Perceptions of control legitimacy in information systems development

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Abstract

Purpose – Existing studies of information systems development (ISD) control commonly examine controller-centric considerations, such as the antecedents and performance impacts of control mode choices. In contrast, little is known about the controllee-centric factors that may influence the effectiveness of control activities. Drawing on institutional theory, the purpose of this paper is to introduce the concept of control legitimacy to the ISD literature – a concept that past organizational research has linked to outcomes such as employee commitment and performance. Specifically, the authors explore how different dimensions of control activities (mode, degree, style) relate to controllee perceptions of control legitimacy in terms of justice, autonomy, group identification, and competence development.

Design/methodology/approach – Interviews were conducted with 20 practitioners across three companies. A structured data coding approach was employed and analysis was conducted within and across each case study.

Findings – The authors find that the control degree and control style can help explain control legitimacy perceptions better than control modes alone. For example, the results suggest that formal controls enacted in a bilateral style correspond with higher perceptions of justice and autonomy, when compared to formal controls enacted in a unilateral style.

Originality/value – The study results imply that ISD managers should be increasingly mindful of enacting controls in a way that is perceived to be legitimate by subordinates, thereby potentially enhancing both staff well-being and ISD performance.

Keywords Information systems development (ISD), Management control, Multiple case studies, IS performance, Control legitimacy, Socio-emotional side effects, ISD performance

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Introduction

Controlling information systems development (ISD) is a fundamental but also highly challenging task (Kirsch, 1996). Managers (controllers) exercise control – including the use of formal policies and standards, periodic status reports, as well as socialization and empowerment strategies – in an attempt to influence and align the behavior of subordinates (controllees) with organizational objectives (Flamholtz *et al.*, 1985; Ouchi, 1979; Eisenhardt, 1985). Existing ISD research provides valuable insights into how task and stakeholder characteristics relate to the selection of specific controls (Kirsch, 1996, 1997; Choudhury and Sabherwal, 2003; Tiwana, 2010), as well as the effects of such controls on ISD performance (Henderson and Lee, 1992; Tiwana and Keil, 2009; Maruping *et al.*, 2009).

Despite these theoretical advances, two research gaps in prior literature are particularly noteworthy. First, existing research primarily focuses on the controller, including the organizational and process-oriented factors that should be considered when designing and implementing controls. This focus largely neglects salient controllee-centric factors including the perceptions of, and reactions to, ISD controls (Cram, 2011; Alvarez, 2002; Wiener *et al.*, 2016). This is problematic since, without explicitly considering controllee attitudes and preferences, managers may inadvertently select and implement controls that contribute to subordinate dissatisfaction and stress, potentially leading to negative side-effects on ISD performance (e.g. efficiency, quality, speed).

A second, related gap concerns the inconsistent research results regarding control effects on ISD performance. While some studies find empirical support for the direct and positive effects of ISD controls on performance (Henderson and Lee, 1992; Liu *et al.*, 2010;

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Tjornehoj and Mathiassen, 2008) and related dimensions (Keil *et al.*, 2013; Maruping *et al.*, 2009; Kautz, 2011), other studies fail to observe direct performance effects of ISD controls (Tiwana and Keil, 2007) and even observe negative effects (Tiwana, 2010; Tiwana and Keil, 2009). One potential explanation for these inconsistencies is that the link between ISD controls and performance is moderated or mediated by controllee-related variables not included in previous studies (Narayanaswamy *et al.*, 2013; Tiwana and Keil, 2009). One such variable may be the extent to which subordinates perceive the controls implemented by their manager to be legitimate. This explanation is consistent with prior research outside of the IS field, which provides evidence for the link between perceptions of legitimacy and performance-related variables such as trust (Suchman, 1995), commitment and motivation (Jaffee, 1991; Workman, 2009), and job effectiveness (Bijlsma-Frankema and Costa, 2010; Niehoff and Moorman, 1993). If a relationship could be established between control activities, control legitimacy, and ISD performance, it may help to clarify why inconsistencies have existed in past research.

In addition to the above-highlighted gaps in the existing research, we note the practical challenges that are also faced by today's managers in overseeing IS control activities. Although guidance in the form of ISD frameworks and methodologies can help managers make an initial selection from a range of possible control activities, it becomes increasingly challenging to make subsequent adjustments when those controls are not as effective as expected or when employee resistance emerges. Although some tools have been created to guide organizations through the customization and tweaking of controls over time (e.g. Cram *et al.*, 2016a; Gregory *et al.*, 2013), their principal focus on controller-centric issues highlights a gap in managerial understanding pertaining to how employee-oriented disputes around control activities could be more effectively addressed.

To address these challenges, this study draws on institutional theory to introduce the concept of control legitimacy (Bijlsma-Frankema and Costa, 2010) to the ISD control literature. Control legitimacy refers to the perception by subordinates that controls used within an organizational setting are appropriate in terms of justice, autonomy, group identification, and competence development (Bijlsma-Frankema and Costa, 2010). Past research outside of the IS field suggests that when legitimacy is high, subordinates increasingly comply with controls, demonstrate improved trust in management, and are positive about their work environment (Meyer and Rowan, 1977; Suchman, 1995; Bijlsma-Frankema and Costa, 2010). In contrast, when control legitimacy is low, subordinates become unmotivated, resist managerial initiatives, and are increasingly absent (Jaffee, 1991). However, it is unclear what specific aspects of ISD control activities[1] lead subordinates to form (high or low) control legitimacy perceptions. In response, we draw on interviews with ISD managers and developers at three organizations to address the research question:

RQ1. How do control activities relate to perceptions of control legitimacy?

This research contributes to practice by providing managers with a valuable "roadmap" that can help to guide their design of ISD control activities to be increasingly perceived by employees as legitimate, which can subsequently lead to improved performance. Our results identify several patterns of ISD control activities that correspond with legitimacy, as well as others that are viewed by employees as illegitimate. By being aware of these opportunities and pitfalls, managers have the opportunity to enhance individual, group, and organizational performance through increasingly motivated and engaged employees, while avoiding the negative side effects (e.g. employee dissatisfaction, stress, and turnover intentions) of controls not perceived to be legitimate. From an academic perspective, this work contributes to the ISD control literature by identifying the factors that influence perceptions of control legitimacy. Recent work in the field has increasingly focused on the

underlying characteristics of control activities (i.e. mode, degree, and style) as an explanation for why some ISD controls are effective, while others are not. By adding the concept of control legitimacy to this "toolbox" of theoretical constructs, this study can further aid the capability for researchers to understand the effectiveness of ISD controls, but also encourage the field to expand the scope of ISD control research to more fully include the perspective of the controllee.

The remainder of the paper is presented as follows. We establish the conceptual foundation for the study, first by providing an overview of existing ISD control research, followed by a discussion of institutional theory and control legitimacy. Next, we outline our methodology and present the results of our within-case and cross-case analysis. A discussion of our findings is then conducted, including comparisons to past research. We conclude with opportunities for future research.

Conceptual foundations

This research draws on control theory and institutional theory to explore control activities in the context of ISD, which refers to "the tasks undertaken to construct a computer-based information system, and the management of this effort, by a group of stakeholders with agendas, who engage in transactions over time within an institutional context by applying structure to their work with a set of tools and methodologies, and who judge outcomes of their efforts and act accordingly" (Sambamurthy and Kirsch, 2000, p. 400). Combining control theory with key concepts of institutional theory provides a lens to view how managers' control activities impact subordinates' perceptions of control legitimacy. In this section, we first present a conceptual framework that describes three main dimensions of ISD control activities. Drawing on institutional theory, we then introduce the concept of control legitimacy and provide an overview of past literature.

Control theory and control activities

Research on ISD control typically draws on agency theory (Tiwana and Keil, 2009; Remus *et al.*, 2015), which considers the relationship between two parties: managers (controllers) who delegate work and subordinates (controllees) who perform the work. In this relationship, controllers (e.g. ISD managers) use controls to ensure that controllees (e.g. software developers) act in a manner that is consistent with organizational objectives. The controls themselves are commonly categorized in terms of: formal controls, which represent explicit control activities such as the creation of written policies that establish clear guidelines, rewards, and penalties for controllee behaviors; and informal controls, which aim to influence implicit determinants of controllee behaviors and encourage individuals, or a group of individuals, to monitor their own actions without close management supervision (Ouchi, 1979; Eisenhardt, 1985; Kirsch, 1996). These two basic categories can be further divided into four control modes: (formal) behavior and outcome controls, as well as (informal) clan and self-controls (Kirsch, 1996).

Prior ISD control research has predominantly focused on the antecedents of control mode choices, as well as the effects of such choices on organizational performance (Cram *et al.*, 2016b; Wiener *et al.*, 2016). While existing studies largely agree on four key antecedents of control mode choices, namely, behavior observability, outcome measurability, ISD knowledge, and business domain knowledge, these studies show some inconsistent results with regard to the performance effects of individual control modes. For example, while several studies find empirical support for the positive effect of formal controls on ISD performance (Henderson and Lee, 1992; Liu *et al.*, 2010), efficiency (Keil *et al.*, 2013), and quality (Maruping *et al.*, 2009), other studies, at least partly, fail to do so (Tiwana and Keil, 2009; Tiwana and Keil, 2007; Srivastava and Teo, 2012). Similarly, study results are inconclusive about whether informal controls have a positive effect

(Henderson and Lee, 1992; Keil *et al.*, 2013; Heumann *et al.*, 2015), no effect (Tiwana and Keil, 2009), or even a negative effect (Tiwana, 2010) on ISD performance.

In this context, recent ISD control research suggests that a broader perspective is required to better understand control activities and their effects (Wiener *et al.*, 2016). Specifically, recent studies point to the importance of supplementing the concept of control modes with control degree (Gregory *et al.*, 2013; Remus and Wiener, 2012; Rustagi *et al.*, 2008) and control style (Gregory *et al.*, 2013, Gregory and Keil, 2014, Heumann *et al.*, 2015). This study therefore draws on a framework proposed by Gregory *et al.* (2013) to conceptualize ISD control activities along three dimensions, namely: control mode[2]; control degree; and control style. Table I provides a description of each framework dimension.

Adding to this, although a few ISD control studies have collected data from the perspective of both the controller and the controllee (Kirsch *et al.*, 2002; Narayanaswamy *et al.*, 2013; Soh *et al.*, 2011), research in the field remains squarely focused on the controller (Cram, 2011; Cram *et al.*, 2016b). This controller-centric perspective is largely consistent with agency theory's assumptions of untrustworthy employees that need careful monitoring in order to avoid shirking, which could negatively impact organizational performance (Eisenhardt, 1989).

Dimension	Definition/meaning	Forms	Examples
Control mode	Refers to the overall characteristics of the controls to be implemented	(Formal) behavior and outcome controls vs (Informal) clan and self-controls	Behavior control: the controller requires the IS project team to use pair programming Outcome control: the controller requires developers to achieve a pre-determined level of progress toward project completion each week Clan control: the controller facilitates regular social gathering for developers in order to create a shared sense of purpose Self-control control: the controller grants the staff the autonomy to determine what software requirements gathering activities should be undertaken
Control degree	Refers to the design of selected controls in terms of their frequency and intensity	Relaxed vs Tight	Relaxed degree: the ISD project team members are required to update the project manager on the status of the project during the monthly team meeting Tight degree: the ISD project team members are required to provide daily e-mail status updates, weekly summary reports, and monthly team meeting summaries to the project manager
Control style	Refers to the enactment of controls in terms of how the controller interacts with the controllee in order to put selected controls into practice	Unilateral (i.e. one-sided commands) vs Bilateral (e.g. appreciation of controllee feedback, explanation of control rationale, collaboration between controller and controllee)[a]	Unilateral: the controller independently decides that software testing activities are insufficient and implements additional mandatory procedures Bilateral: the controller and controllee regularly discuss the effectiveness of software testing activities and work together to improve the approach

Note: [a]The distinction between a unilateral and a bilateral control style resembles the control-style typology used by Wiener *et al.* (2016), who differentiate between an authoritative and an enabling control style

Sources: Adapted from Choudhury and Sabherwal (2003), Cram, Brohman, Chan and Gallupe (2016), Kirsch (1997), Remus *et al.* (2015), Wiener *et al.* (2016)

Table I.
Control activities framework

However, we suggest that this perspective ignores how control activities are perceived by the controllee, as well as what side effects controllee perceptions of control activities may have on their socio-emotional well-being and subsequently on control effectiveness and organizational performance. Against this backdrop, we draw on institutional theory and the concept of control legitimacy (Bijlsma-Frankema and Costa, 2010), which provides a conceptual tool for better understanding controllee perceptions of ISD control activities.

Institutional theory and control legitimacy

Broadly speaking, institutional theory addresses the structures that guide social behavior and order. These structures include norms and routines, which can eventually take on a rule-like status within organizations (Meyer and Rowan, 1977). Elements of institutional theory consider how structures are adapted, refined, interpreted, and conformed to, as well as how they can create value (Selznick, 1957; Scott, 1987; Berger and Luckmann, 1967; Oliver, 1991). One of the core elements of institutional theory, particularly within a modern organizational context, is the concept of legitimacy (Bijlsma-Frankema and Costa, 2010; DiMaggio and Powell, 1983; Dowling and Pfeffer, 1975). Legitimacy refers to "a generalized perception or assumption that the actions of an entity are desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs, and definitions" (Suchman, 1995, p. 574). Three broad types of legitimacy are seen to exist in organizations: pragmatic legitimacy (i.e. employees evaluate organizational activities as legitimate based on the practical benefits for themselves), moral legitimacy (i.e. employees evaluate organizational activities as legitimate based on their personal values and beliefs), and cognitive legitimacy (i.e. employees evaluate organizational activities as legitimate based on their understandability and the extent that they are taken for granted) (Suchman, 1995).

Legitimacy is viewed as a key factor necessary to facilitate voluntary compliance from individuals, rather than relying solely on the use of unilateral power (Tyler, 2006). Drawing on prior institutional literature, Bijlsma-Frankema and Costa (2010) suggest that controllee perceptions of control legitimacy are shaped by four sources: justice, autonomy, group identification, and competence development (see Table II).

By considering the normative and cognitive forces at play in institutions, legitimacy helps examine the antecedents and consequences of employees' perceptions of organizational activities (Suchman, 1995; Dowling and Pfeffer, 1975; Ridgeway *et al.*, 1995). Here, the consequences of control legitimacy can be viewed in both positive and negative terms. Where control legitimacy is high, controllees perceive control activities as being rational and adding value, which can lead to them becoming embedded in firm processes (Meyer and Rowan, 1977). This can provide an improved stability and comprehensibility to organizational activities, including an enhanced trust between controllers and controllees (Suchman, 1995). In contrast, where control legitimacy is low, control activities can result in undesirable

Source	Definition
Justice	The extent that control activities are perceived as being just, fair, and reasonable
Autonomy	The extent that control activities are perceived as recognizing the importance of independence, individuality, and trust
Group identification	The extent that control activities are perceived as enabling cooperation in and belonging to the team, as well as participation in decision-making
Competence development	The extent that control activities are perceived as facilitating knowledge and skills development

Source: Adapted from Bijlsma-Frankema and Costa (2010)

Table II.
Sources of control legitimacy

consequences, such as staff demotivation, absenteeism, resistance, and turnover (Jaffee, 1991). For example, past research outside ISD suggests that employees who feel fairly treated by the controls in place will feel more positive about their work environment and perform their jobs more effectively (Niehoff and Moorman, 1993; Bijlsma-Frankema and Costa, 2010). In contrast, employees who feel constrained, underutilized, and isolated due to controls may generate a diminished commitment to perform their daily activities (Jaffee, 1991; Chalykoff and Kochan, 1989; Schnedler and Vadovic, 2011; Workman, 2009).

Control legitimacy in ISD research

Although the ISD-specific research to date in this area is limited, a few studies within the systems development, software engineering, and IT personnel literatures establish a link between ISD controls and socio-emotional consequences. For example, one area of inquiry focuses on the factors that influence IT professionals' turnover intentions (Ghapanchi and Aurum, 2011; Joseph *et al.*, 2007; Lacity and Iyer, 2008). While these studies tend not to focus on the influence of specific ISD control activities, their results are commonly linked to control legitimacy-related elements, such as supervisor and social support, fair policies, organizational rewards, role ambiguity, workload, job feedback, and autonomy. Other studies look more generally at the factors that motivate and demotivate ISD staff. For instance, Beecham *et al.* (2008) find that characteristics such as a fair reward system, supportive relationships, as well as staff participation, feedback, and recognition all positively contribute to the motivation of software engineers. In contrast, employees experiencing an unfair reward system, poor communication, role ambiguity, and a lack of involvement in decision making were increasingly demotivated, ultimately contributing to increased staff turnover and absenteeism. Similarly, Fitzgerald (1996) considers how ISD methodologies provide an increased level of control, but may also stifle creativity, intuition, and learning.

Other studies consider employee resistance to control activities. For example, Boss *et al.* (2009), as well as Lowry and Moody (2015), examine the degree that security policy controls are perceived to be mandatory by staff. They find that employee perceptions of mandatoriness positively influence the security precautions taken by motivating compliance with the control. Similarly, Kohli and Kettinger (2004) examine the implementation of a hospital information system that is initially resisted by end-user physicians. In this case, the physicians (controllees) viewed administrators (controllers) as having insufficient legitimacy to enforce the intended use of the system, which carefully tracked daily healthcare activities and was seen by some physicians as limiting their autonomy.

In summary, studies from a variety of fields both inside and outside of IS have highlighted the positive and negative consequences that control legitimacy perceptions have on employees' socio-emotional well-being. Here, the four control legitimacy sources identified by Bijlsma-Frankema and Costa (2010) provide a high-level framework to understand the factors that shape control legitimacy perceptions. However, it remains unclear how different ISD control activities are related to low and high perceptions of control legitimacy. In particular, controls such as code documentation, deliverables monitoring, stage gates, and pair programming have become common practice within development projects, but little is known about whether, and under what conditions, employees view these controls as legitimate.

This study seeks to address this research gap by developing empirically based insights into the link between the control activities implemented by managers and controllees' perceptions of these activities in terms of justice, autonomy, group identification, and competence development. Because past research establishes the importance of control legitimacy in driving both positive and negative control consequences, it is important for ISD managers to better understand the factors that influence whether employees will

perceive control activities to be legitimate or not. Our study can thus help managers to be increasingly aware of how control activities are perceived by subordinates, as well as how to select and enact controls in a way that simultaneously enhances controllee well-being and ISD performance through a contented, happier workforce.

Research methodology

We adopted a qualitative, multiple case-study approach to examine the link between ISD control activities and controllees' legitimacy perceptions. This approach is common within our area of study (Cram *et al.*, 2016b; Wiener *et al.*, 2016) and allowed us to conduct an in-depth investigation of a contemporary phenomenon, control legitimacy perceptions, within its real-life context (Yin, 2009). The study is part of a broader program of research examining control activities in a variety of IS processes. A total of three case studies were conducted in order to highlight potential commonalities and differences across case settings. Case companies were selected on the basis of varying industries, organizational size, ISD methodologies, and technology architecture in order to maximize these contrasting elements. Details on the three participating organizations (HealthOrg, InsureCorp, and LargeMan)[3], including a summary of the case-specific ISD control activities and their legitimacy perceptions, are provided in the next section.

Data collection

Across the three case companies, a total of 20 interviews were conducted with employees participating in the ISD process (seven interviews at HealthOrg, eight at InsureCorp, and five at LargeMan). The total duration of the interviews was 13 hours and 3 minutes (average interview duration of roughly 40 minutes). All interviews were recorded and the resulting transcriptions comprised 412 pages. A semi-structured interview protocol was employed, including specific questions on the control activities performed in the past and the socio-emotional perceptions of these activities, such as "How do you personally feel about the control mechanisms that are used in the systems development process?," "Do the systems development controls have a positive or negative impact on how you view your day-to-day work?," and "How do you think the systems development team feels about the controls?" (see Appendix 1 for the interview protocol.) Interviews were conducted with both ISD managers (e.g. IT directors, project managers) who acted as controllers and ISD employees (e.g. business analysts, developers) who acted as controllees. By interviewing both controllers and controllees using a retrospective interview approach, we were able to collect data on how controllees personally felt about the ISD controls, as well as on how controllers perceived the controllees' reaction to controls. The authors were flexible in adapting their questions depending on the role of the interviewee. For example, developers were asked about their personal feelings on the controls, while managers were asked about how their teams felt about the controls. Similarly, if a developer had deep experience in a particular area of the systems development life cycle (e.g. testing), the interview would be adapted to discuss a narrow collection of ISD controls, while developers with more generalist experience would be asked about a wider range of controls. This approach allowed us to leverage the interests and opinions of the interviewee, rather than be restricted to a rigid line of questioning.

Data analysis

Analysis of the collected data was conducted electronically using NVivo 10. We first reviewed and coded the interview transcripts for evidence of the four sources of control legitimacy established by Bijlsma-Frankema and Costa (2010) (see Table II in the previous section). We coded all passages where interviewees indicated a high or low perception of

legitimacy pertaining to ISD control activities. For example, if a developer suggested that she enjoyed participating in pair programming because it helped enhance her software programming skills, we would code the comment into the "competence development" category. A total of 284 interview comments were highlighted (87 to "justice," 62 to "autonomy," 65 to "group identification," and 70 to "competence development"). Refer to Table AI for sample interviewee quotes in each category. On this basis, we rated controllee perceptions of the four control legitimacy sources for each case study on a scale ranging from high to low. For example, a high (low) perception of justice was designated when most case study participants noted a strong, uniform perception that the performed ISD control activities were (not) fair and/or reasonable. Moreover, a mixed perception of justice was assigned when some participants perceived control activities to be fair and reasonable, while others did not.

A second round of coding was then conducted to identify the specific ISD control activities in terms of control modes, control degrees, and control styles (see Table I) that influenced controllees' perceptions of control legitimacy. Specifically, we re-reviewed the text passages identified in the first coding round for factors that interviewees stated as the specific source for their perceptions of control legitimacy. For example, if an interviewee stated that a new policy was perceived as impacting controllee autonomy because management failed to adequately communicate with stakeholders prior to its implementation, we would code the statement as "behavior control" (due to the policy) enacted in a "unilateral control style" (due to the one-sided command) in the second round of coding. A total of 304 interview comments were coded to control modes, 81 to control degree, and 103 to control style[4]. Refer to Table AI for sample interviewee quotes in each category, as well as Table AII for a summary of control activities identified in each case study.

In order to verify the validity and reliability of the coding results, the second author reviewed the coding completed by the first author. Where disagreements were noted, such as when the authors viewed a control activity as belonging to a different mode, the authors revisited the interview transcript and the construct definitions. The coding for the passage was discussed and agreement was reached in all cases. In other situations, one author noted evidence of a control activity corresponding with one legitimacy source (e.g. autonomy), while the other author identified a link with a different source (e.g. justice). In cases where this occurred, the authors again discussed the interview passage and the definitions. If both legitimacy perceptions were viewed as being adequately supported, they were both added to the coding.

Following the completion of the coding, the results were evaluated both within and across the three cases in order to identify patterns that could inform our research objectives. When reviewing the results, we also considered aspects of the organizational context of the case companies (e.g. company size, nature of ISD environment, ISD methodology used). We describe these characteristics in the following section and used them as a basis for interpreting each individual case, as well as the possibility that the factors could influence the relationship between control activities and control legitimacy perceptions (e.g. could the use of an agile methodology increasingly lead to a bilateral control style and a high degree of autonomy-oriented legitimacy?). Insights from this exercise are raised in the cross-case analysis section below.

Case overview

Before presenting the findings from our case analysis in the next section, we first introduce the three cases by outlining the case background and describing the predominant control activities (in terms of mode, degree, and style) employed in each case, alongside the aggregated control legitimacy perceptions (in terms of justice, autonomy, group identification, and competence development).

HealthOrg case

HealthOrg is a large teaching hospital based in Canada. Supporting a wide range of clinical and administrative technology assets, the organization employs a "best-of-breed" approach, whereby it attempts to design or buy, then implement and support whatever applications are deemed to best assist in the provision of patient care. Approximately 80 IT staff are engaged in the development, maintenance, and oversight of both legacy and non-legacy (e.g. web-based) applications. Development teams are created on an ad hoc basis and have traditionally followed a waterfall methodology; however, the company recently began to pilot a Scrum-based form of agile development.

InsureCorp case

InsureCorp is a mid-sized insurance company based in Canada. Providing a range of insurance and other financial products, InsureCorp uses a mix of legacy and modern systems to service its customers. Due to the customized nature of its business, systems development teams are employed to build and maintain many of the company's in-house systems. Although a waterfall development approach has traditionally been followed, experimentation with agile techniques has been employed with a few projects in recent years.

LargeMan case

LargeMan is a large manufacturing company based in the USA. Systems development teams focusing on particular areas of the business are distributed around the world and our research focuses on a division operating in Canada. This division oversees an in-house system that facilitates business-to-business e-commerce transactions with distributors. The organization historically followed a waterfall development approach, but has recently transitioned to an agile-oriented approach that follows Scrum principles. The shift to an agile approach was initiated by a faction within the developer group, who had become disillusioned with the effectiveness of traditional development activities. After convincing management to experiment with agile techniques, significant improvements were exhibited and agile was adopted more widely. However, despite the success with agile, a proportion of the development staff was resistant to the methodology change and continued their preferences for a waterfall approach.

Table III summarizes key context factors, applied ISD control activities, and control legitimacy perceptions for each of the cases (see Table AII for details on the individual control activities performed in the three case organizations).

Results

The objective of this study is to shed light on the link between control activities established by controllers and controllees' perceptions of control legitimacy. We present our results below by first describing the control activities (i.e. modes, degree, and style) employed within each of the three case studies, alongside their relationship to control legitimacy perceptions in terms of justice, autonomy, group identification, and competence development (please refer to Table AII for additional details). After outlining the results for each case individually, we then present an integrated analysis of the control legitimacy perception patterns identified across the three cases.

HealthOrg case

The ISD control activities conducted at HealthOrg primarily comprised behavior and outcome controls with a tight control degree, such as detailed technical standards and strict risk management guidelines, which were enacted in a predominantly unilateral control style. Through this approach, hospital management was able to carefully establish a risk-averse

	HealthOrg	InsureCorp	LargeMan
Context factors			
Industry	Healthcare	Insurance	Manufacturing
Total number of employees	10,000	750	75,000
Total number of ISD staff	80	120	2,500
Nature of ISD environment (e.g. legacy vs non-legacy)	Mix of best-of-breed applications	Core mainframe, with limited non-legacy	Mix of legacy and non-legacy environments
ISD methodology	Waterfall, some pilot agile projects	Waterfall, some pilot agile projects	Agile
Nature of ISD tasks	Mix of formal policies, documentation, etc. and prototypes, sprints	Largely formal use of templates, guidelines, stage gates, etc.	Primarily agile, including stand-up meetings and pair programming
Control activities			
Control modes	Behavior control Outcome control Self-control	Behavior control Outcome control	Behavior control Outcome control Clan control Self-control
Control degree	Tight	Relaxed	Tight
Control style	Unilateral	Bilateral	Bilateral
Control legitimacy perceptions			
Justice	Low	High	Mixed
Autonomy	Mixed	High	High
Group identification	High	Mixed	Mixed
Competence development	High	Low	Mixed

Table III. Overview of case companies

ISD control system that was oriented around patient care and protection by providing controllees with little room for adjustment or interpretation. Overall, the ISD control activities performed at HealthOrg led to low control legitimacy perceptions in terms of justice, mixed controllee perceptions in terms of autonomy, and high perceptions in terms of group identification and competence development.

Justice was the most frequently referenced control legitimacy perception (32 quotes). Here, participants expressed that they perceived many of the ISD policies and standards (behavior controls) in place at HealthOrg to be excessive. As a consequence, some controllees actively resisted the controls that they felt were unfair. A HealthOrg manager traced this resistance back to controllees lacking an understanding of the underlying intent and importance of tight behavior controls (e.g. from a risk and knowledge management perspective), as well as controllees fearing that they may become easily replaceable by adhering to such controls:

> I would say [there is] a little bit of [employee] resistance, but [this may come from] maybe not fully understanding [the intent of the policy]. "I don't want you to know everything that I know, it takes away from what I do". I think in the world of risk management and knowledge management, they all have to understand that you can't hold information. You have to document (Risk Manager, HealthOrg).

To overcome controllee resistance, HealthOrg managers relied on a unilateral control style, thereby using their hierarchical authority to ensure and enforce compliant controllee behaviors:

> Change management is a big thing. That is a risk in and of itself too. How do companies manage just that change? It is difficult and especially in a small company where you have got people with 15, 20, 25 years saying, "I don't do it that way, and I never did it that way, and I'm not going to do it that way". "Okay you will do that and your director will probably tell you tomorrow after I talk to him right now" (Risk Manager, HealthOrg).

Although the control portfolio employed at HealthOrg was clearly dominated by behavior and outcome controls, a few examples of self-controls were also present. For example, the hospital management permitted clinical departments to involve external partners in the sourcing and maintenance of specialist information systems that aided in the provision of patient care. Here, the actual selection of the partner firms was delegated to the individual departments, which provided clinicians with the flexibility to choose the technology resources that could best treat their patients. Interviewees generally viewed this flexibility as providing a beneficial source of autonomy to employees. However, management also simultaneously enforced a set of rigid policies, regulations, and/or guidelines in order to ensure that the provision and maintenance of externally sourced systems met organizational standards. An ISD manager commented:

> So [the IT Director's] team in tech services sets the technical standards […] you want to put something on the network? Here is what you have to comply to, here is what you have to do and by the way, we don't allow you to do A, B, C, and D kind of thing. Their job is to protect the organization, right? (Systems Development Manager, HealthOrg).

The combination of self-controls and tight behavior controls (enacted in a unilateral style) ultimately led to mixed controllee perceptions of autonomy at HealthOrg. On one hand, employees were given a degree of flexibility to scale the intensity of controls in line with the project, but on the other hand, the organization's aversion to risk demanded careful accountability for all actions taken. The following quote describes this balance:

> What fascinates me with every project I do is the fine line between not reinventing the wheel, innovation, and ownership. [This is] because there is a different combination of those three things in every project. I think that you need the tools. As we have become larger and larger and more complex and there is more things to think about. If we go to do an electronic patient record upgrade and we find the server people are doing some upgrade […].people need to know about each other and it is too big and there is too much going on. So the rigor of those templates for change control to be approved is important (Clinical and Business Systems Manager, HealthOrg).

Although HealthOrg managers placed strong emphasis on tight formal controls, controllees perceived that the implemented controls facilitated group identification and competence development. For example, interviewees suggested that resource management guidelines (behavior control) resulted in a good deal of importance placed on project teams functioning well with one another. Staff were encouraged to develop various skill sets to compensate for limited staffing, which contributed to knowledge development. Project post-mortems (behavior control) were also seen as being an important team activity, as they provided a way to work together to learn and improve as a group.

InsureCorp case

The systems development process at InsureCorp relied on a variety of traditional controls, including project initiation procedures, development templates, and stage gates, indicating a strong reliance on behavior controls. A few outcome controls were also employed, such as formal requirements gathering and software testing. These controls were primarily used in combination with a relaxed control degree and a bilateral control style. Overall, the ISD control activities performed at InsureCorp led to high control legitimacy perceptions among ISD staff, particularly related to justice and autonomy. Group identification was somewhat mixed and competence development was viewed as relatively low.

At InsureCorp, for example, many behavior controls, such as development templates, project initiation and review procedures, were designed by managers in consultation with

the project manager and the development team (bilateral control style). The following quote explains this approach:

> I was not the one that said to the team that we should have a pure review done. I had sort of left it as a kind of an optional good idea. The team came to me in one of our weekly meetings and said, "we think that we should take a stronger stance on this and we think that we should require it for everything" (Business Analysis Manager, InsureCorp).

Relatedly, when InsureCorp started to experiment with agile development on some projects, a set of templates had been provided to development teams. Here, depending on the specific project, managers permitted team flexibility in adhering to the guidelines. The use of this bilateral control style created an environment where employees were encouraged to provide input and make project decisions independently, which in turn led to high perceptions of both justice and autonomy among controllees. Also, the use of such a control style contributed to the development of an increased sense of shared ownership, which helped promote controllees' identification with both the project controller(s) and the project in general. However, at the same time, managers' heavy reliance on behavior controls, connected to the continued use of the waterfall development approach traditionally adopted by InsureCorp, seemed to have restricted the ability for controllees to interact and identify with other project participants, as well as their ability to develop new skills and knowledge. The following quote from a systems developer highlights this perception:

> The biggest problem that I see [with […]] waterfall is depending on who […] is driving the project, they don't know what they don't know. So they might want a solution, but they don't know how to ask for it […] you may have lots of business problems out there and they want a solution, but they really have no idea what they want. They know that they want to solve it, but they don't know what it is (Systems Developer, InsureCorp).

LargeMan case

At LargeMan, ISD control activities involved all four control modes (i.e. behavior, outcome, clan, and self-controls), ranging from stand-up meetings and pair programming to resource management guidelines and sprint retrospectives. This mix of formal and informal controls was largely driven by the agile development methodology that the organization employed, since most controls aligned with core agile principles (e.g. regular delivery of working code, minimal documentation, importance placed on communication, etc.). The use of several of these agile-driven controls (e.g. open workspaces and resource management guidelines) evoked divergent legitimacy perceptions among controllees in terms of justice, group identification, and competence development. For example, some controllees perceived the introduction of open workspaces to be reasonable, conducive to group communication and identification, as well as competence-enhancing; others perceived the change of the physical design of the office layout to be disruptive to their work. As a consequence, only half the team chose to situate their workspace in the open area. The remaining members of the team continued to work in traditional, walled workstations. The quotes below describe the situation:

> The biggest difference is the physical barrier that we have removed with the open area. It definitely had more impact on most areas of my day than anything else that we have done. Just being able to yell at someone […] to ask a question quickly and not have to walk over or get someone out of their train of thought. You can just ask a question and then carry on. It has also allowed more ad hoc kind of design. One question leads to another and another and before you know it you have 3 or 4 people chiming in with past experience and all that kind of stuff (Developer, LargeMan).

> This open area fosters interruptions and that is still a bit sticking point for half of our team. If you walk through the area, only 5 of us are in an open area; the other 6 are locked up in their cubes and they don't want to ever go open (Developer, LargeMan).

Interestingly, although the employed controls were combined with a tight control degree (e.g. emphasizing daily repetition), they were still enacted in a bilateral control style, blurring the traditional controller-controllee boundaries. For example, the development team itself, who convinced senior management to alter the development process, initiated the transition that the company made from a traditional development approach to an agile approach. The use of a bilateral control style led to high controllee perceptions of autonomy. Particularly in reference to stand-up meetings (also referred to as scrums) and project task allocation, development team members expressed that the control style in place allowed them to express their independence, as highlighted by the following interviewee quote:

> As far as the scrums […] I work best when tasks are chunked down to a size that is not insurmountable. Personally, a half-day task to a day task is how I get things in and out of my queue the quickest. So when we moved to this format and we started chunking tasks down and started using the scrum board and the scrums in the morning, [it contributed to] that ability for me to stay focused. I knew what was coming up because we had already broken it down as a team (Developer, LargeMan).

Cross-case analysis

Based on the individual, within-case analysis discussed above, we also considered the patterns of control legitimacy that emerged across each of the three cases. Although the patterns below are not an exhaustive listing of all the possible links that exist, they represent the ones that were most prevalent, based on our analysis. A summary of our findings are noted in Figure 1.

Control legitimacy pattern No. 1: the role of formal controls and control style. A recurring pattern across the three cases is how the interaction between formal controls (i.e. behavior and outcome controls) and the employed control style corresponds with controllees'

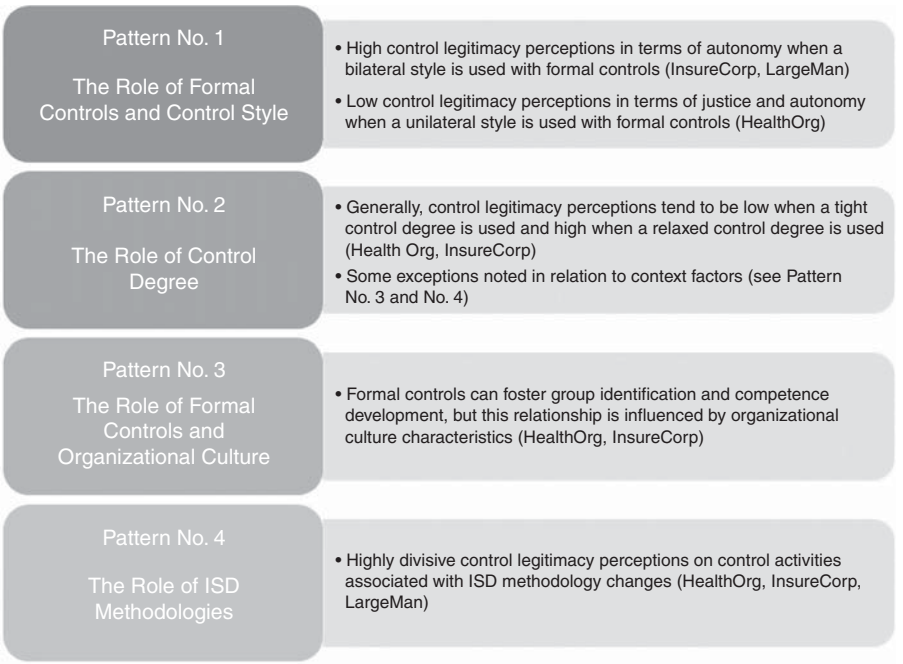

Figure 1.
Summary of cross-case analysis findings

perceptions of justice and autonomy. Our analysis shows that perceptions of these two legitimacy sources were generally higher when formal controls were enacted in a bilateral control style than in a unilateral style. For example, InsureCorp managers relied primarily on the use of a bilateral control style to enact formal controls. Many behavior controls, such as development templates, project initiation and review procedures, were designed by managers in consultation with the project manager and the development team. The following quote illustrates the bilateral control style used at InsureCorp:

> We have to give [employees] permission to [use their skills]. Even chatting with the project manager, he was given a task to investigate how we can accelerate the development efforts […] and he was like, "well we can throw more resources" and we said, "you know, I am going to let you do something". And he said, "what is that?" I said, "break down the barriers. If you think that the process is hindering you from getting this done faster, then you need to declare that and say, 'okay, what do I need to be doing differently with the process?'" (VP Systems Development, InsureCorp).

The use of this bilateral control style created an environment where employees were encouraged to provide input and make project decisions independently, which in turn led to high perceptions of both justice and autonomy among controlees:

> It is having that sense of empowerment with the controls so that there is some level of either predictability or such a high level of feedback that it becomes a self-governing process because the feedback is so active that it just course-corrects or evolves into something that is an appropriate outcome (Systems Design Manager, InsureCorp).

A similar pattern was observed at LargeMan, where formal controls were also enacted in a bilateral control style. For example, the development team convinced senior management to alter the development process and initiate the transition from the company's traditional waterfall development approach to an agile approach. Especially with reference to stand-up meetings and project task allocation, development team members expressed that the control activities in place allowed them to work more independently and efficiently, as highlighted by the following quote:

> Now the whole team gets to essentially democratically vote for what we take on but then will measure to what we say we take on. So we have enabled the team to be a bit more in control of what we do (Development Lead, LargeMan).

In contrast to the control approach used at InsureCorp and LargeMan, HealthOrg management enforced a set of behavior controls in the form of rigid policies, regulations, and/or guidelines without involving the developers in the formulation/design of these controls (i.e. a unilateral control style). The rationale for these controls was to ensure that the provision and maintenance of internally and externally sourced systems met organizational standards. From the perspective of management, there was no need to consult with staff because of the organization's limited appetite for risk. Engaging staff in anything but a unilateral control style was perceived by management as unnecessarily introducing the potential for their strict controls to not be adhered to. As a result, management selected the controls that they thought were appropriate and then implemented them.

However, this unilateral control style corresponded with controllees at HealthOrg who expressed that they perceived the formal ISD policies and standards in place to be excessive. For many of these controls, there had been no prior discussion with management about their design and appropriateness. As a consequence, some controllees actively resisted the controls that they felt were unfair. To overcome controllee resistance, HealthOrg managers again relied on a unilateral control style, using their hierarchical authority to ensure and enforce compliant controllee behaviors.

This continued used of a unilateral style for enacting formal controls, even in the face of employee resistance, cultivated a diminished sense of justice and autonomy for HealthOrg controllees. This is in clear contrast to InsureCorp and LargeMan, where enacting formal controls with the use of a bilateral control style appeared to be a key factor in driving controllees' perceptions of autonomy and justice, although these perceptions did not translate to group identification and competence management.

While the control portfolios employed at HealthOrg and LargeMan were clearly dominated by behavior and outcome controls, a few examples of self-controls were also present. For each of these examples of self-control, interviewees expressed corresponding perceptions of a high level of autonomy. For example, HealthOrg management permitted clinical departments to involve external partners in the sourcing and maintenance of specialist application systems (e.g. for medical imaging) that aided in the provision of patient care. Here, the actual selection of the partner firms was delegated to the individual departments (self-control), which provided clinicians with the flexibility to choose the technology resources that could best treat their patients. The following quote explains this view:

> [HealthOrg] has had a long standing tradition of being best of breed and we have never said you can't go out and acquire something […] you can go out and get a system that does a medical imaging application (Clinical and Business Systems Manager, HealthOrg).

Interviewees generally viewed this flexibility as providing a beneficial source of autonomy to controllees. Similarly, LargeMan's use of the agile methodology permitted development team members to determine the selection of tasks they would work on and monitor their own progress toward completion. The team utilized the story card technique, which broke down system requirements into small, concise directives. Developers could then choose the stories that they would like to work on from the pool that was available. This autonomy was highly valued by the development team members, as it allowed them to work on tasks they preferred rather than those mandated by a project manager. The following quote highlights this perspective:

> One thing that […] I had talked about before was the idea of a story owner […] Let's say if [a developer] took ownership of the entire story, [they would be] responsible for updating it and making sure that we are communicating back to the business and doing our demos and that all of the developers have done their piece. Just kind of take the ownership of it and see it through (Development Manager, LargeMan).

Control legitimacy pattern No. 2: the role of control degree. By definition, the control degree is determined by the control frequency and intensity. As such, we anticipated that controls characterized by a tight degree (i.e. high frequency, high intensity) would correspond with a low level of perceived legitimacy, since employees would view the extent of control to be unnecessary and excessive. Likewise, we expected that less frequent and intense controls (i.e. a relaxed degree) would be viewed as increasingly legitimate, as they provided more flexibility and fairness. Although our analysis did reveal some examples where a tight control degree was associated with low legitimacy perceptions, and a relaxed control degree was associated with high legitimacy perceptions, a notable number of exceptions occurred.

For example, HealthOrg predominantly employed controls of a tight degree, such as technical policies and standards, risk management guidelines, and deliverables monitoring, which corresponded with low perceptions of justice and autonomy. However, interviewees noted other tight controls, such as laws and regulations pertaining to organizational software as being high in justice. In comparison, InsureCorp employed a series of controls of a relaxed degree (e.g. resource management guidelines, project initiation procedures), which corresponded with high autonomy and group identification, but other relaxed controls, such as requirements gathering and business-IT communication processes, had the opposite

effect on group identification and competence development. Specifically, the historical reliance on traditional, waterfall development techniques was viewed as restricting the creativity and problem-solving abilities of team members, which decreased the legitimacy perceptions of the controls.

The most pronounced contrast with our expectations of the control degree-legitimacy perception relationship was at LargeMan, where the majority of controls were characterized by a tight degree but corresponded with high legitimacy perceptions. For example, the daily routines associated with agile development in terms of the stand-up meetings, pair programming, and IT-business communications were both frequent and intense, but were also seen as providing a high degree of autonomy and competence development. Another example was the use of a product backlog, which tracked all of the upcoming ISD project tasks. By continually referring to the backlog (i.e. a tight degree), team members were able to develop new insights into the project and assist colleagues when they experienced problems (i.e. competence development). The following quote explains this view:

> We are consistently grooming the product backlog every week, which includes the BA's [business analysts], our team, and any clients that we may need to pull in. So there is just that constant feedback. Everyone knows what is going on and what is coming up. If there are issues, "What are you doing?" and "What are you doing? What are your expectations?" There just seems to be a lot more visibility (Development Manager, LargeMan).

Control legitimacy pattern No. 3: the role of formal controls and organizational culture. Our case analysis indicates that the use of formal controls has the potential to foster group identification and competence development, but that this relationship is influenced by the characteristics of the organizational culture. At HealthOrg, for example, managers placed strong emphasis on developing and cultivating a patient-oriented culture oriented around high-quality service and the in-depth knowledge of staff. Complementing these cultural norms, behavior controls such as project post-mortems and resource guidelines were appreciated by the controllees and served to foster a feeling of team unity and an environment of knowledge sharing, facilitating group identification and competence development. The following quote describes this perspective:

> If there is one thing that we have kind of consciously decided, it is that [after] we have gone through go-live, our next major benefit to the organization is about historical learnings and so we have treat project closings very, very seriously. What did we learn in the project? What do we think the project was when it started? What did it actually turn out to be? Document what those leanings are, make some recommendations on next steps, and kind of keep that iterative loop going on that cycle […] it was a culture change to tell people to just not walk away from the project; please leave something behind that others can learn from (PMO Director, HealthOrg).

Very different organizational culture influences could be observed at InsureCorp, where perceptions of group identification were mixed and competence development was low. As opposed to the highly integrated, knowledge-centric work culture of HealthOrg, InsureCorp was much more compartmentalized, with considerable differences in work cultures across sub-units of employee work. Due to a recent reorganization, ISD team members tended not to interact extensively with one another or with business stakeholders. As a result, formal controls such as requirements gathering, development, and testing activities were largely disconnected from one another, leading to team perceptions of isolation and inaccessibility. However, demands by the business for accuracy and reliability of the systems developed within the ISD organization were intense and further contributed to a culture of IT being disconnected from the business. The imbalance between a disjointed systems development team and highly demanding business users intensified concerns related to specific control activities, such as requirements gathering and software testing.

Similar to the discussion on HealthOrg's culture above, these legitimacy perceptions (in this case, related to competence development) were not only a reflection of the control activities in place, but were also a function of how the controls operated within the overall organizational culture. However, rather than enhancing the perceptions, as they did at HealthOrg, the cultural characteristics at InsureCorp lowered the perceptions of legitimacy. The following quote highlights this connection:

> So I think that a lot of it stems from culturally we have that fear of making a mistake and getting QA's who did not do a good enough job. I got an email from our VP of Insurance distribution saying, "why is this software horrible and why is it that our distributors can't use it?" and it causes them so much grief and what are we doing about this? (VP Systems Development, InsureCorp).

Control legitimacy pattern No. 4: the role of ISD methodologies. Finally, our analysis also uncovered that a change in ISD methodology (and the associated changes in control activities), such as the transition from waterfall to agile, can correspond with highly divisive legitimacy views on the control activities associated with such a change. Because all three of the case study organizations had recently introduced agile development (on a pilot basis at HealthOrg and InsureCorp, and on a more established basis at LargeMan), we were in a unique position to hear the related legitimacy perspectives of controllees. We recognize that such methodology changes typically occur relatively infrequently and this control legitimacy pattern may not apply to all companies; however, we noted that many of the "mixed" control legitimacy perceptions noted in Table III corresponded with one group of employees having high legitimacy perceptions about the new ISD methodology (or elements thereof), while another group had low legitimacy perceptions.

For example, as part of its transition to agile, LargeMan decided to change the physical design of its ISD offices and introduce open workspaces. While some employees perceived this change to be beneficial to group identification and competence development, others perceived the change of the office layout to be disruptive to their work, and thus to be unreasonable. As a consequence, only half the team chose to situate their workspace in the open area, while the remaining members of the team continued to work in traditional, walled workstations. This polarizing view was reflected in mixed control legitimacy perceptions within LargeMan's ISD development team (as illustrated by the quotes listed above; see LargeMan case analysis).

Similarly, HealthOrg's historical reliance on controls consistent with the traditional waterfall development approach, including process and project documentation, appeared to conflict with the recent introduction of agile techniques. Because waterfall had become so institutionalized, some controllees questioned the value of agile and the legitimacy of the associated controls. These negative views, however, were not uniform, and like at LargeMan, some HealthOrg employees welcomed the introduction of the new ISD methodology. The following quote highlights these divisive views:

> We felt that agile was something that we could incorporate and hopefully reap the rewards of. Now having said that though, I think structurally we have some issues to address first […] I just felt that it was getting out of control and was too much […] I am not so sure that we actually saved any time given the 8 months that we spent on [agile] so far. There is a nice energy and a nice pace to it, but for me it is more about staff morale than it is about productivity (Director of IT, HealthOrg).

Summary

Overall, the results of our analysis point to a notable variance in control legitimacy perceptions within each case study, as well as in control activities performed across the three case studies, especially with regard to the applied control degree and control style (see also Table III). In particular, while the analysis shows that controllers in all

three organizations relied heavily on formal (behavior and outcome) controls, it shows more disparities in tight (HealthOrg, LargeMan) vs relaxed (InsureCorp) control degrees, as well as in unilateral (HealthOrg) vs bilateral (InsureCorp, LargeMan) control styles. The relative uniformity in regard to control modes suggests that explaining control legitimacy perceptions solely from this control-activity category would be difficult. However, a series of unique patterns were uncovered by also considering the employed control degree and style.

Discussion

Theoretical implications

The case results point to the importance of considering the control degree and control style, as well as key contextual factors (e.g. organizational culture, changing ISD methodologies), in order to enable a deeper understanding of the complex links between ISD control activities and control legitimacy perceptions. In particular, our results highlight the need to expand the traditional view of ISD control activities (i.e. control modes) popularized by Kirsch (1996, 1997) in order to shed light on how such activities contribute to shaping controllee perceptions of control legitimacy. Put differently, while control modes alone did little to explain how employees perceive controls, the addition of control degree and control style increasingly aided in understanding the employee points of view. For example, the observed link between the use of self-control and controllee perceptions of autonomy is broadly consistent with findings from past research (e.g. Santana and Robey, 1995), which finds links between the source of control (e.g. manager, co-worker, or self) and controllee satisfaction. However, by also considering the influences of different control styles and varying control degrees, as well as contextual influences, we were able to increasingly clarify the patterns that corresponded with high and low perceptions of control legitimacy. By developing the concept of control legitimacy, these results help to incrementally extend the recent research (e.g. Gregory *et al.*, 2013; Wiener *et al.*, 2016; Cram, Brohman, Chan and Gallupe, 2016) that has attempted to push the boundaries of ISD control theory to consider elements other than control modes as a means to explain unsatisfactory ISD performance.

Regarding the control degree, we were somewhat surprised by the observation that, in some cases, a tight control degree corresponded with high legitimacy perceptions and relaxed control degree corresponded to low legitimacy perceptions. A potential explanation relates to the high degree of change ongoing at our case study organizations, in that employees find reassurance in the close oversight that a tight degree of control provides. Past control research highlights the importance of adapting controls to the project stage (e.g. Gregory *et al.*, 2013; Cram *et al.*, 2016a); our findings may suggest a similar link between organizational change and control degree. This finding also highlights the varying degrees of control legitimacy perceptions that can exist, as well as how these perceptions may change, depending on the characteristics of a particular organization (e.g. organizational culture and change). Existing research in innovation and technology adoption, such as Abrahamson (1991, 1996) and Jackson and Tillquist (2002), highlights the role of organizational norms, structure, and culture in facilitating the transition to new processes and systems. In the context of our case studies, each of the organizations had recently undertaken projects that included elements of an agile development methodology. Because the companies had an extensive history of waterfall development, it may be that the associated controls would have been characterized as having a more passive degree of legitimacy because they had become institutionalized over time (Suchman, 1995). Past research, such as Cram and Brohman (2013), has made similar distinctions between the nature of controls used in waterfall vs agile ISD approaches. Where controls undergo a significant transition, as they did in our case studies with the introduction of agile-oriented controls, future research could examine if this leads employees to become highly active and engaged in drawing legitimacy conclusions. In order for these new controls to be successful

in altering the status quo and guiding employee behavior, we would expect that controls would come under closer scrutiny by employees and that organizations would need to pursue a more active form of control legitimacy support.

An additional factor at play is the possible interaction between control degree and control style. Where the degree and style are employed with seemingly consistent objectives (i.e. tight degree and unilateral style, or relaxed degree and bilateral style), as they were at HealthOrg and InsureCorp, employee perceptions were more uniform (i.e. fewer "mixed" perceptions were encountered). This may suggest that employing controls with a degree and style that seems at odds with one another, at least on the surface, may be more polarizing for employees, as it was at LargeMan, where a tight control degree was combined with a bilateral control style. These contrary perceptions may be traced back to differences in individual work preferences. For example, unlike monochronic individuals, polychronic individuals prefer to do several things at the same time (Bluedorn *et al.*, 1999). They view time as an inexhaustible resource and interpersonal relations are at least as important for them as the work to be performed, which is not the case for monochronics, whose extreme dedication to one particular task relegates interpersonal communication to a position of secondary importance (Bluedorn *et al.*, 1999).

Taken together, by shedding light on the link between ISD control activities and the sources of control legitimacy perceptions, the insights uncovered in this research can aid in avoiding and/or responding to the resulting negative consequences, such as job dissatisfaction and stress. For example, past research suggests that employee perceptions of factors such as autonomy, involvement, and role ambiguity all have a direct link to employee turnover (Joseph *et al.*, 2007; Lacity and Iyer, 2008; Ghapanchi and Aurum, 2011). When organizations support the social and emotional well-being of employees, a reciprocal relationship is formed that encourages stronger performance from staff (Santana and Robey, 1995; Beecham *et al.*, 2008). As a result, managers who implement control activities without taking into account the subordinates' point of view may be overlooking a fundamental driver that shapes employee perceptions of how the organization treats them. Where these perceptions are negative (e.g. ambiguous roles, lack of autonomy, lack of flexibility), managers could be neutralizing the effectiveness of their current controls by emboldening disgruntled employees to resist guidelines and defy management (Kohli and Kettinger, 2004; Jaffee, 1991; Workman, 2009); where the perceptions are positive (e.g. motivation, autonomy, collaboration, flexibility), managers could be enhancing their control effectiveness with socially and emotionally fulfilled employees that understand and comply with controls (Bijlsma-Frankema and Costa, 2010; Avital *et al.*, 2009; Son, 2011).

Practical implications

A series of implications for organizations and managers stems from our research. First, managers should carefully consider the positive and negative consequences of employee legitimacy perceptions when selecting and enacting controls. For example, managers who use controls that are perceived by employees as reasonable will be more likely to improve employee compliance and job satisfaction (Scott, 1987; Suchman, 1995; Santana and Robey, 1995). Here, our findings suggest that employing a bilateral control style may be one way to enhance legitimacy perceptions by fostering controller-controllee interactions and controllee understanding. Based on the benefits of establishing controls that are perceived as legitimate by employees, it would seem advantageous for managers to carefully consider the desirability and appropriateness of potential controls prior to their actual implementation (Bijlsma-Frankema and Costa, 2010; Suchman, 1995; Narayanaswamy *et al.*, 2013). This "roadmap" supplements the practical guidance given to managers within the existing literature, which concerns itself much more with selecting controls that match the strategic (Rao *et al.*, 2007), structural (Choudhury and Sabherwal, 2003), and process (Kirsch, 1996; Kirsch, 1997) characteristics of an organization (Cram, 2011; Cram *et al.*, 2016b).

A second practical consideration from this research should encourage managers to carefully communicate controls to employees. Past research in other areas of IS has established that perceptions can often be reliable, but that misunderstandings can sometimes occur (Tallon and Kraemer, 2007; Tallon *et al.*, 2000). During our interviews, we noted a series of instances where managers believed that resistance to a particular ISD control was at least partly related to misinformed employees. This outcome could relate to a unilateral control style that fails to engage the controllees in the control enactment process (Wiener *et al.*, 2016). In effect, a control that could have been perceived as legitimate is actually being viewed as illegitimate due to a miscommunication between controller and controllee.

Limitations and future research

As with any research, this study has several limitations, which also offer interesting opportunities for future research. First, our case studies sought to collect a range of viewpoints by collecting data from companies of various sizes, technology infrastructures and systems development approaches. However, our cases employed relatively few informal controls and the organizations were undergoing a period of transition. It is unclear how our results may apply to companies that are either stable in their ISD process (e.g. have exclusively used waterfall) or employ a large proportion of informal controls. Second, our research focuses on the (hierarchical) control relationship between ISD managers and developers in an in-house setting. Past research, including Soh *et al.* (2011) and Heumann *et al.* (2015), highlights the different controller-controllee dyads that exist both within a single organization and across multiple organizations via outsourcing. Additional insights may result by considering different control relationships and ISD settings (e.g. C-level executives vs ISD managers, client vs vendor account managers), as well as by breaking down the duality of the controller and controllee (e.g. exploring control self-directed teams without an acting manager). Indeed, challenging the inherent assumptions regarding the purpose of ISD control (e.g. Remus *et al.*, 2015) may help to uncover new directions for future research, particularly in the context of legitimacy. Third, we recognize that other factors (such as controllee age and experience, company size and industry, etc.) may also play a role – alongside the employed control modes, degree, and style as well as the organizational context factors identified in this study – in influencing employees' perceptions of autonomy, justice, group identification, and competence development. Examining these factors in more detail in future research could aid in further clarifying how legitimacy perceptions are formed. Finally, the focus of our study was on exploring the link between control activities and control legitimacy perceptions at a point in time. Future research could build on the insights gained from our study by mapping how controllee perceptions evolve over time. Employing such a dynamic approach could allow for a clearer connection between the temporal fluctuations that link control activities and legitimacy perceptions, as well as ISD performance. Adding to this, future research could examine the interplay (and tensions) between different sources of control legitimacy. For example, Bijlsma-Frankema and Costa (2010) advocate for further consideration of when particular sources of control legitimacy are more important than others (e.g. autonomy vs justice). This may be of particular interest within an ISD context when considering the relative merits of different ISD approaches (e.g. waterfall vs agile), which tend to use fundamentally different control approaches (Cram and Brohman, 2010).

Conclusion

The objective of this research was to explore the relationship between ISD control activities and perceptions of control legitimacy. Motivated by the controller-centric perspective that has traditionally been the focus of ISD control research, this study takes a controllee-oriented viewpoint as a possible explanation for the high degree of variance experienced in ISD outcomes. From a practical standpoint, our findings suggest that managers who exercise

ISD controls in a way that takes into account employees' desires for justice, autonomy, group identification, and competence development, can encourage improved organizational outcomes from a more satisfied development team. By being aware of these opportunities, managers have the opportunity to enhance individual, group, and organizational performance through increasingly motivated and engaged employees, while avoiding the negative side effects (e.g. employee dissatisfaction, stress, and turnover intentions) of controls not perceived to be legitimate. From an academic perspective, the study makes a case for an expanded view of ISD control theory by introducing the concept of control legitimacy. Recent work in the field has increasingly focused on the underlying characteristics of control activities (i.e. mode, degree, and style) as an explanation for why some ISD controls are effective, while others are not. By adding the concept of control legitimacy to this "toolbox" of theoretical constructs, this study can further aid the capability for researchers to understand the effectiveness of ISD controls, but also encourage the field to expand the scope of ISD control research to more fully include the perspective of the controllee.

Notes

1. We use the term "control activities" to encompass the range of actions conducted by managers that relate to the control of ISD processes. This includes the range of classifications that have been used in prior literature to organize control characteristics, including control mode, control degree, and control style.
2. In line with prior ISD control research (e.g. Kirsch, 1996), we distinguish between formal and informal control groupings, which include behavior, outcome, clan, and self-control modes. This "standard" control typology closely resembles the three control "types" suggested by Gregory *et al.* (2013): (formal) procedural controls, (informal) social controls, and hybrid controls.
3. Company names have been changed at the request of the participating organizations.
4. The total number of interview comments coded in the second round is larger than the first because a single comment could be coded to more than one control-activity dimension.

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Appendix 1. Interview protocol

(1) Can you tell me about your current role at CASE STUDY PARTICIPANT? What activities and processes within the IT group are you involved with?

(2) Specific to the systems development process, what do you see as the primary objectives or important outcomes?

(3) What control mechanisms do you see being used within the systems development process to encourage employees to behave in a way that helps achieve the objectives you mentioned?

(4) Do the control mechanisms used to achieve the process objectives change over time? Are they viewed as being effective?

(5) From your perspective, what organizational factors influence why particular control mechanisms are used in the systems development process rather than other mechanisms?

(6) How do you personally feel about the mechanisms that are used in the systems development process? Do they have a positive or negative impact on how you view your day-to-day work? How do you think your team feels about the controls?

(7) When you consider the characteristics of controls related to the systems development process, do you consider them to exist in a consistent pattern within the process?

(8) Thank you for your time. Are there any questions I should have asked on this topic but didn't? Is there anything else you'd like to talk about regarding this topic?

Appendix 2

Coding category	Coding sub-category	Sample quotes
Control legitimacy perceptions	Justice	"How large is the piece of software that you are building? If you are building something that has a couple hundred functions, then yeah I am sure that agile is great. But if you are building something that has tens of thousands of functions and you are looking at potentially hundreds of thousands of lines of code, does it really even apply anymore? Does that have scale is really the question." –IT Director, HealthOrg
		"Well one thing that we agreed as we were working it out was that it would be a blame-free zone, right? And we also agreed that pure reviews would have absolutely no relevance whatever to the formal performance management thing, the annual merit increases and all of that kind of stuff, right? So you may never fear that I am going to give you my document and you are going to look it over and you are going to find 4 or 5 good ideas and somehow the fact that I didn't think of those 4 or 5 good ideas or you found some things that I missed it is not going to reflect on [my performance evaluation]." – Business Analysis Manager, InsureCorp
	Autonomy	"Now the whole team gets to essentially democratically vote for what we take on, but then will measure to what we say we take on. So we have enabled the team to be a bit more in control of what we do." – Development Lead, LargeMan
		"I was not the one that said to the team that we should have a pure review done and everything. I had sort of left it as a kind of an optional good idea. The team came to me in one of our weekly meetings and said, 'we think that we should take a stronger stance on this and we think that we should require it for everything'." –Business Analysis Manager, InsureCorp
	Group identification	"So you know, the reality is that we are a small group and even in our traditional waterfall environment, the analysts are part of the development team and we don't really have any walls between them. So they are a very tight knit group and work together." –Systems Development Manager, HealthOrg
		"The biggest difference is the physical barrier that we have removed with the open area. It definitely had more impact on most areas of my day than anything else that we have done. Just being able to yell at someone […] to ask a question quickly and not have to walk over or get someone out of their train of thought. You can just ask a question and then carry on. It has also allowed more ad hoc kind of design. One question leads to another and another and before you know it you have 3 or 4 people chiming in with past experience and all that kind of stuff." – Developer, LargeMan
	Competence development	"And then after the fact it is doing the post-mortem. What happened? And so that is where I do the risk reports for our CIO. So I go and try and police the investigation side of it. 'So what actually happened? What was the time of it? Who was initially called? Was it a deficiency on our part?' One of the things that I measure here within the hospital

Table AI.
Sample interviewee quotes

(*continued*)

Coding category	Coding sub-category	Sample quotes
		are versions of applications; so a phone has a version, everything has a version. And applications within the hospital have a version." –Risk Manager, HealthOrg
		"A lot of knowledge transfer as well. I came into the team not being a specialist on […] two very different systems. I came into the team last fall clearly not being an expert in either and when we started doing this, it opened me up to become an expert in both fields. And it made that a lot easier to learn both systems." – Developer, LargeMan
Control mode	Behavior control	"As we have become larger and larger and more complex and there are more things to think about […] so the rigor of those templates for change control to be approved is important. It is also great as a checklist because if any person doing a project goes, 'I need to think about communications to the users. Have I done so? What is going to change? Have they done their processes?'." – Clinical and Business Systems Manager, HealthOrg
		"At the beginning of the project the risk is here and it is supposed to go down as you get into execution and then closure, right? It is supposed to go down but if you find that your risk is starting to go up, then that is what happened with that particular strategic process. As we got closer to implementation, the unknowns kept on popping out and issues kept being on being highlighted and the risk went up considerably. So [for our] project assurance process, I meet monthly with the PM's." – Project Management Director, InsureCorp
	Outcome control	"So one of the things that it has brought and why it works out so well is because we put everything into a backlog and we make everything very visible and that is the big key. Everything is visible and everybody knows and has got a better idea of where things are right down to the lowest level. Everybody throughout the entire project knows what is in the backlog right now and can go find it." –Project Manager, LargeMan
		"But what we have really been focussed on is better planning to make sure that we have a proper understanding of what the objectives are of whatever initiative we are taking on and defining those to a point of indicators if we can. Have those indicators be put in a baseline to say, 'okay, we are going to change something, whether it is implement a new system or change the way practice is done or whatever the project is'." – PMO Director, HealthOrg
	Clan control	"I think that I have a pretty good and dynamic team. They work really, really well together. We tend to divide and conquer and so we are having some sessions now where we know that we have all of this work that needs to get done and how are we going to do it? And it is not how are we going to do it individually, it is how are we going to do it as a team." – Quality Assurance Manager, InsureCorp
		"As a prime example, two weeks ago one of our contractors approached me and said, 'hey, I would like to shadow someone. Do you have time for me to work with you?' And I said, 'sure, come on down'." – Developer, LargeMan
	Self-control	"So we think that really people are now mature enough to think about what artefacts make sense for this project and this situation and what level of depth do we really need on each, rather than making it very structured." –Business Analysis Manager, InsureCorp
		"As far as the scrums […] I work best when tasks are chunked down to a size that is not insurmountable […] So when we moved to this format and we started chunking tasks down and started using the

(*continued*)

Table AI.

Coding category	Coding sub-category	Sample quotes
		scrum board and the scrums in the morning, [it contributed to] that ability for me to stay focused." –Developer, LargeMan
Control degree	Tight	"So [the IT Director's] team in tech services sets the technical standards […] you want to put something on the network? Here is what you have to comply to, here is what you have to do and by the way we don't allow you to do A, B, C, and D kind of thing. Their job is to protect the organization, right?" – Systems Development Manager, HealthOrg
	Relaxed	"Now one of the main things that I like about agile and scrum and having the shorter development cycle is that the fact that I do have work all of the time and I am not waiting on other groups […] there is none of that kind of lull, bored time. If I need something it is going to be available for me. As much as I kind of like the silo a bit because of the stuff that I am working on, if I could take my skill set and move it somewhere else that is always a good thing as well." –Developer, LargeMan "That is part of the reason that we put that stage gate model in place. Because it is not meant to be heavy weight or oppressive or anything. It really is […] especially for initiatives of this size and this is part of the experience curve that folks have to go through is those stages and gates really should be quite fluid and flexible and right sized or appropriate for the nature and size and complexity of the project that you are leading." –VP – Project Management, InsureCorp "[Management] are like, 'okay, that is great if people feel the need that they have to stay after hours and give us more work' […] whereas I don't want to get into a trap where I feel that I have to because everybody else is." – Developer, LargeMan
Control style	Unilateral	"You have a project steering committee and you want to have a systems development steering committee so that we can set the stage. 'Here is what we are expecting to see from you' and 'what are the opportunities for those improvements' or 'you stop doing this because it doesn't make any sense and start doing this or change or continue this'." –Systems Development VP, InsureCorp "Change management is a big thing. That is a risk in and of itself too. How do companies manage just that change? It is difficult and especially in a small company where you have got people with 15, 20, 25 years saying, 'I don't do it that way, and I never did it that way, and I'm not going to do it that way'. 'Okay you will do that and your director will probably tell you tomorrow after I talk to him right now'." – Risk Manager, HealthOrg
	Bilateral	"From the very first meeting that we had at the poker planning meeting that we did, that kind of solidified that change in the team. Before it was top-down. Our managers and supervisors would commit to the clients and say, 'yep, we will deliver that' and then come to us and say, 'we have got three months and we have to deliver this'. And it was like, 'well, you didn't ask me if it was feasible!' It makes us a little more accountable and it makes us a little more engaged in the sense that we have the ability to put input and it is up to us whether we do or don't." – Developer, LargeMan "But with that small amount of accountability comes a whole bunch more just by virtue of the fact that they now have a voice in the process. So things like the sprint retrospectives, we get a lot of people piping up and saying things who were very silent on the team before. It feels like they have more control over how we do things and how we can best utilize our skills to produce value." – Development Lead, LargeMan

Table AI.

Appendix 3

Control	Mode	Degree	Style	Legitimacy perceptions (Low, Mixed, High)
HealthOrg case				
Technical policies and standards	Behavior	Tight	Unilateral	Low autonomy, low justice
Risk management guidelines	Behavior	Tight	Unilateral	Low autonomy
Process and project documentation	Behavior	–	Unilateral	Low justice
Communication processes between IT and business users	Behavior	Tight	Bilateral	High justice
Laws and regulations pertaining to organizational software	Behavior	Tight	Unilateral	High justice
Resource management guidelines	Behavior	Relaxed	–	High group identification
Sprint retrospectives or post-mortems	Behavior	–	–	High competence development
Decentralized authority for systems management	Behavior, Self	Relaxed	–	High autonomy
Code review and application testing	Outcome	–	Bilateral	Low justice
Working prototypes	Outcome	Tight	–	High competence development
Deliverables monitoring	Outcome	Tight	Unilateral	Low justice
InsureCorp case				
Development templates/checklists	Behavior	Relaxed	Bilateral	High autonomy
Resource management guidelines	Behavior	Relaxed	Bilateral	High autonomy
Communication processes between IT and business users	Behavior	Relaxed	Bilateral	Low group identification
Stage gates	Behavior	Relaxed	Unilateral	High justice
Task allocation to developers	Behavior	–	Unilateral	High justice
Employee cross-training	Behavior	–	–	High group identification
Project initiation procedures	Behavior	Relaxed	Bilateral	High group identification
Requirements gathering	Outcome	Relaxed	Bilateral	Low competence development
Software testing	Outcome	Tight	Bilateral	Low competence development
LargeMan case				
Communication processes between IT and business users	Behavior	Tight	Bilateral	High group identification
Employee cross-training	Behavior	–	Bilateral	Low competence development
Pair programming	Behavior	Tight	Bilateral	High competence development, low group identification
Software testing	Outcome	–	–	Low justice
Resource management guidelines	Outcome	Relaxed	Bilateral	Mixed justice
Task-level scoping	Outcome	Tight	Bilateral	High group identification
Stand-up meetings	Clan	Tight	Bilateral	High autonomy
Team-based task allocation	Self	Tight	Bilateral	High autonomy

Table AII.
Case-specific control activities and legitimacy perceptions

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