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CONCURRENT LEARNING:

HOW FIRMS DEVELOP MULTIPLE DYNAMIC CAPABILITIES IN PARALLEL

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ABSTRACT

Much is known about the importance of dynamic capabilities. Yet, surprisingly little is known about how multiple dynamic capabilities might be developed in parallel, since most existing work explores a particular dynamic capability in isolation. Using rich quantitative and qualitative data on Dow Chemical's acquisitions, joint ventures, and divestitures over the past 20 years, we seek to address this gap. Besides contributing by adding fresh insights about managing growth and the utility of distributed practice, and by shedding light on positive and negative experience transfer, our core contribution is an emergent theoretical framework that develops the concept of "concurrent learning."

The concept of dynamic capability – defined as "the capacity of an organization to purposefully create, extend, or modify its resource base" (Helfat *et al.*, 2007: 4) – is central to the field of strategic management (Helfat, 1997; Teece, Pisano and Shuen, 1997; Eisenhardt and Martin, 2000; Helfat *et al*., 2007). The reason is that dynamic capabilities can enable firms to profitably enter new product (Gilbert, 2006; King and Tucci, 2002) and geographic markets (Bingham and Eisenhardt, 2011), revitalize resource portfolios (Helfat and Raubitschek, 2000), streamline underperforming divisions (Galunic and Eisenhardt, 2001), restructure industry relationships (Dyer and Hatch, 2006; Kale and Singh, 2007), and foster innovation (Iansiti and Clark, 1994; Rothaermel and Hess, 2007). Further, scholars suggest that dynamic capabilities promote economically significant change not only in more dynamic environments and in new ventures, but also in less dynamic environments and in large established firms (Helfat and Winter, 2011).

Given the importance of dynamic capabilities, much research focuses on how they might be learned (Dosi *et al.*, 2000; Eisenhardt and Martin, 2000; Helfat *et al*., 2007). Empirical work in this stream focuses on one dynamic capability in particular such as an acquisition (Capron, Anand, and Mitchell, 2007; Heimeriks, Schijven, and Gates, 2012), alliance (Kale and Singh, 2007; Schreiner, Kale, and Corsten,

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2009), country entry (Bingham *et al*., 2007), or divestiture (Brauer, 2006; Moliterno and Wiersema, 2007) capability. Yet, while understanding how a particular dynamic capability develops in isolation is important, such an isolationist view offers little insight into the links among dynamic capabilities. To the extent that firms build multiple dynamic capabilities over time, there will likely be overlap between the firm members and learning activities involved. Missing from the literature, therefore, is an empirically grounded understanding of how learning one dynamic capability might influence the learning of others and, in turn, what implications this has for the firm. We address this gap.

We explore whether and how dynamic capabilities are learned concurrently. Consistent with existing research (Cyert and March, 1963; Levitt and March, 1988; Huber, 1991; Argote and Miron-Spektor, 2011), we define "learning" as being an observable change in behavior based on experience.[1] Given the state of extant theory, we rely primarily on theory-building and theory-elaboration methods (Strauss and Corbin, 1990; Lee, 1999; Eisenhardt and Graebner, 2007). The empirical setting is the development of acquisition, joint venture (JV), and divestiture capabilities within Dow Chemical, the world's largest producer of plastics and the world's second largest chemical company. We show that concurrent learning of dynamic capabilities is aided by three activities: "initiating structure," "generalizing structure," and "backward-chaining structure." Concurrent learning begins as firms form a dedicated group to codify knowledge. That emerging structure is idiosyncratic to one phase (e.g., implementation) of one process (e.g., acquisition) but then is quickly leveraged into multiple processes (e.g., JV and divestiture) and further elaborated in a reverse chronological way to address additional phases (e.g., transaction and due diligence). Overall, besides setting forth an emergent theoretical framework that develops the concept of "concurrent learning" we contribute by adding insights about effective growth and distributed practice, and by shedding light on the nature of experience transfer.

THEORETICAL BACKGROUND

[1]Like others, we acknowledge that learning can occur through changes in cognition without a corresponding change in behavior and that learning sometimes, but not always, leads to better outcomes (Argote, 1999; Miner et al. 2001).

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Dynamic capabilities enable firms to modify their resource position. They include those that pertain to doing acquisitions, product development, country entry, alliances and divestitures (e.g., Brown and Eisenhardt, 1997; King and Tucci, 2002; Helfat and Peteraf, 2009; Bingham and Eisenhardt, 2011). These activities foster significant change (Helftat and Winter, 2011) and so are less tied to operational capabilities that allow firms to sustain current actions and make a living in the present.[2]

Although the existing literature does not address how different dynamic capabilities might be learned concurrently, it does suggest how a particular dynamic capability can be learned. One way is via the accumulation of experience. Experience provides individuals with information that can help them better understand the causal linkages between actions and outcomes (Zollo and Winter, 2002). More experience with JVs, for example, should allow managers to gain an understanding of how to select new partners, manage contract negotiations, and terminate agreements (Anand and Khanna, 2000; Sampson, 2005). The logic, therefore, is that skill and capacity build through practice (Argote, 1999).

The timing of experience also appears to influence the learning of dynamic capabilities. Scholars argue that too much new knowledge, as well as too little, inhibits effective learning (Hayward, 2002). The rhythm of experience may thus regulate its benefits (Brown and Eisenhardt, 1997; Gersick, 1994; Vermeulen and Barkema, 2002). To illustrate, Hayward (2002) used data on 535 publicly disclosed acquisitions and found that the benefits from acquisitions depend on their pacing. Hayward argued that acquiring firms learn less from their experience when that experience is accumulated in a rapid sequence of acquisitions. Instead, firms were more likely to learn how to perform acquisitions when executives paced their acquisition experience and had six-to-twelve-month time intervals between their acquisitions.

The similarity of experience may likewise impact the way firms learn dynamic capabilities. For example, Zollo, Reuer, and Singh (2002) studied 145 alliances in the bio-technology industry and found

[2] We acknowledge that some things that are dynamic capabilities in one context may be operational capabilities in others. For example, Helfat and Winter (2011) argue that because the everyday business of buy-out firms involves conducting acquisitions, their associated capabilities are more operational than dynamic.

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that alliance experience with the same partner appeared to be important to learning an alliance capability. The creation of new alliance agreements with prior alliance partners seemed to allow firms the opportunity to exploit prior learning and avoid additional relationship-specific investments in incentive alignment, monitoring and formal controls. Likewise, Haleblian and Finkelstein (1999) analyzed data from 449 large acquisitions and found a positive relationship between acquisition similarity and acquisition performance. The more similar the focal target's industry was to those of the firm's prior targets (measured by four-digit SIC code), the better the focal acquisition performed (as measured by abnormal stock returns).

Research also suggests that the codification of experience impacts the learning of dynamic capabilities (Zollo and Winter, 2002). Codification is defined as the written documentation of knowledge in tools such as manuals and rule books (Zollo and Winter, 2002; Zollo and Singh, 2004). Codification helps capture the tacit knowledge embedded in individuals' experiences about how to manage key activities (Eisenhardt and Martin, 2000; Zollo and Winter, 2002). The exercise of reflecting on past actions to create a tool for the execution of a particular task can improve understanding of cause-and-effect relationships. For example, using a sample of 228 acquisitions Zollo and Singh (2004) found that codification of acquisition experience into detailed rule books and manuals for each phase of an acquisition led to higher-performing focal acquisitions (as measured by ROA improvement post acquisition). Similarly, using a sample of 78 firms with alliance experience, Kale and Singh (2007) found that knowledge codification positively influences alliance performance (as measured by abnormal stock returns). The authors argue that codification helps firms build and exploit alliance know-how and thus, develop the capacity to extend and modify its resource base via alliances.

Overall, theoretical and empirical studies suggest that dynamic capabilities are learned from experience, and that similar, paced, and codified experience is particularly helpful. Yet, while this research is valuable, it focuses attention on the learning of one particular dynamic capability (e.g., an acquisition or alliance capability) and does not discuss how learning one dynamic capability might influence the learning

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of others[3]. From a theoretical perspective, understanding the potential for concurrent learning of dynamic capabilities is important because this would help provide deeper insight into learning, knowledge, and experience transfer effects in activities of high strategic value. For example, scholars argue that acquisitions, alliances or country entry are not just *important* to strategy but may actually constitute the very *essence* of strategy for many firms (Bingham, Eisenhardt, and Furr, 2007). From a managerial perspective, learning how to develop multiple dynamic capabilities concurrently is important as using several capabilities together generates more shareholder value than emphasizing one in particular (Dranikoff, Koller, and Schneider, 2002). As one illustration, Shi and Prescott (2011) discovered that firms using both acquisitions and alliances to drive corporate development outperformed other firms who relied only on acquisitions. In summary, the literature lacks an in-depth, longitudinal study that explores whether firms learn multiple dynamic capabilities concurrently and how that learning might take place.

METHODS

To gain in-depth understanding of how firms learn multiple dynamic capabilities concurrently, we rely on the extended case method. This method uses an in-depth historical analysis of a single firm to reconceptualize, build and extend theory (Burawoy, 1998; Danneels, 2010)[4]. The extended case method thus involves constant cycling between theory and data to help provide novel accounts of organizational behavior over a protracted period of time. In our study, we focus on the development of acquisition, joint venture (JV), and divestiture capabilities within Dow Chemical Corporation over multiple years.

[3] Some recent work has started to address this gap by examining experience spillovers across activities. For example, Zollo and Reuer (2010) used data from the U.S. banking industry and found that alliance experience improves the performance of a focal acquisition when that acquisition is managed in ways that resemble the typical handling of an alliance. However, results from this large-scale empirical study suggest that firms might learn to manage alliances before they learn to manage acquisitions. Thus, it does not explicitly examine whether alliance and acquisition capabilities might be learned together and, if so, how. It also leaves unaddressed several other critical research questions, such as whether experience spillover effects are symmetric in both directions and whether, if at all, divestitures – often seen as the mirror image of acquisitions – might also influence alliance and acquisition outcomes.

[4] Examples of the extended case study in the organizational literature include Burgelman's (1994) study of Intel's successful movement from memory chips to microprocessors, Tripsas and Gavetti's (2000) study of how Polaroid's history hampered its ability to adapt to digital photography, Siggelkow's (2002) study of the gradual evolution of strategy in the mutual fund giant Vanguard, and Danneels' (2010) study of how Smith Corona, a leading manufacturer of typewriters, altered its resource base in response to technological shifts in its industry.

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Founded in 1897, chemist Herbert Henry Dow used electrochemistry to convert the brine underneath Midland, Michigan into bromine. The bromine was then used to form bleach that could be sold commercially. The firm began its own sales department in 1904 and started building up its agricultural chemical business. By the 1990s, Dow had built up a successful portfolio of chemistries and advanced materials agro-sciences that were sold in products and solutions to customers in more than 150 countries and sectors spanning from agriculture to electronics, water and energy. Yet, while the chemicals industry as a whole had enjoyed rapid growth for almost 50 years, by the turn of the century the industry faced a series of environmental challenges. Traditional chemical companies such as Dow faced changes in feedstock availability and price, rising energy costs and demand shifts from Triad to Asian countries (Heimeriks and Gates, 2010). Moreover, global demand for basic chemicals (e.g., polymers and petrochemicals used for rubber and plastics products) was stable though margins decreased due to maturing products and consolidation. Instead, specialty chemicals (e.g., industrial gases and adhesives for coatings and industrial cleaning products) were becoming more attractive as they contained higher-margin products for a rapidly growing range of end markets. Leading chemical companies (e.g., BASF, Bayer, Dupont, and Dow), therefore began to gradually shift their portfolio from predominantly lower-margin basic to higher-margin specialty chemicals. For instance, Bayer gradually divested its oil and gas related units, while Dupont moved away from producing petrochemical products. Likewise, Dow discontinued producing chemicals for pharma and started reducing its exposure to basic petrochemicals.

Dow Chemical lends itself well to a case study of dynamic capability development for several reasons. First, key decision makers involved in the formalization of acquisition, JV, and divestiture activity were present in the firm at the time of data collection. On average, these individuals had almost 30 years of experience working with Dow and could therefore provide an accurate and rich, in-depth perspective on acquisitions, JVs, and divestitures from the time the firm started enacting efforts to become more effective in doing them. Second, the chemical industry in which Dow operates is attractive for this

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study because of the need to acquire, partner, and divest over time in order to grow and survive (Dow Annual Reports, 2010-2012). Third, because Dow archived its documents for managing acquisitions, JVs, and divestitures, we have a historical trail of what was created as well as when and how it was to be used. As such, data for each process can be isolated, enabling single and multi-process analysis. Fourth, Dow had entered into at least one hundred acquisitions, JVs, and divestitures at the time of data collection, which ensures sufficient experience with which to examine how the firm has been purposefully modifying its resource base over time. Finally, as Dow is a publicly traded organization, financial statements, stock-market return data, and press releases are available to help us analyze how well the capabilities perform.

We rely on three data sources: (1) quantitative and qualitative data from semi-structured interviews with company leaders; (2) quantitative data from company and public sources on Dow's acquisition, JV, and divestiture performance; and (3) archival data including company intranet documents, business publications, and other materials produced by the firm. A primary data source was the semi-structured interviews with informants directly responsible for corporate development (see Table 2 for more information about informants). Each interview consisted of three parts: (1) background of the firm and the importance of acquisitions, JVs, and divestitures; (2) event chronology for acquisitions, JVs, and/or divestitures; and (3) direct questions related to learning over time. For the event chronology, we asked open-ended questions that focused on the sequence of events (e.g., How, if at all, did your company start formalizing the acquisition process? What did you do first? What did you do next?). We then reviewed the actions of executives, and asked if we had covered all main activities. We also sent follow-up emails and conducted additional interviews. Finally, we triangulated interview data with observations and archival data to improve completeness (Jick, 1979). For example, we spent several days on site and were given access to several hundred pages of process-related documents created by Dow executives. These documents frequently took the form of Power Point presentations or manuals that detailed the overall flow of activity across a particular process (e.g., acquisition) as well as the more granular action steps

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associated with a particular phase of a process (e.g., due diligence or implementation). Together, supplementing interview data with archival data and relying on very knowledgeable informants (with an average of 30 years of experience at Dow) helps mitigate informant bias[5].

Our analysis involved looking for the emergence of similar themes and relationships related to learning across acquisitions, JVs, and divestitures (Strauss and Corbin, 1990; Miles and Huberman, 1994). From the emerging patterns, we formed tentative theoretical constructs. We then refined them by revisiting the data to compare and verify the occurrence of specific learning mechanisms. Given the literature's focus on learning from more and similar experience, pacing of experience, and codification, we examined the data for these constructs. However, we also looked for unexpected constructs, thus combining theory elaboration and theory generation (Strauss and Corbin, 1990; Lee, 1999) in our analysis. We then iterated between theory, data, and extant research until a strong match appeared between the data and our theoretical framework (see Figures 1 and 2).

CONCURRENT LEARNING OF DYNAMIC CAPABILITIES

Our data show that Dow learned acquisition, JV and divestiture capabilities concurrently. This organizational-level learning is taking place as indicated by changes in behavior (Argote and Miron-Spektor, 2011) as it relates to Dow's Program Management Office (to be discussed) and the activities they are engaged in. We first describe how Dow learned acquisition, JV, and divestiture capabilities concurrently. We then discuss how well these capabilities perform.

Initiating structure

Research suggests that knowledge codification helps in developing dynamic capabilities (Kale and Singh, 2002; Zollo and Winter, 2002). But, this work provides little understanding of how such

[5] We also attempted to mitigate informant bias by combining both real-time and retrospective data; that is, Dow not only had a rich history of acquisitions, JVs, and divestitures, but was also engaged in numerous new acquisitions, JVs, and divestitures at the time of data collection. Such a combination is attractive because the retrospective data enables efficient data collection of more observations (thus enabling better grounding), whereas real-time data collection allows for further in-depth insight into learning (Leonard-Barton, 1990).

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codification comes to exist since empirical research only assesses whether codified knowledge (e.g., manuals or checklists) exists. Our study contributes by suggesting that the nature and order of codification is consequential for dynamic capability development. We find that Dow executives began the concurrent learning of multiple dynamic capabilities by "initiating structure". "Initiating structure" emerged from our data and is defined as the formation of a dedicated corporate group that begins knowledge codification. Hence, our definition of structure is consistent with others who define it broadly as constraint on action (Davis, Eisenhardt, and Bingham, 2009)[6]. Figure 2 and Table 3 show how "initiating structure" occurred from 1999 to 2002 and involves (1) creating a dedicated group and initial codified templates, (2) making the templates more granular, and then (3) continually updating the templates.

Creating a dedicated group and initial codified templates:

Dow created a dedicated group to begin knowledge codification in 1999 as it began the integration of Union Carbide Corporation (UCC) – the company's (and industry's) largest acquisition up to that point in time.[7] The group was called the Program Management Office (PMO). Rich Carlisle[8], the person asked to head the PMO recalled, *"At the time, my boss, the VP of Operations and a member of the board of directors, called me into his office and said 'Rich, we would like you to head up the PMO.' And I said 'What is the PMO?' 'The program management office.' 'What's a program management office?' He said, 'Rich, I don't have a clue, but we talked to some consultants and they said we need one'"* (RC). Rich had spent 25 years at Dow in manufacturing, operations and change management. Rich quickly hired three seasoned executives within Dow, each with about 15 years of experience in the firm, to help as PMO staff members. Rich added, *"I brought in a finance person because I knew that we needed to keep track of cost synergies. I brought in a manufacturing and operations person because we knew at that time Union*

[6] Structure as constraint on action is consistent with other definitions of structure including the regulated norms (e.g., rules, communication patterns) that shape action of firm members and the regular patterns of organization (e.g., roles, policies, manuals) through which a firm is expected to be administered (Chandler, 1962 Lawrence and Lorsch, 1967).
[7] At the time of the announcement, which was August 1999, Dow was about a $19 billion company and Union Carbide was a $6 billion company. Dow was thus adding about 33 percent additional revenue into the company.
[8] Pseudonyms are used to ensure anonymity. Initials at the end of a quote refer to an informant listed in Table 2.

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Carbide had a lot of manufacturing sites. I also brought in a computer person because we knew that we would need to set up Web sites, we need to be able to share information; special file servers, etc." (RC).

Between 1999 and 2001, when the Union Carbide deal closed, Rich and his group helped put together a plan for acquisition implementation. They first spoke to business unit and functional leaders at Dow. Although Dow had been involved in many acquisitions before the Union Carbide deal, at the time there was no codified documentation that synthesized lessons and insights from these groups to help shape the acquisition process. This resulted in lower-than-hoped-for outcomes. A PMO Manager expounded, "*We didn't have any documentation prior to the Union Carbide deal. Before 1999, we managed more case-by-case; find whoever you can find. We did not have a standard methodology around implementation"* (JP). The PMO Director added, *"There was a lot of knowledge all over the place, but it was never in any central repository… Deals were being done but basically the way it would work is that you'd have the folks doing the negotiations and all of a sudden they said 'We've just acquired a company.' There was no planning as far as what's the integration, what's the implementation. It was a fire drill. Nobody knew what the hell was going on"* (RC).

One of the first codified documents the PMO created for managing acquisitions detailed team structures. In the fall of 1999, Rich and his group outlined the different teams that would be involved in the Union Carbide acquisition implementation. One was cross-functional teams that would work together to ensure a smooth integration of the acquired company[9]. He said, *"We put together a very good team structure at the very beginning of Union Carbide and that served us well and was the model that we used as we moved forward whether it was JVs, divestitures, or additional acquisitions"* (RC).

Other codified tools were created soon thereafter. The PMO produced documentation for "on-boarding". This provided instruction for integrating acquired employees. The PMO also produced

[9] As an example of cross-functional teams, consider the case of getting a new ID badge for acquired employees. The ID badge has a number on it (the employee number) which is obtained from human resources. But then for the ID badges to work properly, they need to be linked to a company's computer systems. And public affairs is responsible for taking the photos of the individual. So, three different functions are needed: HR, IT, and public affairs.

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documentation that specified timelines in the acquisition process. Rich recalled, *"We needed an overall roadmap to try to guide the firm. You could just envision there were thousands and thousands of different tasks that needed to be accomplished to fully integrate Carbide into Dow. And so that was the reason for putting together this high-level timeline."* (RC). Finally, because the Union Carbide deal was tied to the promise of synergies, the PMO put together tools to help measure synergies along the way. Regarding these first codified tools Rich observed, *"Specifying team structure, trying to put together a good on-boarding program, setting overall timelines and then helping with synergy estimation. Those were really the first key codified tools that we started working on"* (RC).

Making initial templates more granular:

After initially creating generic codified tools (e.g., team structures, overall timelines, on-boarding detail), Dow then began creating more function-specific codified tools (see codified knowledge in "initiating structure" in Figure 2). The PMO had originally not codified function-specific information given that the role of the PMO was to supply generic templates. Rich explained, *"And as far as the reason why we didn't initially put together the detailed functional information in our plan was the fact that we had a lot of subject matter experts and their responsibility was to put together the detailed integration plan for their specific function, whether it was R&D or manufacturing or purchasing, etc."* (RC). Moreover, the functional representatives from Dow involved in acquisitions were working part-time on the acquisitions, in addition to their other corporate responsibilities, and so did not have the time and resources like the individuals within the PMO to focus exclusively on codifying knowledge. With some knowledge captured in codified documents, Rich and his PMO group began to function as coaches to business unit leaders who came to them wanting to capture an acquisition opportunity but with little or no experience doing them. The head of the PMO said, *"The business leader obviously knew the business… But, in general, that business leader probably had never done an acquisition… They were basically clueless as far as, 'Ok, how do we do this?' This is where the PMO coach or the PMO leader came into*

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play. He or she was the expert regarding the tools, the templates, the methodology, where the pitfalls would be, etc. And having those two people plan and work side by side was absolutely critical" (RC).

Continually updating the templates:

After Rich and his team started coaching business unit leaders, they also started performing after-action reviews. These reviews became the main means to update codified tools and methodologies. Rich said, *"What we did when we were done with the transaction was have an after-action review. This would be the PMO, the business leader and some of the other key players in that transaction. We would review what worked and what did not work. And then we would take that learning and infuse that into our methodology, infuse that into the tools and templates so that the methodology and the templates we had were basically evergreen. We really didn't want them to get stagnant. We wanted to constantly improve on those tools"* (RC). After-action reviews occurred in a large-group format, where the PMO joined with most functional leaders to discuss actions and outcomes. After-action reviews also occurred via one-on-one reviews with key functional leaders like human resources, finance, safety, or manufacturing since *"the success or failure of the acquisition is so dependent upon those specific functions."*

How initiating structure contributes to concurrent learning:

Overall, we find that initiating structure facilitates the learning of multiple dynamic capabilities. One reason is that the formation of a dedicated group (a PMO in our case) to start codification focuses attention and provides coherence and direction. Having a dedicated group synchronizes geographically dispersed and functionally diverse work groups with each other. This lowers the likelihood of confusion, fatigue, and wasted effort, and it allows organization members to regulate the tempo of their actions and allocate time and resources accordingly (Martin, 2011). As the PMO Director commented, *"The reason why we formed the PMO was to make sure that we have good alignment with all of our M&A activities, functions, and with the corporate strategy"* (RC). A PMO Project Manager added, *"We clarified touch*

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points, roles, and responsibilities" (AJ). Without a dedicated group, like the PMO, to coordinate activity, firm members may overlap in roles and thus become confused about what to do and when.

The formation of a dedicated group also saves time. The group's creation of initial codified tools speeds capability creation as it allows executives to build off the past. For example, the PMO Director remarked how the timeline for acquisitions made future acquisitions more efficient: *"Speed is so critical in an acquisition… So when we announced [acquisition target], we pulled that timeline off the shelf, I put the name on top, I made a couple other tweaks here and there and we had it within 24 hours"* (RC). A PMO Project Manager concurred, *"Acquisitions follow a fairly similar path, so documenting those and being able to pull that off the shelf is helpful. That's probably the key advantage. You're not reinventing the wheel… That enables us to move a lot more quickly, a lot more efficiently, a lot more effectively than we had prior*" (JP). Codification may therefore be particularly foundational to dynamic capabilities in less or moderately dynamic industries where efficiencies exist from using common action steps, since prior theoretical and empirical research suggests that less codified structures like 'simple rules' or 'heuristics' are foundational to dynamic capabilities in highly dynamic environments where executing common action steps becomes problematic (Eisenhardt and Martin, 2000; Bingham and Eisenhardt, 2011).

Finally, the creation of a dedicated group that begins knowledge codification limits errors. The dedicated group formulates rough initial structure for how organization members should act. This reduces mistakes. As support, the PMO Director stated, "*Prior to 1999, we didn't have a core group. Whenever there was an M&A deal, you just grabbed whoever. So no one was really trying to focus those resources"* (RC). We find that the dedicated group first creates generic (vs function-specific) structure. In our study, initial generic structure took the form of codified tools about team structures, on-boarding detail, overall timelines, implementation milestones, and performance metrics and tracking (see evolution of codified knowledge in Figure 2). These initial codified documents help facilitate the creation of capabilities, since they channel the efforts of firm members into higher-level activities that are relevant to multiple deals, not

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just one. Thus, while the PMO was initially formed to help manage a focal acquisition (UCC), members of the PMO quickly began to see that they were developing lessons that could apply to many future acquisitions. One PMO leader involved remembered, *"We were very specifically formed to do the Carbide deal, period. Once we did that, we went to management and said, 'We have some capability here, do you want to keep us around to work on other acquisitions?' The answer came back, 'yes!'"* (JP).

Generalizing structure

Research on capabilities suggests the need for maintaining a dedicated corporate function to oversee a particular process. For example, Kale, Dyer, and Singh (2002) found that firms with a dedicated alliance function (a dedicated group of individuals overseeing alliances) performed better in their alliances than firms that did not have a dedicated alliance function. While our first finding on initiating structure also suggests the importance of a dedicated corporate function for developing one dynamic capability in isolation (e.g., acquisition capability) our second finding suggests the importance of transitioning dedicated corporate functions to *non*-dedicated ones to help firms develop multiple dynamic capabilities in parallel. In particular, we find that after Dow leaders set up a PMO (program management office) and the PMO created some codified tools for acquisition implementation (1999-2002), the PMO then began using those same codified tools for JVs and divestitures (2003-2005). We label this activity "generalizing structure". Generalizing structure emerged from the data and is defined as a firm leveraging initial structure for one process (e.g., acquisition) into multiple processes (e.g., JV and divestiture) concurrently. Figure 2 and Table 4 show how "generalizing structure" involves (1) generalizing structure developed for one process into multiple processes and (2) strengthening communication.

Generalizing structure developed for one process into multiple processes:

Through 2002, Dow's PMO focused on the implementation of acquisitions. But, in 2003, acquisition activity slowed down and corporate management asked the PMO to help codify knowledge for how to implement JVs (see Figure 2). The PMO Director recalled: *"We expanded into JVs in 2003…all of the*

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discipline that we had developed and learned with Union Carbide, we just turned around and applied that to those JVs" (RC). Similarly, a PMO leader added that once the PMO demonstrated its value for facilitating acquisition implementations, senior executives at Dow were able to see how "*leveraging that expertise*" to facilitate implementation in JVs made strategic sense.

As PMO leaders began to see similarities between the implementation of acquisitions and the implementation of JVs they also began to see the similarities between the implementation of acquisitions and the implementation of divestitures. An IT manager involved with the PMO noted the broad link among them when he said, *"When we acquire, and we go through implementation, you could somewhat put those items in reverse on the divestiture side"* (MP). Hence, after applying the codified tools from acquisition implementation to JV implementation starting in 2003, Dow continued to learn by applying the same codified tools to divestitures in 2004. There were two specific drivers of this timing. One was that, as a result of Union Carbide, Dow was forced to do some divestitures because of FTC concerns. The other driver was that 2004 marked the beginning of a major business downturn. The firm thus needed cash to pay off the debt from Union Carbide. Hence, Dow began applying its acquisition implementation documents (e.g., team structures, on-boarding detail, timelines, function-specific plans) to divestitures starting in 2004. A PMO Manager noted: *"So pretty much whether we are doing acquisitions or divestitures or JVs, we all form cross-functional teams"* (JP). He continued, *"The reason we are involved in JVs and divestitures besides acquisitions is that the same processes and the types of individuals you need to bring onto these teams are the same types of folks that are involved with M&As. In that regard it has worked exceedingly well"* (JP). The PMO Director said, *"We started working just on acquisitions. And shortly thereafter executive management said, 'Would you look at JVs?' Shortly thereafter we had a lot of divestiture activity and so our capabilities just kept growing"* (RC).

Strengthening communication:

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The value of cross-functional communication, initiated for acquisitions in early 2002, became re-emphasized as Dow began to formalize its knowledge for JVs (2003) and divestitures (2004-2005). The PMO Director said: *"What we found then was that with JVs and divestitures there were so many cross-functional interdependencies that we needed to be able to have cross-functional teams, and we needed to have an overall roadmap and communication so that people understood the overall sequencing as we move forward, whether it's an acquisition, JV, or a divestiture"* (RC). While Dow continued to rely on cross-functional teams for acquisitions, JVs, or divestitures PMO leaders noticed that the amount of communication across the cross-functional teams evolved – i.e., it increased at the start of a deal and decreased towards the end. At the start, the cross-functional team would meet several times a week to put together the overall plan, and ensure everybody understood timelines and responsibilities. But, once they had their plan, cross-functional teams would meet every three or four weeks. At the end of the deal (implementation phase) the time was lengthened such that cross-functional teams only met monthly.

Dow also strengthened communication through after-action reviews. To further develop their codified tools, PMO leaders started sending surveys to those involved in JVs and divestitures, and then conducting extensive one-on-one interviews with those individuals to understand survey insights and answers. These changes in behavior provide further evidence of learning. The PMO Director explained:

"I think when we started to codify it, you obviously codify what you know. But once we do that, we then have the opportunity to sit back and say, are we missing something? As an example, we have put together a joint venture strategic guidance document. The way that we assembled it is, first of all we send them a questionnaire and ask them what went well, what are the areas of improvement. We then follow up with one-on-one interviews with the individuals. I had about 100 interviews of Dow leaders who work for joint ventures. So I would come into your office and you would tell what you knew about joint ventures. And actually what we found is that there was a wealth of information but once we assembled it there were some gaps, there were obvious things that needed to be addressed but we didn't have anything. So that is when we said, we need to develop some tools or templates or processes to try to address those gaps…[this is now our process] whether we are doing a joint venture, an acquisition, or a divestiture" (RC).

<u>*How generalizing structure contributes to concurrent learning:*</u>

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Overall, we find that generalizing structure fosters the learning of multiple dynamic capabilities concurrently. One reason is that it allows the recurrent use of knowledge. Scholars contend that acquisitions, JVs, and divestitures relate to one another, as they are alternative ways to shape firm boundaries, with divestitures and JVs being ways of contracting them, and acquisitions and JVs being ways of expanding them (Villalonga and McGahan, 2005). Plus, one can be the flip side of another; an acquisition for one firm often represents a divestiture for another. Given links among JVs, acquisitions and divestitures, PMO managers felt that lessons gained in acquisition implementation were generalizable beyond acquisitions. One stated, *"We understood that there would be some commonality in the other processes, namely JVs and divestitures, but it took us a while to build that experience"* (JP). Similarly, the PMO Director said, *"We took a lot of the documents, the templates that we had used with Union Carbide (acquisition) and then modified those for JVs and likewise for divestitures"* (RC). This role of the PMO in making modifications not only provides evidence of learning (via changes in behavior) but also suggests that while codified knowledge is helpful for effective experience transfer, it alone may be insufficient.

More broadly, generalizing structure improves the learning of multiple dynamic capabilities concurrently because it helps executives create expertise across multiple areas concurrently. Keeping constant the PMO members while changing the deal type facilitates learning as PMO members can readily identify similarities and differences across projects. This increases opportunities for positive experience transfer (Haleblian and Finkelstein, 1999). As the PMO Director explained, *"It's all those types of things that start building on each other and you say: 'Ah, there is something I just learned from a JV that maybe I can apply next time I do a divestiture or next time I do an acquisition.' So there is tremendous commonality regarding some of the work process discipline that we've developed and that we use"* (RC).

Finally, generalizing structure allows for concurrent learning because it maintains momentum in the development of dynamic capabilities. Since practice with one process is often relatively sporadic (e.g., low rate of acquisitions), taking codified knowledge for implementation in one process (e.g., acquisitions)

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and testing it out in related processes (e.g., JVs and divestitures) speeds the accumulation of experience and allows leaders to quickly understand the usefulness of initial codified tools. A PMO Project Manager stated, *"We did take advantage if there were downtimes relative to acquisitions to focus on codifying and documenting our processes and taking what we began to learn from acquisitions and apply that as we started to do JVs"* (JP). Likewise, another PMO Project Manager corroborated, *"Greenfield JVs, where you start from nothing and you build something, was not something that the group really had targeted for, but when asked, they just stepped into that space. And so I think you take whatever opportunity early on that you have to fill voids that the business would have, to see how the methodology could apply in ways that really you hadn't contemplated but works pretty well"* (AJ).

Backward-chaining structure

Empirical work suggests that capabilities are likely to be developed as leaders codify knowledge for each phase of a corporate development process – i.e., the transaction phase, the due diligence phase, and the implementation phase (Kale and Singh, 2007; Zollo and Singh, 2004). But, this work is silent on the order in which phases are codified and why that order may be important for capability development. Our work suggests that learning multiple dynamic capabilities concurrently is facilitated when firms codify phases in reverse chronological order, not in chronological order as might be implicitly assumed. We term this activity "backward-chaining structure." Backward-chaining structure emerged from the data and is defined as starting codification with the last phase and then working back to the first phase. We find that the PMO started codifying documents for the implementation phase of acquisitions, JVs, and divestitures. This focused attention on the phase that is often considered the most critical and most complex, but that is also associated with many mistakes (Graebner, 2002). The PMO then codified the due diligence phase for acquisitions, JVs, and divestitures - the phase before implementation. Finally, the PMO codified the transaction phase for acquisitions, JVs, and divestitures - the phase before due diligence and the first phase chronologically. Figure 2 and Table 5 detail this finding and show how backward-chaining structure

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involves (1) sequencing codification based on importance and complexity as well as unmet firm needs, and (2) enhancing knowledge transfer via coaching and cross-fertilization.

Sequencing codification based on importance, complexity and unmet organizational needs:

Several studies identify the implementation phase of acquisitions as the most complex and critical phase influencing acquisition performance (Heimeriks, Schijven, & Gates, 2012; Larson & Finkelstein, 1999)[10]. Likewise, we find that before 2006 Dow's top management saw implementation as the key phase of acquisitions, JVs and divestitures and so focused exclusively on codifying knowledge for this phase. The PMO Director noted, "*Our role is to make business unit heads successful. It's really about the understanding and the vision as far as how are you going to implement something."*

In 2006, the PMO group began to see a need for its expertise outside of the implementation phase. Leaders noticed that the due diligence phase in acquisitions, JVs and divestitures lacked process discipline. Said the PMO Director, *"And the person in charge of the deal would say, 'Well, I guess we have to do a due diligence. Who do we need?' And it was not coordinated. They had no idea who to even contact. There was no process discipline, they didn't have a checklist, they didn't train people…They had never done a due diligence. In fact, they couldn't even spell due diligence"* (RC). This lack of process discipline and codified tools caused the firm problems. The Director of the PMO recounted, *"As an example we bought a company. And actually when we went in after we acquired it, and this is before my group was engaged, there was not a lot of due diligence done but our executive management really just wanted to do this deal and it turned out terrible. We have either shut down or divested every piece of it because it was a flawed strategy, there was nothing there"* (RC).

Just as the PMO group began to see how *implementation* tools created for acquisitions were relevant to JVs and divestitures, so they began to see how *due diligence* tools, such as corporate and function-

[10] For example, the implementation phase for a large acquisition involves coordinating hundreds of professionals and touches every operational aspect of the company, while the transaction phase involves as few people as possible (it is confidential), and touches hardly any operational aspect of the company.

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specific due diligence checklists and value assessment documents, had relevance for all three deal types. Given their credibility and experience, the PMO offered to oversee the due diligence phase, rather than just the implementation phase, for acquisitions, JVs, and divestments. This proposed action met little resistance within Dow because it not only exploited the knowledge base of the PMO but also addressed a critical need. The PMO Director said, "*Frankly, it was such a pain for our business and corporate leaders to put together a due diligence team that they welcomed anybody who was willing to help them pull together those groups of individuals"* (RC). The Director added, *"We said, 'Hey, guys, we have the time, we have this experience and can take the lead on due diligence. We'll make sure that we get the right people, we get the right function at the right time and make sure that their people are trained and that they have the appropriate checklists and that they know what to do from a due diligence standpoint.'"* (RC).

Dow's top management team authorized the PMO to begin codifying tools for the due diligence phase of acquisitions, JVs and divestitures. This additional evidence of learning was described by a PMO Project Manager who noted the movement from codifying implementation tools for acquisitions, JVs, and divestitures to codifying due diligence tools for acquisitions, JVs, and divestitures. He said, *"We first engaged in the acquisition integration phase. After we documented that phase we created and worked on the JV process and what we call the JV guidance document. We then put together our divestiture process and divestiture guidance document...We used our implementation expertise across the three types (acquisition, JV, divestiture). Then we saw a place for ourselves in the due diligence phase"* (JP). Another senior leader added more detail about how something that was learned doing due diligence for acquisitions was subsequently applied in JVs when he commented, *"We have codified our due diligence process and due diligence checklists when we do acquisitions. We would apply basically those same processes and checklists in a JV if a partner we're getting together with is contributing their own manufacturing assets and intellectual property assets. We use those same due diligence checklists or similar, when we would*

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look at those things that the party brings to the JV. Much like when we would look at those if we were looking to fully acquire a 100% acquisition" (SS).

As the PMO gained competence and credibility for handling both the implementation and due diligence phases of acquisitions, JVs, and divestitures, it saw an opportunity to further extend its role into the transaction phase – the phase preceding the due diligence phase and one that also had unmet firm needs. Part of the value of having the PMO assist with and create codified tools for the transaction phase (in addition to tools for the implementation and due diligence phases) came from the high level of turnover in the people working in the transaction phase, which made capturing lessons from the past difficult. The PMO Director recollected, *"There was a tremendous turnover of people in the transaction phase. You'd have the corporate director of M&A who's responsible for the transaction. He or she will only be there for two years and then move on to another job and then they would bring somebody else then who had never had any experience. So there was really a lack of process discipline*" (RC). Further, the personnel in charge of the transaction phase at Dow seemed to place less emphasis on capturing knowledge. Instead, they appeared to be more concerned with timely execution. The PMO Director remembered, "*The finance guys don't have a really good appreciation of some of the operations issues that we run into. They're not as process-oriented. They worry about doing the deal and then they move on to the next, whereas our group is a lot more into trying to capture the knowledge"* (RC).

Because of the PMO's reputation, the PMO was able to help Dow address an unmet need in the transaction phase. Hence, in 2007, after codifying tools for the implementation phase and the due diligence phase, the PMO started to codify tools for the transaction phase. The PMO Director said, *"We started to codify some of the things that our transaction people were doing"* (RC). Another PMO leader added, *"We talk about acquisitions, JVs, divestitures and we talk about phases of each– transaction phase, due diligence phase, and implementation phase. So each type has all three of those phases. Phase-wise, we first developed our expertise in implementation. Then, we were 'moving upstream'. We became*

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leaders of the due diligence phase of acquisition, JV, divestiture. Now we support the transaction phase" (JP).

These tools included a transaction proposal, a business support document, a negotiations template, board approval guidelines, and documents detailing how to perform a post-process review (see codified knowledge under Transaction tools in Figure 2). A PMO Manager involved elaborated, *"Our focus was acquisitions first, and we were just focusing on the implementation of the acquisitions. Then we segued into JVs… then, we went into divestitures, and then we started saying: 'not only can our group help with the implementation but why don't you let us drive and lead the due diligence effort?' So we do the due diligence for acquisitions, we do due diligence for JVs, we assemble all the information for due diligence on divestitures. Then more and more we're spending time working with the transaction teams*[11]*"* (JP).

<u>*Enhancing knowledge transfer through coaching and cross-fertilization:*</u>

As the PMO gained experience across acquisitions, JVs, and divestitures and across deal phases (implementation, due diligence, and transaction), it gained expertise managing any type and facet of those deals. This increased the PMO's ability to transfer knowledge across the firm. One way this occurred was through improved coaching of business unit leaders and functional leaders who lacked experience in acquisitions, JVs, or divestitures. An information systems (IS) functional leader recounted:

"They call Rich with a new deal. Rich launches a team with his direct staff, which includes his project leaders and the functional leaders – I am one of the functional leaders and I'm invited to participate as the IS central point for the PMO… I am in a coaching and counseling mode for IS managers as they go through the steps of the methodology… One of my roles is to have a monthly meeting with each of the business IS managers who are on projects to discuss where they are in the methodology. That communication is one way how we are constantly reinforcing the use of the methodology" (TW).

[11] Backward-chaining structure assumes a reverse chronological pattern. Dow also started from the most important phase (implementation) and then worked backwards. Likewise, Dow moved from the most complex phase (i.e., implementation phase where the PMO had more operational issues and people to coordinate) to the least complex (i.e., transaction phase where there are fewer operational issues and people to coordinate). While these patterns appeared to coincide for Dow, future research is needed to understand if backward-chaining relates equally to time, importance, and complexity.

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Another PMO Project Manager supported this view. She detailed her ongoing coaching with functional leaders within business units looking to acquire, joint venture, or divest. Said she, "*It's an ongoing dialogue. So I'll be with an HR representative from a business unit and be their shadow all along the way. And they will create things like an HR strategy document, an HR internal due diligence document, a document that states 'here are our desired starting positions for negotiations,' an implementation plan. That person will create those things, but I'm doing the support all along the way. So they'll create it, I'll look at it, we'll sit down and talk about it … they've got a project, and a coach assigned to them and you work it together. Issues come up, questions come up, the unexpected comes up, and you have a dialogue around that to help them think through what they would do"* (AJ).

Through their coaching, PMO leaders also encouraged knowledge transfer by promoting cross-functional communication within business units. This occurred in several ways. First, the PMO initiated a hand-over meeting from the due diligence team to the implementation team. Here, all of the insights from each of the functions in the due diligence phase are communicated. Second, the PMO made sure functional people that are handing over due diligence information to the implementation team did not disappear but rather remained on the steering team for the implementation project and involved in consulting for another three to twelve months to ensure a smooth implementation. The continuity of functional leaders across phases mitigated knowledge loss since Dow employees frequently moved from one assignment and team to another. A PMO IS functional leader stated this benefit when he said, *"We can document as much as we can in our methodology... But losing that key person who has that experience with the deal and some of the softer points of the deal, that's a problem. So we try to keep key people in there throughout the steering team part of the implementation project. That is something that has evolved over time"* (TW). Collectively, our data on the PMO's coaching provide further evidence of learning and also suggest that codified knowledge alone is inadequate for successful knowledge transfer.

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Knowledge transfer also occurred through the cross-fertilization of ideas within the PMO. As PMO members were located close together and were connected through shared goals and activities, Dow's PMO appeared to meet the formal definition of a group (Edmondson, 2002). Consequently, PMO members frequently communicated with each other to share insights as they gained experience across deal types. Importantly, this activity allowed knowledge to move from an individual level to a collective level. One senior PMO member at Dow stated, *"We have folks that are experienced with all three project types and they can leverage their experience in one type and apply it to another. Then we have sharing from PMO project manager to PMO project manager so we keep that learning alive. And we keep that capability strong. So aside from the documentation, there is a very important aspect of people in all of this and having that continuity and experience across multiple project managers here is highly valuable"* (SS).

Communication among PMO members helped indicate which codified tools needed updating. While the updating of tool did not account for as much time as it did when the PMO was created in 1999, it still was an important element of each PMO member's responsibilities. As one PMO functional leader stated, *"Part of my responsibility as a functional leader in the PMO is to keep the tools updated… In the times of PMO formation, we created templates as we were running projects. That was around 40 percent of our time. Today, updating takes 5-10 percent of my time, including evaluation with the project team"* (TW).

How backward-chaining structure contributes to concurrent learning:

Overall, we find that backward-chaining structure is another activity that facilitates the learning of multiple dynamic capabilities concurrently. One reason is that acquisitions, JVs, and divestitures can all be organized in terms of similar phases: transaction, due diligence, and implementation. A PMO manager stated, *"We divide all our processes in three phases… The transaction phase – target identification, negotiation, document phase with lawyers, getting the agreements in place, etc. Second, due diligence. When we are buying, we need due diligence, and when we are divesting we need to do an internal due diligence to prepare information for potential buyers. Third, implementation"* (JP).

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A second reason backward-chaining structure helps facilitate concurrent learning is that working on documentation for common phases across acquisitions, JVs, and divestitures allows leaders to better see how lessons from one process may be transferred to another. Dow's PMO Director said, *"Sometimes, when we're doing a divestiture, there are some things that we can learn on the acquisition side and vice versa."* (RC). For example, acquisitions, JVs, and divestitures all benefited from using a "white paper document[12]" in the transaction phase. Whereas with acquisitions and JVs the white paper document specifies the motivation for resource integration, in the case of divestitures it outlines the motivation for resource de-integration. Another executive explained: *"We have a white paper template…as you're going through acquisitions, JVs, or divestitures, you're going to say: 'That looks pretty similar. I saw that with acquisitions or JVs or divestitures. There is commonality across these different types of processes"* (RC).

Finally, backward-chaining structure further fosters the learning of multiple dynamic capabilities because it gradually increases the centrality and applicability of the PMO. The PMO Director summarized: *"My goal for my staff was that those individuals would be able to do acquisitions, divestitures, or JVs. I did not try to have one person just only focused on JVs or one only focused on acquisitions because I really felt there was tremendous value for a member of the PMO to understand all three"* (RC). The implication is that as groups like Dow's PMO extend their structure across different phases (e.g., transaction, due diligence, and implementation), they can better coordinate the development of dynamic capabilities concurrently because they create continuities between phases. That is, often when firms engage in acquisitions, JVs, or divestitures the present and future become disconnected. Some executives concentrate on the transaction phase, while others focus on the due diligence phase or implementation phase. Backward-chaining brings the present and future together in orderly ways that help firms get into a cadence and create guidance for action that is both powerful and efficient. Regarding this, a senior PMO leader stated, *"We're engaged in all those activities all the time. Our project managers are*

[12] A "white paper" is an informational document that explicates the strategic rationale, key value drivers, and risks for a particular deal.

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multi-capable with respect to managing any type of those projects" (SS). The PMO Director added, *"One of the beauties of having my group involved in due diligence is we're also involved with driving implementation…We've really tried to improve the linkage between transaction, due diligence and implementation."*

The performance effects of Dow's dynamic capabilities

Thus far, we have focused on how Dow created multiple dynamic capabilities in parallel. We have also avoided the tautology of equating a capability with its performance by first ascertaining the characteristics of Dow's capabilities and how they developed (i.e., initiating structure, generalizing structure, and backward-chaining structure) without assessing performance. We now assess how well Dow's dynamic capabilities perform in terms of technical and evolutionary fitness.

Technical fitness denotes "how effectively a capability performs its intended function" (Helfat and Peteraf, 2009: 97-98). We assessed technical fitness through qualitative statements of informants (see Table 6A). These statements emerged without prompting, as executives described the performance of acquisitions, JVs, and divestitures. Examples include, *"If I look back at the last 10 years, we've enabled some consistencies across different types of M&As with definitely a lot of the implementations moving faster than we've ever done before,"* and *"Deep down inside I believe our performance improved in divestitures."* Broadly, leaders felt that their JVs, acquisitions, and divestitures were largely performing their intended functions. As the PMO Director said, *"I have been participating in The Conference Board for seven to eight years and sitting around the table, listening to how other companies work on acquisitions or JVs or divestitures, what they were doing and what they were struggling with. I personally believe Dow was in the top tier"* (RC). Additional qualitative data suggests that Dow's dynamic capabilities are self-reinforcing as the ability to do acquisitions, JVs, and divestitures seemed to improve when done together. As the head of the PMO stated, *"Dow's ability to perform acquisitions or JVs or*

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divestitures absolutely improved by doing the other deal types" (RC). In sum, our data appear to provide evidence of technical fitness.

After assessing technical fitness, we then assessed evolutionary fitness. Evolutionary fitness denotes "how well a dynamic capability enables an organization to make a living by creating, extending, or modifying its resource base" (Helfat and Peteraf, 2009: 97-98; see also Helfat *et al.*, 2007: 7). Stock market returns are useful measures of evolutionary fitness since they reflect investor forecasts of future financial returns and so reflect how well the capabilities (are likely to) enable firms to make a living from these capabilities. Accordingly, we assess evolutionary fitness through a quantitative event study (see Table 6B). We used Thomson Financial's SDC Platinum database to look up all the acquisitions, JVs, and divestitures that Dow had engaged in between 1990 and 2010. We gathered stock-market data from the CRSP database and computed the abnormal returns associated with each of these events. Finally, we used event-study methodology to assess for each acquisition, JV, and divestiture whether this performance measure tended to increase with experience and thus, whether our empirical setting exhibited evidence of a capability improving firm outcomes over time. Using event windows of three (-1,1), five (-2,2), seven (-3,3), and nine (-4,4) days surrounding the announcement dates, we found consistent statistical patterns suggesting positive performance effects of experience in the context of acquisitions ($p < .01$), JVs ($p < .001$), and divestitures ($p < .10$). Overall, our quantitative event study provides evidence of evolutionary fitness. Together, assessments of technical and evolutionary fitness are important since they suggest that while all of Dow's dynamic capabilities we studied (i.e., acquisitions, JVs and divestitures) seem to perform their intended function, these capabilities also seem to enable Dow to make a living from them.

DISCUSSION

Research in strategy indicates the importance of dynamic capabilities (Teece *et al.*, 1997; Eisenhardt and Martin, 2000; Helfat *et al*., 2007) and suggests that these capabilities are learned from experience. But

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empirical work has invariably focused on a single dynamic capability in isolation, thus overlooking how firms might learn multiple dynamic capabilities concurrently. We explore this gap.

Framework: Concurrent learning

Our primary contribution is an emergent theoretical framework for how firms learn multiple dynamic capabilities concurrently (see Figures 1 and 2). First, concurrent learning starts as firms initiate structure. Dow created a Program Management Office (PMO), a dedicated group that began knowledge codification. While existing literature also highlights the role of codified knowledge in the creation of dynamic capabilities (e.g., Zollo and Winter, 2002), we add by showing how the order of creation appears to be consequential. The PMO first created generic documents for acquisition implementation (e.g., team structures and on-boarding detail) and then created more function-specific ones (e.g., HR strategy documents). This sequence helped the PMO generate documents relevant to future acquisitions vs. just the focal one in particular. Moreover, we find that the PMO complemented their codification with coaching to business unit and functional leaders to help them understand which codified tools to use and when. As a whole, the initial codified tools gave needed guidance and so helped Dow improve *efficiency*. Yet at the same time the PMO coaching helped the firm adjust to the idiosyncrasies of each particular event (e.g., each acquisition) and so helped Dow preserve *flexibility*. Together, these actions helped Dow extend its resource base by using acquisitions to strengthen its position in commodity chemicals.

Second, concurrent learning continues as firms generalize structure. Existing research finds that executives often bias activity towards one particular growth process such as acquisitions or JVs (Argyres and Liebeskind, 1999; Folta and Miller, 2002). By contrast, we find that Dow created more symmetry than asymmetry across acquisition, JV, and divestiture experience since PMO leaders began to see how the structure used to shape acquisition implementation could also help guide implementation in JVs and divestitures. As one member of the PMO remarked, *"At a high level, acquisitions follow a fairly similar path… It also became more explicit that the other processes follow a similar path"* (JP). Hence, reuse of

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knowledge occurred as knowledge gained from acquisition experience is not just specialized to future acquisitions. Rather, it is fungible and applicable to JVs and divestitures as well. This helped Dow modify and extend its resource base by using JVs and divestitures to carve out basic (commodity) chemicals.

Finally, concurrent learning progresses by backward-chaining structure. Leaders codified knowledge for the most critical and complex phase of acquisitions, JVs and divestitures first and codified knowledge for the least complex phase last (see Figure 2). In our study, this occurred in reverse chronological order. PMO executives started codifying knowledge for the implementation phase of acquisitions, JVs, and divestitures and then expanded their role and began codifying knowledge for the due diligence phase of each. Last, PMO executives codified knowledge for the transaction phase of each. This order helped the PMO use JVs and divestitures to exit lower margin businesses and finance deals. In sum, our framework identifies *how* concurrent learning of dynamic capabilities occurs (see Figure 1). These dynamic capabilities in turn allowed Dow to purposefully modify its resource base by reducing activity in commodity chemicals and moving into specialty chemicals.

Growth and massed versus distributed practice

Our study contributes by shedding light on how firms might more effectively grow. Extant research finds that many firms skew their growth activity towards one particular growth process, such as acquisitions (Villalonga and McGahan, 2005) or JVs (Argyres and Liebeskind, 1999; Folta and Miller, 2002). This outcome is not surprising given that firms are prone to repeat what they know how to do (Argote, 1999) and expanding activities too far beyond a core activity can hurt performance (Eggers, 2012). In contrast, we find that growth may be enhanced when firms do not skew towards the use of one particular growth process, but rather use multiple ones in a balanced approach. Regarding this point, the head of Dow's PMO commented, *"We have a lot of deals closed in all three areas (acquisitions, JVs, and divestitures)… We've had as much experience on each of the three; I can't say one area is more dominant than others"* (RC). When a firm has some symmetry in its use of acquisitions, JVs, and divestitures, it can

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more easily adjust and improve its "fit" with the external market. This is because the existing knowledge base of the firm restricts its growth opportunities (Cohen and Levinthal, 1990). So, even though firms gain more from acquisitions by divesting excess, obsolete, or underperforming resources (Capron, Swaminathan, and Mitchell, 2001), if executives have little experience with divestitures, their change efforts will be limited. Therefore, while dynamic capabilities help firms purposefully modify their resource base, balancing acquisition, JV, and divestiture experience gives firms more degrees of freedom for how that modification can take place.

We also contribute by providing a deeper understanding of the role of practice in the creation of dynamic capabilities. Most work on capability development implicitly advocates massed practice – that is, repeat practice with a particular process (e.g., Danneels, 2010; Eisenhardt and Martin, 2000; Helfat *et al.*, 2007). With massed practice the assumption is that executives focus on completing more repetitions with a particular process. More repetitions allow firm members time to draw inferences from the past and give them greater insight into the linkages between actions and outcomes such that firms can better leverage knowledge over time (Dyer and Hatch, 2006; Helfat *et al*., 2007).

Our study, alternatively, brings to light the value of *distributed* practice. With distributed practice, trials of one activity are broken up with periods of some other activity (Schilling, Vidal, Ployhart, and Marangoni, 2003). We find evidence of distributed practice as Dow did not simply continue to amass acquisition experience to build an acquisition capability. Rather, it interspersed acquisition experience with JV and divestiture experience. As one leader observed, *"We manage acquisitions, JVs, and divestitures concurrently*." Distributed practice is important because massed practice often leads to maladaptive specialization (March, 1991). Practice with one process leads a firm to accumulate more experience with it, thus making experience with other key processes (e.g., JVs and divestitures) inadequate to make them rewarding to use (Levitt and March, 1988). Distributed practice helps avoid maladaptive specialization and the problem of overcoming competencies firms have developed with

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earlier processes (Whetten, 1987). Interspersing JV experience with acquisition experience, for example, gave executives more associations for their ideas on acquisitions (and vice versa). Other research also supports the relative benefits of distributed practice over massed practice for learning (Cornelius and Modigliani, 1985; Smith and Rothkopf, 1984), arguing that it allows for deeper processing of action-outcome relationships (Mumford, Costanza, Baughman, Threlfall, and Fleishman, 1994). In short, our study suggests that the benefits of practice may increase as the massed nature of that practice decreases.

Positive and negative experience transfer

Our study also contributes by providing understanding of experience transfer (Singley and Anderson, 1989; Finkelstein and Haleblian, 2002). Positive transfer occurs when experience with a prior event improves performance in a subsequent event. Negative transfer occurs when experience with a prior event weakens performance in the subsequent event. Most empirical work explores transfer effects within a given process like acquisitions (Finkelstein and Haleblian, 2002)[13]. Our study adds by showing transfer effects across *multiple* processes (i.e., acquisitions, JVs, divestitures). An original PMO member stated, *"So we came to see the commonalities [in processes] and develop the documents as well. For example, there are a lot of different permutations in a JV, but in some sense, it has elements of both acquisitions and divestitures"* (JP). Empirical work provides some support for positive transfer between two processes (Zollo and Reuer, 2010; Villalonga and McGahan, 2005). Our study extends this prior research by suggesting that there are positive transfer effects from acquisitions to JVs and divestitures, from JVs to acquisitions and divestitures, and from divestitures to acquisitions and JVs. We also provide more granularity about how such positive transfer occurs and why. Our data reveal that Dow leaders began to see how acquisitions, JVs, and divestitures all seemed to follow three basic phases – transaction, due diligence, and implementation – and that knowledge about how one phase (e.g., implementation) worked in one process (e.g., acquisition) would generally transfer to others (e.g., divestitures). As prior research

[13] Research finds that when a focal acquisition is similar to the prior acquisition (as measured by their four-digit SIC codes), the performance of the focal acquisition is likely to be higher, thereby suggesting positive transfer effects.

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on experience transfer (e.g., Finkelstein and Haleblian, 2002; Zollo and Reuer, 2010) generally does not assume intentionality on the part of executives linking knowledge about one experience to another, an added contribution of our study is showing how positive transfer may often be inherently intentional. As one example, a PMO manager noted: *"Divestitures have an element of 'internal due diligence.' We want to ensure we understand the assets we're divesting. So, taking those due diligence principles from acquisitions you can apply due diligence on yourself, prior to divestiture. Then, when we acquire and go through implementation you could put those items in reverse on the divestiture side"* (JP).

Our study also sheds light on negative experience transfer. We find that when codified knowledge is overly scripted it can lead to quasi-automatic behavior that may be inappropriate for the idiosyncrasies of a focal acquisition, JV, or divestiture. For example, an original PMO member recalled: *"Each acquisition is completely different. Regretfully, we had a recent acquisition that was too rigidly following the templates. Our group didn't recognize what needed to change on that. I think I have too many people who think if we have a set of guidelines, we have to follow those guidelines"* (AJ). To prevent negative transfer, Dow encouraged business unit leaders to work with PMO coaches to help them understand what tools to use. As the PMO Director explained, *"We have a PMO coach who is assigned to every one of our deals (acquisition, JV, or divestiture) and who is working with the business unit. Then, he or she would pick and choose what would be the appropriate template, the appropriate process or methodology for that particular transaction... We work with the business to select what tool is needed"* (RC).

In summary, a key managerial implication is that codified knowledge alone is a necessary but insufficient condition for successful experience transfer. Some tacit knowledge residing in a stable set of generalist "coaches" may also be needed. Further, our data suggest that managers' use of "coaches" to guide the use of codified knowledge may become more important the more heterogeneous the activity (e.g., acquisitions, JVs, divestitures) since "*There are no two deals that are the same."* Therefore,

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dedicated groups (like Dow's PMO), and the knowledge that gets codified by the group, reinforce each other. Used in tandem they help leaders effectively disseminate 'best practices' throughout a firm.

CONCLUSION

Combining qualitative and quantitative data on acquisitions, JVs, and divestitures, we explore how firms learn multiple dynamic capabilities concurrently. Our emergent theoretical framework indicates that concurrent learning is facilitated by a corporate function (PMO) and codified knowledge that is idiosyncratic to a particular phase (transaction, due diligence, and implementation), but that is utilized across acquisitions, JVs, and divestitures and developed in a sequenced fashion. Besides shedding light on the nature of effective growth and observing the hidden relevance of distributed versus massed practice in the building of dynamic capabilities, we contribute by expanding understanding of experience transfer. Overall, our work is a first step in addressing concurrent learning and uncovering its related activities.

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Table 1: Descriptive Information on Dow Chemical

	2012	2011	2010	2009	2008	2007
Net sales ($m)	56,786	59,985	53,674	44,875	66,924	53,513
Net income ($m)	1,100	2,784	2,321	566	626	2,887
Earnings per share ($)	1.90	2.54	1.97	0.63	1.79	2.99
Dividends per share ($)	1.21	0.90	0.60	0.60	1.68	1.64
Net debt to capital ratio (%)	43	40	43	48	46	32
Number of employees	54,000	52,000	49,505	52,195	46,102	45,856

Table 2: Interview Data

Informant number	Informant code	Informant title	Years at Dow	Number of interviews	Hours interviewed
1	RC	Former Director of PMO	35	8	13
2	DM	PMO Project Manager 1	27	2	3
3	MB	PMO Project Manager 2	35	2	3
4	JP	PMO Project Manager 3	30	3	5
5	TW	Business IS Manager, IS PMO Focal Point	28	1	1.5
6	BK	EH&S Director, EH&S PMO Focal Point	28	1	1.5
7	WM	IS Implementation Program Director	27	1	1.5
8	BK	Business IS Manager	22	3	4.5
9	JW	Strategy and Business Dev. Manager	29	1	1.5
10	MP	Business IT Manager	25	1	2
11	BS	Data room Manager	20	1	2
12	JB	Project manager	31	1	2
13	JS	Project manager	22	1	2
14	AJ	Project manager	35	1	2
15	SS	Office manager	30	1	2
16	SS	Current Director of PMO	32	3	4

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Figure 1: Theoretical Framework for Concurrent Learning

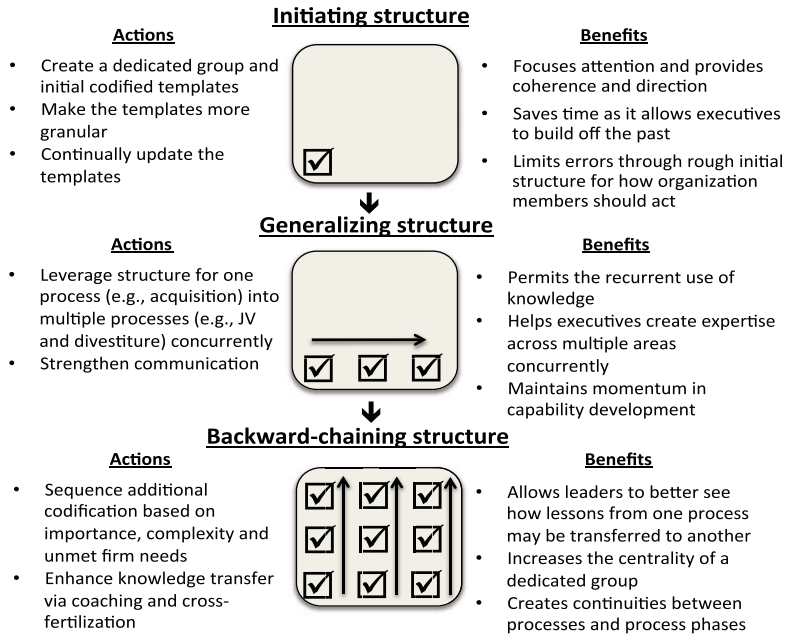

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Figure 2: Detailed Theoretical Framework for Concurrent Learning

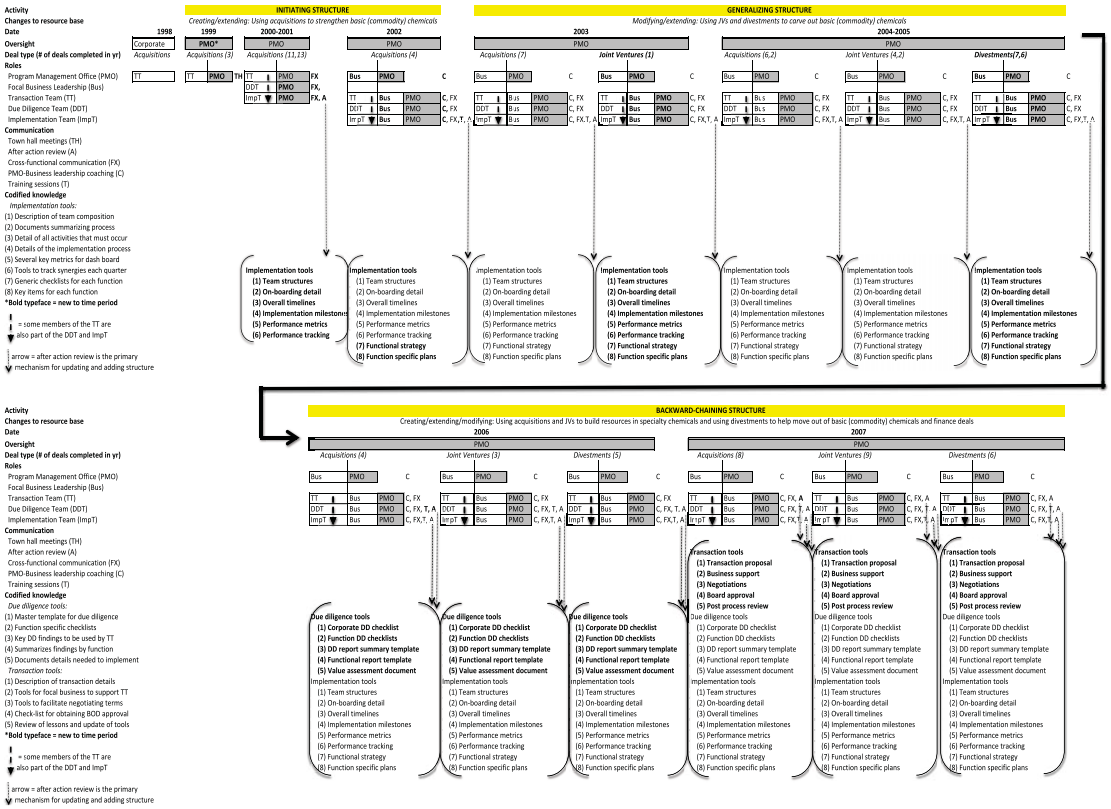

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Table 3: Initiating Structure

Element	Illustrative quotes
Creating a dedicated group and initial codified templates	*Program Management Office* "My boss…called me into his office and said 'Rich, we would like you to head up the PMO.' And I said 'What is the PMO?' 'The program management office.' 'What's a program management office?' He said, 'Rich, I don't have a clue, but we talked to some consultants and they said we need one.'" "I brought in a finance person because I knew that one of the things that we were going to need is try to keep track of is cost synergies. I brought in a manufacturing and operations person.. I also brought in a computer person because we knew that we'd need to set up Web sites, we need to be able to share information; special file servers, etc." *Begin codification for acquisition implementation* "There was just a lot of knowledge all over the place, but it was never in any central repository…. Nobody knew what was going on." "We didn't have any documentation prior to UCC. Before 1999, we managed more case-by-case; find whoever you can find and participate. We did not have a standard methodology around implementation."
Continually updating the templates	*Coaching by PMO* "The business leader obviously knew the business, knew the business strategy, knew why they were doing the acquisition from a strategic standpoint. But, in general, that business leader probably had never done an acquisition… This is where the PMO coach or the PMO leader came in to play. He or she was the expert regarding the tools, the templates, the methodology". *After-action reviews* "What we did when we were done with the transaction was have an after-action review…We'd review what worked and what did not work. Then we would take that learning and infuse that into our methodology, infuse that into the tools and templates so that the methodology and the templates we had were basically evergreen. We didn't want them to get stagnant. We wanted to constantly improve on those tools"

Table 4: Generalizing Structure

Element	Illustrative quotes
Generalizing structure developed for one process into multiple processes	*Project Management Office role expands to help with joint ventures and divestments and not just acquisitions* "Once we showed the value of having this PMO group and how well we'd managed that Carbide integration, I think it was understood by corporate that leveraging that expertise to the other activities (JVs and divestitures) made sense." "We expanded into JVs in 2003…all of the discipline that we had developed and learned with Union Carbide, we just turned around and applied that to those JVs."
	Documents used for acquisition implementation are used to help with joint ventures and divestments "The reason we are involved in joint ventures and divestitures (besides acquisitions) is that the same processes and the types of individuals you need to bring onto these teams are the same types of folks that are involved with M&As. In that regard it has worked exceedingly well." "We started working on acquisitions. And then executive management said, 'Would you look at joint ventures?' Shortly thereafter we had a lot of divestiture activity and so our capabilities just kept growing." "You pick some of those implementation principles and start thinking about them somewhat in reverse as to how you make separations in divestitures."
Strengthening communication	*Cross-functional communication expands into joint ventures and divestments* "We needed to be able to have cross-functional teams, and we needed to have an overall roadmap and communication so that people understood the overall sequencing as we move forward whether it's an acquisition joint venture or a divestiture." *After-action review begins to include surveys* "First of all we send them a questionnaire and ask them what went well, what are the areas of improvement. We then follow up with one-on-one interviews with the individuals." "I had about 100 interviews of Dow leaders who work for joint ventures. …what we found is that there was a wealth of information but once we assembled it there were some gaps, there were obvious things that needed to be addressed but we didn't have anything. So that is when we said, you know what, we need to develop some tools or templates or processes to try to address those gaps. And I think all of that then pulled together and helped to say okay, with all the whole body of work, now how is that impacting us, whether we are doing a joint venture, an acquisition or a divestiture."

Table 5: Backward-chaining structure

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Element	Illustrative quotes
Sequencing structure based importance, complexity and unmet organizational needs	*Program Management Office role expands based on unmet needs* "And the person in-charge of the deal would say, 'Well, I guess we have to do a due diligence. Who do we need?' And it was not coordinated. They had no idea who to even contact. There was no process discipline, they didn't have a checklist, they didn't train people... They had never done a due diligence. In fact, they couldn't even spell due diligence." "Frankly, it was such a pain for our business and corporate leaders to put together a due diligence team that they welcomed anybody who was willing to help them pull together those groups of individuals" "What we found also was that there was a tremendous turnover of people in the transaction phase. ..So there was really a lack of process discipline".
	Codification occurs in phases, starting with the most critical and complex phase and then moving backward "Phase-wise, we first developed our expertise in implementation. And then, we…became the leaders of the due diligence phase of acquisition, JV, divestiture. And now we support the transaction phase." "We used our implementation expertise across the three types of transactions (acquisition, joint venture, divestiture). And then we saw a place for ourselves in the due diligence phase." "We were just focusing on the implementation of the acquisitions. Then we segued into joint ventures… And then, we went into the divestitures, and then all along here we started saying: 'You know what, not only can our group help with the implementation but why don't you let us drive and lead the due diligence effort.' So we do the due diligence for the acquisitions, we do due diligence for JVs, we assemble all the information for due diligence on divestitures. And then more and more we're spending time working with the transaction teams."
Enhancing knowledge transfer through coaching and cross-fertilization	*PMO coaching of business units continues to evolve to provide additional help to functional leaders within business units (and not just business unit heads)* "I am in a coaching and counselling mode for IS managers as they go through the steps of the methodology…That communication is one way how we are constantly reinforcing the use of the methodology." "They (HR functional leaders in a business unit) have got a project, and they've got a coach assigned to them and you work it together. Issues come up, questions come up, the unexpected comes up, and you have a dialogue around that to help them think through, okay, what would you do, what are the variables involved here." *Sharing of knowledge within PMO* "We have sharing from PMO project manager to PMO project manager so we keep that learning alive." *Sharing of knowledge among functional leaders* Functional leaders within a business unit frequently communicated with other functional leaders within that business unit through the use of formal kick-off meetings and stable steering committees that would work together across the different phases (transaction, due diligence, and implementation) of a deal to help transfer knowledge.

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Table 6A: Technical Fitness – Qualitative Assessment

Definition	Illustrative quotes
"How effectively a capability performs its intended function" (Helfat and Peteraf, 2009: 97-98).	• *"If I look back at the last 10 years, we've enabled some consistencies across M&As with the implementations moving faster than we've ever done before."* • *"Deep down inside I believe our performance improved in divestitures."* • *"I've been participating in The Conference Board for seven to eight years listening to how other companies work on acquisitions or JVs or divestitures…Dow was in the top tier."* • "*I have benchmarked all other companies and I truly believe we're best in class when it comes to M&A"* • *"We are focussing more on the high value activities not some of the low activities,"* • *"Having those capabilities enables us to move a lot more quickly, a lot more efficiently, a lot more effectively than we did before."* • *"Dow's ability to perform acquisitions or JVs or divestitures absolutely improved by doing the other deal types."*

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Table 6B: Evolutionary Fitness – Quantitative Event Study [1]

	Acquisitions				Joint Ventures				Divestitures			
	CAR(-1,1)	CAR(-2,2)	CAR(-3,3)	CAR(-4,4)	CAR(-1,1)	CAR(-2,2)	CAR(-3,3)	CAR(-4,4)	CAR(-1,1)	CAR(-2,2)	CAR(-3,3)	CAR(-4,4)
Acquisition experience	0.151†	0.337**	0.365**	0.310*								
Alliance experience					0.377***	0.412***	0.435***	0.366**				
Divestiture experience									0.063†	0.004	0.038	0.049†
N	138	138	138	138	122	122	122	122	156	156	156	156

[1] † $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$ Coefficients have been multiplied by 10^3 and tests are based on robust Huber-White standard errors.

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