The Building Blocks of a Cloud Strategy: Evidence from Three SaaS Providers

Abstract

With all the hype about how easy it is to jump to the cloud, and master the art of offering application software via the cloud, it is hardly surprising that many firms have approached the cloud without a clear strategy in mind, which has resulted in numerous downfalls. Analyzing three firms on the point of deciding to offer cloud-based application software, we show how the decision to utilize the cloud is informed by the characteristics of the firm's respective industry, as well as by the existing stock of their internal systems and processes (also known as its design capital). These two dimensions comprise five building blocks that largely determine the unfolding of a cloud strategy. The five blocks include the turbulence, concentration and growth that characterize a firm's industry, a firm's option value (i.e. the breadth of a firm's opportunities afforded by its design capital), and the expected cost or effort entailed in exercising the opportunities embedded in that design capital (also known as its technical debt). Most importantly, our case analysis reveals two additional blocks related to customers' perceptions and concerns with the cloud-based SaaS offering. These include the criticality of security optimization and the demand for software customization in the firm's offering. We argue that firms wishing to offer cloud-based application software need to consider these seven blocks in order to develop a successful cloud-based SaaS strategy.

Keywords: software as a service (SaaS), cloud-based SaaS strategy, industry analysis, digital capital, criticality of security optimization, software customization demand

WHEN THERE IS NO CLEAR STRATEGY TO FOLLOW, THE 'NO STRATEGY' BECOMES THE COMMONLY ADOPTED CLOUD STRATEGY

Cloud computing refers to an on-demand network service that allows individual users or businesses to access configurable resources. It can also be defined as an on-demand delivery model that enables the synchronized delivery of computing resources such as applications, storage, servers, networks and services [1]. As it stands, there are three cloud computing delivery models: 1) software as a service (SaaS - such as Salesforce.com and Google apps), which delivers applications to the end users over a network, 2) platform as a service (PaaS - such as the Google app engine and Microsoft Azure) that deploys applications to a cloud, and 3) infrastructure as a service (IaaS - such as the Amazon Elastic Compute Cloud) that rents storage, processing, and network capacity to host applications. Of the three, the SaaS model has gained the greatest attention, given its economically efficient foundations, as well as its ability to satisfy users' preferences for the ubiquitous availability of data and applications [2]. From the perspective of application software providers, the SaaS model offers the obvious benefit of liberating them from the traditional low-level tasks setting up IT infrastructures and deploying applications to client machines [3]. This enables the providers to scale their investments with a view to growing their businesses [4], and focus on innovation and creating business value [5]. Additionally, cloud computing has been associated with a series of other benefits, such as offering a controlled interface, a virtual business environment, increased addressability and traceability, and the advantage of rapid elasticity/scalability [6].

With all the promise held by cloud computing, it is easy to understand why application software providers face increasing pressures to jump onto the cloud, and exchange their on-site application software offerings for cloud-based solutions. However, the unfortunate reality is that most of the promised benefits have turned out to be a triumph of hype over reality. A recent Forbes article has noted that many firms are following a *no strategy* in moving to the cloud, thus leading more often to failures than successes [7]. For example, Adobe's new Creative Cloud Product line has been impeded by the skepticism of customers who are not yet ready to move to subscription-based services; among others, common concerns include file recovery in the event of a subscription lapse, and the need for a more tailored offerings for photography enthusiasts [8].

As we aim to show in this paper, where we focus on the offering of software application via the cloud, there is a clear need for a better understanding of the fundamental underpinnings of a successful cloud-based SaaS strategy (henceforth termed a cloud strategy, and defined as "a set of decisions required to create and deploy a network-based, information service delivery strategy that results in both cost savings and organizational agility" [6, p. 117]). To this effect, we argue that a successful cloud strategy needs to encompass some of the key elements that distinguish a broader digital business strategy. We also argue that these elements include a series of higher-order dimensions that relate to the characteristics of the firm's respective industry and its existing stock of internal technological capabilities. Moreover, in our paper we show that complementing these dimensions with a consideration of certain attributes of cloud technology that are related

to the actual application software offering lead to the formation of distinct strategies. We discuss these concepts in more detail in the remaining sections.

THE COMPONENTS OF A DIGITAL BUSINESS STRATEGY

A digital business strategy can be understood as the manner in which a firm engages in any category of IT activity; the strategic nature of this engagement implies "a dynamic synchronization between business and IT to gain competitive advantage" [9, p. 513]. Recent studies have proposed more elaborate frameworks of digital business strategy, such as those of a firm's digital strategic posture [9] and the design-based logic of a digital business strategy [10].

The digital strategic posture has been defined as a firm's degree of engagement in a particular digital business practice relative to the industry norm [9]. The degree to which a firm chooses to diverge from or converge to the industry norm in its ongoing digital business strategy is influenced by the interaction between its current digital strategic posture and three key elements of the firm's industry environment: industry turbulence, concentration, and growth [9]. These elements have been defined as follows: industry turbulence is the rate at which firms enter and exit the industry; concentration is the extent of competitive rivalry in an industry, whereas growth is measured as the rate of increase in demand for the industry's output [9]. It has been proposed that high industry turbulence, low industry concentration, and low industry growth will influence firms to develop digital business strategies that diverges from the industry norms because of the intense competition, and also due to the fact that such norms are less reliable guides to

future success [9]. In contrast, it is proposed that low industry turbulence, high industry concentration, and high industry growth will influence firms to develop digital business strategies that converge to the industry norms as these norms are reliable indicators of the possible success of particular strategic moves [9].

Instead of looking at the external factors, Woodard et al. [10] proposed the design-based logic of digital business strategy that examines the firm's internal systems and processes, also referred to as the firm's design capital. Design capital includes the firm's option value, which is the breadth of opportunities that are afforded by the firm's internal systems and processes, and technical debt, which is the expected cost or effort entailed in exercising those opportunities [10]. It has been proposed that a digital business strategy should aim to manage the levels of option value and technical debt associated with the firm's design capital towards the ideal state of high-quality design capital characterized by high option value and low technical debt [10]. This ideal state will allow firms to seize a wide range of market opportunities and respond to their competitors' actions with speed and scale [10].

Although a digital strategy is not synonymous to a cloud strategy, insights from these higher-level frameworks can arguably serve as a useful foundation for better understanding how firms approach the cloud. Our conviction firstly stems from the fact that a cloud strategy is inherently embedded in a broader digital strategy, and secondly from the notion that the industry environment and a firm's internal capabilities are the main determinants of a firm's competitive strategy [9, 10]. We draw empirical support

for these insights by analyzing the recent strategic decisions by three firms to offer cloud-based application software. We present our analysis and findings for each firm in the next section.

CASE ANALYSES

The three firms are located in the same European country, but are positioned in different industries. Firm 1 is a leading telecommunications provider; Firm 2 is a small engineering simulation software provider; and Firm 3 is a mid-sized company specialized in offering customer relationship management (CRM) software. While it may take a while before one can conclude whether these companies' cloud strategies have been ultimately successful or not, by synthesizing the analyses of these three firms at the point where they made their decisions, this paper contributes to both researchers' and practitioners' understanding of the different parameters that firms take into account during the unfolding of a cloud strategy.

Firm 1: A Major Telecommunication Provider

Firm 1 is a large telecommunication provider that serves both residential and business customers. The telecommunication industry is characterized by a high degree of industry turbulence (where there are frequent entries and exits of firms from different industries, such as firms from the mobile applications industry that offer customers cheaper alternatives for long-distance calls), high industry concentration (generally, there are only a few telecommunication providers in a given country – there are three main telecommunication providers in the country that Firm 1 operates at), and high industry

growth (demands for improved connectivity and speed are continually increasing). In this environment, it is not immediately clear whether this firm's digital business strategy should diverge or converge from the telecommunication industry norms – supplementing traditional offerings (e.g., voice calls and data offerings) with more non-traditional arrangements (e.g., mobile payments) by collaborating with firms in other industries (e.g. firms in the financial services sector).

An assessment of the first firm's internal systems and processes (digital capital) positions the firm in the debt-constrained design capital state (high option value and high technical debt [10]). While its telecommunication infrastructure appears to give it plenty of options to enter the cloud business, significant investment is needed to make it IaaS-ready, as a recent report noted: "We thoroughly discussed with [our] cloud architects … about the IaaS. Their response was positive but it would be very expensive …" In such a debt-constrained state, depending on the level of its resource munificence, the firm will need either abandon the option or reduce its debt [10]. Debt-constrained firms that have access to abundant resources - as is the case for Firm 1the first firm - can afford to reduce their debt without abandoning their strategic options.

In fact, considering other cloud computing delivery models besides IaaS, Firm 1 decided to invest in developing a cloud infrastructure, as well as new business models that offer various SaaS to end users (in this case, business users) instead of offering IaaS to application service providers. Leveraging its current position as a trusted telecommunication provider and the well-known data protection policy of the country of

its operations, Firm 1 targets enterprises operating in high security-loss environments with highly critical SaaS security optimization. The main value proposition Firm 1 offers these enterprises to replace their existing on-premises software with its SaaS is the security of their data, as the data does not leave the country (i.e., the cloud farms are located in the country where Firm 1 operates), and the security of their data processing, as the SaaS will be hosted locally by Firm 1 itself.

Part of this firm's initial initiative is to enter into the collaboration with a CRM software provider to provide CRM SaaS to business customers. It needs to be noted that besides the existing enterprises the focal CRM provider currently serves, the immediate target customers of Firm 1 are medium and large financial enterprises in the country that are current subscribers to its telecommunication network. These financial enterprises are working in high security-loss environments, and will suffer major economic losses if the CRM system is subject to security attacks [2].

However, the specific nature of the CRM SaaS, which supports multi-tenancy with high parameterization or customization, is technically very complex and can be very expensive. According to the firm's CRM company collaborators, their CRM software does not support multi-tenancy, because each client (tenant) tends to require system parameterization i.e., "the customers that buy the CRM software usually demand a customized system according to their business processes and therefore the support of multi-tenancy with high parameterization is technically very complex and expensive".

This situation is a good example of how a firm's digital capital is intertwined with its client's technical needs (in this particular case, support for multi-tenancy with high parameterization). Having access to the technical resources needed, Firm 1 finds a secured cost-effective solution to the multi-tenancy challenge of providing highly customized systems, which is to deploy multiple software instances for different tenants at a single server; thus the client can achieve software customization while still enjoying the benefits of a cloud-based service.

As it turns out, Firm 1 decided to diverge from the industry norm: instead of offering the usual telecommunication infrastructure-related offerings, it aims to offer SaaS to business customers, thus altering its position in the current industry ecosystem from being merely a telecommunication provider to an SaaS provider. Its new position as a SaaS provider will enable Firm 1 to enjoy multiple benefits "as it enables vertical selling opportunities in addition to the license fees such as iPads [rental] and voice and data subscriptions" (excerpt from a Firm report). At the moment, "the infrastructure to host the SaaS is an ongoing work and it is expected to be available within the next few months … there is [still] a high business interest to start this SaaS projects … within the next year" (excerpt from an email communication).

Firm 2: An Engineering Simulation Software Provider

Our second case is a small provider of engineering simulation software. Specifically, it specializes in simulating computational fluid dynamics and multiphase flow heat transfers. Its software is sold globally and is mainly used by research organizations and

companies in the oil and gas industry, nuclear engineering, renewable energies, microfluidics, and advanced materials science (hereafter refer to as ‘client companies’). The client companies’ use of this advanced software is limited by their access to computing power - only a few clients have the computational resources (parallel computers or clusters) required to run very demanding simulations, which shrinks the size of the engineering simulation software market (and thus contributes to low industry growth).

The competition for this already small market is fierce and is dominated by two large companies (high industry concentration). “Unlike [the] commodity [software] market, the engineering simulation [software] market is highly oriented towards a “dominant design”. This means, the incumbents try to make their competitors obsolete by locking their customers into their software logic [and algorithms]” (excerpt from a report). Although the software logic and algorithm may not be the most efficient (or even the most appropriate), the client companies will incur high switching costs if they change from one software provider to another due to organizational latency, training costs, know how transfer, and the learning curves involved. This is a strong indication of low industry turbulence, as it is difficult for firms from different sectors to enter and exit the industry. To sustain itself in this small yet highly competitive market, Firm 2 also offers consultancy services. In this environment of low turbulence, high concentration, and low growth, it is not immediately clear whether its digital business strategy should diverge or converge from the engineering simulation industry norm – which (for small providers) would imply having to heavily supplement their software offerings with consultancy

service. However, Firm 2 has realized that providing a consultancy service is not as scalable as its software offering, and thus - although it is the industry norm - it may not be a sustainable strategy in the long run. The founder of Firm 2 remarked, “[The consultancy service] is very labor-intensive”. Hence, the tendency is to follow a business strategy that diverges from the industry norm.

In terms of its digital capital, Firm 2 is in the low-quality design capital state (low option value and high technical debt [10]). Such firms, depending on their level of resource abundance and technical capability, can either aim to reduce their technical debt or create different value options [10]. By default, this firm is constrained by a lack of resources, but at the same time it enjoys a strong relationship with academic stakeholders (in an excerpt from an interview Firm 2 states, “We are working closely with a research institute in a local university”), enabling it to exit the low-quality state by increasing the level of its technical capabilities.

Since the market is small, not very adaptable, and dominated by two large companies, Firm 2 has considered - with the aid of its academic contacts - deploying its software as a cloud-computing hosted service. “Companies on the edge of starting engineering simulation activities are not willing to invest in IT infrastructure acquisition and long term maintenance contracts. They rather [tend to] spread [their] investment over time, much like any other operation consumable. Furthermore yearly software license fees constitute a financial burden, especially when the software vendor enjoys a quasi-monopoly situation. [In this context] cloud computing appears… [to be] a real alternative

answer to engineering needs" (excerpt from a report). Since the engineering data is not sensitive data and the simulation process does not need to be performed in a highly secured environment, the cloud-hosted SaaS solution seems to be a viable way for Firm 2 to compete with the dominant players in the current market and increase the market size.

Firm 2 realized that the high switching costs associated with its product offering imply that the decision as to which simulation software to adopt lies in the hands of client companies' top managers, who may not be familiar with algorithms and simulation software logics. For their engineers to use inefficient software on daily basis could be very frustrating. With a web-based cloud-computing hosted service, Firm 2 can invite these engineers to test their software during a free trial period, without the need to access or use their companies' own computational resources. The aim is to allow the engineers who are the real users of the simulation software to use it and test its efficiency and accuracy in a cloud environment, and hopes they can then convince their top management to switch to its software.

The switching cost from on-premise software to cloud-computing hosted service is considered to be marginal. Moreover, since the cloud-based simulation software is meant to allow virtually anyone to perform highly demanding engineering simulations with no infrastructure prerequisites, Firm 2 intends to increase its target market beyond that of the large companies with computational resources in place. The firm is currently working with a cloud broker and a cloud infrastructure provider to implement its cloud-based solution and bring its software to the cloud. The company intends to "use it exactly in the

same way as planned: it will lock new customers by offering them trial access without software installation" (excerpt from an email transcript).

Firm 3: A CRM Software Provider

Firm 3 is a mid-sized software company specialized in CRM software. "[The CRM software] is available as fat client: it has iPhone and iPad applications and also has a web front-end. This allows the customers to flexibly use the front-end that is most suitable for their processes. [For example], sales personnel can use the iPad version to be fully mobile while being with the customer, so a call center agent can use the fat client perfectly optimized for his tasks" (excerpt from a report). The analysis of the firm's industry environment is as follows: the CRM software industry is characterized by low industry turbulence (where firms' entries and exits from different industries are not so frequent), high industry concentration (there are few well-known CRM software providers), and high industry growth (there is an increase in demand for CRM software, especially from the small and medium sizes companies). In this environment, the literature predicts that this firm's digital business strategy should converge to the industry norm, because it is relatively easy to clearly determine the optimal level of IT investment and its potential for success [9]. The industry norm for firms like Firm 3 that offer on-premise CRM software is to supplement this traditional offering with the SaaS version of the CRM software. As our conceptual framework would predict, Firm 3 indeed views cloud computing as a new opportunity that could extend its business and therefore plans to provide the SaaS version of its CRM software and offer it alongside with the on-premises version. "As the current [on-premises] CRM version already fulfills the main characteristics of online access with

multiple devices, no local data storage, and scalability, the private offering can mainly be seen as a marketing enhancement" (excerpt from a report).

An assessment of the internal systems and processes (digital capital) of Firm 3 positions it in the debt-constraint design capital state sector (high option value and high technical debt [10]). A significant investment is required to produce the SaaS version of the software, and there is an internal concern about going in this direction, as the following report excerpt indicates: "The question of whether the CRM [software] should be offered in the cloud or not is omnipresent. This dilemma involves various factors. As [the company] is not a big software producer, this dilemma needs to be taken seriously, as [the required] financial investment can hardly be covered in case of a failure" (excerpt from a report). In such a debt-constrained state, the firm should either abandon the option or reduce its debt, depending on the level of its resource munificence [10]. Firm 3 observes the significant resources needed to develop the SaaS version of its software is a necessity as "there is not only the question whether it is worth to invest into a cloud solution, but also whether it is possible for [the company] to survive in the long run without a cloud solution" (excerpt from a report). As already noted above, the current industry norm is for CRM software providers to offer a cloud solution; "… the topic is brought up [in the company] as the customers start asking for it" (excerpt from an email transcript).

Understanding that an aggressive move to compete with the big providers of CRM SaaS would be quite difficult, and would most likely lead to a price war, Firm 3 sought to

identify a number of unique selling propositions that were hard for its competitors to imitate before moving to the cloud. Specifically, it saw a regional advantage, a legal advantage (storage of customers' data according to country-specific-laws), and a know-how advantage (knowledge about a specific security algorithm). These unique selling propositions stem on the one hand from the fact that the business users who work with client data are working in a high security-loss environment and face considerable economic losses if the CRM system suffers security attacks [2], and on the other hand from the fact that the firm has already built significant levels of personal trust with its clients.

Firm 3 mostly serves customers in its home country. Its customer base mainly consists of large organizations in various industries, especially in the retail, pharmaceutical, and insurance sectors. With the aforementioned selling propositions in mind, Firm 3 decided against a public cloud offering as it saw a number of constraints that would disrupt its existing business model, not only its in-depth, personal relationships with all of its customers. Shifting to a public cloud offering would also imply a cultural change within the company that would be hard to achieve. Firm 3 opted for a private cloud solution, as this was largely compatible with its existing personalized services. This new offering might attract new customers that do not want to operate the application themselves, but do want to have their own private application. The only constraint in this case was the lack of a data center where the application could be hosted. As running such a data center is not its core business, Firm 3 decided to outsource the task to a well-known provider that could ensure the scalability and most importantly the security required by its

customers.

INSIGHTS FROM THE THREE CASES – TWO ADDITIONAL BLOCKS COMPLEMENT THE FIVE BUILDING BLOCKS IN DETERMINING THE RESULTANT STRATEGIC BEHAVIOR

Analyzing the above cases, we established two things: first, in addition to the five building blocks that are related to the external environment and the firms' broader internal digital capabilities, all three firms had to take into account certain requirements of their customers' with respect to the cloud technology before deciding how to approach them with a cloud-based SaaS offering. In particular, we found that customers' requirements of software security and customization are the two main attributes that determine firms' decision to changing their on-premise software to cloud-based SaaS. The criticality of security optimization depends on whether the target users are working in high or low security-loss environment [2], whereas the importance of software customization depends on the type of software that is offered.

Second, we observe that the three firms developed three different strategies in terms of utilizing the cloud to impact their industries, as well as their value propositions. In our empirical examples, Firm 1 can be seen as an *innovator*, Firm 2 as a *disruptor*, and Firm 3 as an *optimizer*. We define innovators as firms that offer cloud-based application software to create new revenue streams by moving into an adjacent ecosystem or market space. In the course of this extension and transformation, innovators will often have the chance of combining elements of the value propositions and value chains that were

previously unrelated, and so increase their competitive advantage [11]. The cloud is not only a technology that enables businesses to embrace opportunities for innovation [11], but it also serves as a catalyst for business model transformation.

In contrast with *innovator* strategies, companies classified as having disruptive strategies share the perception that cloud-based application software offerings can generate completely different value chains. We define disruptors as firms that either radically reformulate customer value propositions, or generate new customer needs in their current ecosystems. Disruptors have the potential to capture inimitable competitive advantage by creating disruptive mechanisms in existing markets or industries. Typically, such firms provide customers with what they were either unaware of, or didn't realize they needed. While businesses using this model face greater risks, they also tend to gain higher rewards. Cloud computing enables the radical transformation of existing markets or industries by enabling businesses to become more agile, and to adopt technology-integrated business strategies in place of technology-strategies that are based on business strategies [11].

Finally, we define optimizers as firms that draw advantages from cloud computing to improve their existing customer value propositions within their existing ecosystems. Optimizers can expand their value propositions by offering enhanced products and services, improved customer experience, and/or more extensive channel delivery options [11] and tend to be more risk averse than innovators and disruptors. By supporting fast experimental implementation of new application software offerings without the need for

substantial upfront costs, cloud computing drives improvements across optimizers' value propositions and value chains.

It is important to note that the adopted strategies are contingent upon the configuration of the focal firms with respect to the initial five building blocks and the remaining two blocks that are related to their target clients' requirements of the application software offering via the cloud. Figure 1 illustrates the seven building blocks that largely determine whether firms should utilize cloud computing in order to innovate, disrupt or optimize their business models. The first five building blocks are derived from the two frameworks of digital business strategy that were discussed in the earlier part of this paper, i.e. those of digital strategic posture [9] and design-based logic of digital business strategy [10]. The remaining two building blocks, i.e., the criticality of security optimization and the demand for software customization, emerge from the cases and refer to clients' requirements with respect to a cloud-based SaaS offering. These two attributes of the software offering appear to complement the broader categories of the firms' industry environments and their digital capital.

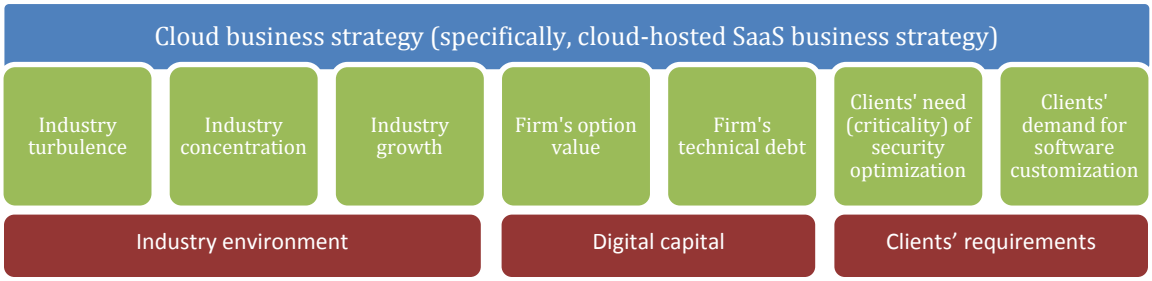

Figure 1: The building blocks of a cloud strategy

The first three building blocks, which can be categorized as characteristics of the industry in which a firm operates, include the turbulence, concentration, and the growth rate of the industry [9]. It has been already acknowledged that high (low) industry turbulence, low (high) industry concentration, and low (high) industry growth would influence a firm to develop a digital business strategy that diverges from (converges to) industry norms [9]. In our three empirical examples, we observe two scenarios: on the one hand, Firm 3 operates in an industry that has low turbulence, high industry concentration, and high industry growth, and so has designed a digital business strategy that converges to the industry norm - that is to optimize its existing software offering by adding a SaaS version of the software. Firm 3 imitates what happens in its industry without much innovation or any attempt to disrupt the industry norms. On the other hand, Firm 1 operates in an industry that is distinguished by high turbulence, high concentration, and high growth, whereas Firm 2 is in an industry that is characterized by low turbulence, high concentration, and low growth. For these two firms, it is not immediately clear whether they should diverge from or converge to their respective industry norms with regard to developing cloud-related strategies.

The next two building blocks - option value and technical debt – refer to firms' design capital (in terms of their internal systems and processes) [10]. While Firm 1 is in the debt-constrained design capital state (high option value and high technical debt), Firm 2 is in the low-quality design capital state (low option value and high technical debt [10]), but its close relationships with local academics enables it to escape the low-quality state by accessing the technical capabilities it needs from these academics. Leveraging on its

current position as a trusted telecommunication provider and the well-known data protection policy of the country in which it operates, Firm 1 decided to invest considerable resources to innovate and to alter its position in its industry ecosystem from a telecommunication infrastructure provider to a SaaS provider specializing in servicing business users working in high security-loss environments, so Firm 1 is diverging from its industry norm.

Compared to Firm 1, which also diverges from its industry's norms, Firm 2 hopes that it will disrupt the operations of the current industry players by offering SaaS for engineering simulation instead of innovating by establishing a new revenue stream through a cloud-based offering. It considers this a radical solution that will allow it to disrupt the current top-down nature of its clients' decision-making about engineering simulation software, and therefore break through the dominant market players. By offering a web-based cloud-computing hosted service, Firm 2 can invite its potential customers' engineers - who are the ultimate users of their software - to test it during a free trial period without them needing to access or use their own companies' computational resources: it hopes these engineers will then convince the top management in their organization to adopt their software. There are two reasons for this apparent difference in the two firms' strategies: first, engineering-related data for simulation purposes does not need security optimization (neither the storage nor the processing of the data need to be fully secured). This makes it easy for Firm 2 to disrupt the market by inviting the engineers who they hope will be their software's ultimate users to test it by uploading engineering-related data to the cloud, so avoiding having to access or use their

companies' own computational resources to test the software. It would be difficult to disrupt the current market by the means of free trial of a web-based cloud-computing hosted service if the demands for data security optimization were high. Second, the software offered by Firm 2 need not cater to users' demand for software customization. Engineering simulation software has a specific logic and algorithms that are relevant for every engineer using the software. A less critical security optimization and a low demand for software customization ultimately drive the attempt of Firm 2 to grow by adopting a disruptive cloud strategy.

Even though the attributes of the industry environment seem to be the main driver of the third firm's cloud strategy, the analysis of its clients' demand for security optimization and customization complete its detailed plan. Considering the high risk to customers' data and its processing and the high demand for software customization, Firm 3 decides to offer a private cloud-based application software solution. Firm 1, Firm 3 is in a state of debt-constrained design capital (high option value and high technical debt); however, Firm 3 cannot invest as much in infrastructure and know-how in the way that Firm 1 does. Investing aggressively in acquiring both the infrastructure and the necessary know-how, Firm 1 is able to deploy multiple software operations for different tenants on a single server; thus enabling it to offer customization but also to retain the cost benefits of multi-tenancy. Without many resources to invest, Firm 3 seeks to collaborate with a well-known cloud infrastructure provider to offer its customization via a private cloud-based system, therefore optimizing rather than innovating in terms of its cloud offering.

Table 1 summarizes the seven building blocks of a cloud strategy and the resultant strategies adopted by the three firms in our study. It is worth noting that there can be other combinations of these seven building blocks than those reported here and that it is not our aim to present all possible combinations of these building blocks; for instance, we anticipate that having distinct structural characteristics (e.g. being a start-up firm and not having an existing customer base as in our empirical examples) would most likely lead to the formation of distinct configurations in our scheme. In this respect, any future study that would examine how startup companies strategize their cloud-based SaaS offerings according to our framework would certainly complement the findings of our study.

	Firm 1 (Innovating strategy)	**Firm 2 (Disrupting strategy)**	**Firm 3 (Optimizing strategy)**
1. Industry turbulence	High	Low	Low
2. Industry concentration	High	High	High
3. Industry growth	High	Low	High
4. Option value	High	Low	High
5. Technical debt	High	High	High
6. Criticality of software security optimization	High	Low	High
7. Demand for software customization	High	Low	High

Table 1: The building blocks of cloud business strategy and the resultant strategies as evidenced in the three cases

CONCLUDING COMMENTS

In conclusion, the main aim of this paper is to assist researchers and practitioners in utilizing the building blocks identified as essential ingredients for analyzing firms' cloud strategies. We set out to achieve this by providing readers with an overarching framework that consists of seven building blocks and encompasses firms' industry environment

characteristics, their internal digital capabilities and their target clients' requirements of the particular cloud-based offering, which ultimately determines how firms embark upon a cloud-based SaaS strategy.

While significant challenges still exist for firms offering application software successfully through the cloud, we find it important to start right and better understand the main building blocks of such an endeavor. Innovation, optimization, and disruptive strategies represent possible ways for firms to leverage the cloud to impact their value propositions. It is important to highlight that we do not advocate any one approach as superior to the others; instead, the strategies identified in our study should be viewed as the most favorable strategies given the firms' industry characteristics (turbulence, concentration, growth), their digital capital (option value, technical debt), and their clients' requirements of the cloud-based SaaS offering (criticality of security optimization and software customization).

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