



# “Unblackboxing” Decision Makers’ Interpretations of IS Certifications in the Context of Cloud Service Certifications

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## Abstract

IS literature has predominantly taken a black box perspective on IS certifications and studied their diverse set of outcomes, such as signaling superior quality and increased customer trust. As a result, there is little understanding about the structure of certifications and its role in decision makers’ evaluations of certifications to achieve these outcomes. However, idiosyncrasies of novel IT services, such as cloud services, create a need for “unblackboxing” certifications and theorizing about their constituting structural building blocks and structural elements, as well as examining key features that might lead to a more favorable evaluation of a certification by decision makers. To advance theory building on certifications, this article develops an empirically grounded typology of certifications’ key structural building blocks and structural elements, and examines how they interpret substantive features within these elements. Using evidence from 20 interviews with decision makers from a wide range of industries in the context of cloud service certifications, we find that a decision maker’s aggregate evaluation of a certification is a function of their interpretations of its features guided by cognitive interpretive schemas along six key structural elements, contrasted with the decision makers’ expectations regarding the certification’s outcomes. This study contributes by conceptualizing the necessary and sufficient elements of certifications, constructing a nascent theory on decision makers’ evaluations of certifications, and illuminating the dynamics between certifications’ structural elements and outcomes as a coevolutionary process. We discuss implications for the certification literature and give managerial advice regarding the factors to consider when designing and evaluating certifications.

**Keywords:** Certification, Trust, Signaling, Legitimacy, Theory Building, Interpretive

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## 1 Introduction

*One should bear in mind that certifications contain specific principles for good reason . . . It takes a lot of work to design these principles and think about which create value and which do not.* (cloud-based CRM software-provider executive on the value of certifications for customers and providers).

IT providers worldwide have been increasingly adopting certifications of processes, products, and services related to information systems (IS), as demonstrated by adoption rates of prominent IS certifications,<sup>1</sup> such as ISO/IEC 20000 for IT service

<sup>1</sup> In the following we use the term certification as a synonym for IS certifications of IS processes, IS products, and IS services for simplicity. Note that this definition does not include certification of individual IS professionals in terms of specific IS skills.

management and ISO/IEC 27001 for IT security (e.g., Disterer, 2012; ISO, 2012). With services becoming more complex and sourced from physically distant providers and online markets, certifications—as devices to signal quality and create trust—are also becoming more important to IT providers' customers, as demonstrated by the growing number of cases featuring certifications as an integral part of bidding processes.

For example, U.S. federal contracts between June 2011 and December 2012 requiring ISO/IEC 20000 amounted to about USD 30 billion (ITG Group, 2013). Initiatives such as Cloud Security Alliance (CSA) STAR, TRUSTed Cloud Data Privacy Certification, and EuroCloud Star Audit have begun to design a novel class of certifications, namely cloud service certifications (CSCs).

The executive's comment above illustrates that a certification's features are important for a decision maker's evaluation of the potential value of a certification. For IT providers (i.e., senders of certifications), it is believed that certifications can improve legitimacy in a market, earn price premiums by signaling high quality, and trigger internal improvements by aligning processes with best practices codified in a certification (Gopal & Gao, 2009). For (prospective) customers of certified IT providers (i.e., receivers of certifications), it is theorized that certifications aid decisions by providing assurance that a provider will fulfil its promises (i.e., trust) and by reducing information asymmetries about IT service quality (Aiken & Boush, 2006). Whether, to what extent, and in what way these outcomes materialize is, however, subject to an ongoing discussion with inconclusive findings. For example, some studies find a significant effect of certifications on customers' trust in e-commerce providers (Hu, Wu, Wu, & Zhang, 2010), while others do not (McKnight, Kacmar, & Choudhury, 2004). The existing initial research sought explanation by identifying contextual or perceptual contingency factors (e.g., Gao, Gopal, & Agarwal, 2010; Lowry et al., 2012). The role of certifications and their features in such settings, however, have not yet been explored, although some scholars have conjectured that differences between certifications affect decision makers' behaviors upon certifications (Özpolat, Gao, Jank, & Viswanathan, 2013).

As a result, we only have limited understanding of the nature and characteristics of certifications and to what extent possible configurations of certifications affect decision makers' reactions to them. For example, certifications differ substantially in terms of their *content* (e.g., TRUSTed Cloud Data Privacy Certification on *privacy* and ISO 27001 on *security* management), *sources* (e.g., incumbent authorities such as ISO and novel ones such as CSA), and *audit processes* (e.g., a third-party audit for ISO 27001 and

a self-assessment for CSA STAR level 1). Arguably, differences in these features might influence a decision maker's perceived value of a certification. Hence, understanding the constituting structural elements of a certification and the features that might lead to a more favorable evaluation of a certification would help clarify why a certification might have different effects in different conditions, for reasons that are rooted in certifications rather than in contextual or perceptual contingency factors. Knowing which certification elements are relevant to decision makers, which value-specific features certifications provide, and why they do so, is also fundamental for practitioners. Without such knowledge, certification initiatives face the risk of designing certifications that are not adopted by providers, and providers, in turn, may adopt certifications that are rejected by customers.

The objective of this article is, therefore, to advance theory-building on certifications by (1) developing an empirically grounded typology of the key structural building blocks and elements of certifications that decision makers consider in evaluating certifications, and by (2) examining how decision makers interpret certifications' features within those structural elements in terms of the outcomes decision makers expect from a certification. We conceptualize certifications as a configuration of features along structural elements that are clustered in structural building blocks (e.g., structural building block "content" with structural element "codification style" and feature "management standard"). Features embody the salient attributes of a certification at a level of abstraction that is comprehensible to decision makers. Building on this conceptualization, we conduct a qualitative study in the context of CSCs consisting of exploratory interviews among IS decision makers employed by both providers and customers of cloud services. CSCs are both prototypical for IS certifications and have underexplored idiosyncrasies. For example, the content of CSCs consists of features (e.g., privacy, security or interoperability) that not only address the provider and its processes, but also the service and its quality—things that may fluctuate over time. These idiosyncrasies require decision makers to have a detailed understanding of which multifaceted aspects of a cloud service are certified by a CSC (content), if the issuer and auditor are competent in assessing these complex facets (source), and how the certification was obtained and is carried forward (process). In an iterative inductive analysis process we derive a typology of the structural elements of certifications and extract features of CSCs from the data. We then identify the cognitive interpretive schemas that guide a decision maker's evaluation of CSCs along the structural elements. This identification is based on a deep examination of the

interpretations of the features of CSCs against expectations of CSCs’ outcomes concerning individual decision makers.

The analyses result in a nascent theory of the structure and role of certification in the context of decision makers’ evaluations of certifications, which explains (1) *what* structural building blocks and elements should be considered for explaining the value of a certification to a decision maker, and (2) *how* and *why* specific features within those structural elements influence decision-maker evaluations of a certification’s value with regard to expected outcomes.

We provide three contributions. First, a conceptualization of the structure of certifications as a two-level hierarchy of three first-order structural building blocks and six second-order structural elements, each of which captures a different substantive domain that is pertinent to decision makers’ evaluations of a certification. Second, we describe a model of a multifaceted and dynamic, coevolutionary evaluation process of certifications, in which a certification’s expected outcomes and the cognitive interpretive schemas along the structural elements reciprocally affect each other. Third, through this model, we provide novel insights into the dynamics between the structural elements and outcomes of certifications.

The remainder proceeds as follows. We begin with reviewing what is known about the outcomes and structural properties of certifications. Then, we describe our research context and design. In the results section, we present our typology of the structural elements of certifications, specific features of CSCs along these structural elements, and results from our interview analysis. The concluding sections discuss the coevolutionary evaluation process of certifications, its implications for our findings, and the limitations of our study and avenues for future research.

## 2 A Brief Review of IS Certifications

Certification refers to a process in which an IT provider’s processes and services are evaluated against a predefined set of criteria via an audit by a third party, which formally acknowledges that the standard defined by the criteria is met (ISO/IEC, 2004).<sup>2</sup> Examples of IS certifications included in our definition are the ISO/IEC 27000-series for information security management, ISO/IEC 20000 for IT service management, and CMM for software development models. E-commerce privacy and security certifications, such as BBBOnline and TRUSTe, are also prominent examples.

IS literature has broadly considered certifications as a means to an end for IT providers to achieve an outcome of some kind by adopting a certification. In this regard, there are two major streams that vary with the research subjects: (1) directly studying the outcomes of adopting a certification from the perspective of a provider; or (2) studying the outcome indirectly, from the perspective of a (prospective) customer of a certified provider, by examining the effect of a certification on the customer’s decision to contract with the certified provider. Both streams are relevant to our research questions because each can offer an initial understanding of what decision makers seek in a certification. Table 1 summarizes the outcomes of certifications and research subjects, as well as the respective theoretical foundations found in the extant research.

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<sup>2</sup> Note that in this context the definition does not refer to certifications of individual IS professionals’ skills (e.g., certification of specific operating systems or database management skills).

Table 1. Outcomes of Certifications and Respective Research Subjects in Extant Research

Outcomes	Research subject	Theoretical foundation and assertions
<i>Internal improvements:</i> certifications enable work practices that are considered best-practice in the certification's domain.	Certified provider of an IS service	Efficiency gains <ul style="list-style-type: none"> <li>• Certifications contain 'best practice' management standards whose adoption will improve a company's productivity and overall performance (Corbett, Montes-Sancho, &amp; Kirsch, 2005; Gopal &amp; Gao, 2009).</li> <li>• Certification leads to internal improvements, for instance process quality or operational efficiency (Gopal &amp; Gao, 2009).</li> </ul>
<i>Legitimacy:</i> certifications enable providers to disseminate proof of their legitimacy in the market.	Certified provider of an IS service	Institutional theory <ul style="list-style-type: none"> <li>• Certifications based on certified management standards are decentralized institutions and certification of firms against these standards is driven by coercive, normative and mimetic forces (King, Lenox, &amp; Terlaak, 2005).</li> <li>• Certification is a strategic action to gain market legitimacy driven by institutional pressures, even in the absence of direct economic benefits (Gopal &amp; Gao, 2009; Sine, David, &amp; Mitsuhashi, 2007).</li> </ul>
<i>Quality signaling:</i> certifications enable dissemination of quality-related information about the provider and its service to customers and potential customers.	Certified provider of an IS service	Signaling theory <ul style="list-style-type: none"> <li>• Certifications are signals that reduce uncertainties in markets with information asymmetries by conveying credible information about attributes of another party (King et al., 2005; Terlaak &amp; King, 2006).</li> <li>• Signals need to be more costly for less productive actors to be effective (Spence, 1973).</li> <li>• Providers may use a certification strategically to reduce information asymmetries (King et al., 2005; Terlaak &amp; King, 2006) and to influence customers' beliefs, attitudes, and behaviors (Kimery &amp; McCord, 2006).</li> </ul>
<i>Information:</i> certifications enable seeking information about the quality of the certified providers and their services.	(Prospective) customer of a certified provider	<ul style="list-style-type: none"> <li>• Certifications allow providers to price at a premium, i.e., provide economic benefits (Gao et al., 2010).</li> <li>• A certification provides customers with information that helps evaluate unobservable qualities of providers (Kirmani &amp; Rao, 2000).</li> </ul>
<i>Assurance:</i> certifications allow for a reconsideration of belief formation related to the trustworthiness of a provider and its service.	(Prospective) customer of a certified provider	Trust theory <ul style="list-style-type: none"> <li>• Certifications communicate sets of third-party trust assurances that stimulate cognitive trust-building processes (Kim &amp; Benbasat, 2006), such as prediction, intentionality, and transference processes (Doney &amp; Cannon, 1997).</li> <li>• Certifications lead to assurance perceptions, and subsequently, trust (Lowry et al., 2012) and decisions (Kaplan &amp; Nieschwietz, 2003).</li> </ul>

Previous studies on IS certifications from the provider perspective have generally focused on understanding the outcomes of obtaining a certification for an IT provider throughout the implementation process (e.g., Hsu, 2009 for BS 7799, the predecessor of ISO/IEC 27000), measuring adoption benefits (e.g., Gopal & Gao, 2009 for CMM), and identifying providers' motives for adopting a certification (e.g., Disterer, 2012 for ISO 20000). Three theoretical views exist (Gopal & Gao, 2009; Heras-Saizarbitoria & Boiral, 2013). Taking an efficiency perspective, one stream of studies posits that managers seek certification of their companies because certifications provide *internal improvements* that result from codification of best practices (Terlaak, 2007), such as higher effectiveness, quality improvements or employee motivation (Heras-Saizarbitoria & Boiral, 2013). In

contrast, others have maintained that adoption of certifications is driven externally by customers, either as a response to institutional pressures or to signal quality. In the former view that is grounded in institutional theory, managers seek certification of their companies to gain institutional *legitimacy* in the market, even in absence of direct economic benefits (Gopal & Gao, 2009). In the latter view that is grounded in signaling theory, certifications are *quality signals* that provide information about the certified company, and managers seek certification of their companies to incur economic benefits for reducing information asymmetries (Terlaak & King, 2006). Gopal & Gao (2009) compared the three views taking the example of CMM certification and found that certifications allow companies to gain institutional legitimacy and earn premiums by

signaling higher quality, but they do not lead to internal improvements in process efficiency.

The majority of research on IS certifications has been on consumer e-commerce—studies have predominantly investigated certifications’ effects on customers’ decisions and antecedents of decisions, such as assurance and trust perceptions. The major viewpoint is that a certification provides customers *information* about a provider and its service and elicits trust because of the third-party verified *assurances* (Kimery & McCord, 2006). However, empirical evidence for certifications’ effects is thus far inconclusive (see Hu et al., 2010; Lowry et al., 2012 for a review). While a group of studies have found significant effects of certifications on assurance (Kaplan & Nieschwietz, 2003; Yang, Hung, Sung, & Farn, 2006), trust (Hu et al., 2010; Kim & Kim, 2011), and decisions (Kaplan & Nieschwietz, 2003; Nöteberg, Christiaanse, & Wallage, 2003), another group has found effects on trust (Kim, Ferrin, & Rao, 2008; McKnight et al., 2004) and decisions (Hui, Teo, & Lee, 2007) to be insignificant. Potential explanations for these mixed findings include perceptual contingency factors (e.g., understanding of certifications; Lowry et al., 2012) or contextual contingency factors (e.g., product familiarity; Mauldin & Arunachalam, 2002; or decision involvement Kim & Kim, 2011). A third conjecture is that the effect of a certification is influenced by factors embedded in the certification, such as its content and source (Kim & Benbasat, 2009). Studies that have investigated these factors are scarce and only few factors have been identified, including for example, types and composition of content dimensions (Hu et al., 2010; Odom, Kumar, & Saunders, 2002). Yet, as of today, no holistic, integrative view exists on such factors. For example, further factors may exist, the factors may not be independent, and variations in the underlying technologies or processes being certified may create inevitable differences across certifications in the dynamics between these factors.

In summary, prior research on certifications in IS contexts has almost exclusively focused on certifications’ outcomes, including predicting IT-providers’ motives to adopt a certification, measuring benefits of adopting a certification for IT providers, and comparing the effect of certifications on customers’ decision variables in the context of alternative instruments or identifying contingency factors. As such, most studies focus on one certification with given properties that is embedded in an appropriate theoretical framework (e.g., institutional theory, signaling theory, trust theory) to predict, measure, and explain certification outcomes. However, the diversity of outcomes suggests that certifications themselves are complex, multifaceted

phenomena and that—when viewing them as artifacts—are multidimensional concepts. What is lacking, however, is research on the different dimensions of certifications and the role that differences in certification features (e.g., different quality management standards, or different issuing organizations) play in decision makers’ evaluations of certifications in terms of their (expected) outcomes. As a result, we only have a very limited understanding of the nature and characteristics of certifications as artifacts, and the extent to which possible configurations of certifications affect decision makers’ reactions to them. Against the background of numerous inconclusive findings on certification outcomes, such an understanding is important for identifying why certifications might have differential effects in different conditions that are rooted in the certifications themselves rather than in contextual or perceptual contingency factors.

Miller and Friesen (1984) compare understanding complex concepts with understanding a painting: for viewers it is important to first understand primary elements of the painting (e.g., colors and tones) and then consider “their role in making up that whole” painting (p. 29).

Building on this analogy, we first identify the different dimensions (“structural building blocks”) and sub-dimensions (“structural elements”) of certifications. Then, we investigate how individual decision makers assemble their overall evaluation of a certification from its structural elements by interpreting substantive features within those structural elements. In a last step, guided by our data, we construct a descriptive model that links how substantive features within certifications’ structural elements might influence a decision makers’ evaluation of a certification to enable a specific outcome.

### 3 Research Methodology

Our study followed a qualitative approach because of the lack of prior theorization on the structure of certifications. In line with our objective of advancing theory-building, this qualitative approach generated rich insights into the relationship between the structure and outcome of certifications. Our main research method was exploratory interviews with decision makers who evaluate certifications. Our research context focused on a single category of certifications, CSCs, because they stand out as a prototypical category, and because studying their idiosyncrasies allowed us to contribute to an underexplored research field (Venters & Whitley, 2012). We collected and analyzed data in parallel to the interviews. For data analysis, we adopted a predominantly inductive, interpretive approach. The following sections describe the research context as well as the methods applied for data collection and data analysis.

### 3.1 Research Context: Cloud Service Certifications

CSCs are a novel class of IS certifications that are emerging in practice. Examples include Cloud Security Alliance (CSA) STAR, TRUSTed Cloud Data Privacy Certification, and EuroCloud Star Audit. These nascent CSCs are competing and no single CSC has yet emerged as the predominant one. These properties support our objective of theory-building on certifications' structure and its relationship to certification outcomes because they set a clean sheet for research. We assumed that interviewees had not yet developed preconceived interpretive schemas regarding CSCs' features based on a predominant CSC, which would reduce the risk of biases in decision makers' perceptions. Moreover, as we elaborate in the following, CSCs are an appropriate research context because (1) they are a prototypical instance of an IS certification, and (2) they have unique characteristics, which render them as interesting research phenomena (e.g., certifying novel types of assurances such as flexibility).

On the one hand, CSCs are like other IS certifications, such for IT outsourcing or for e-commerce services. CSCs have in common with other IS certifications that their focal certification object is an IS artifact (e.g., for CSCs focal certification object is a cloud service and in IT outsourcing it is an IS provider). Moreover, decision makers turn to CSCs for the same reasons that they turn to other IS certifications. CSCs are embedded in an environment that is characterized by high levels of quality uncertainty, a lack of proven standards (e.g., in terms of security management), and customers who question the legitimacy of service offerings due to the number of emerging services. Similar environmental characteristics can be observed in IT outsourcing or e-commerce services (Bekmamedova, Prananto, McKay, & Vorobiev, 2008; Pavlou, Liang, & Xue, 2007). Like other IS certifications, CSC certification is voluntary for providers in the majority of cloud markets, and only a few public sector customers requiring certifications (e.g., U.S. General Services Administration requires FedRAMP certifications). In our work, we thus focus on the voluntary adoption of CSCs by providers.

On the other hand, cloud computing and CSCs have idiosyncrasies that distinguish them from other IS domains and IS certifications, respectively. Cloud computing minimizes on-premise installations and enables IT resources and data to be moved to remote services that are managed by a third-party provider and that have an unknown physical location (location independence; Iyer & Henderson, 2010; Schneider & Sunyaev, 2016). The underlying IT infrastructures and IT architectures are highly distributed and are shared between customers (multitenancy), contrary to

single-tenant architectures in IT outsourcing. This setup allows resources to be rapidly adjusted to demand and charged on a per-use basis rather than on a fixed-fee basis (Benlian, Kettinger, Sunyaev, & Winkler, 2018). To achieve these benefits, cloud services are highly standardized with a fixed set of features and a common code base for all customers (Benlian, Koufaris, & Hess, 2011; Schneider & Sunyaev, 2016). Many cloud services offer interfaces that allow customization on top of common features and that enable them to be integrated with other applications or services (Iyer & Henderson, 2010; Benlian et al., 2018). However, these interfaces are maintained by providers, and customers have little influence on the further development and are forced to adopt future releases (Benlian et al., 2011). Together, these arrangements require a novel governance mode and many established contractual clauses require reexamination (Marston, Li, Bandyopadhyay, Zhang, & Ghalsasi, 2011; Schneider & Sunyaev, 2016; Benlian et al., 2018).

In addition, CSCs differ conceptually from previously studied certifications (Sunyaev & Schneider, 2013): To mitigate the uncertainties caused by cloud computing's idiosyncrasies, CSCs provide assurances whose scope differs from prior assurances (e.g., privacy and security) or that have not been previously examined (e.g., legal compliance and availability). Moreover, these assurances address both provider-related uncertainties *and* service-related uncertainties. CSCs thus not only contain assurances about a provider and its processes or—in case of e-commerce certifications, about the transaction medium—but also enable companies and consumers to make judgments about future product quality.

### 3.2 Data Collection and Interviewee Descriptives

Because studies on decision makers' evaluations of certifications are still scarce, we decided to conduct exploratory interviews with a diverse set of IS decision makers, and advance our understanding based on the data collected. Focusing on IS decision makers addresses the research problem at its foundation, because key decision maker perceptions influence the IT provider's decisions concerning the adoption of a certification, as well as the customer's beliefs about the certification's viability when evaluating a certified IT service (Homburg, Klarmann, Reimann, & Schilke, 2012). We conducted 20 interviews with experts to validate and refine the typology of an IS certification's structural elements where necessary. Additionally, we also aimed to inductively identify features for CSCs, and to explore decision makers' interpretations of these features, potentially linking them to expected certification outcomes (see Table 1). This bottom-up data

collection of the features of CSCs allowed us to uncover their total bandwidth, which might not have been derived from an analysis of existing CSCs, due to their early lifecycle stage. This allowed us to collect rich data regarding perceptions of the structural elements and features of certifications. This in turn enabled us to discern patterns and to uncover diverse and potentially conflicting perceptions, resulting in a deeper and more comprehensive understanding of how features influence decision makers’ evaluations of certifications in terms of their potential outcomes. Figure 1 summarizes the phases for data collection and analysis, the activities performed in each phase, and their outcomes. In Section 3.3 below, we detail the data analysis procedures for the qualitative interviews.

Data collection took place between June and October 2012 and followed established guidelines for qualitative interviews (Myers & Newman, 2007). We recruited interviewees by contacting cloud service customer and cloud service provider companies via telephone, followed by emails requesting employees matching the criteria outlined below. To foster participation, emphasize our credibility, and address potential concerns, the email outlined the purpose of the study, stated our academic affiliations, offered a report of study results, and assured confidentiality and anonymity. We were able to schedule 20 interviews, the breakdowns of which are summarized in Table 2.

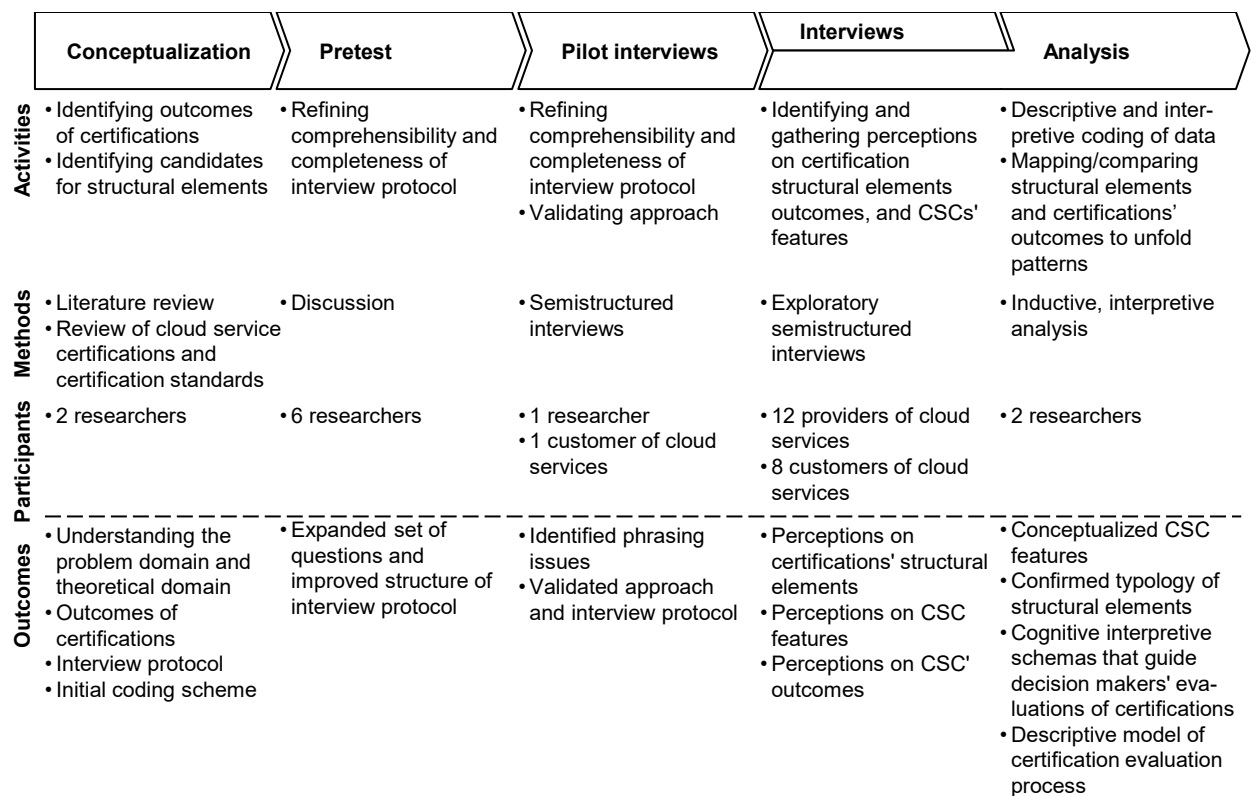


Figure 1. Overview of Research Phases through Data Collection and Analysis

To represent various voices (Myers & Newman, 2007), two theoretical considerations guided the selection of interviewees. First, in order to uncover the bandwidth of features and to focus on all outcomes identified in the literature review (Table 1), we interviewed stakeholders from both cloud service customer-companies and cloud service provider-companies. This helped us understand what decision makers from provider firms hope a certification will achieve (i.e., internally: efficiency; externally: legitimacy, signaling quality, appearing trustworthy), as well as whether a certification also serves as a motivation for customers (i.e., providing information, being perceived as trustworthy).

Second, we chose interviewees with respect to their influence on organizational IT sourcing (customers) and certification adoption (providers) decisions. We interviewed executives because they are the main drivers for IT innovations and are responsible for IT sourcing (Dibbern, Goles, Hirschheim, & Jayatilaka, 2004; Kern, Kreijger, & Willcocks, 2002) and certification adoption decisions. We also interviewed middle-managers because they are responsible for evaluating potential solutions (Benlian, Hess, & Buxmann, 2009; Dibbern et al., 2004) and certifications. Additionally, we interviewed consultants because they are involved in selecting and implementing cloud services (Leimeister, Böhm,

Riedl, & Krcmar, 2010). Table A1 in Appendix A presents further characteristics of the interviewees' companies, the types of cloud services used and provided, and the individual roles and functional

backgrounds of the interviewees. On average, the interviewees had 18 years of work experience and were involved in 6 projects that involved deploying or procuring cloud services.

**Table 2. Interviewees' Details**

No.	Job Title	Organization's industry	User of cloud services <sup>a</sup>	Provider of cloud services
i1	Senior Research Manager	Consulting	X	
i2	CEO	Software solutions	X	X
i3	Head of Research Department	Consulting	X	
i4	Director Software Development	Software solutions	X	X
i5	Global Server Virtualization Offering Lead	Consulting	X	
i6	Senior Consultant	Consulting	X	
i7	Cloud Territory Business Manager	Software and hardware solutions	X	X
i8	CEO	IT services provider		X
i9	CEO	Software solutions	X	X
i10	CMO	Software solutions	X	X
i11	CEO	Software solutions	X	
i12	Innovation Manager	IT services provider		X
i13	Sales Manager	Software solutions	X	X
i14	Sales Manager	Software solutions		X
i15	Head of Business Development	Software solutions		X
i16	CTO	Software solutions	X	X
i17	CTO	Software solutions	X	X
i18	Senior IT Professional Project Management	Logistics	X	
i19	CIO/CTO	Software solutions	X	
i20	Security Advisor, Consultant	Consulting	X	

*Note:* (iN) refers to "interview N" and is used as a reference to map quotes to interviews throughout the article.

<sup>a</sup>Given the nested ecosystem of cloud services, a company that provides a cloud service can, at the same time, also be a user of cloud services. For example, many contemporary software-as-a-service providers (e.g., Dropbox.com) use infrastructure-as-a-service.

Data were collected via telephone with the application of a semi-structured interview protocol (Appendix B), complied using the guidelines established by Myers and Newman (2007). We validated the quality of our protocol through discussions with peer researchers and pilot interviews (Figure 1). Questions focused on interviewees' personal and company background, experience in cloud decisions, and perceptions of certifications. Concerning the latter, questions were guided by our research objectives and aimed at interviewees' perceptions of structural elements and features, as well as outcomes of certifications. To prevent imposing our own world views and languages on interviewees (Myers & Newman, 2007), we first collected perceptions indirectly by asking open-ended questions about certification outcomes and views on features, and only then asking interviewees directly about their perceptions of specific features and outcomes emerging from the literature, existing

CSCs, and earlier interviews. We conducted the main interview study in three rounds of five, eight, and seven interviews, applying the same core interview protocol and complementing it with additional or more nuanced questions as the study progressed. Two researchers jointly conducted each interview. Interviews lasted, on average, 66 minutes and were recorded and transcribed. We returned transcripts to the interviewees for communicative validation (Flick, 2009), resulting in minor wording adjustments.

### 3.3 Analysis of Interview Statements

We collected and analyzed data in parallel, which allowed us to gain deeper insights by formulating new or more nuanced questions in later interviews. Acknowledging the nascent nature of our theorizing, we adopted a predominantly inductive, interpretive approach.

Consistent with this approach, we analyzed interviews using iterative descriptive and interpretive



coding (Myers, 2009), examining and making sense of our data in a grounded theory manner. Following methodological guidelines (Flick, 2009; Myers, 2009; Myers & Newman, 2007), we proceeded much like in constant comparative analysis, by first coding initial concepts, and then constantly linking the evolving set of concepts to higher-level categories.

In this way, we sequentially followed a mixed top-down, bottom-up approach. We started top-down with two a priori coding schemes, the high-level structural building blocks (Table 3; content, source, process) and the certification outcomes (Table 1; internal improvement, legitimacy, quality signaling, information, assurance), which we then updated bottom-up, while developing and validating subordinate coding categories throughout the data analysis. The structural building blocks and certification outcomes were defined after reviewing the literature and existing certifications in practice to better understand the problem domain. We then refined and validated the discovered structural elements through interviews with experts, and finally reestablished their theoretical links (Bailey, 1994).

Two IS researchers iteratively coded the data and ensured a common understanding of the two coding schemes through intensive joint discussions. In each iteration, one researcher coded interviewees’ statements, which another researcher then reviewed. The researcher responsible for coding assigned a descriptive code to each statement and classified it in the coding scheme. After coding all the statements, the researcher interpreted all the codes, condensed codes of similar meaning into common superordinate codes, and verified consistency by revisiting existing codes and recoding them if necessary. After each coding and review cycle, the two researchers met and discussed the codes to ensure consistency in the meanings and to resolve conflicts.

Through this process we were able to refine and validate the typology of structural building-blocks elements and structural elements, and the certification outcomes. The typology was supported with regard to the high-level structural building-blocks content, source, and process, but expanded by fine-grained structural elements that also evolved in the course of data analysis. For example, one of the initial iterations of the typology did not differentiate between the auditor and issuer who emerged from the data after the first few interviews. Hence, we modified the coding scheme and interview protocol for the remaining interviews. Table 4 in the results section delineates the range of features in CSCs that emerged from the coding process. Finally, we compared the inductively derived features with those of the existing CSCs to ensure external validity. We found that all features existed in practice and that none of the features of existing CSCs were overlooked.

Next, we turned to unfolding patterns of relationships between the two code trees. To that end, we mapped cross-references and compared structural elements and certifications’ outcomes to tease the meaning out of the identified features, constantly iterating between data and emerging themes, and referencing the themes with the literature and theory for validation. Through this process, *cognitive interpretive schemas* for each structural element emerged (see Table 4 in results section); each of these schemas characterized an underlying factor that elicited perceptions among decision makers and demonstrated that the certification resulted in an expected outcome.

We now elaborate on (1) the *structural elements*, as well as (2) the substantive *features* of CSCs along these structural elements, and the *cognitive interpretive schema* for each structural element that emerged through the interpretation of data. Overall, our study highlights that certifications comprise three coarse-grained structural building blocks and two fine-grained structural elements for each block: content (content dimensions and codification style), source (issuer and auditor), and process (audit and reaudit).

## 4 Interviews Analysis Results: Exploring Decision Makers’ Interpretive Schemas

### 4.1 A Typology of IS Certifications’ Structural Building Blocks and Elements

Table 3 depicts the typology of the certifications’ structural elements and their definitions, both of which emerged through interpreting the data. The first structural building block, *content*, refers to the specification underlying a certification. Content is composed of two structural elements: *content dimensions* and *codification style*. To the interviewees, content dimensions are an important aspect of a certification, as they specify *what* is certified (i.e., a certification’s information content, such as the security and privacy practices that a provider must fulfill for the certification to be granted) as well as what is *not* certified (e.g., a certification may certify security but not privacy), thereby allowing certified providers to provide customers with information to evaluate the true qualities of the provider and its service. *Codification style* complements content dimensions in that it specifies the way the information is codified (e.g., in the form of a proprietary catalogue, such as in EuroCloud SaaS StarAudit or as an open management standard like in ISO 27001).

**Table 3. Typology of Certifications’ Structural Building Blocks**

Structural building block	Content		Source		Process	
	Structural element	Content dimensions	Codification Style	Issuer	Auditor	Audit
Definition	The specific certification dimensions and constituting evaluation criteria contained in a certification.	The style of the formal specification in which content dimensions are codified.	The organization that specifies a certification’s content dimensions.	The organization that evaluates a company against the content in an audit process.	The form of the initial audit process by which a noncertified company is evaluated as specified in the content.	The form of the repeated process by which a certified company is reevaluated after the initial audit.

The second structural building block is the *source* of a certification, which refers to organizations that are involved in a certification’s issuance and audit processes, and thus specifies *who* issues and audits a certification. Source is composed of two structural elements: *issuer* and *auditor*. Interviewees distinguish between the two dimensions; they address different aspects of the certifications source. While the issuer develops and issues a certification (e.g., ISO and its member organizations), the auditor conducts the actual certification audits (e.g., an accredited organization).

Finally, the third structural building block is *process*, which defines *how* an auditor evaluates conformance with a specification. As examined in more detail in Section 4.4, process was an important structural building block to interviewees since audit processes of certifications vary greatly from each other. Process is composed of two structural elements: initial *audit* and *reaudit*. While an initial audit ensures compliance with codified practices, a reaudit ensures compliance over time (e.g., in practice, certifications differ significantly in terms of reaudit requirements; the TRUSTed Cloud Privacy Certification Program

requires an annual reaudit, whereas ISO/IEC 20000 and ISO/IEC 27001 only require triennial reaudits). Independent of the initial audit, a decision maker’s confidence in actual compliance may be higher in the former case because the requirements are more restrictive.

For each structural element, a number of features of CSCs emerged from the data. Each feature describes a potential manifestation that may appear in a CSC in practice. Hence, a CSC in practice is a configuration of these features along the structural elements. For the structural elements—codification style, issuer, and auditor—exactly one of the features appear in a CSC, whereas for the remaining structural elements—content dimensions, audit, and reaudit—combinations of features may appear in a CSC. Decision makers interpret the features within a structural element by applying a cognitive interpretive schema. Table 4 lists the key features we identified for the six structural elements of certifications, augmented by the definitions for each of the features and the interpretive schema (for the purpose of clarity, definitions for features within the structural element “content dimensions” are depicted separately in Table 5).

**Table 4. Features of Certifications in Context of CS’s and Cognitive Interpretive Schemas**

Structural building blocks and elements	Features	Definitions	Cognitive interpretive schemas
<b>Content</b>			
Content dimensions	Availability, contract, customer support, financial stability, flexibility, interoperability, legal compliance, privacy, process, maturity, security	See Table 5	Relevance, composition
Codification style	Proprietary catalogue	A codification style in which the certification criteria are specified by the issuer and inaccessible to the public.	Transparency, recommendation

**Table 4. Features of Certifications in Context of CS’s and Cognitive Interpretive Schemas**

	Best practices compilation	A codification style in which the certification criteria stem from a de facto standard that compiles best practices.	
	Management standard	A codification style in which the certification criteria stem from a de jure standard that has been defined by a standardization body and is publicly available.	
<b>Source</b>			
Issuer	Standardization body	The certification is issued by a standard-setting organization that defines the criteria and the process for the audit in a participatory way and in consensus of its members.	Legitimacy, expertise
	Public agency	The certification is issued by a public agency that defines the criteria and the process for the audit.	
	Industry association	The certification is issued by an association of firms that are active in the respective field and collaborate in defining the criteria and the process for the audit.	
	Private auditor	The certification is issued by a private auditing company that defines the criteria and the process for the audit.	
Auditor	Independent accredited third party	The organization conducting the audit is an independent entity that is specialized in certification audits in a variety of business areas.	Independence, guidance
	Public agency	The organization conducting the audit is a public agency.	
	Industry association	The organization conducting the audit is an association of companies that are active in the respective field.	
	Private auditor	The organization conducting the audit is a profit-oriented professional services company that conducts certification audits as a line of business, among other auditing and consulting services.	
<b>Process</b>			
Audit	On-site assessment	An audit process that mandates on-site visits of the auditor at the provider’s premises.	Evaluation, learning
	Remote assessment	An audit process that mandates verification of documentation by the auditor but no on-site visits at the provider’s premises.	
	Self-assessment	An audit process that mandates that the provider provides key information, which is recorded, but not verified by the auditor.	
Reaudit	Regular interval	A reaudit process in which the initial audit is re-conducted at regular intervals.	Perpetuation, currency
	Continuous auditing	A reaudit process in which the providers’ systems and processes are continuously audited with the help of automated monitoring tools.	

Table 5 depicts the definitions of the ten features within the structural element of content dimensions. These features describe the assurances that can be found in CSCs, each of which addresses an

uncertainty specific to cloud computing. A configuration of a CSC may include one or more features within the structural element of content dimensions.

**Table 5. Detailed View of CSCs' Features within Structural Element "Content Dimensions"**

<b>Features of content dimensions</b>	<b>Definition</b>
Availability	The provider complies with performance commitments, ensures availability of data, and implements measures to prevent data loss.
Contract	The provider offers understandable contractual arrangements that meet common business practice, and the contract terms do not restrict the customers' property rights concerning their data stored in the cloud service.
Customer support	The provider ensures accessibility and responsive customer support and practices a proactive information policy towards customers.
Financial stability	The medium-term financial viability of the provider is assured.
Flexibility	The customer can independently adjust the obtained capabilities and the adjustments are carried out automatically within a short period of time and with transparent costs.
Interoperability	Customers can save and export data in standard formats, the cloud service offers open interfaces for integration with other cloud services or applications, and customers can access the cloud service location independently via various devices.
Legal compliance	The provider complies with legal and regulatory requirements of cloud services.
Privacy	The provider complies with applicable data protection laws, refrains from content-related analysis of the customers' data stored in the cloud service, completely and unrecoverably deletes all customer data after termination of the contract, and does not sell, rent, or give away customer data to third parties.
Process maturity	The business processes maturity of the provider aligns with established best practices in the IT service sector.
Security	The provider has established measures to ensure that data are securely stored, transmitted and protected against unauthorized access by third parties and other cloud service users.

## 4.2 Structural Building Block I: Content

In the following, we discuss and illustrate the cognitive interpretive schemas that we identified for each structural element. For narrative flow, we selected quotations that best synthesized and relayed the range of decision makers' interpretations in each coding category. Nonetheless, each presented statement reflects multiple other statements that have the same meaning and belong to the same coding category.

### 4.2.1 Interpretive Schema for the Structural Element "Content Dimensions": Relevance and Composition

Our data elucidates that the interpretive schema for content dimensions comprises *relevance* and

*composition*. Relevance refers to the perceived relative importance of a content dimension for the decision makers' goals, and composition refers to the perception that content dimensions are framed in a coherent assemblage.

Customers and providers noted (Table 6, quote 1) that content dimensions provide information about the quality of the certified provider and its service. This information is thus perceived to enable providers to signal quality to customers and to allow customers to gather information about the provider through the certification. Additionally, customers' comments can be interpreted such that information is also important as to whether a certification provides trust assurance (Table 6, quote 2).

**Table 6. Illustrative Quotes on Structural Element “Content Dimensions”**

Interpretive schema and findings	Illustrative quotes
<b>Relevance</b>	
Content dimensions provide information on quality, which fosters trust assurance	(1) Customer: “I think trust is one of the most essential factors that are influenced by a certification. And ultimately, the customer can be somewhat sure that the outsourced service will be delivered according to certain quality criteria.” (i5)
	(2) Provider: “generally, anything that engenders trust in a cloud service is an eligible aspect of a certification.” (i4)
Content dimensions provide best practices to assess the organization and unlock internal improvements	(3) Provider: “The second point is to put oneself to the test; that is, to take the time to carefully determine which capabilities the organization has and which it does not, what is missing, what are the strengths and weaknesses. That’s always good, of course.” (i9)
	(4) Provider: “But it would be legit to say: we need a certification to simply structure ourselves and do similar things.” (i4)
	(5) Customer: “. . . to structurally align the organization with security requirements . . . That is, I consider a certification as a means of optimizing the security processes of the provider organization.” (i6)
Certification is a sign of approval to gain legitimacy with regards to content dimensions	(6) Provider: “some certifications allow assessing process maturity to improve the internal organization—that’s nice, but it’s always enforced from outside.” (i1)
	(7) Provider: “As a provider, we won’t be able to sell in the future without certification, because our customers are urged to pay attention to certifications.” (i12)
	(8) Provider: “First, a certification must not be expensive. We would only certify if a certification is not expensive. Second, it must be simple and, in particular, it must not be time-consuming. In terms of outcomes: one gets a sign of approval . . . It attests that we are able to comply with data protection rules specified by the relevant laws.” (i2)
<b>Composition</b>	
Dependencies between content dimensions exist	(9) Customer: “Separate certifications for privacy and legal compliance are not helpful, because these two often go hand in hand.” (i19)
	(10) Customer: “cloud service certifications usually specify requirements for professional IT operations as a basis. Security is always an additional requirement, but never or seldom required on its own . . . For me, a certification would be ideal if it only included security aspects—however, you can’t completely resolve dependencies and it thus needs to be included in a certification. As a user, I only want a certification to include aspects of my concern. This includes business continuity and availability, but also data security and protection according to the contract as well as to laws and regulations.” (i20)
The number of content dimension features influences perceptions	(11) Customer: “getting certified always requires effort for a firm, even if the scope is narrowly defined, e.g., as with ISO [27001], many different aspects need to be certified. On the other hand, customers know that a firm certified with a very generic certification cannot comprehensively fulfil all requirements, and some are definitely circumvented.” (i20)
<p><i>Note:</i> Index numbers in parentheses refer to the interviewees listed in Table 2.</p>	

Furthermore, providers commented that content dimensions outline standards, which allow them to assess the organization and adopt best practices (Table 6, quotes 3 to 5). This suggests that providers anticipate gaining economic or quality benefits and indicates that the content dimensions associated with

the highest level of expected benefits through internal improvements are perceived as most relevant. Finally, providers commented that they adopt CSCs because potential customers demand it (Table 6, quotes 6 and 7). These comments imply that providers perceive that certifications help them gain legitimacy among

customers, and suggest that providers may perceive only those content dimensions as relevant that they perceive as demanded by customers and required for legitimacy or legal compliance (Table 6, quote 8).

When discussing content dimensions, interviewees from both provider- and customer-firms assigned different degrees of relevance to specific features of content dimensions. For instance, security and privacy were unanimously perceived as an important feature of CSCs.

Customer on security: *“Securely handling and storing data is the foremost criterion. Data is the highest asset of most companies and any data leak is a catastrophe for most companies”* (i5).

Customer on security: *“Information security management system, which means responsibilities are clearly defined, processes are in place and are executed, and security requirements are defined and implemented in respective systems . . . optionally, it covers all major risks related to the cloud. For example, it’s an all-rounder if it covers identity/access management, compliance, BCM, and incident management. . . . then I can really focus on the business decision and what delivers the highest value”* (i6).

Provider on privacy: *“For me data privacy is more important than compliance topics because it does not change much.”* (i8)

Provider on privacy: *“Predominantly, it’s always about privacy”* (i4)

Customer on privacy: *“Definitely privacy . . . stating that in the way [the provider] handles data, it is compliant with requirements from the following countries, Germany, France, USA, etc.”* (i4)

Others, such as interoperability, customer support, and functionality—despite being perceived as eligible—were perceived as highly important by some but less important by others. For example, regarding interoperability, one provider reflected on the potential lock-in effects inherent to cloud services:

Provider on interoperability: *“One of the biggest drawbacks of the cloud probably is that in fact you have some kind of vendor lock-in. . . . It’s basically the same with us. Although building upon open technologies, not all vendors or service providers have the expertise of operating a cloud service.”* (i10)

For customer support, some decision makers argue that it is necessary to create comparability across services, while others think customer support should be part of the service-level agreement:

Provider on customer support: *“Yes, very specifically: availability, responsiveness and response times of the support or customer service, number of languages spoken, and so forth; these kind of things.”* (i10)

Provider on interoperability: *“Support, or the quality of support, is related to agreed-upon service levels. But I don’t think there is any necessity for a certification. There may be different support levels, and I think it’s legit if someone wants a bundle with relatively little support, while others want more and get premium support.”* (i8)

In terms of functionality, some decision makers perceive it as highly relevant because such a criterion would create comparability across different service offerings and thereby help users to evaluate services. Others, in contrast, perceive functionality as less relevant in the context of CSCs because cloud services’ software architectures are dynamic and allow adding new functionality more easily than in classic architectures:

Provider on functionality: *“and maybe something like functionality. Considering that there are a lot of homogeneous services from different vendors, it could well be that perhaps some say ‘ok, we have a certain amount of disk space,’ while others say ‘we have less space.’ And in this case, a seal might signal that these actually belong to the top 5 within the market or something. And then customers may realize that these are, compared to others, like in some kind of ranking, somewhat special.”* (i4)

Provider on functionality: *“With modern software solutions and architectures, there are no more limits regarding functionality. . . . The dynamics gain so much traction, that prospects or customers do not orient themselves on and increasingly do look after which capabilities they require or what the industry benchmark is in terms of functionality.”* (i10)

Interview statements furthermore show that the composition of the content dimensions in certifications is also a factor that influences their evaluation of a certification (Table 6). Though the identified content dimensions are mutually exclusive from a conceptual point of view, customers’ and providers’ comments reveal that dependencies exist (e.g., between privacy and legal compliance; Table 6, quote 9), and they perceive content dimensions to build on each other (e.g., security and process maturity; Table 6, quote 10). Decision makers perceive that including some content dimensions

mandates including other content dimensions implying that the effect of a content dimension on a decision maker’s perception depends on the presence of another content dimension, and that they may reinforce each other. While one might infer that a broad scope is more effective, decision makers’ comments also highlight that a scope that is too broad and generic limits the value of a certification (Table 6, quote 11). This indicates that decision makers perceive that a composition of content dimensions is coherent if it provides a balance between resolving dependencies and limiting the scope to a parsimonious assemblage of relevant content dimensions.

**4.2.2 Interpretive Schema for the Structural Element “Codification Style”: Transparency and Recommendation**

The cognitive interpretive schema that emerged for the structural element of codification style consists of two elements: *transparency* and *recommendation*. Transparency refers to the perception that certification standards outlined in the codification style are publicly available and developed in a participatory process. Recommendation refers to the perceived extent to which a codification style codifies best practices.

Each of the three features (i.e., proprietary catalogues, best practices compilations, and management standards) reflects a different type of codification style. Interviewees’ statements suggest that customers

and providers associate different codification styles with different degrees of transparency and recommendation. Certifications that codify certification criteria in a proprietary catalogue are perceived as providing little insight into the underlying certification criteria, which is why they are perceived as having low transparency (Table 7, quote 12). This low transparency also seems to exacerbate decision makers’ evaluations of provided recommendations. In contrast, interviewees perceive that the openness to and involvement of various stakeholders in the development of management standards and best practices compilations foster transparency (Table 7, quote 13). These comments suggest that decision makers on the customer side interpret a codification style’s transparency in terms of offering information and assurance as well as quality signaling.

Recommendation emerged as second theme. Decision makers commented on the value of best practices compilations and management standards beyond outlining certification criteria and providing quality information (Table 7, quote 14). In that sense, they perceive that different codification styles provide recommendations for organizational processes and practices, which enable providers to trigger internal management system improvements. Thus, the recommendatory nature of a codification style is linked to internal improvements.

**Table 7. Illustrative Quotes on Structural Element “Codification Style”**

Interpretive schema and findings	Illustrative quotes
<b>Transparency</b>	
Increasing secrecy of codification style signals low degree of transparency	(12) Customer on proprietary catalogues: “I asked [sanitized CSC] for their certification principles for infrastructure services, but didn’t receive a comprehensive questionnaire—thus I rated [sanitized CSC] as relatively useless because I couldn’t find out its underlying principles. For ISO, I can do that. . . . What I received was too wishy-washy, there wasn’t more to it. So I didn’t deal with it anymore” (i20)
Customer involvement in development of best practice compilations and management standards signals a high degree of transparency	(13) Provider on best-practice compilations and management standards: “From an industry perspective, I consider an ITIL-like certification as suitable, because—like a more normative-oriented certification such as ISO—customers jointly control who’s involved [in developing the underlying criteria]” (i4).
<b>Recommendation</b>	
A recommendatory codification style fosters provider perceptions of internal improvement realizations	(14) Provider on best-practice compilations: “I don’t need to find out what best practices are, but best practices possibly are already codified, and I can say: ‘okay, if I fulfil those, I fulfil best practices in my sector.’ This already has an inherent value for me, independent of my employees or customers noticing it” (i16).
<i>Note:</i> Index numbers in parentheses refer to the interviewees listed in Table 2.	

### 4.3 Structural Building Block II: Source

#### 4.3.1 Interpretive Schema for the Structural Element “Issuer”: Legitimacy and Expertise

In terms of the structural element “issuer,” two cognitive interpretive schemas emerge from our interviews. First, interviewees seek to confirm that the issuer has *legitimacy* to operate in the certification space. Second, they want confirmation that the issuer has sufficient *expertise* in designing the certification (Table 8). Legitimacy refers to the perception that the issuer is recognized by the industry as legitimate, trustworthy, and powerful. Expertise refers to the perception that the issuer is competent, knowledgeable, and adaptive in terms of the technical advancement in the respective industry.

Interviewees’ statements suggest that expertise is needed for an issuer to fulfil its role of specifying a

certification’s content dimensions; legitimacy, on the other hand, fosters assurance among customers and enables providers to gain legitimacy among customers. Customers commented that trust assurance results from the transference of trust from the issuer to the certified provider (Table 8, quote 15). Providers commented that a trustworthy, reputable, and powerful issuer supports their objectives of gaining legitimacy in the immature cloud market and of being recognized as trustworthy (Table 8, quote 16). Thus, perceptions of assurance and legitimacy vary with the perceived legitimacy and expertise offered by organizational form of the substantive feature. Private organizations such as private auditors or industry associations are perceived as possessing expertise, but are simultaneously perceived as being less legitimate and as being in conflict with economic interests; public agencies, in contrast, are perceived as being legitimate, but are also perceived as being less adaptive and having lower expertise (Table 8, quote 17).

**Table 8. Illustrative Quotes on Structural Elements “Issuer” and “Auditor”**

Structural element	Interpretive schema and findings	Illustrative quotes
<b>Legitimacy and expertise</b>		
Source: Issuer	The issuer’s legitimacy fosters trust transference	(15) Customer on issuers in general: “In the same manner I need to trust an uncertified firm, I need to trust the certifier of a certified firm.” (i19)
	A legitimate issuer increases provider legitimacy	(16) Provider on issuers in general: “due to the hype on cloud and SaaS, there are so many free riders. . . . To protect ourselves as a true cloud provider, it would be very desirable to have a binding list of criteria issued by a neutral body, which states that one may only talk about oneself as a true cloud service, if the following criteria are met in some way” (i10).
	Expertise may come at cost of legitimacy	(17) Provider on private auditors and public agencies: “Private organizations are always better suited because they have more experience and higher interest. Of course, on the other hand, the economic interest may be unfavorable. If ‘the state’ issues a certification, then it is a public agency and it will become very complex, very time-consuming, and will result in a bill or an obligation, and ultimately lead to market segmentation. And that is probably not the best solution” (i9).
<b>Independence and guidance</b>		
Source: Auditor	Independence of auditor increases assurance	(18) Customer on auditors in general: “I’d expect an auditor who is relatively independent so that one can trust the results” (i1)
	A guiding auditor is perceived as less independent	(19) Customer on private auditors: “If I allow the audits to be conducted by private organizations, according to my experience, the actual requirements are relatively low. Or let’s say: the auditor is keen to see that a certificate is actually issued” (i6)
	Private organizations are perceived as more competent for guidance	(20) Provider on industry associations and private auditors: “The private sector and industry associations are well-suited since they are doing such assessments anyway. They have the knowledge, they have the experience, and they know the market.” (i9)
<p><i>Note:</i> Index numbers in parentheses refer to the interviewees listed in Table 2.</p>		



### 4.3.2 Interpretive Schema for the Structural Element “Auditor”: Independence and Guidance

In terms of the auditor, the cognitive interpretive schema emerging from the interviews is comprised of *independence* and *guidance*. Independence refers to the perception that the auditor’s evaluation is conducted in an unbiased way and is in line with the fundamental principles of the certification standard. Guidance refers to the perceived extent to which the auditor supports the provider in implementing and fulfilling the certification standards.

Similar to issuers, customers’ desire for independence results from trust transference. Customer interviewees’ comments indicate that a certification whose auditor is considered independent of providers’ influence offers assurance and is perceived as more credible (Table 8, quote 18). Providers’ comments on guidance can be understood through their perceptions that adopting a certification would spur internal improvements at the provider firm (Table 8, quote 20). As a result, perceptions of potential outcomes vary with the independence and guidance that decision makers relate with features of the structural element “auditor.” Interviewees interpret private auditors and industry associations as having expertise and providing guidance, thereby facilitating internal improvements (Table 8, quotes 19 and 20). However, such private organizations are also perceived as being less independent and the neutrality of their auditing practices is sometimes called into question, thus undermining quality signaling as well as the validity of the information provided by a certification.

## 4.4 Structural Building Block III: Process

### 4.4.1 Interpretive Schema for the Structural Element “Audit”: Evaluation and Learning

For the initial audit, the cognitive interpretive schema emerging from the interviews is comprised of *evaluation* and *learning*. Evaluation refers to the perception that the initial audit process requires a rigorous evaluation of certification criteria. Learning refers to the perception that the audit process allows the provider to enhance its capabilities with regard to the certification’s content dimensions.

For the audit, each of the three features (i.e., self-assessment, remote assessments, and on-site audit) represents a different type of evaluation with varying degrees of rigor perceived by decision makers (Table 9, quote 21). In that sense, decision makers commented that they perceive self-assessments and remote document assessments as providing lower rigor than on-site audits, and that they think that a certification that requires on-site audits would be more credible than one that does not (Table 9, quotes 22 to 24). This implies a linear relationship between the implied rigor and credibility of the certifications’ audit processes. In addition, an on-site audit is perceived as demanding more effort from the certified provider than completing documents for a remote assessment (Table 9, quote 21), which thus implies higher costs (monetary or effort) associated with acquiring the certification. Hence, customers have a higher degree of confidence that a certification’s information is accurate. This point of view is also shared by providers: “[a certification] implies a relatively costly certification procedure, which displays certain strengths of a provider” (i7). This statement indicates that provider-side decision makers who seek a quality signal are willing to bear the cost of undergoing an audit, because they are aware that the type of evaluation influences customers’ perceptions of information accuracy, which will be rewarded by customers with a premium. Hence, customers’ and providers’ perceptions of the audit process influence their perceptions of the degree to which a certification provides information and assurance to customers, and enables quality signaling for providers, respectively.

From providers’ comments on the audit process, a second theme emerged, namely learning. Providers commented that they not only perceive the audit process as a means of being evaluated against the criteria specified by the certifications, but that they also expect to learn from the audit process (Table 9, quote 25). This can be interpreted in terms of expected internal improvements. During the audit process, a provider may learn from the practices specified in a certification, which could trigger internal improvements. Thus, providers interpret learning-type audit processes associated with certification as enabling internal improvements.

Table 9. Illustrative Quotes on Structural Elements “Audit Process” and “Reaudit Process”

Structural element	Interpretive schema and findings	Illustrative quotes
<b>Evaluation</b>		
Process: Audit	A rigorous evaluation strengthens credibility of the provider’s intentions to certify	(21) Customer on remote assessment and on-site audits: “If someone tells me he filled out some checklists and talked to the auditor on phone, I wouldn’t take it seriously. But if someone plausibly explains, how and why they got certified—namely, to genuinely optimize business processes—it’s fundamentally different. Then it’s not an improvement for the cachet only, but for more profitable and efficient business operations . . . in that case, it has a much higher value.” (i17)
	Credibility of a CSC is higher for on-site audits than for remote assessments and self- assessments	(22) Customer on-site audit: “a customer can only rely on the certification, if they know that the certification authority inspected and can confirm that a certification’s assertions are actually followed . . .” (i5)
		(23) Customer on on-site audit and remote assessments: “I always consider a certification more meaningful that requires an on-site audit and a revision of an organization through interviews, more than one that just requires a document review.” (i20)
		(24) Customer on self-assessment: I have great doubts [about a self-assessment]. I think an auditor needs to conduct an on-site visit, otherwise a certification will not engender trust.” (i11)
<b>Learning</b>		
	Audit process creates opportunities for learning through feedback	(25) Provider on on-site audit: “If I had the impression that investing effort in a certification would improve my service or, while familiarizing myself with a certification, I realize that it contains reasonable best practices . . . then I wouldn’t hesitate to invest the effort. At best, the audit itself provides added value. By this I mean that an audit not only involves saying ‘yes/no,’ but it offers feedback. . . . Thus, it’s more like a counseling session.” (i16)
<b>Perpetuation</b>		
Process: Reaudit	A potential revocation after a reaudit ensures a CSC’s credibility over time	(26) Customer on reaudit in general: “a certification should only be issued for a limited period . . . and require a reaudit. If a certification isn’t prolonged, it’s a problem for the provider because it leads to external damage to their reputation” (i1)
<b>Currency</b>		
	Reaudit fosters customers’ trust assurance	(27) Customer on regular intervals: “if a provider documents in which cycles they recertify—or, in addition to certifying, permanently tests systems for vulnerabilities by the help of hackers or offers third-party audits—they gain a competitive advantage and earn users’ trust” (i18).
	Reaudit ensures that the information is current in a constantly evolving environment	(28) Provider on regular intervals: “I think it’s imperative to create a certain continuity because ultimately all services are subject to changes . . . it doesn’t help me to have a certification that is one or two years old, but reveals nothing about the current state” (i12).
<i>Note:</i> Index numbers in parentheses refer to the interviewees listed in Table 2.		

#### 4.4.2 Interpretive Schema for the Structural Element “Reaudit”: Perpetuation and Currency

In terms of the second-process structural element “reaudit,” a cognitive interpretive schema emerged comprised of *perpetuation* and *currency* (Table 9). Perpetuation refers to the perception that a reaudit ensures that the provider will continuously fulfil the certification standard verified in the initial audit. Currency refers to the perception that a reaudit ensures that the certification reflects a current picture of the providers and their services.

In terms of perpetuation, the two identified features—regular intervals and continuous auditing—reflect different frequencies of reaudits. In that sense, the decision makers’ comments imply that they believe that frequent reaudits perpetuate the accuracy of information from the initial audit over time (Table 9, quote 26). This is nurtured by two factors. On the one hand, adopting a certification that requires regular reaudits or continuous auditing can be considered as a commitment from the provider and can thus be a sign of the providers’ honest intentions (Table 9, quote 27). On the other hand, the scenario of a certification being revoked creates a control mechanism that ensures that providers comply with the certification’s criteria over time.

Given the research context, the currency of reaudit can also be interpreted in light of the technological uncertainty that is present in cloud computing (Lins, Grochol, Schneider, & Sunyaev, 2016). Both services and external requirements towards services are continuously evolving (Iyer & Henderson, 2010; Lins, Schneider, & Sunyaev, 2018). Thus, the significant technological changes that may occur after a service has been audited undermine the validity of the initial audit. From this perspective, currency complements perpetuation in that a frequent reaudit not only ensures that information verified during the initial audit is perpetuated, but also that it is regularly updated over time (Table 9, quote 28). Consequently, the perpetuation and currency of the reaudit are

interpreted by customers as providing the validity of information contained in the certification, and by provider-side decision makers as providing quality signaling to customers.

## 5 Discussion and Theoretical Integration

In studying certifications’ structural elements, our data prompted us to examine the interpretive schemas that decision makers apply in evaluating certifications, which formed the basis for our theory development. Our nascent theory of the structure of certifications and the role it plays in decision makers’ evaluations of certifications in IS domains offers two explanations. First, it clarifies *what* structural building blocks and structural elements decision makers consider in evaluating certifications (Tables 3 to 5). Second, our theory examines *how* and *why* specific features within those structural elements influence decision makers’ evaluation of a certification’s value through cognitive interpretive schemas, suggesting that certifications’ structural properties are highly important (Tables 6 to 9). Our findings, summarized in Figure 2 as a descriptive model, suggest a multifaceted and dynamic, coevolutionary evaluation process associated with certifications. The nascent theory arising from our data suggests that in a decision maker’s evaluation of a certification, the certification’s expected outcomes and the cognitive interpretive schemas along the structural building blocks and elements reciprocally affect each other. A decision maker evaluates a certification with one or more expected outcomes in mind that set a frame for the evaluation. The subsequent evaluation result arises from applying cognitive interpretive schemas to the features of the six structural elements and interpreting whether the overall configuration of features will facilitate the expected outcomes. Hence, the application of the cognitive interpretive schemas changes the decision maker’s expectations of the certification’s outcomes. Next, we discuss two conclusions arising from the descriptive model in Figure 2 and integrate them into the literature.

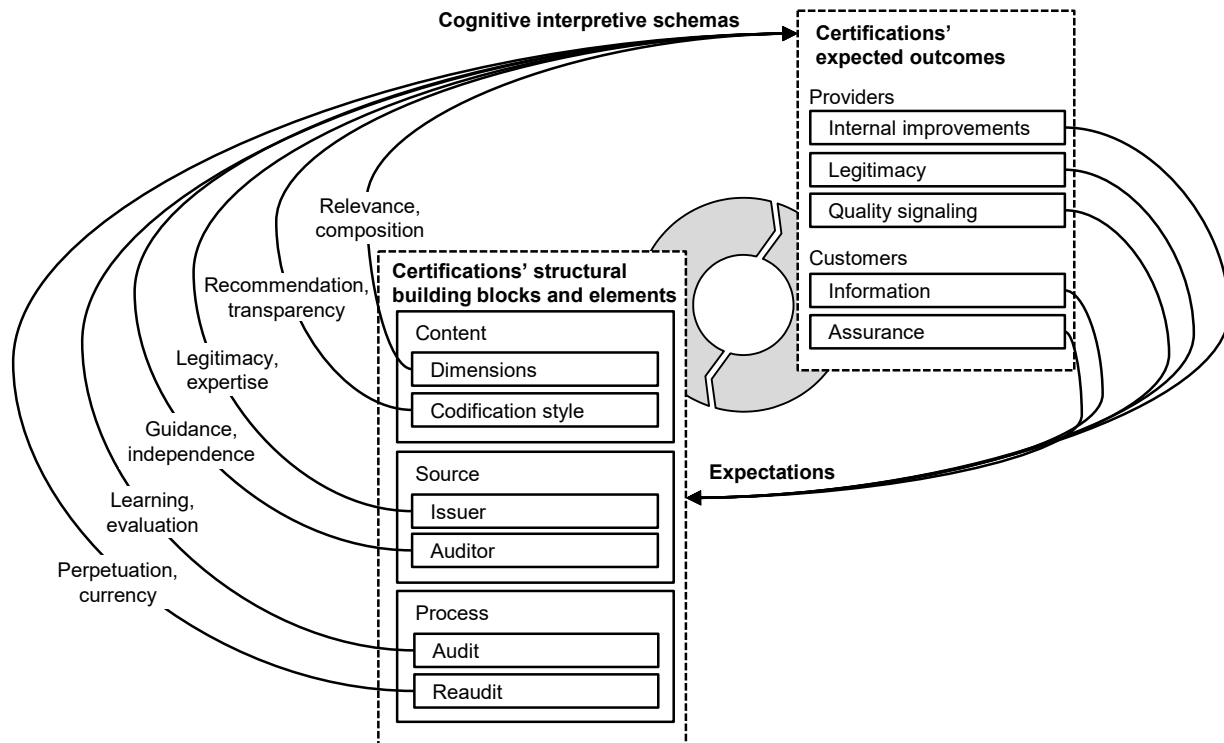


Figure 2. Model of the Coevolutionary Evaluation Process of IS Certifications

**Conclusion 1:** Decision makers evaluate a certification by applying cognitive interpretive schemas on the features along all its structural building blocks and elements.

The first component of our theory is the typology of three structural building blocks with six structural elements of certifications that are pertinent to a decision maker's evaluation of a certification. Our data suggest that for a decision maker a certification implies a configuration of features along the certification's structural elements, with each feature encoding a piece of information about the certification that he or she interprets as a component necessary for forming an aggregate evaluation of the certification. Our data reveal that for the structural elements of content dimensions, audit, and reaudit multiple features can provide input for to decision makers' interpretations (e.g., in context of CSCs content dimensions privacy, security, and availability), whereas for each of the remaining structural elements—codification style, issuer, auditor—one feature is responsible for their interpretation (e.g., a standardization body versus a public agency as the issuer of the certification).

For each structural element, our data revealed a set of interpretive schemas that decision makers apply on features within that structural element. While features vary between certifications and IS domains (e.g., e-commerce vs. cloud computing), the explanatory value of the interpretive schemas is that they describe

the certification- and domain-independent cognitive patterns that a decision maker uses to make sense of a certification's particular features. As illustrated by decision makers' comments (Tables 6 to 9) on the range of features in the specific context of CSCs (Table 4 and Table 5), in applying these interpretive schemas, decision makers ascribe different meanings to the features within one structural element. For example, in the present context of CSCs, in the lens of the interpretive schema of *transparency*, some decision makers perceived a proprietary catalogue as a less transparent codification style than a management standard (Table 7, quotes 12 and 13). Thus, the interpretive schemas describe how a decision maker teases out meaning from a certification's specific features within the respective structural element while repeating this process along all structural elements. Consequently, a decision maker's aggregate evaluation of a certification is a function of the individual interpretations of the certification's features via the respective interpretive schema.

The interpretive schemas described in this article significantly advance prior theorizing on certifications in IS literature, which thus far has only speculated that differences between certifications' features play a role in shaping decision makers' evaluations of a certification (Özpolat et al., 2013). Moreover, our comprehensive conceptualization of certifications' structural building blocks and elements extends prior literature that only proposed the high-

level structural building blocks, *content* and *source* (e.g., Kim & Benbasat, 2009), and identified only the *composition* of content dimensions as a factor that influences decision makers’ evaluations of certifications (Hu et al., 2010).

**Conclusion 2:** The interpretations along a certification’s structural elements contrasted with their expected outcomes contribute to the aggregate evaluation of whether a certification facilitates these outcomes.

The second component of our theory is the set of constructs on certifications’ expected outcomes—which can be *internal improvements*, *legitimacy*, or *quality signaling* for the provider of a certified IT service, or *information* and *assurance* for the customer of a certified IT service (e.g., Table 6, quotes 1 to 8). Abstracting from interviewees’ comments (Tables 6 to 9), our data suggest a dynamic between certifications’ structural elements and certifications’ expected outcomes, in that decision makers have one or more expected outcomes of a certification in mind, and evaluate a certification in terms of its ability to facilitate one or more of these outcomes. The former ties into the notion in earlier IS literature that decision makers turn to certifications with specific motives (see Section 2). When evaluating certifications in a specific domain, these motives may form a predisposition towards certifications. In our data on CSCs, this can be observed in decision makers’ statements on the structural element of content dimensions (Table 6, quotes 1 to 8) that tie into the peculiarities of the cloud context—such as the need for information on cloud services’ technical details due to their opaque nature and rapidly changing functionality, or the need to distinguish legitimate providers from illegitimate ones due to the low market maturity. Furthermore, our data suggest that the cognitive interpretive schemas reflect the cues that decision makers seek to validate their expectations regarding a certification’s outcomes. Thus, in process of scrutinizing a certification’s features through the cognitive schemas, decision makers contrast the features with their expectations in order to evaluate to what extent they will be able to achieve the expected certification outcomes, which in turn shapes the perception of the actual ability to achieve the expected outcomes with the certification. Put another way, decision makers’ overall evaluation of a certification is a coevolutionary process and the evaluation result is a function of how decision makers interpret the configuration of features to fit to their expected outcomes.

By illustrating this evaluation process through examples from our data on CSCs, we also provide explanations for several, sometimes paradoxical, observations. First, our study explains how the same features are perceived to enable different outcomes

across different decision makers from the same group. For example, for the structural element *audit*, some providers perceive that a certification with a rigorous audit enables their objectives of quality signaling, while other providers interpret such features as less helpful for their objectives of creating legitimacy among customers (Table 6, quote 8). One potential explanation derivable from our theorizing is that *audit* triggers the evaluation aspect of the interpretive schema by giving decision makers the idea that it evaluates their ability to, for example, manage a complex technical cloud architecture. However, if providers interpret a rigorous audit as less helpful, the implied rigor might give them the impression that it is an unneeded costly process. This would also be in line with the literature, which maintains that *legitimacy* derives from an external endorsement by an institutional actor, for which a mere accreditation is sufficient (Sine et al., 2007). Second, the examples we present explain observations generated from our data that customer-side decision makers and provider-side decision makers perceive different outcomes originating from the same features. For instance, when discussing the feature “best practice compilation” of the structural element *codification style*, some providers interpreted this feature as enabling their objective of internal improvements, while customers interpreted it as enabling assurance (Table 7, quotes 12 and 13). One potential explanation might be that this element triggers the guidance aspect of the interpretive schema among providers—giving them guidelines, for example, to structure the complexity resulting from distributed architecture, multitenancy, and customizability found in cloud services—while at the same time triggering the guidance aspect makes customers feel assured that the provider has the ability to manage the complexity. Similarly, for the structural element *audit*, some providers think an “on-site audit” will enable internal improvements (Table 9, quote 25), whereas customers perceive an “on-site audit” as a sign of a rigorous evaluation, therefore providing stronger assurance (Table 9, quote 21 to 23). Third, the theorized evaluation process also explains how different features within one structural element are perceived as enabling different certification outcomes. For example, while providers perceive transparent codification styles (e.g., management standards) as enabling quality signaling, they perceive recommendation-type codification styles (e.g., best practices compilations) as enabling internal improvements (Table 7, quotes 12 to 14). This finding is also in line with literature that argues that “standards that include beneficial practices may seldom act as market signals” (King et al., 2005, p. 1103). One potential explanation from our theorizing is that while management standards do trigger the guidance aspect of the interpretive schema, they also, and more importantly, set the (high) bar of what needs

to be in place (e.g., continuity management in case a service in the nested stack of cloud services fails). In contrast, best practices compilations describe commonly accepted practices that do not differentiate among cloud services (e.g., two-factor SSL encrypted data transfer).

Revisiting the literature from which we extracted the constructs *internal improvements*, *legitimacy*, *quality signaling*, *information*, *assurance* (Table 1) in light of our theorizing shows that our six structural elements can be mapped against the underlying theoretical reasoning of the reference literature to clarify how and why structural elements affect outcomes and/or decision makers' perceptions. For instance, the example above illustrates that *content dimensions* might tie into quality signaling for providers (signaling theory), offering information (signaling theory) and assurance (trust theory) to customers. In a similar way, we found evidence that the degree to which a certification's codification style codifies and communicates adherence to best practices influences the abilities of providers to *signal quality* and achieve *internal improvements* through a certification. For the structural elements, *issuer* and *auditor*, we found initial evidence suggesting that they tie into the certification outcomes associated with a customer's trust *assurance* in a certified provider, and the institutional *legitimacy* gains enjoyed by a certified provider. Finally, for the structural element *process* and its two subordinate structural elements, the initial *audit* and the regular *reaudit*, we found evidence tying them to the outcomes of quality signaling (signaling theory) and legitimacy (institutional theory).

## 6 Implications

In this article, we develop a conceptual typology of the structural elements of certifications and use this typology to examine decision makers' evaluations of certifications in the context of CSCs. We believe that this approach provides an analytical device for understanding the perceptions of both provider-side and customer-side decision makers when evaluating a certification on behalf of their organizations. The following sections outline our contributions to the IS certification literature as well as the practical implications of our work.

### 6.1 Developing a Conceptual Typology of the Dimensions of Certifications

By introducing the structure of certifications as a concept and augmenting it with in-depth verbal accounts of decision makers' interpretations of certification features, this study contributes by developing novel concepts and rich insights (Walsham, 1995). To date only rudimentary conceptual research has been conducted on the structure of certifications. The current study captures

and significantly extends initial work on the structural elements of certifications by systematically conceptualizing and empirically grounding a set of structural elements in a comprehensive typology. The typology maintains conceptual consistency with the IS literature by including the previously known structural building blocks *content* and *source*, introduced by Kim & Benbasat (2009), and complementing these with a third structural building block, *process*. All three structural building blocks are broken down into six additional fine-grained structural elements of certifications. As a means to identify decision makers' cognitive interpretive schemas, we also provide a taxonomy of the diverse ranges of features within certifications' structural elements in the specific context of CSCs. In contrast, prior certification research has predominantly focused on a reduced set of prominent certifications, such as TRUSTe in the consumer e-commerce domain or CMM in the IT service sector. As a result, previously studied certifications do not cover the bandwidth of potential features of certifications. On this basis, we feel that both certification research from the customer perspective and certification research from the provider perspective can particularly benefit from examining types of certifications that contain hitherto unstudied configurations of features or configurations of features that decision makers perceive as maladjusted.

In this regard, we believe our study provides an important contribution in the form of a "Type I" theory (Gregor, 2006) by "analyzing or summarizing salient attributes of phenomena" (p. 623), which are needed "when little is known about some phenomena" (Gregor, 2006, p. 623), as in case of certifications. Specifically, the typology of structural building blocks and elements, and the conceptualized CSC features are valuable for researchers because they create a conceptual groundwork for the systematic study of how differences between certifications affect customer evaluation of services and subsequent behaviors, and how the structure of certifications affects the benefits associated with adopting a certification for providers. In terms of rich insights, the conceptual typology is an analytic device that allows researchers to develop a deeper understanding of how decision makers react to differences in certifications' features. Thus, it provides a lens through which to understand the interpretive schemas of decision makers when evaluating certifications. The application of this lens reveals a rich image of what decision makers believe about different features of certifications. These explanations would have been missed had the analysis focused only on the aggregate effects of a certification on customer decision variables or on measures for provider benefits, as is commonly done in the literature. In this way, the present study is the first to "unblackbox" decision makers' evaluations of certifications.

Future research should use the identified typology of the structural elements of certifications and the features of CSCs to map specific decision makers’ views of feature configurations in terms of their decision whether to use a CSC or not. In this way, such research would not only validate that the structural elements are important collectively, but would also validate that each structural element exerts a unique influence on a certification outcome, as well as uncovering potential patterns among structural elements that lead to differentiated outcomes (e.g., some structural elements could essentially be decisive either positively or negatively, or thresholds could exist for each of the structural elements). Moreover, because the typology is a general one, it is thus likely to be applicable for the evaluation of diverse types of certifications beyond CSCs, and the comparison of decision-maker profiles may be able to provide additional insight into how decision makers process information associated with a certification and also concerning the relative value of different certification schemes.

## 6.2 Providing a Descriptive Model on Decision Makers’ Evaluations of Certifications

In analyzing and exploring the rich insights outlined above, we describe a multifaceted, dynamic, and iterative evaluation process elucidating *how* specific certification features within a variety of structural elements are interpreted by decision makers, guided by the identified interpretive schemas, and contrasted with the potential outcomes they might expect from a certification. This description points out that changing a certification in a describable way will also change a decision maker’s response to it. As such, the described model paves the way for future explanatory and predictive research leading to “Type II” and Type III” theory (Gregor, 2006).

We believe this description is an important contribution because it introduces a novel view to the literature in that the few prior studies on decision makers’ evaluations of the structural elements of certifications have predominantly focused on content-related aspects. Our study supports Hu’s and Wu’s (2010) argument that the combination of a certification’s content dimensions is a factor which influences customer trust in a certified service. However, our study’s findings also illustrate that a decision maker’s evaluation of a certification results from aggregating the perceptions of a more extensive set of structural elements. Thus, extending the earlier literature our work delineates a more complex set of factors that drive decision makers’ evaluations of certifications. As a result of our work, decision makers’ (cognitive) evaluations of certifications become more transparent to researchers, which is

useful for studying providers’ certification adoption decisions and customers’ adoption decisions about certified services. Because the structural elements in the typology are linked to assertions of signaling theory, institutional theory, trust theory, and efficiency gains, its concepts can be embedded in studies drawing on these theoretical lenses to investigate the effects of certifications.

Hence, the logical next steps in future research towards full “Type II” and “Type III” theories are to first clearly map and then measure the link between certification outcomes to the structural elements of certifications. Such research would provide an additional understanding of, for instance, why changing one structural element may have more impact on certification outcomes than changing another one; what potential dynamics and dependencies exist between structural elements; or how emphasizing one of the structural elements may shift receptiveness for the certification from one audience to another (e.g., from technically oriented CIOs to business oriented CIOs or vice versa).

## 6.3 Illuminating the Dynamics Between Certifications’ Structural Elements and Certification Outcomes

Our theorizing contributes to the more general debate on the value of certifications by illuminating how decision makers make sense of certifications in terms of the outcomes they expect from them, thereby highlighting the need to refocus the discussion from examining outcomes of certifications in different IS domains to the notion of the dynamics between certifications’ structural buildings blocks and elements, and certifications’ outcomes. Our findings suggest that subtle differences in features can alter decision makers’ perceptions of the outcomes they expect from a certification. Although we do not directly measure any relationships between specific configurations of certifications and certification outcomes, this finding is nonetheless of theoretical importance. We reveal that the structure of certifications may be a potentially overlooked antecedent of certifications’ outcomes, that is, specific configurations of structural elements can lead to specific certification outcomes. In so doing, we define new areas for theory building within the two streams of certification literature described in Section 2. In terms of the stream on customer perspectives, our work highlights the need to broaden the scope of certification research to go beyond identifying contextual or perceptual contingency factors that influence or explain the effect mechanisms of certifications. In particular, our findings provide a possible explanation for the inconclusive effects of privacy certifications on trust and decisions. For studies with nonsignificant results, it is possible that

the certifications' features elicited unfavorable perceptions (e.g., subjects thought that the certification was not issued by a legitimate source, that the auditor was not independent, or that the audit process was not rigorous), which led subjects to disregard the certification in forming trust and making their decisions. As such, our work advances the understanding of the conditions under which certifications effectively influence customers' decisions.

In terms of the stream on provider perspectives, our work highlights the need to consider certifications' structure as a variable when examining certifications and advances the understanding of the boundary conditions for the theoretical perspectives on certifications' benefits. The prevailing approach in the literature is to compare the benefits that providers derive from a certification (e.g., CMM or ISO 9000) with a given configuration of features across opposing theoretical perspectives, in order to determine which perspective has higher explanatory power. The outcomes in our study are directly drawn from signaling theory, institutional theory, and efficiency gains perspectives on certifications. Our finding that these outcomes may arise from different features implies that the benefits of certifications for providers—and thus the theoretical predictions—are contingent on the features of the certifications.

#### **6.4 Providing Practical Guidelines for Designing Certifications and Devising Certification Implementation Programs**

This article offers three contributions for managers at certification authorities and service providers. First, we provide a taxonomy of the structural elements of certifications as well as substantive features for CSCs that certification authorities can use as a guide in designing and evaluating certifications in general and CSCs in particular.

Second, based on this taxonomy we provide insights into what features are valued by decision makers and what features are valued differently by providers and customers. In this regard, our findings are particularly noteworthy regarding CSCs' content dimensions. Existing CSCs predominantly focus on either security or privacy (e.g., CSA Star for security and TRUSTed Cloud Data Privacy Certification for privacy). Based on our results, certification authorities can conclude that decision makers value content dimensions beyond security and privacy (e.g., availability). Regarding certifications in general, our results also imply that designing a certification with multidimensional content requires careful balancing between parsimoniousness and resolving dependencies, because too broad a composition may

undermine a certification's ability to signal quality and provide information to customers.

Furthermore, certification authorities can conclude that some features across structural elements might not mix well. Advertising that the auditor offers guidance and that the audit process allows learning may attract providers but may also diminish customers' perceptions that a certification provides information and assurance, hence undermining the certifications' diffusion in the long run.

Third, we provide a typology of certification outcomes that practitioners can use to devise their individual implementation programs for certification schemes in a way that maximizes the aspired benefits realization for the provider. We found that no single "ideal" certification exists for all outcomes, but rather that different configurations of certifications' features are associated with different, or even opposing, outcomes. Possible certification strategies depend on which outcomes a provider intends to actualize. Nascent or unknown providers seeking to gain legitimacy should seek certification from an established issuer and undergo an audit from an independent auditor. Providers intending to signal quality should consider adopting a certification that aligns its content dimensions with customers' information needs and use an independent auditor whose audit process requires a rigorous evaluation. In contrast, providers seeking internal organizational improvements should consider adopting a certification that balances best-practice driven content with a learning-type audit process using a guidance-type auditor.

### **7 Limitations and Future Research**

Our study has three main limitations that offer opportunities for future research. First, we focused our research on identifying and exploring interpretations of certifications' features without taking into account possible contingency factors that may represent some important boundary conditions associated with the emergence of certification outcomes derived from decision makers' interpretations. Future research should trace features' *actual* effects on certification outcomes perceived by decision makers in conjunction with industry-, company-, or personality-related contingency factors and decisions made. An additional opportunity for future research would be to more closely examine how decision makers evaluate the different interpretations relative to each other and the extent to which each structural element directly contributes to a certification's expected outcomes (e.g., via an experiment that measures how decision makers react to substantial changes in a certification scheme that affect a certification's underlying characteristics or features).



The second limitation refers to the generalizability of our findings. Our study empirically focuses on CSCs and interviewees have the same Western cultural background. Research has emphasized that certifications are highly context-specific (Aiken & Boush, 2006), and their effects are subject to cultural influences (Kim, 2008). Yet, CSCs, while being important in their own right, may have nuance due to specifics of cloud technology and contractual relationships that are not prevalent in other types of certifications. Research in other certification contexts is needed to confirm whether our findings are generalizable. Third, we chose a key informant method for data collection and focused on informants on a managerial level. This approach, while having advantages for our exploratory work, has the limitation that the data reflect perceptions of one person per company and certifications' features are on a level of abstraction that is comprehensible to decision makers. Future studies should consider research designs that allow for data collection and analysis from multiple actors across different organizational levels who are involved in evaluating certifications. In this regard, we also believe that detailing certifications' features on a technical level (e.g., concrete evaluation criteria) would further deepen the understanding of how organizational actors other than those in this study evaluate certifications.

## **8 Conclusion**

The trend of sourcing services from online markets or from physically distant business partners makes certifications an increasingly important topic on IS

managers' agendas. The executive's remark quoted at the beginning of this article—that designing a certification requires careful evaluation of certifications' features with regards to their potential value—pinpoints the two core questions addressed in this article: what factors are pertinent to decision makers' evaluations of certifications and how do they relate to the potential value for decision makers?

To answer these questions, this article has empirically focused on CSCs as a nascent class of certifications to conceptualize a typology of certifications' structural elements and to explore the differential effects of features on providers' and customers' evaluation of certifications. Our research is novel in that it opens the “black box” of decision makers' evaluations of certifications, thereby providing theoretically nuanced insights. The findings suggest that the six structural elements are key to decision makers' evaluations of certifications. Furthermore, alternative configurations of certifications' features result in different evaluations by decision makers in terms of their expectations for a certification's outcomes, as they are interpreted differently through decision makers' interpretive schemas. Our findings imply that researchers should pay attention to certifications' structural elements as a potential contingency factor when examining benefits of certification for providers or the effects of certifications on customers' decisions concerning certified IT services. We hope that these insights help researchers better understand the nature and effects of different certifications and help certification authorities design better certifications.

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## Appendix A

**Table A1. Interviewees’ Roles and Company Details**

Category	Frequency	Category	Frequency	
			Usage	Provision
Employees		Cloud service types		
<10	1	Software-as-a-service	12	13
10–49	6	Platform-as-a-service	5	2
50–249	2	Infrastructure-as-a-service	7	1
250–999	4	Hierarchical role of interviewee		
≥1000	7	Executives / top management		8
Revenue		Middle management		9
<2	5	Employee / consultant		3
2–10	1	Functional role of interviewee		
10–50	2	Business		13
50–250	5	IT		7
>250	5			
Prefer not to say	2			

## Appendix B

The questions in Table B1 guided the expert interviews on certifications. We used the same protocol for interviewing customers and providers but adapted questions to the context as indicated. Throughout the interviews we used follow-up questions to clarify statements or discuss topics not cover by the protocol. Also, to foster a natural conversation with interviewees we adapted the order of questions if an interviewee raised a topic that was planned to be discussed at a later stage.

**Table B1. Interview Protocol**

### Introduction

Thank you for taking your time for this interview. The interview length will be 60 to 90 minutes. Our aim is to develop a framework to understand certifications in context of cloud computing.

Please take as much time as necessary to reflect on and answer our questions. The questions are structured in three sections: (1) questions on your personal background and role in your company, (2) questions on your experience with decisions about cloud services, (3) questions on certification of cloud services.

After the interview you will receive a transcript for review. In analyzing your answers we will maintain confidentiality and your identity will remain anonymous.

### A. Background

- How many employees work at [company name] and what is [company name]'s revenue?
- Could you please describe your area of responsibility at [company name]?
- How many years have you been working in your area of responsibility? What is your total work experience in years?
- What is your understanding of the term 'cloud computing'?
- [Providers only] Which types of cloud services does [company name] offer?
- Which types of cloud services does [company name] purchase? For how long?
- How many cloud-related projects (procurement or deployment at client) were you personally involved in and what was the average duration of these projects?
- Could you please describe the cloud services in the projects that you were involved in?

### B. Contextualization of cloud decisions and interviewees' experience thereof

- Could you please describe the overall selection, decision and implementation process of a cloud project that you were involved in?
  - Which critical challenges or problems did you encounter in each phase and how did you manage these?
  - [Customers] Did you have any concerns regarding the chosen cloud service or its provider? If so, which? Did your concerns change in course of the project?
  - [Providers] Did your customer express any concerns regarding your cloud service or your organization? If so, which? Did their concerns change in course of the project?
- Could you please reflect on the decision?
  - What is your opinion on risks and uncertainties in decisions about cloud services in comparison to other IT sourcing decisions?
  - [Customers] What were the main drivers that led to the decision for this cloud service / provider?
  - [Customers] Why exactly did you decide for this cloud service / provider? Which criteria were decisive in selecting the cloud service / provider?
  - [Providers] Do you have any information about why your customer chose your company as their cloud provider? Do you know which criteria were decisive in selecting your cloud service / company?
- In your opinion, what are the factors that constitute a trustworthy cloud service?

### C. Certifications' Elements and Outcomes

- Reflecting the role of certification in the decision process
  - Which role did certifications have in the decision for the cloud service?
  - How do certifications stand against other decision criteria that we just discussed?
  - If certifications were relevant in selecting the cloud service / provider,
  - Which certifications was the cloud service / provider certified with?
  - How did the certification influence decision-making?
  - If certifications were not relevant in selecting the cloud service / provider,
    - Were you aware that any of the cloud services in the choice set was certified?
    - Why did the certification(s) not influence your decisions?

- Did you know the certification(s) and its/their content/elements?
- How did you acquaint yourself with the certification? About which factors did you collect information?
- Certifications of cloud services in use / offered
  - [Customers] Is any of the cloud services that you use certified? If so,
    - Which certifications is the cloud service certified with?
    - What do you think of the certifications in detail?
  - [Providers] Is your company or any of your cloud services certified? If so,
    - Which certifications is your company / are your services certified with?
    - What do you think of the certifications in detail?
    - If not, do you plan to get certified? Which certifications do you consider and why?
- Knowledge of certifications in general
  - What additional certifications are you familiar with?
  - What do you think of the efficacy of these certifications?
- Utility and benefits of certifications for customers and providers
  - What do you think is the value and benefit of certifying for a provider?
  - What do you think is the value and benefit of certifying for customers?
  - Exemplary follow-up questions
    - What benefits do you think exist beyond fulfilling bidding prerequisites?
    - Do you think that certifications facilitate process maturity improvements?
    - What do you think of certifications as marketing signals?
    - What other benefits do you see beyond assurance?
  - [Customers] Which properties do you associate with a certified cloud service/provider?
  - [Providers] What do you think which properties customers associate with a certified cloud service/provider (compared to noncertified cloud service provider)?
- Perceptions of certifications’ outcomes
  - [Customers] What do you expect from a certified provider compared to a noncertified cloud service/provider?
  - [Providers] Do you think customers’ expectations of a certified provider differ from noncertified cloud services/providers?
  - What do you think is the risk of using a certified service/ provider compared to a noncertified service/provider?
  - What do you think in terms of trust if comparing a certified service/provider with a noncertified service/provider?
  - From your perspective, are there any factors that alter the value of a certification in a more positive/negative light in decision contexts?
  - Exemplary follow-up questions
    - Do you think a certified provider’s/service’s quality differs from noncertified providers/services?
    - Do you think the value of a certification differs for public, private vs. hybrid cloud models?
    - Do you think the value of a certification differs for different service delivery models (infrastructure, platform, application)?
- Perceptions of certifications’ elements
  - Perceptions of codification style
    - How should a certifications be developed and established? Why?
    - What is your opinion on the following other options: [management standard, best practice compilation, proprietary catalogue]
  - Perceptions of issuer
    - What type of organizations should issue certifications? Why?
    - What is your opinion on the following other options: [standardization body, public agency, industry association, private auditor]
  - Perceptions of auditor
    - What type of organizations should conduct audits? Why?
    - What is your opinion on the following other options: [independent accredited third-party, public agency, industry association, private auditor]
  - Perception of audit and reaudit processes
    - How should the audit process be designed? Why?
    - What alternatives can you think of?
    - What is your opinion on the following other options: [on-site audits, automatic/continuous monitoring, self-assessments]
    - What is your opinion on reaudits?
    - What should happen in case of violations against certification criteria?
    - [Providers] What effort and costs would you be willing to invest in a certification?
  - What do you think of the focal object of certifications [provider versus service]?
  - What should be the scope of certification in the cloud context? [sector requirements, service layers]
  - What is your opinion on the certification’s geographical coverage? [e.g., national, regional/EU, worldwide]?

- Perceptions of content dimensions
  - What dimensions should be certified? Why? Please try to reflect on your past cloud projects?
  - What is your opinion on the following other content dimensions: [state security (e.g., physical, encryption), privacy (e.g., location, deletion), legal compliance, contract (e.g., exit terms, billing, pricing model), flexibility, availability and performance commitments, interoperability, process maturity, customer support, financial stability]
  - Could you try to prioritize the content dimensions you named?

**D. Conclusion**

- Did we miss anything? Is there anything else you would like discuss on cloud service certifications?
- Can we get back to you in case for any follow-up inquiries?



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