Shadow Analytics

Full Paper

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Abstract (Required)

Gartner predicts that analytics will revolutionize how we conduct business. By 2019 worldwide analytics implementation are estimated to reach $187 billion (Olavsrud 2016). Unfortunately, many internal IT departments lack the business acumen, financial resources and data science expertise to initiate analytics initiatives (Goldberg 2012). This leads functional departments, armed with use cases, trying to launch their own analytic program. We call this shadow analytics. To add insight to this shadow analytics phenomenon, this paper uses an in-depth longitudinal case study of one department’s shadow analytics initiative. Using technology affordances and constraints theory, we investigate what enables and constrains a shadow analytics initiative. This study offers practical insights to others trying to launch an analytics program and shows a shift in client vendor outsourcing projects towards, agile delivery, experimentation and failure acceptance.

Keywords (Required)

Analytics, shadow IT, Technology Affordances and Constraints Theory, and Agile.

Introduction

The purpose of this paper is to share insights on a shadow analytics initiative. By shadow analytics, we mean an analytics initiative initiated by a functional department outside of the corporate information technology department (hereinafter IT) and deliberately kept under the radar of the corporate IT department (Furstenau and Rothe 2014; Zimmerman et al. 2014). This multi-year case study will offer insights into the pre-implementation stage of an analytics project as well as the literature on shadow IT systems.

Enabled by large amounts of both structured and unstructured data and businesses’ realization that analyzing this data can have important consequences, many organizations are initiating analytics projects. AT&T now send crews to fix network outages based on its analysis of social media tweets (Crosman 2010). The New Mexico Department of Workforce Solutions uses analytics to avoid overpaying government assistance recipients by encouraging them to accurately report their wages and work (Deliotte 2017). Legend Hospitality, the company that manages sports and entertainment complexes like Yankee Stadium, identified how variables such as the weather, team performance and open registers impact customer revenue at its venues (IBM, 2015). Success stories like these are driving many companies to initiate analytics programs.

Unfortunately, analytics initiatives may not top an internal IT department’s list. IT departments often face resource constraints where they simply do not have the budget or the personnel to initiate every project end-users want (Hein 2012). In the case of an analytics project, IT departments have to find data scientists who are in short supply and then provide the necessary data and tools. While the tools are available, finding the right data, and putting it in the right format is a challenge (McAfee and Brynjolfsson 2012). This frustrates functional departments who are interested in launching analytics projects to gain a competitive advantage or improve operations.

To deal with this frustration, both functional departments and business units may launch their own analytics program. This phenomenon of end-users launching their own IT initiatives is well-documented in the literature on end-user computing, feral IT or shadow IT. Gyory et al. (2012) explain that shadow IT usually emanates from individuals or business units trying to find alternative and simpler ways to perform
their jobs. Individuals can develop shadow IT systems if they possess the technical skills. In the absence of technical know-how, individuals turn to third-party vendors for solutions.

This paper explains the experiences of one functional department as they tried to hire a vendor to build a shadow analytics system for their organization. We want to understand what enables and constrains shadow IT initiatives. The insights from this case study will offer implications to research on shadow IT systems by studying the pre-implementation stage of one shadow analytics initiative. Most of the shadow IT research takes the internal IT department’s perspective and views shadow IT as something that the IT department should abolish (Furstenau et.al 2016). Research discusses the risks shadow IT systems pose to organizations, management and IT department resistance to the rise of shadow IT (Furstenau, Sandner and Anapliotis 2016), political tussles about shadow IT’s place in the organization, and the role of IT governance in managing shadow IT instances in organizations (Zimmermann, Rentrop and Felden 2016). In contrast, our research will discuss the enablers and constraints of a shadow analytics project from the functional department’s perspective. The following paragraphs will explain our theory, method, initial findings and implications.

Theoretical Framework

To help us understand the enablers and constraints faced by functional departments implementing shadow analytics projects, we rely on technology affordances and constraints theory along with theories of dynamic capabilities and improvisation. Technology affordances and constraints theory (TACT) serves as a framework to explain the interactions of humans, the organization and technology (Majchrzak and Markus 2013). The theory includes the concepts of affordances, enablers, constraints and outcomes. An affordance refers to what individuals or organizations can do with a technology (Majchrzak and Markus 2013). Affordances can be constraints, enablers, or both. A technology constraint refers to the way technology use can hinder individuals or organizations from achieving goals. For example, IT security programs that alert managers when knowledge workers send email attachments to outside addresses may stifle co-innovation between knowledge workers and outside vendors. Enablers are conditions that allow actions to take place. For example, when analytics companies like SAS host executive workshops, executives learn how other organizations use analytics. Outcomes refer to technology’s impact. Some outcomes from analytics programs include increased profits, better customer service and competitive intelligence. By using analytics on patient visits, Bon Secours generated more than $7 million in profits. Analytics helped a leading retailer improve its customer service by understanding why customers abandoned their mobile purchases. Finally, a beauty company built a competitive dashboard that monitors how celebrity comments impact both their competitors and their sales (IBM 2016).

Developing analytics programs that create such positive outcomes likely requires that the department initiating the program has dynamic capabilities. Dynamic capabilities are the processes of integrating, reconfiguring, gaining and releasing resources to match or create market change (Eisenhardt and Martin, 2000 p. 1107). In the case of implementing an analytics program, significant dynamic capabilities may include entrepreneurial alertness, customer agility and digitized process reach (Graeme and Nargiza 2012). Entrepreneurial alertness is the ability to explore the marketplace and identify opportunities for profit. This involves probing how other companies are experimenting and using analytics initiatives (Graeme and Nargiza 2012). The probing and experimenting necessary to launch an analytics program likely requires co-innovation between organizational departments, an organization’s vendors and customers as well as analytics vendors. Motivating these stakeholders to explore and exploit analytics opportunities requires a partner-centric culture, that fosters trust. Finally, through agility and entrepreneurial alertness organizations may create digitized process reach. Digitized process reach is an organization’s ability to deploy integrated and connected information technology (IT) like analytics.

Whereas implementing an analytics program may require dynamic capabilities, acting on the analytics may require different capabilities. Pavlou and El-Sawy (2010) propose improvisational capabilities as a third hand helping organizations attain and retain competitive advantage in turbulent environments. Improvisational capabilities are the ability to spontaneously reconfigure existing resources to simultaneously build new capabilities that address urgent, unpredictable and novel environmental situations (Pavlou and El Sawy 2010). For example, UBER recently used its analytics program to determine how to respond to the delete UBER hashtag showing up all over social media in response to UBER offering rides and eliminating surge pricing during New York City taxi cab driver’s protest over U.S.
President Trump’s immigration ban (Feldman 2017). While taxi cab protests and the delete UBER hashtag definitely pose an urgent, unpredictable and novel situation for UBER's management, only time will tell if the company’s response and improvisational capabilities were adequate.

**Method**

To investigate what enables functional departments to initiate shadow analytics projects and the constraints they face, we rely on a case study of SupplyChainCo (hereinafter SCC). Given the limited amount of qualitative research on the pre-implementation stage of analytics implementations, this exploratory approach was appropriate. Using grounded theory, we began our case study with no pre-conceived notions and allowed our research question to emerge from the data (Klein and Myers 1999; Walsham 1995b; Walsham 2006). This approach allowed us to gain rich and deep insight grounded in the organizational context and accounts of those involved with the project.

For our case study, we chose SCC’s analytics project for theoretical sampling reasons. Theoretical sampling involves researchers choosing cases that exhibit the phenomenon of interest naturally and intensively, thus allowing the researcher to examine and elaborate on the theoretical constructs under investigation (Pare’ 2004). We chose SCC because, SpecOps, a functional department outside of the IT group was initiating the analytics project and we were able to get involved with the project from when management first conceptualized it.

Data collection began in January 2013 and is ongoing. The manager responsible for the analytics initiative allowed us to review status reports, conduct interviews, and attend meetings. We observed in-person meetings between analytics vendors and SCC management. Thus far, most meetings have had the Special Operations (hereinafter SpecOps) senior vice president, director and the manager in charge of the analytics project in attendance. Each vendor brings a technical person, an industry expert and a business development person to the meetings. We have copies of the vendors’ presentations along with internal presentations and some internal emails regarding the project. Since it is an ongoing project, we receive periodic updates about the project on a weekly basis. We created a shared repository with copies of all analytics’ vendors’ presentations, work statements and over 80 single-spaced pages of field notes detailing these meetings and our periodic semi-structured interviews. To date we have interviewed both senior management and operational employees from the following SCC departments: SpecOps, Purchasing and IT. Table 1 outlines the data collected.

<table>
<thead>
<tr>
<th>Data Collected</th>
<th>Number</th>
<th>Length</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weeks Status Reports (12 weeks * 2 people): of SpecOps analysts working on the project</td>
<td>24</td>
<td>1 page</td>
<td>May-August 2015</td>
</tr>
<tr>
<td>Focus Groups: 4 with SpecOps’ analytics implementation team and 1 with all SpecOps analysts</td>
<td>5</td>
<td>60-120 minutes</td>
<td>May 2015-August 2016</td>
</tr>
<tr>
<td>Meetings between 3 analytics vendors and SCC departments</td>
<td>6</td>
<td>90 minutes</td>
<td>January 2016-February 2017</td>
</tr>
<tr>
<td>Practitioner conferences</td>
<td>2</td>
<td>1 and 8 hours</td>
<td>April 2016</td>
</tr>
<tr>
<td>Interviews-semi-structured and field notes written</td>
<td>30</td>
<td>15 minutes to 4 ½ hours</td>
<td>May 2015-February 2017</td>
</tr>
<tr>
<td>Interviews-semi-structured, recorded and transcribed</td>
<td>15</td>
<td>60 minutes</td>
<td>July 2013-July 2016</td>
</tr>
</tbody>
</table>

**Table 1. Data Collected**

Our data collection and analysis are occurring iteratively. We are following a three-stage analysis process: open coding, selective coding, and theoretical coding (Glaser and Strauss 2009; Urquhart 2013). Our open coding involves reading our data and assigning a code to each line of text. Using constant comparison, we are cross-examining the responses from different interviewees. Using QSR NVIVO 11, we grouped similar
responses together, identified different dimensions of our emerging categories and created relationships between categories. The case that follows, explains our within case analysis. Our findings will explain theoretical themes we’ve identified from our analysis.

CASE

SupplyChainCompany (hereinafter) SCC is a United States (hereinafter U.S.) distribution company with nearly $50 billion dollars in annual sales. SCC resembles most other companies in its hierarchical structure and departmental layout. It includes support departments like finance, accounting, and information technology (hereinafter IT). As well as primary departments like purchasing, warehousing, sales and transportation. SCC’s primary activity is purchasing over 100,000 items, storing them in its warehouses and delivering them to U.S. retail grocers and restaurants. The grocery distribution business is intensely competitive leaving distributors like SCC with thin profit margins. An SCC executive comments, “We have to run lean because we make pennies on the dollar.” In this comment, the SCC executive is talking about its employees' heavy workload. Buyers spend their days purchasing products for the 1000s of stores SCC services, and dealing with stock-outs. Unfortunately, the buyers are using a decade old purchasing system SCC’s IT department built internally. SCC’s IT department has to move very slowly with the implementation of the Oracle enterprise resource system because of extreme cost control. After 10 years, IT is in the process of rolling out the Oracle purchasing system. These conditions give IT employees limited time to explore new possibilities and new technologies.

In 2002, SCC formed a SpecOps department. Unlike most of SCC’s internal departments, SpecOps employees have the leeway to explore new business opportunities for SCC. A senior executive formed SpecOps to expand the special projects that had become part of his job. In the following quote the executive explains how he convinced management to form the department:

> It is a no brainer, if I can spend $1 and make a $1000, we should do the project. I have an entire list of projects like this and I don’t have the time to get them done.

Most SpecOps projects focus on arbitrage profits. SpecOps listens to what is happening in the environment, comes up with a strategy and then works with the functional departments to implement it. Typical projects involve buying inventory low and then selling it to retailers at the new higher market price.

In 2014, the SpecOps group began learning about analytics and saw its potential for automating the excel spreadsheets they were currently using for their arbitrage profit initiatives. Based on insights they had picked up at conferences, from reading and in meetings with analytics vendors, the senior leadership team began experimenting with analytics. The team developed ways that SCC may use analytics and hired summer MBA and Masters of Science in Information Systems students to work on the use case. Use cases included purchasing, competitive intelligence and traceability. The purchasing use case explored how SCC could predict when the market price for items it held in inventory would increase so SCC could increase its inventory on those items. The competitive intelligence use case deals with SCC collecting information about its competitors so it could adjust its policies and practices. An SCC executive commented, “If we can learn the capabilities of our competitors we can better bid our contracts.” SCC developed the traceability use case in response to the Chipotle food safety crisis (Berfield 2015). A SpecOps director noted, “I am sure that crisis cost Chipotle millions of dollars, our retailers will pay a few cents more if we can ensure our products are safe.”

In the process of prototyping these projects, SpecOps employees encountered considerable resistance from functional departments and operating units. The buyers felt the purchasing analytics system would put them out of a job. Buyers received considerable praise and bonuses when they used their business acumen and experience to buy in on products that were likely to increase in price. A SpecOps analyst explained his experience with the sales department as he tried to prototype the competitive intelligence system, “Sales is like a cabal.” By this he means that the sales department seemed like a private club and they weren’t going to let an outsider in to learn about their practices. When the SpecOps senior executive tried to attenuate sales’ responses to the analysts, the executive in charge of sales forbid SpecOps from going in the building or talking with sales associates. All the projects required tools and information from IT. IT inspected these requests and according to the analysts begrudgingly granted access. But still the
analysts had to work around cumbersome IT policies. The tools IT provided couldn’t run the millions of lines of transaction data necessary to analyze price increases quickly, rather they tied up analysts’ computers all night. IT investigated when anyone sent an attachment to an outside email address, thus preventing co-innovation with vendors.

Despite the challenges, the experimentation phase gave SpecOps management an idea about which use case may have the most potential to increase profit and began evaluating vendors. Using a list of the top analytics vendors, the analysts followed the traditional vendor selection process (Weber et.al 1991). They called vendors, explained the use case, and discussed the vendor’s capabilities. Ultimately SpecOps identified three vendors that were willing to bid on the project. We will use pseudonyms that describe these vendors based on their sales approach: SocialVendor, SocioTechVendor and TechnicalVendor. SocialVendor was a start-up company interested in securing the SCC contract as a way to break into the analytics business. Their sales approach focused on building relationships with SpecOps employees. SocioTechVendor had a long-standing relationship with SCC as a software and hardware provider. Their sales approach emphasized their technical and business analytics expertise and how this could help SCC. As an established analytics vendor, TechnicalVendor focused on its market share and technical prowess, leaving the application and data fetching to SpecOps.

In the vendor evaluation process, SpecOps met with each vendor twice. During the first meeting SpecOps explained its purchasing predictive analytics project and gave the vendor a test case to work on. During the second meeting, the vendor was supposed to present their solution to the test case. None of the vendors presented a solution. SocialVendor was honest about its inability to find a solution and explained that it needed compensation to spend additional time. TechnicalVendor stated that it could solve the problem and educated SpecOps on their responsibility for fetching the necessary data including product ingredients, ingredient price history and product price history. TechnicalVendor would only compute the solution and explained that the solution would appear as the chance of a Type1 or Type2 error. Showing his disdain for the project, the SCC Purchasing Vice President explained, “I am not going to pour millions of dollars in inventory based on the probability of a Type 1 or Type 2 error.”

SocioTechVendor stated that it had solved the problem and could solve more problems provided SCC provided a business contact to help SocioTechVendor gather the data and evaluate the solution. Of the three vendors, SocioTechVendor rose to the top. Yet, as senior management was about to sign the contract, the SpecOps analytics project managers halted. He explained: “We currently don’t have the staff or internal support to provide what they need. Furthermore, I am not clear on what the solution would look like and if we’d be able to act upon it. We’d be wasting their time and our money.”

The analytics project laid dormant for nearly a year, while SpecOps employees worked on other things. Then in November 2016, SocioTech vendor resurrected the project. The account manager for SCC was in the building working with the IT department and set up a meeting with the SpecOps executives. Accompanied by a grocery industry analytics expert, the SocioTechVendor account manager educated the SpecOps executives on how other organizations were using analytics. SocioTechVendor set up a February 2017 meeting with SpecOps and Purchasing where it presented its latest analytics tools and how businesses were using them. SocioTechVendor then tasked the SCC employees to use what they had learned from the presentation and come up with how SCC could use SocioTechVendor’s offerings. A few weeks later, SocioTechVendor held a 4-hour brainstorming session with SCC. With the help of SocioTechVendor’s industry expert, SCC management had come up with six solid use cases, which SCC presented to SocioTechVendor at the meeting. In addition to the grocery industry expert, the vendor brought experts in analytics, cognitive science, business development and project management to help SCC shape their business cases to SocioTechVendor’s capabilities. At the writing of this paper, SocioTechVendor is evaluating the use cases and preparing for their next meeting with SCC where they will present the use cases they think best match SocioTechVendor’s capabilities and will have the largest impact on SCC’s profit. At this meeting SocioTechVendor will also discuss costs. Table 2 below shows SpecOps’ shadow analytics timeline to date.
<table>
<thead>
<tr>
<th>STAGE/TIME PERIOD</th>
<th>ACTIVITIES</th>
<th>OUTCOMES</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXPERIMENTATION</td>
<td>Gathered information about how to use analytics from reading, conferences and meeting with vendors</td>
<td>Resistance from internal departments that needed to add insight to the use cases (i.e., IT, Purchasing and Sales).</td>
</tr>
<tr>
<td>April 2015-September 2015</td>
<td>Developed use cases and hired analysts to prototype the use cases</td>
<td>Ideas about which use cases may work.</td>
</tr>
<tr>
<td>April 2016-September 2016</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VENDOR EVALUATION</td>
<td>Brought in different vendors to try out the purchasing predictive analytics use cases</td>
<td>SocioTechVendor becomes the preferred vendor</td>
</tr>
<tr>
<td>October 2015-April 2016</td>
<td></td>
<td>SpecOps learns that they cannot totally outsource an analytics solution, they will have to do considerable data fetching and that they may not have the capabilities to act upon the vendor’s solution.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SpecOps shelves the project.</td>
</tr>
<tr>
<td>RESURRECTION</td>
<td>SocioTech vendor resurrects the projects, turns vendor selection project upside down</td>
<td>Vendor teaches SCC functional department about its analytics capabilities with use cases of projects it does for other clients.</td>
</tr>
<tr>
<td>January 2017-present</td>
<td></td>
<td>SCC functional departments develops use cases and SocioTech vendor evaluates the use cases it can solve with the largest impact.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SocioTechVendor encourages SCC to subscribe to its innovation lab.</td>
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</table>

Table 2. Analytics Timeline

**FINDINGS**

Our research question set out to understand what enables and constrains a functional department in their efforts to launch a shadow analytics system. The paragraph below proposes that the organization’s IT department, job autonomy and analytics vendors can both enable and constrain a shadow analytics initiative.

Internal IT departments are both enablers and constraints of shadow analytics project. IT department’s enable shadow IT initiatives when the IT department is a cost center that frustrates functional departments (Jasperson et al. 2002). In the SCC case, the IT department frustrated the functional departments to a point where the departments sought IT services elsewhere because of their internal IT department's history of poor responsiveness and control. The IT department’s limited resources required that it allocate the number of hours it spent on each functional department each week. Departments were cautious not to exceed their allocated hours so IT could work on their backlog of projects. As one executive noted, “IT would rather tell you why you can’t do something than how you can.” Once they learned of the analytics project, IT constrained the project. When IT executives forced themselves into the SpecOps brainstorming meeting with SocioTechVendor, IT executives voiced concerns about the vendor having access to SCC’s proprietary information and the vendor’s cloud storage solutions. When SpecOps moved closer to engaging the analytics vendor, the IT department slowed the project. IT squabbled about protecting SCC’s data, raised concerns about IT governance and squabbled with the analytics vendor on other non-analytics related projects.

Job Autonomy enables and constrains analytics project. Job autonomy is the ability to exercise control over one’s work including: control over tasks, decisions and projects (Mazmanian, Orlikowski and Yates 2013). In our case, it seemed that both IT and Purchasing had little job autonomy which constrained both groups’ improvisational abilities and opportunities to get involved with the analytics project. SCC’s IT
department was a low-cost provider and therefore focused on delivering necessary IT service. Most
departmental employees were caught up with service requests and had little autonomy to experiment with
or learn about potential technologies that may help SCC. Purchasing, one of the main groups that would
use the proposed shadow analytics system, also had little job autonomy. Faced with ensuring retail
grocery stores and restaurants had the necessary grocery items, buyers had little time to think about how
analytics could improve their operations. In contrast, SpecOps’ high autonomy over the projects that they
worked on created high improvisational abilities and enabled them to learn about and experiment with
new technology and initiatives like analytics. This enabled the shadow analytics project early on and also
led to the project’s stagnation. After learning about analytics and what the project would require, SpecOps
used their autonomy to pursue other projects for nearly a year before the analytics vendor reenergized the
initiative.

Analytics vendors both enable and constrain shadow analytics projects. In this case the vendors were
initially enablers, as the bid process progressed they became constraints and then over time the vendor
that became the preferred vendor again became an enabler. In the inquiry phase all 3 vendors enabled the
shadow analytics project through their willingness to engage with a functional department outside of IT to
discuss the analytics project. They continued enabling the project by agreeing to do a free analytics test
project, to prove to the business unit that analytics could solve their problem. When none of the vendors
could successfully complete the test project, the vendor constrained the project. In their efforts to work on
the test project, the vendors realized that the test case would take significant time and that they needed
significant historical data. These necessities became constraints because the vendors wanted the initiating
department to provide the data and since the department was trying to implement a shadow analytics
project they didn’t want to involve their IT department to fetch the data. Furthermore, the client didn’t
want to pay until the vendor could prove that the test case would work. This became such a constraint that
the client shelved its shadow analytics initiative.

After seemingly losing out on the lucrative shadow analytics initiative, the vendor that ultimately became
the client’s preferred analytics vendor developed its improvisational capabilities. Several of the vendor’s
improvisational capabilities enabled the client to revisit its shadow analytics project. This includes
reversing the traditional vendor selection process, agile project management and innovation labs. After
seemingly losing the initial analytics project bid, the vendor maintained contact with SpecOps
management. Instead of management having a use case and selecting a vendor, in this case the vendor
worked with management and helped them come up with use cases.

SocioTechVendor’s agile project delivery approach enabled SCC to move forward with the project. Rather
than getting involved with a long, drawn out expensive IT project, SocioTechVendor proposed an agile
project delivery approach where they worked in two to four week sprints to test different SCC use cases.
As SocioTechVendor’s industry expert explained, “If it doesn’t work, we move on.” SocioTechVendor
implemented this agile approach in their innovation labs. The innovation lab is a group of data scientists,
cognitive learning specialists and business experts available to a client on an ad-hoc basis to work on
different projects. To ensure co-innovation SocioTechVendor will co-locate with the client either at the
client’s sites or the vendor’s labs. The innovation lab utilizes global deliver centers (i.e. different offices
around the world to take advantage of the 24-hour clock) to make the two to four weeks sprints for testing
different use cases a reality.

Based on SCC’s shadow analytics journey, Figure 1 shows our proposed framework to understand vendor-
client shadow analytics projects. The figure proposes that the vendor and the client’s improvisation
abilities affect whether the client will initiate one or many shadow analytics projects. The ideal scenario is
when both the client and the vendor have high improvisation capabilities. In this case, the vendor and the
client will co-innovate to develop many analytics use cases and projects. This is the path SpecOps and
SocioTechVendor are currently pursuing. In situations where the vendor has high improvisation
capabilities and the client does not, the client will likely hire the vendor to initiate one particular analytics
project. This was the case SCC was, during its initial vendor evaluation stage. If the client has high
improvisation capabilities and the vendor does not, the vendor may not be able to keep up with all the
client’s ideas and experience scope creep. This happened when SpecOps was evaluating SocialVendor and
TechnicalVendor. In both cases, SpecOps management was brainstorming all types of ideas while the
vendor was trying to keep management focused on the initial project. When both parties have low
improvisation capabilities, the parties may not agree on an analytics project. This would likely have been
the case if SpecOps had left Purchasing to deal exclusively with SocialVendor or TechnicalVendor. Purchasing’s limited job autonomy created limited improvisation abilities when it came to the analytics project or other initiatives outside of the buyers’ routine job responsibilities.

<table>
<thead>
<tr>
<th>VENDOR IMPROVISATION</th>
<th>CLIENT IMPROVISATION</th>
<th>IMPLICATIONS &amp; CONCLUSION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>High</strong></td>
<td><strong>High</strong></td>
<td>Our study offers a functional department's perspective on the shadow IT literature which is dominated by the IT department’s perspective. Based on SCC's analytics journey, informed by technology affordances and constraints theory, we developed a 2 x 2 matrix that shows how vendor and client improvisation abilities may impact the process of developing a shadow analytics initiative. Our study finds that the same factors can both enable and constrain a functional department's shadow analytics initiative. This has implications for both functional departments and analytics vendors. Functional departments need to think about the power their internal IT department wields over them and whether they have the power to rise above IT’s control and authority over technology resources (Markus and Bjorn-Andersen, 1986). If not, the functional department may never pass the pre-implementation stage and may have harmed the analytics vendor’s relationship with the internal IT department. In contrast, if the functional department does have the power to launch a shadow analytics initiative, without IT, the initiating department might consider bringing its internal IT department into the project as a way to promote learning for the entire organization and possibly scale analytics initiatives to other departments and business units. This research shows how vendor-client development projects are becoming more agile, which offers implications to the IT outsourcing literature (Levina and Ross 2003). Instead of coming up with a project and selecting vendors to bid on the project, in this case the successful vendor turned the process upside down. The vendor selected the client, educated them on analytics use cases, had the client brainstorm internal use cases, and then presented to the client the use case it thought would work. Furthermore, rather than guaranteeing that the project would work, the vendor’s remuneration strategy involved trying a use case and if it didn’t work, moving on to the next one in a few weeks. This process offers implications to the vendor outsourcing literature (Levina and Ross 2003) by introducing experimentation, short cycles, and openness to failure. All in all, we hope this study offers some new ideas about how functional departments and analytics vendors are co-innovating to launch analytics initiatives. We look forward to writing future papers about the lessons learned and outcomes of shadow analytics initiatives.</td>
</tr>
<tr>
<td><strong>Low</strong></td>
<td><strong>Low</strong></td>
<td><strong>REFERENCES</strong></td>
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