change message received	3	100	1.337*	.276*	None	6.12	3.88	8.36
						Limited	5.09	2.75	7.43
						Immersive	3.33	−0.81	7.48
H9	Formal change agents	–	–	4.952**	<b>.000**</b>	Experience	3.19	0.92	5.46
						No	8.21	0.49	15.93
						Yes	2.42	−1.79	6.63
H10	Change agent involvement	3	100	9.526	<b>.000</b>	None	8.21	5.67	10.75
						Irregular	4.29	0.40	8.17
						Regular	3.93	0.75	6.92
						Direct role	1.35	0.65	2.05

Dependent variable for all cases is frequency of resistive behaviors encountered per project (N = 104).

Note: for ease of viewing, rows set in bold indicate statistical significance at the 95% Confidence Interval.

\* Welch’s F-statistic (homogeneity of variance violated).

\*\* *t*-test *t*-statistic.

**Table 5**

Tukey post-hoc testing for change management factors and resistance frequency.

Change management factor	Sub-factor A	Sub-factor B	Mean difference (A–B)	Sig.	95% Sig. level	99% Sig. level
Project scope	Constr.	A/E	–2.155	.488	X	X
	Constr.	FM service	<b>–3.824</b>	<b>.011</b>	✓	X
	A/E	FM service	–1.669	.653	X	X
Project size	<\$1M	\$1M–\$25M	<b>–3.755</b>	<b>.021</b>	✓	X
	<\$1M	\$25M+	<b>–5.488</b>	<b>.001</b>	✓	✓
	\$1M–\$25M	\$25M+	–1.733	.494	X	X
Project duration	<1 yr	1–3 yrs	–3.361	.082	X	X
	<1 yr	3 years+	<b>–5.938</b>	<b>.001</b>	✓	✓
	1–3 yrs	3 years+	–2.577	.336	X	X
Personnel position level	Frontline	Supervisor	2.412	.103	X	X
	Frontline	Executive	–0.634	.974	X	X
	Supervisor	Executive	–3.046	.573	X	X
Personnel career stage	Early	Mid	–3.847	.065	X	X
	Early	Late	–3.740	.113	X	X
	Mid	Late	–0.107	.997	X	X
Expected impl. speed	None (N/A)	Accelerated	<b>–6.431</b>	<b>.000</b>	✓	✓
	None (N/A)	Longitudinal	1.194	.450	X	X
	Accelerated	Longitudinal	<b>7.631</b>	<b>.000</b>	✓	✓
Expected org. shift	Minimal	Moderate	–0.563	.964*	X	X
	Minimal	High	0.667	.942*	X	X
	Moderate	High	1.229	.656*	X	X
Change message received	None	Limited	1.030	.934	X	X
	None	Immersive	2.788	.559	X	X
	None	Experience	2.932	.219	X	X
	Limited	Immersive	1.758	.866	X	X
	Limited	Experience	1.902	.679	X	X
	Immersive	Experience	0.144	1.00	X	X
Formal change agents	Yes	No	<b>5.786</b>	<b>.000**</b>	✓	✓
Change agent involve.	None	Irregular	3.925	.129	X	X
	None	Regular	4.377	.100	X	X
	None	Direct role	<b>6.861</b>	<b>.000</b>	✓	✓
	Irregular	Regular	0.452	.997	X	X
	Irregular	Direct role	2.936	.350	X	X
	Regular	Direct role	2.483	.549	X	X

Dependent variable for all cases is frequency of resistive behaviors encountered per project (N = 104).

Note: for ease of viewing, rows set in bold indicate statistical significance at the 95% Confidence Interval.

\* Welch's F-statistic (homogeneity of variance violated).

\*\* *t*-test *t*-statistic.

resistive behaviors (2.63 per project) than facility management service projects (6.45). It is important to note that although construction projects were found to have the least amount of resistance, practitioners should still expect to encounter resistance (in some capacity) no matter what the project scope they are implementing a change within.

## 5.2. Project size (H2)

Two significant relationships were found for project size, leading to an acceptance of Hypothesis 2. Smaller projects (less than one million dollars) encounter less frequent resistance than medium- and large-sized projects. Medium-sized projects (\$1M to \$25M) encountered 3 times the amount of resistive behaviors and large projects (\$25M and larger) encountered 4 times more resistance than small projects.

## 5.3. Project duration (H3)

Projects with shorter project durations (less than one year) encountered less resistive behaviors (1.64) than either medium duration projects of one to three years in length (5.59) and long-term projects with durations of more than three years (7.32).

## 5.4. Personnel position level (H4)

Personnel position level (frontline, supervisor, executive) within the owner organization was not found to be significant at the 95% confidence level. This result confirms previous research by Smollan (2011), who studied resistance within the three personnel hierarchical levels of executives (senior management), supervisors (managers), and frontline personnel (first-level employees) and found empirical evidence that it is

not just “workers” or frontline personnel who resist change, but organizational personnel at all different hierarchical levels.

##### 5.5. Personnel career stage (H5)

The difference in resistive behaviors encountered for each of the personnel career stages tracked were not significant at the 95% confidence level, leading to the rejection of hypothesis 5 and acceptance of the null hypothesis. However, it should be noted that the difference between early career stage resistance (1.39) and middle career (5.24) as well as late career (5.13) was significant at the 93% and 88% confidence levels, respectively.

##### 5.6. Expected speed to institutionalization (H6)

Organizations that had different expectations of the implementation speed encountered statistically significant differences in resistance. Tukey post-hoc testing found that organizations who expected change institutionalization to be achieved at an accelerated pace encountered greater resistance.

##### 5.7. Expected shift magnitude (H7)

Results did not show a significant difference in resistance for organizations that held different expectations about the magnitude of the change they were undertaking, where magnitude was defined as the overall shift that the change represented in procurement, contracting, and project management processes compared with the organization’s traditional practices (either a minimal, moderate, or high shift for the organization’s internal operations).

##### 5.8. Change message received (H8)

The extent to which each lead owner personnel received the change message when implementing the new processes on their projects did not have a statistically significant effect on resistance (none, limited, immersive, previous experience). Although the results of this study are inconclusive regarding change message delivery, the authors must nevertheless stress that change practitioners not overlook the need for proper training, education, and support of their project teams. Previous studies have indeed found management’s tendency to overlook the need for adequate training in new methods and procedures as a major risk to successful change implementation (Ates and Bititci, 2011; Dawson, 1994; Mento et al., 2002).

##### 5.9. Formal change agents (H9)

Results revealed that organizations who did not formally designate change agents to lead the implementation effort encountered significantly more resistance than those organizations that did, leading to the acceptance of Hypothesis 9.

##### 5.10. Level of change agent involvement (H10)

Higher levels of change agent involvement resulted in lower resistance. Tukey post-hoc analysis revealed that project teams that did not have change agent support had a higher mean frequency of resistive behaviors (8.21) than those teams who were supported by irregular change agent involvement (4.29, significant at the 85% confidence level), those supported by regular change agent involvement (3.93, significant at the 90% confidence interval), and those projects where a change agent performed a direct project role as either the lead contracting officer or project manager (1.35, significant at the 99% confidence level).

## 6. Discussion

Change requires leadership. Organizations that make the conscious decision to change their operations must also identify change agents who are responsible for leading and implementing the change effort. Organizations that did not formally identify change agents were shown to encounter four times more resistance than those organizations that did. Formally identifying change agents is beneficial in two ways. First, it assigns responsibility in such a way that certain organizational members are now accountable for change implementation success. Second, change agents become a guiding force who can support other organizational members who may struggle with or question the change. The extent to which agents are personally involved with change implementation activities is also important. Change agents should have direct, day-to-day involvement that contributes to actual project-specific deliverables within the change implementation process. This minimizes resistance because other organizational members sense that someone in a formally designated leadership role is both present (thereby increasing their accountability to enact the change) and supportive (which may boost feelings of self-efficacy).

Change requires patience. When organizational members collectively expected rapid change implementation (i.e. expecting mastery of new procurement, contracting, and project management processes within a few project experiences spread over a single calendar year), they encountered the greatest amount of resistance (nearly nine separate instances of resistive actions per project). One potential reason for this reaction is that personnel may be dismayed with the size and scale of change if they enter implementation with unrealistic expectations (Fiedler, 2010). By contrast, organizations who expected change implementation to be a long-term process that requires continuous education for their personnel encountered seven times less resistance. These results indicate the importance of setting realistic expectations around the realities of the change effort. Organizations cannot expect change to be easy; rather, overcoming resistance requires an understanding that change implementation is a long-term and strategic process. Organizational leaders and executives who expect they can simply decree the need for change and hope for a “quick fix” approach to implementation will only exacerbate resistance from their

organizational members. Organizations must be patient and understand that they cannot force the change to go faster than organizational members are comfortable with.

Change requires involvement of the right personnel. Perhaps surprisingly this does not mean that practitioners should focus on attributes of personnel position titles; in fact, executives who were involved with actual implementation activities were found to exhibit just as much resistance as frontline personnel. Instead career stage was more reflective of resistance. Early career members displayed the least amount of resistance when compared with mid- and late-career personnel. Although only significant at the 90% level, these results may signify that more experienced personnel tend to resist change more frequently, perhaps because experienced personnel have to “unfreeze” a greater history of habits, beliefs, and values that were tied to status quo practices (Lewin, 1947) whereas previous research found newer recruits to be more positive about change compared to longer-serving staff (Balogun and Jenkins, 2003).

Change maybe impacted by the environmental factors of project scope, size, and duration within the project-based AEC industry. Practitioners should consider these factors when selecting projects as candidates for change implementation. Based on this study’s results, the profile of a project that encounters the least resistance from organizational members is a small and short construction project. This may be due to the ability to participate in the full change effort across a shorter time horizon, and on a smaller and more controllable scale. The fact that construction project types encountered less resistance than other project scopes may be due to the specific nature of the change that was studied. Within the participating owner organizations, their traditional processes included a predominantly low-bid procurement approach. When alternative, best value methods were then implemented, perhaps organizational members were able to see greater benefits. These results may have the broader implication that the construction field is actually suited for organizational change in the area of project delivery. However, the authors must caution practitioners not to be too restrictive with their criteria in attempting to select “the perfect” project candidate for change implementation. Other factors beyond scope, size, and duration may be even more important. For example, change leaders should always strive to identify project opportunities that can demonstrate “short term wins” (Kotter, 1995) that will highlight the beneficial impacts of the change. These “wins” can help build momentum and support for the change, which then enables the effort to expand within the organization.

### 6.1. Limitations

This study is limited to resistive behaviors observed within AEC owner organizations. Due to inherent difficulties in multi-organizational data collection, resistance from the AEC firms that partnered with the owner organization on each of the observed projects was not documented.

Each of the twelve resistive behavior types measured within this study was given equal weights, which does not account for the relative strength of behavior types. For example, obstructing

the change is a stronger action than behavior types such as delaying or reluctant compliance.

It is acknowledged that other factors influence resistance beyond the ten change management factors measured in this study, such as change agent leadership style and behaviors, change recipient views of the change agent credibility, and organizational culture (i.e. trust, values, respect, and working relationships). All participating organizations were located in the United States and Canada, and this study did not account for the role of national or societal culture on resistance to change, which may bear further investigation.

## 7. Conclusions

The objective of this research was to measure the frequency of behavioral resistance encountered among AEC owner project teams tasked with implementing new procurement, contracting, and project management processes. The major contribution was identification of certain change management factors that were associated with minimizing the amount of resistance encountered during change implementation. Project scope, size, and duration had significant relationships with resistance to change, with projects of construction scoping, small size, and short duration encountering the least resistance. Organizational expectations of the speed of implementation also impacted resistance, with expectations of accelerated implementation speed later manifesting high levels of resistance. Organizations that held long-term, multi-year, strategic expectations of the change effort experienced the least amount of resistance during implementation. Formal establishment of change agents to lead the implementation effort significantly reduced resistance, and high levels of day-to-day project involvement by change agents resulted in the lowest levels of resistance overall.

A contribution to practitioners is the empirical data that helps guide change management approaches within AEC owner organizations. First, change practitioners must be cognizant of project scope, size, and duration when choosing between multiple upcoming project opportunities that are candidates for change implementation. Second, practitioners may consider piloting the change on a smaller scale before expanding it to broader implementation, while keeping in mind the benefits of achieving “short term wins.” Third, setting realistic and sobering expectations regarding the strategic and difficult nature of change implementation may actually foster greater levels of readiness among the AEC project teams who will be asked to implement the change. Fourth, AEC owner organizations that intend to implement a change in their project delivery processes are strongly advised to identify a core team of change agents to act as the champions of implementation. Finally, the work capacity, availability, and capability of change agents should be carefully considered as results show that higher levels of change agent involvement significantly reduce the amount of resistance the organization will face.

Although not intended as a method paper, a contribution of this study is being the first empirical, practice-based research on resistance to change and associated change management

factors within the AEC industry. In their review of resistance to change research from the past twenty years, Erwin and Garman (2010) noted that data collection methods have mainly been based on self-report surveys, resulting in their recommendation that further research utilize the more “practice-based methods” of case studies and action research. Hallencreutz and Turner (2011) reviewed 160 articles on “best practices” for organizational change only to observe that less than 10% were labeled as case studies, which lead to their conclusion that only a fraction of change management research is based on “demonstrated and documented practical applications.” Todnem (2005) noted that although literature emphasis on change management is continually growing, “very little” empirical evidence supports the suggested theories. The fact that a multi-organization data set was captured, where all organizations were pursuing identical organizational change objectives, makes this study even more valuable.

Future research is recommended to expand the scope to include the impact of planned change within owner organizations on the AEC companies they partner with, such as contractors, design firms, architectural firms, and operations companies. The fact that any change in process not only impacts the owner team, but also how they interact with their hired AEC firms, may have a significant impact on resistance to change.

The magnitude or strength of the resistance behaviors, in addition to frequency, should be accounted for by future researchers. The current study recorded the frequency of occurrence for resistive behaviors, yet did not account for whether these behaviors were strong, aggressive, passive, or covert. Future studies may also quantify the actual impact of resistance on the overall adoption of the change.

Finally, future research is recommended to include a more nuanced investigation of the establishment, definition, and involvement of formal change agents. This study did not identify implications related to the number of change agents, their hierarchical level within the organization, or their level of experience, leadership capability, and personal readiness for change. Since change agent leadership is seen to be a highly important element of change management, understanding the specific factors that contribute to change agent success bears further investigation.

### Conflict of interest

There is no conflict of interest.

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