Using IT to Unleash the Power of Strategic Improvisation

Completed Research Paper

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Abstract

To lead their company toward success in today's ever-changing landscape, managers need to know how to rapidly and creatively use their organization's capabilities to seize opportunities before others do. We term this leadership team capability strategic improvisation. Strategic improvisation, as an alternative to traditional planning for urgent situations, builds on clear and real-time information and communication. After surveying multiple executive respondents in 100 organizations, we found that information technology (IT) capabilities, especially information management capability and IT infrastructure flexibility, facilitate strategic improvisation. These capabilities play different roles depending on the type of IT strategy the organization follows. Other factors, including the organization's competitive environment and design, affect the development and impact of strategic improvisation. In a rapidly changing business environment, an organization is best served by strategic improvisation when it has an innovative IT strategy, a flexible IT infrastructure, a loose organizational structure and an experimental culture.

Keywords: Improvisation, dynamic capabilities framework, IT capabilities, IT strategy, practice-oriented, set-theoretic configurational approach, csQCA.

Strategic Improvisation: A Deliberate Way for Leaders to Seize Unexpected Opportunities

Today's competitive landscape has greatly evolved over the past two decades. On a daily basis, start-up organizations develop an innovative and disruptive business model and rise to the top in a matter of months. For instance, between 2012 and 2014, Uber's car sharing service model caused the number of daily cab trips to plummet from an average of 1400 per day to less than 500 per day (Ferenstein 2014). Google has become a superpower, able to penetrate diverse and seemingly unrelated markets, going from driverless cars to enterprise collaboration systems, and including wearable devices. Somehow, these successful organizations manage to rapidly identify and seize business opportunities in their ever-changing environments. Indeed for their companies to be competitive and thrive in dynamic environments, organizational leaders need to have the ability to rapidly and creatively use their organization's capabilities to seize business opportunities before another organization does. We call this top management team capability strategic improvisation.

To be able to strategically improvise, companies need to rapidly identify and assess business opportunities. Access to real-time information is essential because it provides organizational leaders with the means to have a clear and real-time understanding of their resources and capabilities. Resources such as organizational memory are critical. Organizational memory represents all the information and knowledge retained by an organization, especially factual information, routines and procedures, that can be used to make current decisions. In terms of organizational capabilities, the availability and leveraging of information technology (IT) such as business intelligence systems, knowledge management systems and collaborative systems helps to provide organizational leaders with useful information at the tip of their fingers.

Companies that master strategic improvisation have implemented the right tools, especially IT capabilities, that allow organizational leaders to quickly make strategic decisions and act upon them. While a capability can be seen as the ability to manage valuables resources or organizational assets to keep an organizational running well (Bharadwaj 2000), an IT capability supports and enhances business strategies, as well as other capabilities by creating, combining and reconfiguring IT resources (Sambamurthy and Zmud 1997). Key terms that we use are defined in Table 1 below.

Key Term	Definition
Strategic improvisation capability	Top managers' ability to spontaneously and creatively integrate, build, and reconfigure internal and external resources and capabilities to address unpredictable and rapidly changing strategic opportunities and threats.
Organizational resources	Valued organizational assets (Bharadwaj 2000).
Organizational capabilities	The ability to manage valuables resources to keep an organizational running well (Bharadwaj 2000).
IT capabilities	An organization's ability to support and enhance other capabilities, as well as the organization's overall strategy by creating, combining and reconfiguring IT resources (Sambamurthy and Zmud 1997).
Information management (IM) capability	The ability by which an organization can have access to memory, as well as current information, using information technology (Mithas et al. 2011).
IT infrastructure flexibility	Ability for an organization to easily develop and maintain a range of information technologies necessary for the good operation of the organization (Kim et al. 2011).
Organizational memory	Information that an organization possesses and stores for future use (Walsh and Ungson 1991).

Table 1. Key Definitions

Strategic improvisation can be an alternative or a complement to traditional strategic planning. Strategic planning is appropriate in conditions that allow for careful design of a strategy before its execution. On the other hand, strategic improvisation applies to conditions when there is little time to design a strategy and execute it. Not only is strategic improvisation a useful complement to strategic planning in today's turbulent environment, its use also provides tangible benefits in terms of organizational performance. Organizations where top managers have developed a strategic improvisation capability can expect to see improved product or service flexibility, process flexibility and organizational learning (Miner et al. 2001; Moorman and Miner 1998a).

In a recent *MIS Quarterly Executive* article, El Sawy and Pavlou (2008) discuss the importance of IT capabilities to enable other capabilities such as improvisational capabilities, that are directly linked to strategic advantage. We are extending their work by further guiding organizational leaders interested in developing a strategic improvisation capability. To reach this goal, we develop a research model based on the resource-based view of the firm (Barney 1991) and the dynamic capabilities (Eisenhardt and Martin 2000; Teece et al. 1997). This theoretical perspective suggests that some specific types of capabilities such as strategic improvisation, called dynamic capabilities, can be used to alter and improve existing capabilities.

In this practice-oriented article, our aim is to help managers identify an excellent combination of IT capabilities and organizational memory to focus on developing, in order to foster strategic improvisation and grasp opportunities or avoid disaster. We loosely term this the "best" configuration for the firm, depending on the organization's IT strategy. To achieve our objective, we use a research method called Qualitative Configurative Analysis (QCA, Ragin 2000). QCA is a well-developed set-theoretic method used in various fields such as sociology and strategic management. With the method, it is possible to identify combinations of conditions or variables most likely to produce desired outcomes (Ragin 2000). Because organizations have finite resources to allocate, it is important to provide organizational leaders with specific recommendations based on their current state and desired objectives.

Research Framework

A simple model representing the relationships between IT capabilities, strategic improvisation, its outcomes, as well as the contextual role of IT strategy and environmental dynamism is presented in Figure 1.

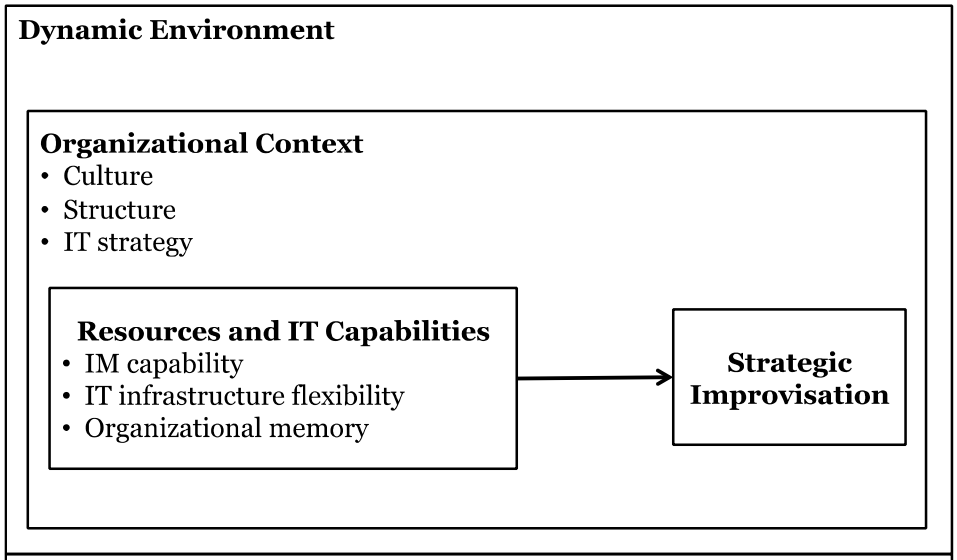

Figure 1. Research Framework

The model builds on recent research by El Sawy and Pavlou (2008, 2010) that emphasizes the role played by dynamic capabilities in reconfiguring organizational capabilities. In their work, the authors distinguish dynamic capabilities from improvisational capabilities and demonstrate that improvisational capabilities have a stronger impact on new product development capabilities in highly turbulent environments than dynamic capabilities do (2010). We agree with the authors that both improvisational and dynamic capabilities are essentially reconfiguring capabilities. However, in contrast to them, we conceptualize strategic improvisation as one type of reconfiguring dynamic capability that should be most effective in highly dynamic environments.

In the remainder of this section, we provide an overview of the organizational memory and IT capabilities critical for the development of strategic improvisation, which is first briefly defined. We then spend time explaining the various IT strategy types seen in organizations, because they influence the extent to which IT capabilities can be fully leveraged.

Strategic Improvisation

We conceptualize strategic improvisation as a dynamic capability, usually defined as a firm's *"ability to integrate, build, and reconfigure internal and external resources and capabilities to address rapidly changing environments"* (Teece et al. 1997, p.517). Dynamic capabilities are actions that aim at altering organizational resources and capabilities to develop new capabilities that better support changing strategies in dynamic environments (Eisenhardt and Martin 2000; Teece et al. 1997). As the ability of organizational leaders to rapidly and creatively use their organizations' capabilities to seize business opportunities, strategic improvisation can be viewed as a dynamic capability. First, it is a *capability* because improvisational actions are *"collective, repeatable or patterned and purposeful"* (Pavlou and El Sawy 2010, p.449). In addition, it is a *dynamic* capability as, like many other dynamic capabilities, strategic improvisation originates from top management (Baker et al. 2003), is time sensitive and driven by the ability to address business opportunities rapidly (Crossan et al. 2005; Miner et al. 2001; Moorman and Miner 1998b), and is path dependent (Cunha et al. 1999; Miner et al. 2001).

IT Strategy

Organizations tend to have one of the following four types of IT strategy: innovative, conservative, ambidextrous or undefined (Chen et al. 2010; Leidner et al. 2011). The type of IT strategy followed by an organization is important because the supporting role of IT capabilities varies depending on the position given to IT within the organization. Companies that adopt an innovative IT strategy are constantly looking for IT innovations that can be used internally or included in product or service offerings. For instance, we know an agile software development company with an innovative IT strategy that constantly tries new agile products to facilitate project management. Some of these products may only be used by one team and later abandoned, while others are successfully implemented throughout the organization. This type of company has clear objectives in terms of its IT strategy and strives to innovate throughout the business using information technology.

Organizations with a conservative IT strategy generally also have a clearly defined IT strategy but this strategy is centered around exploiting current information technology to its fullest. This involves careful assessment of potential additions to the existing infrastructure. IT conservatives are more likely to adopt new technologies when their organizational benefits have been proven. They tend to be driven by cost control and efficiency.

Organizations with an ambidextrous IT strategy take the best of conservative and innovative strategies and seek to strike a balance between novelty and caution. IT leaders tend to constantly scan the IT environment looking out for potential IT innovations. However, these innovations may only be implemented after their potential benefit has been clearly identified. In fact, the majority of organizations may fall in the approach to IT strategy that combines innovativeness and caution (Leidner et al. 2011).

Last, some organizations have an undefined IT strategy. These companies do not necessarily have a formalized strategy, and there tends to be little consistency in their IT approach. These organizations

operate on an as-needed basis, with no clear long term IT objectives. For instance, MarketingOrg[1], a marketing agency we studied, decided to implement Salesforce, a customer relationship management system, for its sales representatives in one of MarketingOrg's affiliated organization. This decision was made without first seeking to determine how the application might fit with the current IT infrastructure or benefit the overall organization over time, and Salesforce was later abandoned (Chen et al. 2010; Leidner et al. 2011).

Organizational Resources and Capabilities

To improvise, companies need to have instant access to information and to be able to communicate in real-time (Crossan et al. 2005). That is because time constraints are usually high and little time can be devoted to locating information throughout the organization. Organizational memory, as a resource, and two IT capabilities, IM capability and IT infrastructure flexibility, are especially important to enable strategic improvisation because they facilitate real-time information and instant communication.

Information that an organization possesses and stores for future use is called organizational memory (Walsh and Ungson 1991). Organizational memory includes relatively stable information, for instance policies and procedures, processes, and corporate information, as well past factual information. It is present everywhere in the organization. For instance, we all store information in paper files, in our email folders, in shared drives or repositories. Organizational memory is more important in some contexts than in others. In industries where change is constant, relying on past experiences and information may be less useful than in more stable industries. Nonetheless, organizational memory provides insights to organizational leaders and helps them make informed decisions. Past research has linked organizational memory to improvisation, although mixed findings (e.g., Kyriakopoulos 2011; Moorman and Miner 1998a) suggest that organizational memory alone is not sufficient for strategic improvisation.

IM capability is the ability by which organizational leaders can have access to memory, as well as current information, using information technology (Mithas et al. 2011). IM capability represents the processes in place to ensure that organizational leaders and other members in the organization are guaranteed access to good information. Good information refers to information that is accurate, relevant, secure, and timely. To achieve this objective, processes are in place to effectively manage information, in terms of collection, processing, storage, creation, production and distribution of information. In short, this means that organizations that possess an IM capability can share good information easily, which facilitates the development of a strategic improvisation capability.

IT infrastructure flexibility represents the ability for an organization to easily develop and maintain a range of information technologies needed for the changing operations of the organization (Kim et al. 2011). To develop a flexible IT infrastructure, organizations need to focus on four important factors when considering software, hardware, and network investments: scalability, adaptability, compatibility and modularity. A flexible IT infrastructure provides the basis upon which information can be made available in real-time and communications can be instantaneous, two critical enablers of a strategic improvisation capability.

Methodology

Why Use Configuration Analysis?

The overall relationships between dynamic environments, organizational strategy and capabilities such as IT capabilities are complex (El Sawy et al. 2010). Organizations develop more dynamic capabilities to cope with the ever-increasing turbulence of their environments. IT is used pervasively in the organization at all levels to cope with environmental dynamism. At the same time, rapid technological changes increase environmental dynamism as well and contribute to the need for organizations to develop dynamic capabilities. IT, dynamic environments and dynamic capabilities are linked in many, non-linear ways, which makes it hard to study their interactions using traditional methods like variance-based analyses (El Sawy et al. 2010). Traditional methods allow for the study of linear relationships and provide insights into

[1] We used pseudonyms to protect companies' identities.

sequential relationships, where the effect of each variable on the outcome can be detected. Since our objective for this study is to better understand how multiple IT capabilities and resources interact to facilitate the development of strategic improvisation, the benefits of variance-based analyses are limited.

Case studies provide insights into the mechanisms linking IT capabilities and strategic improvisation, but with limited generalizability because it is generally cumbersome to study and analyze a large number of case studies. In contrast, IS researchers have recently suggested that the use of configuration analysis, specifically QCA, can complement traditional analytical methods well to study the complex interactions among environmental dynamism, IT and strategy (El Sawy et al. 2010). With this method, it is possible to identify the combinations of resources, such as organizational memory and IT capabilities, most likely to be associated with high levels of strategic improvisation. The configuration perspective assumes that organizational activities are interconnected and function in a systemic way (Fiss 2007). With this approach, the objective is to understand patterns as a whole, rather than isolated elements. In this way, the QCA approach extends case study analysis, by using analytical tools that identify commonalities among cases or organizations (Ragin 1994). For instance, the attributes (or variables of interest) of cases with high strategic improvisation are compared and reduced using Boolean algorithms, with the objective of identifying key variables, called conditions (e.g., presence of IT infrastructure flexibility and organizational memory) that consistently lead to the desired outcome, here high strategic improvisation (Fiss 2011). Similarly, the method identifies combinations of different attributes (e.g., absence of IM capability and presence of IT infrastructure flexibility) that result in low strategic improvisation. While researchers are used to describing phenomena in correlational terms, QCA permits us to determine successful and unsuccessful configurations of variables.

Four main benefits of configurational models, including QCA, are highlighted here (El Sawy et al. 2010). First, unlike linear relationships that characterize variance models, configuration models allow for non-linearity and can more fully capture the complex nature of relationships among organizational memory, IT infrastructure flexibility, IM capability and strategic improvisation. Second, with configuration models, it is possible to study various phenomena in groups and understand how together, as opposed to separately, they influence other phenomena of interest. Additionally, with approaches like set-theoretic methods, it is possible to differentiate core elements with a strong relationship to organizational outcomes from those with weaker or no links. Finally, an outcome of interest may result from different paths and conditions, i.e., there can be equifinality. Therefore, it is possible to observe a number of configurations involving information and knowledge capabilities and organizational factors that result in high or low strategic improvisation.

Data Collection

To study the relationships among strategic improvisation, IT infrastructure flexibility, IM capability and organizational memory, we conducted a survey. We developed the survey questions based on past literature and case studies we had completed. To assess content validity, we conducted an online item-sorting pre-test using an 'open-card' approach with eight respondents (Moore and Benbasat 1991). We also conducted a pilot survey with nine respondents, all IT executives or MIS faculty experts. We revised a small number of items and construct definitions following the pre-test and pilot results.

A list of 9,424 Canadian organizations was purchased through a market research company called SSI[2]. Organizations with between 50 and 500 full time equivalent (FTE) employees were targeted. Service organizations between 50 and 500 FTEs are categorized as medium-sized organizations (Industry Canada 2012). Past research (e.g., Davis et al., 2009) suggests that to develop improvisational abilities, organizations should be large enough to have reached a certain level of structure and maturity. Target industries included primarily service industries, which tend to be more dynamic than manufacturing industries. The majority of our respondents had held a managerial or executive position in IT or other functions (e.g., management, finance, marketing) for five years or more. As a result, the 100 sampled organizations were mostly service organizations (78% of sample). The large majority were mature organizations with less than 250 employees (91% of sample) that had been operating for more than 10 years (95% of sample). See Appendix A.

[2] http://www.surveysampling.com/en

Approaches to Foster Strategic Improvisation

The analysis of survey data using QCA was based on a number of steps. See Appendix B. Before executing these steps, we used factor scores to identify the organizations with an innovative, conservative, ambidextrous or undefined IT strategy. Following past research (Leidner et al. 2011), we expected high innovative and conservative IT strategy factor scores for an ambidextrous IT strategy. Table 2 below represents a simplified version of our results for high strategic improvisation, which we discuss in this section. QCA results also provide insights when strategic improvisation is absent. These results are discussed below in the Key Implications for Managers section.

The existing resources and IT capabilities within an organization provide multiple options for organizational leaders seeking to provide the right environment for strategic improvisation to develop. With finite financial resources, most organizations cannot afford to develop organizational memory, IM capability and IT infrastructure flexibility at the same time. However, our study results show that it is possible for organizations to prioritize their investments based on the type of IT strategy they are following. From our study, we identified two options by IT strategy type to develop the ability to strategically improvise at the top management level. The "best" options summarized in Table 2 below represent the configurations of IT resources and capabilities used by the largest number of organizations in our sample with high strategic improvisation. The second set of configurations called "good" options are followed by the second largest group of organizations with high strategic improvisation.

Best IT Strategy for Strategic Improvisation to Develop	"Best" Option	Good Option
1- Innovative	Focus on improving a flexible IT infrastructure and strong organizational memory.	In the absence of a flexible IT infrastructure, focus on developing a strong IM capability.
2- Ambidextrous	Develop all three (organizational memory, IT infrastructure flexibility, IM capability).	In the absence of a flexible IT infrastructure, focus on developing a strong IM capability and organizational memory.
3- Conservative	Focus on improving a flexible IT infrastructure and strong organizational memory and do not spend much time on IM capability.	Our study did not reveal any other significant options for organizations with a conservative IT strategy.
4- Undefined	Develop all three resource and capabilities (organizational memory, IT infrastructure flexibility, IM capability).	Develop strong IT infrastructure flexibility and IM capability.

Table 2. Investment Priorities to Facilitate High Levels of Strategic Improvisation

Results from our study indicate that there are more IT innovative organizations with a high level of strategic improvisation than with any other IT strategy. In contrast, the opposite is true of organizations with a more conservative IT strategy. The different options available to organizational leaders that should be considered when developing a strategic improvisation capability are described in detail below.

Innovative IT Strategy

Companies with an innovative IT strategy that have developed high strategic improvisation to help their organizational leaders address unexpected and urgent strategic opportunities, tend to follow one of two combinations. In fact, more than three quarters of these companies use one of these two options. The "best" option, used by more than half the IT innovators with high strategic improvisation we studied, suggests prioritizing the development of a flexible IT infrastructure in conjunction with a strong organizational memory. In this option, many organizations choose to develop their IM capability as well, but it is not critical.

An organization's IT infrastructure incorporates all hardware, software applications and networks. An IT infrastructure may be small and easy to manage, for instance including only a start-up owner's laptop, MS office software, an accounting software, some secure cloud storage space and a secure Internet connection. It may also be complex. CommOrg, a public relations and communications agency we studied, has multiple locations throughout Canada and internationally. In this case, the IT infrastructure may include multiple network domains, various types of hardware equipment and diverse software application needs. For an IT infrastructure to be flexible under these conditions, the technology must be scalable to handle future systems' growth or contraction requirements. It must be adaptable and compatible with other systems too. Finally, software applications should be modular, acting as "plug and play" applications where components can be easily added, removed or modified (Kim et al. 2011; Tallon and Pinsonneault 2011).

IT infrastructure standardization facilitates IT infrastructure flexibility. With a standardized IT infrastructure, IT issues become less diverse, easier to detect and faster to solve; new software applications are more easily deployed. EngagementOrg is a Canadian company that provides donor management services to large non-profit organizations. The organization has standardized its infrastructure to run on Windows-supported networks and applications, which also facilitates data exchanges with EngagementOrg's clients and partners.

Another way to develop flexible infrastructures is with cloud computing. Cloud computing can improve scalability, because it allows organizations to modify the amount of server space required on short notice. SoftwareOrg, a software development company that we also studied, leverages cloud storage to provide more processing capabilities to its software developers when they are most needed.

In summary, IT innovators seeking to develop a strategic improvisation capability first need to improve on the flexibility of their IT infrastructure. We suggest that the first steps to achieve a flexible IT infrastructure are standardization and transfer of key activities to the cloud. Because a flexible IT infrastructure results in easier access to and better integration of key software applications, one important consequence is faster access to the right information. Data specialists can easily provide relevant information derived from multiple data sources in real-time. IT-enabled organizational memory can be more easily and rapidly retrieved and shared.

Consequently, for these firms, the development of a flexible IT infrastructure should be combined with a strong organizational memory. For strategic improvisation, organizational memory is particularly useful to organizational leaders in two ways. Business information gathered in the past, for instance about the industry, competitors, clients, the organization's operations, can be reapplied easily to a number of business opportunities or threats. EngagementOrg makes excellent use of past key performance indicators (KPIs) about the organization's operational performance to determine trends for its clients and the industry. CommOrg conducts an annual survey to update its knowledge about key players in the industry, which helps its organizational leaders more readily address business opportunities and organizations to target for a potential acquisition.

In addition, this type of memory is usually combined with more domain-specific knowledge, which includes skills, routines, procedures and processes. Over the years, CommOrg has grown through the acquisition of smaller firms in its industry. The organization has developed a very detailed procedure based on past acquisitions that allows its leaders to examine each potential acquisition using a step-by-step approach that has been revised over time and is most likely to result in successful acquisitions. Because this type of memory is specific to a domain (e.g., firm acquisition), an organization runs the risk of becoming too reliant on stale memory that does not fit with present requirements. When leaders are dealing with time-sensitive opportunities that require fast actions, they may not have time to think about the relevance of specific information to the current situation. Ideally, good organizational memory for strategic improvisation combines generally transferable information and domain-specific knowledge to guide decision-making.

To sum up this first option, IT innovators have excellent improvisational potential when they combine a flexible IT infrastructure with a strong organizational memory. Organizational leaders from these companies rely on past experiences to help them make decisions for the future but are careful not to rely on memory that may be irrelevant. Thanks to their highly adaptable IT infrastructure, these leaders are

also keenly aware that they can expect the organization to react rapidly to major shifts in organizational goals resulting from strategic improvisation.

A second very good option, followed by about a quarter of IT innovators with high strategic improvisation includes a focus on IM capability only. This is a good option for organizations that have yet to develop a flexible IT infrastructure. With this option, organizational memory may be emphasized but its development is not critical.

An organization that has developed an IT-enabled IM capability knows how to use information systems and technology to provide the right employees and managers with the right information at the right time. This means that information used by decision-makers is accurate, timely, reliable and secure. To achieve this goal, successful organizations know what type of information is the "right" information for them. These organizations also use processes to ensure that information is well managed. At EngagementOrg for instance, the collection, distribution and maintenance of the organization's KPIs is well defined. KPIs are established using a number of data points linked to the company's performance in terms of quality, service and utilization. The top management team receives these daily KPIs on the company's dashboard system, while employees review a subset of these KPIs in the morning, before they start receiving donor calls. Last, the top management team regularly reviews the KPIs in use and assesses their relevance against the organization's strategic priorities.

Under these circumstances, the focus is on the management and delivery of current information to decision-makers. Because these organizations have a direct and timely access to information that is highly relevant to the current strategic opportunities at play, they rely less on organizational memory to help them make decisions. In fact, the strong presence of organizational memory is not a requirement in organizations that have developed a strategic improvisation capability using their high IM capability in the absence of a flexible IT infrastructure. It does not impede strategic improvisation but it does not facilitate it either. Organizations able to manage information so well that it is available to them in nearly real time, see less of a use for past and possibly outdated stored information.

To summarize, the two options that we recommend for IT innovators are either a focus on a highly flexible IT infrastructure combined with robust organizational memory or simply a strong IM capability. Based on our study, the first option is the most effective for IT innovators.

Ambidextrous IT Strategy

Companies following an ambidextrous IT strategy with components of innovation and conservatism and that seek to develop high levels of strategic improvisation have two very good options. They can focus on developing organizational memory and IM capability, with or without worrying about IT infrastructure flexibility. These two options account for about two-thirds of the companies we studied with an ambidextrous IT strategy and high strategic improvisation. In these organizations, investments related to IT infrastructure are made more cautiously than with IT innovators, even though IT leaders have a sharp understanding of current IT innovations. In most organizations where financial resources may be scarce, the higher the investment, the more cautious IT leaders may become. For instance, investment in a network overhaul requires a more structured and time consuming approach than investments in cheaper cloud-based tools designed to facilitate information sharing among employees.

Under this perspective, organizations with an ambidextrous IT strategy and high strategic improvisation focus their efforts on enhancing their ability to manage information and organizational memory well. These capabilities do not rely on investments as financially demanding and risky as IT infrastructure-related investments. For instance, data visualization tools that facilitate information sharing can be obtained at low cost and low risk under a cloud-based subscription models. A subscription to Tableau, a business intelligence tool, is inexpensive, carries few risks and allows for the visualization of information from varied sources, with limited IT expertise required.

Furthermore, the development of an IM capability is facilitated in organizations that have clearly defined their IT strategy, such as organizations with an ambidextrous IT strategy. There, processes to effectively manage information are more easily developed than in organizations with an undefined IT strategy (discussed below), simply because overarching IT goals have been clearly defined and there is an enterprise-wide perspective on IT. Organizations with an ambidextrous IT strategy also tend to be more conservative and cautious in their business strategy than other organizations. As such, their

organizational leaders are also more likely to value organizational memory, that is past experience, when making decisions.

Conservative IT Strategy

In our study, we found fewer examples of organizations with a conservative IT strategy and a strong ability to strategically improvise. In most of these organizations, it appears that high levels of strategic improvisation rely on other factors than the ones presented here. Indeed, only 12% of IT conservative companies with high strategic improvisation apply the following option. Similarly to IT innovators, the focus should be on developing organizational memory, coupled with a flexible IT infrastructure, without emphasizing IM capability.

As suggested for organizations with an ambidextrous IT strategy, it could be that companies with a conservative IT strategy also follow fairly cautious approaches in terms of business strategy. They value past experience more than they value current information, which is the focus of information management. The type of organizational culture, structure and overall top management team dynamics may be important in determining whether these organizations should focus on developing strategic improvisation capabilities. This will be expanded on later.

Undefined IT Strategy

Companies that have not defined their IT strategy but have managed to develop high levels of strategic improvisation have followed a number of routes. We recommend that companies with undefined IT strategies focus on developing their organizational memory, in combination with building a strong IM capability and flexible IT infrastructure.

A second very good option is to focus on IT capabilities, that is on developing a flexible IT infrastructure and a strong IM capability. No emphasis on organizational memory is needed.

These two options, adopted by almost three quarters of the companies with a strong strategic improvisation capability and an undefined IT strategy, make sense since there is no overarching strategy guiding the use of IT capabilities within the organization. Without a clear IT strategy, IS leaders are left having to develop all resources and capabilities to ensure that organizational leaders receive the information they need in real-time.

Keep in mind that organizations with an undefined IT strategy often believe that IT does support or enable their overall strategy. For instance, SoftwareOrg is currently in the process of formalizing its IT strategy. SoftwareOrg's top management team felt it had become necessary to do so when the organization started a software selection process for a lightweight enterprise resource planning system that would address their needs. In the meantime, SoftwareOrg keeps providing its software developers with the latest technology to facilitate their work. While SoftwareOrg and other organizations with an undefined IT strategy may recognize the value of IT, they have not yet formalized their approach to IT, and react to IT needs as they arise, without a clear vision or objective. Organizations with an undefined IT strategy that have developed high strategic improvisation generally only achieve it by working on all elements at the same time. This means making sure that real-time information and potentially organizational memory are readily accessible and properly managed. A flexible IT infrastructure may facilitate timely information sharing because of the ease with which IM enabling systems, such as business intelligence systems, or knowledge management systems, can be integrated and made available to top managers. Of course, these options are not the most efficient ones for an organization. Organizations with a defined IT strategy can focus on a smaller number of areas to improve on, in order to develop a strategic improvisation capability. But if an organization is still working toward defining its perspective on IT, we recommend that organizational leaders interested in better addressing unplanned and urgent opportunities should invest in all three elements at the same time, IT infrastructure flexibility, IM capability and organizational memory.

In sum, any organization seeking to develop a strategic improvisation capability, regardless of its IT strategy, should develop a flexible IT infrastructure. Depending on their IT strategy, these organizations can also benefit from combining their flexible IT infrastructure with a strong organizational memory

and/or an IM capability. Next, we provide information on very good environments in which to foster strategic improvisation, as well as those that may hinder its development and impact.

Key Implications

This study has implications for both practice and research. Since the objective of this article is to provide managers with recommendations on the best way to develop a strategic improvisation, we start this section by providing managerial recommendations and guidelines. A brief discussion on implications for research follows.

Implications for Managers

The discussion above provides organizations interested in developing a strategic improvisation capability with a set of prioritized options depending on their IT strategy. While the development of a resource like organizational memory, especially factual information, may be useful in most cases, the focus on developing IT capabilities like a strong information management capability or a highly flexible IT infrastructure flexibility varies depending on the IT strategy. Organizational leaders can then focus on the most important IT-related elements to invest time and effort in, with the objective of developing the ability to rapidly assess and address unexpected business opportunities or threats.

However, it is important to note that information and technology-related resources and capabilities are not the only ingredients in the strategic improvisation recipe. Organizational leaders should also examine other factors in their organizations before seeking to develop a strategic improvisation capability. These factors are described below. Their presence, combined with the IT factors described above, is critical for strategic improvisation. In contrast, their absence will reduce the positive effects of any strategic improvisation capability development attempt, no matter the IT strategy or the type of IT capability developed.

Environments Where Strategic Improvisation Is Likely to Develop

Before organizational leaders decide to invest in resources and capabilities based on their IT strategy, it is wise to reflect carefully on the organization's context to determine the potential benefit of strategic improvisation. A three-step decision-making process is summarized in Figure 2 below, which provides guidance for organizational leaders in their quest for a strategic improvisation capability.

First, a review of the organization's competitive environment is advisable. Strategic improvisation is most useful in environments that are dynamic, where the level of unpredictability and the rate of change are both high. It is in these environments that a strategic improvisation capability proves most beneficial, since the rate at which unexpected opportunities occur is higher than in more stable environments. If a company is in this situation, then its top management team may benefit greatly from strategic improvisation, especially if the company strategy tends to seek to influence the environment rather than simply react to it. For instance, EngagementOrg is considered a trendsetter in the non-profit industry. Top management team members regularly present the organization's IT innovations at the industry's main North American annual conference. The organization recently unveiled a new social media platform that links donor, non-profit and a corporate sponsor around a specific cause or charity. Whenever donors post a specific cause-related message on their social media accounts (e.g., Twitter, Facebook), a corporate sponsor donates a set amount to the cause. This innovation has the potential to change the way donors and corporate sponsors interact with causes and non-profit organizations. In addition, other, smaller IT innovations are often presented to EngagementOrg's clients as new offerings.

Second, some general characteristics of a company may dictate whether it should consider strategic improvisation as an option to be pursued for strategic decision-making and actions. In general, strategic improvisation is more likely to develop and be more effective in organizations that have fairly loose organizational structures and an experimental culture (Crossan et al. 2005; Davis et al. 2009). This combination of loose organizational structure and experimental culture allows employees and managers alike to deviate from original plans and try out new things. The ability to be spontaneous and creative without worrying overly about failure and its consequences is critical to strategic improvisation. SoftwareOrg follows the Agile methodology principles, for software development projects with its clients

but also in its day-to-day and strategic activities. The Agile Manifesto's[3] principles emphasize the importance of frequent software deliveries, combined with constant changes. Following these principles at SoftwareOrg implies that a trial and error approach is welcome and that failures are expected. Other principles of the Agile manifesto encourage employee empowerment, without rigid structures that may limit their ability to interact with other project stakeholders. As a result, SoftwareOrg top management team is willing to take risks when assessing potential business opportunities.

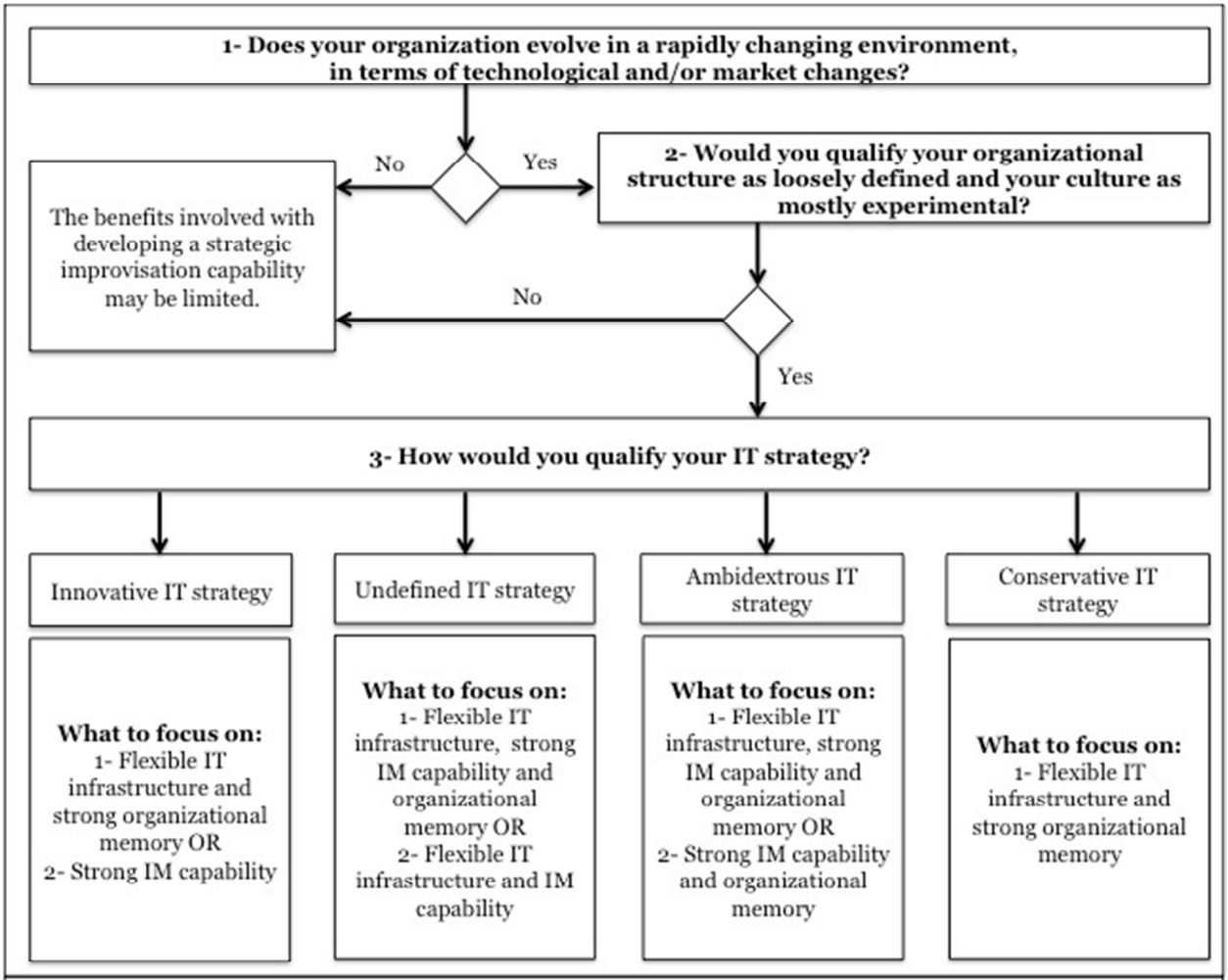

Figure 2. Three Questions to Answer on the Road to Strategic Improvisation

Environments Where Strategic Improvisation is Unlikely to Develop

In contrast, strategic improvisation is unlikely to be fostered in organizations with more formalized structures and cultures. The framework within which employees and managers can operate is limited and restricts the decisions they can readily make.

At CommOrg, regional offices operate in relative autonomy. For instance, each regional office prepares its own budget and operating plans. However, CommOrg's head office has implemented procedures that require regional managing directors to follow set procedures before making any major strategic decisions, in effect restricting the development of a potential strategic improvisation capability.

[3] http://agilemanifesto.org

As the results from the organizations with a conservative IT strategy demonstrate, strategic improvisation may not be appropriate for all companies. In fact, depending on the combination of resources and IT capabilities in place or not in place in an organization, low levels of strategic improvisation can be expected in companies with different types of IT strategy, as shown in Table 3.

IT Strategy	Combinations
Innovative	When the organization combines inflexible IT infrastructure flexibility and weak IM capability, it is unlikely that a strategic improvisation capability can be developed.
Ambidextrous	When the organization combines low organizational memory and weak IM capability, it is unlikely that strategic improvisation can be developed.
Conservative	When the organization combines low organizational memory and weak IM capability, or an inflexible IT infrastructure and weak IM capability, it is unlikely that strategic improvisation can be developed.
Undefined	It is unlikely that strategic improvisation can be developed with any of the following combinations: low organizational memory and weak IM capability; low organizational memory and an inflexible IT infrastructure; or an inflexible IT infrastructure and weak IM capability.

Table 3. Organizations Likely to Experience Low Levels of Strategic Improvisation

Implications for Research

The limitations of this study are interesting avenues for future research. This study provides a first step in understanding how certain resources and IT capabilities can be combined to facilitate the building of a strategic improvisation capability. However, and as with any cross-sectional survey, we cannot explain how strategic improvisation develops over time. Moreover, we do not know whether a "best" combination of capabilities and resources is more helpful than other combinations at a certain stage of the dynamic capability development process. Future longitudinal research can focus on better understanding the evolution of strategic improvisation over time, including the type of resources and IT capabilities used.

Second, other IT related constructs may impact strategic improvisation, aside from IT strategy and the IT capabilities we have studied. For instance, IT governance mechanisms, characterized by a formalized decision-making structure, monitoring processes and communication approaches (Wu et al. 2014), may facilitate the development of IT capabilities and therefore of strategic improvisation. While our study implicitly includes IT governance mechanisms by studying IT strategies and specific IT capabilities, it may be important to empirically study the potential relationships between strategic improvisation and IT governance.

Conclusion: The Road to Strategic Improvisation

In this paper, we have argued that the successful development of strategic improvisation, or the ability of organizational leaders to rapidly and creatively use their organization's capabilities to seize business opportunities, depends on three main factors: 1) the organization's competitive environment; 2) the organization's structure and culture; and 3) the organization's IT-enabled resources and capabilities.

An organization interested in developing a strategic improvisation capability should first ensure that it would derive significant benefits from it. It is more likely to be the case if the organization is competing in a dynamic environment, where change occurs often and quickly. Second, strategic improvisation is a capability that has the best chances of developing in organizations that foster loose organizational structures, as well as experimental, risk-taking cultures. Third, strategic improvisation is more likely to develop in organizations that believe that IT innovations are critical for high organizational performance. Nonetheless, it is possible, although more difficult, to develop a strategic improvisation capability in any organization. Based on the organization's IT strategy, specific combinations of resources and IT capabilities contribute to the development of a strategic improvisation capability.

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Appendix A. Study Sample

The study consisted of a 2014 survey of 100 companies in "dynamic" environments, especially from a technology perspective. The sampled organizations are mostly service organizations (78% of the sample) located in Canada. The large majority are mature organizations that have been operating for more than 10 years (95% of sample) and have less than 250 employees (91%). Most respondents have been in their managerial position for five years or more (57%). A total of 143 respondents participated in the survey, including 61 IT executives and 82 business executives.

IS/IT Respondents	%	Business Respondents	%
Chief information/technology officer, (executive) vice-president	2.1%	Chief executive/operating/ administrative/financial officer	7.0%
Director	7.7%	President/Owner	6.3%
Manager	25.2%	Director	10.5%
Other, IS/IT	7.7%	Manager	23.8%
		Other, business	9.7%
Total	**42.7%**	**Total**	**57.3%**

Table A1. Respondents by Position

Canadian Province	Percentage of Respondents
Alberta	18.9%
British Columbia	16.8%
Manitoba	1.4%
New Brunswick	0.7%
Nova Scotia	6.3%
Ontario	36.4%
Quebec	14%
Saskatchewan	4.9%
Nunavut	0.7%
Total	**100%**

Table A2. Geographical Location of Respondents

Main Industry	Percentage of Respondents
Service industries	77.7%
Non-service industries (e.g., manufacturing, retail)	5.6%
Other	16.8%
Total	**100%**

Table A3. Industry Distribution

Years in Activity	Percentage of Respondents
Less than 5 years	2.1%
5-9 years	3.5%
10-19 years	16.1%
20-29 years	14%
30 years or more	64.3%
Total	**100%**

Table A4. Organizational Maturity

Number of Employees	Percentage of Respondents
50-99 employees	61.5%
100-249 employees	29.4%
250-499 employees	9.1%
Total	**100%**

Table A5. Organizational Size

Appendix B. QCA Steps

The QCA process is accomplished in three main steps (Fiss 2011). First, a truth table is created to account for all possible configurations of attributes and their link to the outcome of interest. This is done after the antecedents, called conditions, and the outcome, have been modified to allow for the creation of sets. For instance, if strategic improvisation is measured using six items, a factor score must be first created based on a factor analysis. In our study, we use standardized factor scores using principal components analysis. Next, we code each factor score as either a 0 for an absence of a variable or condition or a 1 for the presence of a condition. The cutoff value is determined by the factor score distribution, specifically the mean with normal distribution (IM capability, IT infrastructure flexibility, strategic improvisation) and the median with non-normal distribution (organizational memory). Any value equal to or above the mean or median is coded as a 1, while any value under the mean or median is coded as a 0. For instance, a factor score of 0.78 for strategic improvisation is coded as 1, which means that this specific organization belongs to the high strategic improvisation set.

Consequently, the csQCA truth table has 2^k rows, where k represents the number of conditions or attributes (e.g., IT infrastructure flexibility), and 2 is for the number of options for each condition (0 or 1). Each row represents a solution, that is a combination of conditions (e.g., 011). The number of cases per row depends on the dataset. In our study, we have three conditions (organizational memory, IT infrastructure flexibility and IM capability). Consequently our truth table has 2^3 or 8 rows. These represent all possible combinations of conditions. However, it is possible that based on our dataset, no, one or multiple cases can be associated with a solution. For instance, while 50 high strategic improvisation cases may be associated with a 111 combination (high organizational memory, high IT infrastructure flexibility, high IM capability), it is possible that no case from our dataset is associated with the 000 combination (absence of organizational memory, absence of IT infrastructure flexibility, absence of IM capability).

The second step involves the reduction of the truth table based on the minimum acceptable solution frequency and consistency (Fiss 2011). The minimum acceptable solution frequency is a limit set to determine the minimum number of cases in solutions to include in the analysis. In smaller samples, all solutions with at least one case may be considered, while in larger samples, the lower limit may be set higher, for instance a minimum of three case frequency in all solutions. In our study, we set the frequency to three cases. Second, the truth table is reduced based on consistency. Consistency refers to the proportion of cases in a solution that display the outcome (e.g., 1 for high strategic improvisation) compared to the number of cases in a solution that have the same attributes but do not exhibit the outcome (0 for low strategic improvisation; Ragin 2006). This is similar to the variance explained in a variance-based statistical model. For this study, we set the consistency to 75%, which is the minimum recommended (Ragin 2006).

In the third step, the objective is to further reduce the truth table by using Boolean algorithm based on counterfactual analysis (Ragin 2008). The objective of counterfactual analysis is to determine a plausible outcome for configurations without empirical evidence, that is cases (Ragin 2008). To do so, counterfactual analysis identifies conditions that are core to the outcomes versus peripheral conditions, which are not essential to the solution. This is based on 'easy' counterfactuals, that is evaluating whether the addition of a condition to a set of conditions leading to the outcome changes anything, and 'difficult' counterfactuals, that is evaluating whether the removal of a condition to a set of conditions leading to the outcome changes anything (Fiss 2011). The algorithm produces a parsimonious solution with all simplified solutions based on easy and difficult counterfactuals, and an intermediate solution with simplified solutions based on easy counterfactuals only. Depending on how strong the link is between a condition and an outcome, the condition is categorized as core (i.e., belonging to the parsimonious and intermediate solutions) or peripheral (i.e., belonging to the intermediate solution only; Fiss 2011).