IT in the Context of Mergers and Acquisitions: Designing a New Method for IT Due Diligence

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ABSTRACT

Many mergers and acquisitions (M&As) do not live up to expectations due to problems with IT integration. More than 45% of M&A value depends on successful IT integration, but IT is not always considered during the due diligence phase. The number of previous studies on IT due diligence (ITDD) methods is limited and existing methods are often non-transparent and difficult to apply in practice. It is difficult for merger teams to balance how thorough to be with ITDD.

This research designs a new method for ITDD which is adjustable to specific merger contexts. A basic version of the new ITDD method is derived by assessing existing ITDD methods and IT integration success and failure factors from previous case studies. The results from the literature review are expanded by interviewing industry experts. Three main variations of the new ITDD method are then introduced based on the specific merger context: the merger type, overall M&A strategy, IT integration strategy, IT dependency level and use of innovative IT.

By designing an integrated, transparent IT due diligence method and by giving adjustment options for several contextual factors, this research helps merge teams to value deals more accurately and to signal risks for IT integration early on.

Keywords

IT Due Diligence; Contextual Method; Mergers; Acquisitions; Pre-Merger; IT Integration; Information Technology.

1. INTRODUCTION

Mergers and acquisitions (M&As) are a key aspect of corporate strategy. In 2015 alone companies announced over 44,000 transactions worth US$ 4.5 trillion worldwide [18]. Strategic goals for M&A include achieving benefits of scale, expanding into adjacent markets, redefining the business and redefining an industry [7].

The Federal Trade Committee has defined several different merger types. A horizontal merger is a merger between companies with similar business activities, whereas a vertical merger is between companies in a buyer-seller relationship. Conglomerate merger types include product extension and market extension [23].

The value of M&As depends on the ability to achieve synergies, the increased income and cost savings realized by merging the two organizations. More than half of those synergies are strongly related to information systems [27]. IT integration problems are the third most important reason for M&A failure [25].

At the highest level, a merger can be split into three phases: pre-merger, merger and post-merger [4]. The pre-merger phase is for preparing the transaction, doing due diligence and negotiating the price. Due diligence allows the acquirer to assess the target company’s value and the risks of the deal. The merger phase is when the contract is signed and the integration is planned. During the post-merger phase the actual transition takes place, in which the two companies are integrated to the desired extent.

The extent to which the acquirer and target company integrate differs depending on the overall M&A strategy. The three main strategies are absorption, symbiosis and preservation. The overall M&A strategy matches with one of the four IT integration methods: renewal, standardization, takeover and synchronization [31]. In the post-merger stage, the pressure is high to quickly integrate IT systems to achieve business benefits. IT innovations like enterprise systems and cloud computing have influenced the IT integration process.

In recent years IT has become more central to companies’ day to day operations. Some companies rely more heavily on IT than others. A company is IT-dependent when it uses IT in core business processes and data-accuracy and uptime is crucial.

1.1 Problem Statement

Even though M&A value heavily relies on successful IT integration, IT is often not considered during the due diligence phase [19]. Just 56% of organizations consider IT issues during the initial due diligence process and merely 12% allow the IT function to make decisions [22]. In cases where IT was included during due diligence, IT quality, effectiveness, infrastructure and the development environment were often neglected [19]. In cases where IT due diligence was absent or late, the IT integration took much longer than anticipated [2].

The number of previous studies on methods for ITDD is limited. Existing methods are often non-transparent and difficult to use in practice.

It is difficult for merger teams to balance speed versus thoroughness in IT due diligence. A too comprehensive ITDD can lead to possible high costs in terms of inaction, managerial time and financial resources [1]. However, ignoring the pre-merger assessment of IT fit may prove problematic later as it sheds light on what can be expected from post-merger integration [1]. Time constraints, cost constraints and situational factors limit the level of due diligence [9].
existing ITDD methods do not provide suggestions to solve this comprehensiveness-dilemma.

In recent years IT has become more central to companies’ daily operations. With IT being a potential deal-breaker in many mergers, the need for a clear IT due diligence method is high.

1.2 Desired Results
This paper designs a method for IT due diligence with a solid background in literature and case studies.

IT due diligence should result in information on the effect of IT on the acquisition price as well as information on what can be expected of the acquired firm’s IT and the post-merger IT integration [1]. The IT due diligence method designed in this paper focusses on the second goal. With respect to the first goal, the new method can be used to identify whether certain elements of the acquired company’s IT have a positive or negative influence on the acquisition price, but the exact weights and amounts for each of the elements are beyond the scope of this paper.

The basis of the new ITDD method are the topics or elements that should be evaluated. The basic version of the ITDD method will be adjustable to different merger contexts. Based on the overall M&A strategy, IT integration strategy, merger type and IT dependency level the importance of IT integration for merger value and degree of ITDD thoroughness might differ. Different elements might be included or excluded in the ITDD method depending on the context. This will make it easier for practitioners to balance how comprehensive ITDD should be in a particular merger.

1.3 Research Questions
The problem statement gives rise to the following research question:
Q1. “What are the elements that should be considered by an IT due diligence method in context!”?

To be able to design a complete ITDD method which is adaptable to context, several sub questions have to be answered first. The first step is to determine the state of the art by evaluating existing ITDD methods. Common elements are extracted to be included in the new ITDD method.

A. What are existing methods for IT due diligence?

B. How does IT dependency influence IT due diligence?

C. How do different merger types, overall M&A strategies and IT integration strategies influence IT due diligence?

D. What is the impact of new IT innovations on IT due diligence?

The next sub question identifies more elements to include in the new ITDD method by evaluating success and failure factors from past case studies.

E. What are success and failure factors of M&A IT integration and can they be assessed during due diligence?

Questions A and E will result in the basic version of the new ITDD method. Question B, C and D will determine how contextual elements influence ITDD. Figure 1 illustrates how the contextual factors for ITDD play a role in a merger between company X and company Y. The approach depends on the IT dependency levels and use of IT innovations in both companies. The merger type, merger goals, overall M&A strategy and IT integration strategy also influence the followed ITDD method.

Figure 1. Contextual factors influencing an ITDD method: illustration for a merger between companies X and Y.

1.4 Structure
The research methodology is described in section two. Sections three to five follow the structure of the sub questions A to E. Section six describes insights from interviews with ITDD experts. Section seven describes the design of the new, integrated ITDD method and the adaptation options to particular M&A contexts. Section eight concludes the paper and section nine contains discussion points and directions for further research. Section ten contains the acknowledgements.

2. METHODS
A literature review [30] has been conducted to answer the research questions. Success and failure factors were identified from past case studies. Because the number of previous studies on ITDD is limited, articles from IT auditing and management consulting firms were considered in addition to articles in scientific journals. The non-scientific sources also helped to gain insight into how ITDD is conducted in practice. Web of Science and Scopus were the main sources for journal articles, whereas Google searches were performed to discover articles written by IT auditing and management consulting firms. Further details on literature identification and selection can be found in Appendix A.

To validate findings from literature and to expand the new ITDD method, several experts on IT integration and ITDD were interviewed. The interviews were semi-structured [5]. That way the main topics that were discussed were always the same, but there was also enough flexibility for the interviewees to introduce their own relevant experiences. Appendix B contains further details on the interview setup, questions and expert characteristics.

3. EXISTING IT DUE DILIGENCE METHODS
During the pre-merger phase, companies have the opportunity to hire an independent third party to perform due diligence. There are two main types of due diligence. One is vendor due diligence, which is initiated by a company that is on sale to create an information package for interested parties. However, since these information packages tend to emphasize the positive aspects, interested companies also start their own due diligence. The buyer due diligence identifies any risks associated with the deal and helps to determine the target company’s value. The methods in this paper are primarily focused on buyer due diligence.

Traditionally, due diligence had a financial and legal focus and mainly internal, tangible assets of the target company were evaluated. It is important to also evaluate intangible assets like organizational culture, leadership quality and customer loyalty [5]. IT is not often considered separately during due diligence, but is part of the larger due diligence process.

There are several existing IT due diligence methods [3, 9, 26] from scientific as well as non-scientific, practical sources. The
companies that can be hired to conduct IT due diligence have also developed their own IT due diligence methods, but they have not published about it in detail, probably due to competitive concerns.

In 1995, Harvey and Lusch [9] proposed an extension of the due diligence scope. They noted that IT due diligence should encompass three integrated issues: technology issues, management issues and transition issues. Technology issues consist of hardware architecture, vendor agreements and software. Management issues assess internal IT personnel and IT management skills as well as IT maintenance costs and the level of external technical support. With respect to transition issues, the impact of the merger on IT strategy is determined and an initial template with IT integration priorities is delivered. As one of the first publications on IT in the due diligence process it forms a good basis for further research. Most of the elements that are introduced are still relevant and should be included in the new ITDD method as well. However, creating the template for IT integration may be too time-consuming during due diligence. During due diligence it may be possible to already determine which systems to replace or consolidate, but the exact integration plan should be created post-merger. Harvey and Lusch also do not give suggestions as to how to adapt the proposed method to specific M&A contexts.

Bhatia [3] advised to evaluate the following areas within ITDD: IT organization and flexibility, network design, application and information architecture, datacenters and facilities, contract and regulatory requirements, business process integration and IT tools and methodologies. Many elements in this method are similar to those from Harvey and Lusch, but Bhatia describes them in more detail. Bhatia does introduce business process integration as a new element for ITDD, which is a valuable addition because before replacing or changing IT systems it is important to check whether the business processes are still properly supported. However, it is not documented how the ITDD method has been designed and why these particular elements were included. There are also no adjustment options provided for different M&A contexts.

Delak and Bajec [6] have created a Framework for IS Due Diligence (FISDD). The FISDD decision model is based on current IT asset value, IT costs and investments for the next 5 years, the investor’s HR requirements, IT strengths and weaknesses, IT risks and the degree of product diversity. Their model helps merger teams to make deal/ no deal decisions in a structured manner. The decision model itself does not go into much detail as to which elements should be evaluated during ITDD. With FISDD, surveys have to be conducted at both companies involved to assess IT elements. The IT value questionnaire covers asset value, maintenance contracts, project costs, supplier’s costs and costs of outsourced IT services. However, the topics covered with the IS status and IS strength & weaknesses questionnaires are not included.

The Ernst & Young IT Due Diligence Framework [26] is divided into 8 main topics, which need not be assessed in any particular order: IT strategy and governance, IT infrastructure, IT synergy, IT operating model and service management, Intellectual property licenses and vendor management, IT projects and solution delivery, IT financial elements and lastly ERP systems and applications. This framework covers so many different elements that it will take a lot of time and resources to complete, which will not be suitable in many merger contexts. The author does not go into much detail, most likely because his firm can be hired to conduct ITDD.

None of the existing ITDD methods give options for adjusting the method based on context. There also seems to be no particular order in which the ITDD method elements have to be evaluated. A concept matrix [30] was created to compare the elements in the existing ITDD methods, from which five sets of elements emerged. The new ITDD method should consider technological, organizational, financial, legal and strategic elements.

4. M&A CONTEXTS
This section determines the influence of several contextual factors on the importance of and method to follow for ITDD.

4.1 IT Dependence Levels
The importance of ITDD in a particular merger differs corresponding to the industry context, because some companies are more information intensive and IT dependent than others. A company is information intensive when its products, services and operations are based on information that is processed as part of exchanges with customers, suppliers or within the company itself. Information intensity is positively associated with IT dependence [16]. Companies are IT dependent when they use IT in core business processes. They become dependent on IT for survival and data accuracy and up-time is critical. A proactive role for IT integration during mergers is useful for companies with high IT dependence [11]. The more information intensive and therefore more IT dependent a target company is, the more important it is to be thorough with ITDD during the M&A process.

To assess the IT dependence in a particular merger, the IT strategic impact grid [20] can be used. The grid, depicted in figure 2, consists of four IT modes and companies are classified based on their need for new IT and need for reliable IT. When a company has a high need for new IT, it is in an offensive IT mode.

<table>
<thead>
<tr>
<th>Need for reliable IT</th>
<th>Need for new IT</th>
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<tbody>
<tr>
<td>Low</td>
<td>Turnaround</td>
</tr>
<tr>
<td>High</td>
<td>Strategic</td>
</tr>
<tr>
<td>Low</td>
<td>Support</td>
</tr>
<tr>
<td>High</td>
<td>Factory</td>
</tr>
</tbody>
</table>

Companies with an offensive IT mode have a higher use of IT governance mechanisms [12]. Higher IT dependence also leads to greater board involvement in IT governance. In a merger with companies with high IT dependence it is more likely that IT plays a proactive role and that IT management is involved from an early stage, which can help in timely identifying integration risks. A more proactive role for IT in the merger process also leads to a better estimation of synergies and the possible identification of new synergies [19].

4.2 Merger Types
The Federal Trade Committee has defined several merger types. In a horizontal merger, a company merges with a direct competitor, so the companies have similar business activities. In a vertical merger, companies in a buyer-seller relationship merge, so the companies handle another part of the value chain. Conglomerate merger types include product extension and market extension [23].

A vertical merger typically needs loosely coupled IT [13], since only a connection between the systems of the two companies can be sufficient. The importance of IT integration is limited in this case, since the impact of the merger on IT operations is low and there are limited synergies to be achieved with IT.
In horizontal mergers the companies will have similar business process and more overlapping IT systems. IT integration is much more challenging in this case and IT due diligence should be more extensive.

4.3 M&A and IT Integration Strategies

Overall merger strategies as well as IT integration strategies and their alignment have been well researched. However, the impact of a particular strategy on the importance and method of IT due diligence is unclear. How important it is to involve IT early on during the merger process is dependent on the objective of the merger and the IT integration process [22].

The three overall M&A strategies are absorption, symbiosis and preservation. When the strategy is preservation, the acquired company will mostly stay the same. However, when the merger strategy is absorption, the acquired company will cease to exist in its current form and will be completely integrated into the acquirer. Symbiosis is the middle ground, where some parts of the acquired company remain existing, but several business units are integrated. The overall M&A strategy is formed based on the goals for the merger [14]. For example when the goal for the merger is to reduce costs, the most common overall strategy is absorption. In case the goal is to add value or achieve synergies, the symbiosis strategy fits best. Conglomerate mergers often have preservation as an overall strategy. In vertical mergers it is often preservation or absorption. Symbiosis is more common in horizontal mergers.

There are four IT integration strategies: renewal, standardization, takeover and synchronization [31]. Renewal replaces the systems of both companies by an entirely new IT system. With takeover, the systems of the acquired company are replaced by those of the acquirer. With standardization, IT functions in both companies are integrated. With synchronization the systems from both companies are preserved and bridges are created to consolidate data or periodically synchronize. Table 1 shows the alignment between overall M&A strategies and IT integration strategies.

Table 1. Overall M&A strategies with matching IT integration strategies [31].

<table>
<thead>
<tr>
<th>M&amp;A Strategy</th>
<th>IT Integration Strategies</th>
</tr>
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<tbody>
<tr>
<td>Absorption</td>
<td>Renewal / Takeover / Standardization</td>
</tr>
<tr>
<td>Symbiosis</td>
<td>Standardization</td>
</tr>
<tr>
<td>Preservation</td>
<td>Synchronization</td>
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When the merger strategy is preservation and the IT strategy is synchronization there are little IT integration issues [11] and therefore the importance of ITDD is relatively low.

In case a company regularly acquires other companies, it can standardize the process for a takeover IT integration. This standardization will lead to less IT integration issues [10] and for these ‘serial acquirers’ ITDD can be less comprehensive.

When the IT integration strategy is synchronization or takeover the effects of early IT involvement in the merger are limited, but the benefits of early IT involvement are most distinctive with the renewal and standardization strategies [22]. So ITDD is most important for renewal and standardization strategies. However, the symbiosis approach did have the greatest success variance [22] and since variance can be interpreted as a measure of risk, some elements from ITDD will still be important in that case.

4.4 IT Innovations

In recent years the use of several IT innovations has become more common. Recent IT trends like cloud computing influence the complexity of post-merger IT integration and the topics to assess during due diligence.

Cloud computing may simplify IT integration as firms increasingly employ standardized software packages. However, standardization could reduce competitive advantage/strategic benefits gained from M&A [17].

It is important to compare the use of innovative IT for both companies involved in the merger. If there are great differences between adoption of IT innovations between the two companies, IT integration will be more complex. In these cases, ITDD is more important and should be more thorough. For example, when one company has already moved all its systems to the cloud and the other still has everything in-house it will be more difficult to integrate the systems.

However, IT innovations can also have a positive influence on ITDD. When both companies are already using innovative IT, the IT integration can be easier, for example because of the improved scalability and common standards of cloud systems. An additional benefit is that when IT is outsourced, vendor contracts guarantee certain service levels and exact technical details for the vendor’s setup need not be evaluated in ITDD.

5. POST-MERGER IT INTEGRATION SUCCESS AND FAILURE FACTORS

Multiple studies have been conducted on post-merger IT integration [1, 2, 11, 14, 24, 28, 31]. The cases and results in these studies have been used to determine success and failure factors in post-merger IT integration. The factors can be split into three topics: technology, organization and transition. For each of the factors it will be determined to what extent these factors can already be signaled during the due diligence phase.

General success and failure factors for mergers include strategic motives, strategic fit, price, management involved in the process, size differences, organizational structure and analysis of future need [4].

5.1 Technological Factors

IT integration is more likely to succeed when both companies already have similar hardware and software systems [31]. It is also easier to integrate systems when processing capabilities are geographically centralized and software is standardized [8]. These success factors can be signaled during ITDD by comparing existing software and hardware and its location and by evaluating compliance to software standardization standards.

In cases with standardization as the IT integration strategy, full data integration is another success factor [2]. To assess whether this success factor is obtainable, business processes and data structures could be compared during ITDD.

During and right after a merger, companies are more vulnerable to hackers. Therefore it is important to quickly align disparate IT security policies across the merged firm [17]. During ITDD, this success factor can be signaled by checking which IT security policies are already in place and how easily they can be adapted.

IT resources are often not scale-free and do not transfer easily [29]. This failure factor can be assessed during ITDD by checking the scalability of IT systems. Scalability will be most important for the takeover and standardization IT integration strategies, since those strategies require a system at one of the two companies to handle more load than before.
When the acquiring company has superior IT capabilities, it is likely to replace IT resources of the target, which can increase risks for disruption of the target’s business processes, operations and growth [29]. Therefore, the business processes of the two companies have to be compared before executing a takeover strategy to see whether the acquirer’s systems can equally well support the target company’s processes.

5.2 Organizational Factors
Several case studies note the importance of organizational factors in IT integration success. The organizational factors can be split into cultural, communication and employee-related factors.

When two companies merge, it is likely that there will be cultural differences between them. It is important to prevent organizational paralysis due to clashing cultures [2]. Therefore, differences in formality, decision processes and aggressiveness should be assessed. It helps to have formal conflict resolution procedures in place. So an IT due diligence method should include organizational elements to identify the cultural differences between companies.

Another important success factor is good communication. Communication on integration processes and timelines, but also about job security should be consistent, clear and frequent [2]. The communication success factor is hard to signal during ITDD, since communication plans for the IT integration process are defined post-merger. However, some communication plans from previous projects at the target company could be evaluated. Especially in mergers where the overall M&A strategy and IT integration strategies are not aligned, the importance of good communication and leadership is high [2].

An employee-related factor for post-merger IT integration is employee retention. It is essential to retain the employees with the most knowledge of the systems [2, 26]. It is important to already identify these employees during IT due diligence, so steps can be taken already pre-merger to ensure these employees will stay at the company. Another staff-related success factor is senior support. CIOs should be involved in M&A process from the beginning [2, 17, 22, 26]. Top management commitment to IT integration can also improve reliability of systems [17]. Doing ITDD in itself contributes to this success factor, since it increases the involvement of IT personnel in the merger.

5.3 Transitional Factors
The transitional success factors can be split into transition preparation and transition execution.

For transition preparation it is important to have up-to-date, quality information on all IT assets, organization, costs and initiatives [26]. There should be information on legacy systems and key vendors and suppliers as well as in-flight projects. When the IT integration strategy is standardization, it is important to know beforehand which resources, data and business processes to keep as is and which to integrate. It is also important to focus on future business value instead of just cost savings when making integration decisions [2]. These success factors emphasize the need for thorough ITDD and also introduce several elements that should be assessed during ITDD, namely: IT assets, IT organization, IT costs, IT initiatives.

For transition execution it is important to have good transition leadership. The correct timing of the integration is also crucial [2]. If the changes are implemented too quickly, it can lead to costly revisions later. However, if the implementation is too late, synergy and business opportunities might be lost. These factors can not be signaled during ITDD, but the merger team can generate awareness of these success factors among the employees planning the IT integration in the post-merger phase.

6. EXPERT INTERVIEWS
The six IT due diligence and IT integration experts that have been interviewed provided valuable insights into how ITDD is conducted in practice. To ensure the interviews would represent different views on ITDD, a mixed pool of interviewees was selected based on their experience and publications. The expert characteristics can be found in appendix B2.

All six experts confirmed that the importance of ITDD, as well as the method for ITDD, differs greatly depending on the specific merger context. As one of the experts said: “The IT due diligence method does not exist”. They all mentioned that even though existing frameworks for ITDD can be used as a start, they always need adaptations depending on the particular merger context and the client’s wishes. Therefore, the design of a method for ITDD should be highly adaptable to different merger contexts. Their experience also was that the more IT dependent a company is, the more important ITDD is.

Most experts experienced that in most of the cases the merging companies have already defined an overall strategy for the merger and integration level before starting ITDD. However, one expert often develops these strategies together with the client during the ITDD process. Five experts mentioned that synergy identification was rarely a part of the ITDD process and that the client does already have some thoughts on it.

The method followed during ITDD differed between the experts. They all have a basic template for ITDD with several focus areas, which they adapt based on merger context. How elements are categorized differs between experts, but in essence they all cover the same elements. These elements all fit within one of the five overarching topics technology, organization, strategy, legal and financial. In terms of context adaptation two experts mentioned using a T-shaped approach, where they would cover all elements lightly and be more thorough with certain elements depending on the merger context. One of the experts often uses ‘mirroring’, which means that for each element to be assessed the result at the target company are compared with those from the acquiring company. The other five experts apply a more one-sided approach, where they primarily assess the current situation at the target company.

Five experts experienced a change in IT due diligence over the years. The experts noted that most often ITDD is still a part of the larger due diligence process, but that completely separate ITDDs are more frequent in recent years. As IT innovations, like cloud computing, became more common, the approach to ITDD changed. When both companies are already using cloud services, IT integration is potentially easier. Since contracts with vendors then guarantee certain service levels IT DD can be less thorough and will take less time.

7. NEW IT DUE DILIGENCE METHOD
The findings from literature, past case studies and interviews with ITDD experts have been integrated to design a ITDD method which is adaptable to context. Section 7.1 introduces the basic version of the new ITDD method. Because ITDD is highly dependent on context, section 7.2 discusses how the basic version can be adapted to specific M&A contexts. The new ITDD method provides the elements which should be evaluated in a particular merger context, but the exact contribution of the evaluation results to the merger decision and deal price are beyond the scope of this paper.
7.1 Elements
The elements within the ITDD method can be classified into five topics: Technology, Organization, Strategy, Legal and Finance. Figure 3 gives an overview of the ITDD elements.

7.1.1 Technological Elements
A thorough understanding of the current technology at both the acquiring and acquired company forms the basis for successful IT integration and is therefore also a basis for ITDD.

The current software systems should be analyzed. Important metrics for assessing current software systems are their age, average downtime, scalability, effectiveness and efficiency. In addition, the hardware infrastructure and network setup should be examined as well as the degree of processing capability centralization and compliance to standardization standards. In case of bespoke applications the code quality can be assessed as well. Other technological elements include the data structures and security policies.

The business processes that are supported by the acquired company’s software systems should be assessed to determine whether they can be properly integrated with the acquirer’s processes.

When companies have an up-to-date enterprise architecture model in place, this can save a lot of time during this stage of the integrated ITDD method. For example, a model based on the ArchiMate framework [15] can be very useful in ITDD, since it gives a clear overview of the current IT infrastructure. By comparing enterprise architecture models, the match between the desired integration levels and current systems, infrastructure and business processes of the two companies can be assessed. Based on enterprise architecture models of the target company, its IT portfolio can be evaluated [21], which could directly link it to the financial side of due diligence.

7.1.2 Organizational Elements
Another important element within ITDD is evaluating the IT organization. Some elements are employee-related, others are culture-related.

The number of internal IT employees should be determined and their IT and management skills should be assessed as well as the level of external support. The employees with critical knowledge about certain business critical or strategic systems should be identified so immediately after the deal is signed they can be incentivized to stay. Another element is assessing how much support there is for a merger among senior IT staff, since their support and involvement could ease the integration process.

Each IT organization has its own culture. To assess the differences in IT culture, the ITDD team should compare the project management and development approach, the level of formality, the decision structures, conflict resolution procedures and modes of communication for both companies.

7.1.3 Strategic Elements
The strategic side of ITDD should assess the IT strategy at the target company and also evaluate the impact of the merger on the IT strategy. It should also check business-IT alignment within the target company. An IT integration template can be produced as part of the strategic side of ITDD as well. IT synergy opportunities can be identified, but as the experts indicated this is rarely part of ITDD in practice.

7.1.4 Legal Elements
The legal side of ITDD evaluates all IT contracts with vendors, as well as license agreements. Important things to assess are the durations of the contracts, clauses on termination for convenience and any damages to be paid in case of early termination. It should also be determined how change of title of ownership influences the costs associated with the contracts. Cost savings might be realized when the acquiring company already has similar contracts with the same vendors. Any penalties or cost savings can be directly included in calculations for the deal price, so this element is closely related to the financial side of due diligence.

Several intellectual property issues should be assessed as well. It is important to determine to what extent the target company owns its own IT systems and how its intellectual property is protected.

7.1.5 Financial Elements
The financial side of ITDD should evaluate the periodical IT costs of the target company as well future IT investment budgets. The periodical IT costs include license, service or vendor costs, maintenance costs, staff costs and depreciation. The future IT investment budgets at the target company give a good indication as to which systems will need to be replaced soon and how much that will cost. Those costs can be used in the negotiation process to lower the deal price. When an extensive post-deal IT integration project is expected, those estimates and expectations can be used in the negotiations as well.

Figure 3. Overview of elements in the new ITDD method.
7.2 Adjusting to M&A Context
This section provides guidelines for how to modify the basic IT due diligence method in several merger contexts. The three main adaptation options are based on the different overall merger strategies. The ITDD method is most extensive in cases where the overall strategy is symbiosis and the integration strategy is standardization.

7.2.1 ITDD for Preservation
When the desire is to create a synchronization link between the two merging companies’ systems, some of the technological elements are still important. For realizing the synchronization between the systems it is important to look at the IT infrastructure and the data structures of both companies. Elements like scalability and business processes do not have to be covered in much detail, but the other metrics to assess the current IT systems remain important.

The cultural-related elements within the organizational topic need not be evaluated, since both organizations will continue separately with their usual IT operations. Since operations will remain the same and therefore it is not likely that the merger leads to employees leaving the acquired company, some employee-related elements are now not required either. Determining the number of employees and the level of external support is still useful to see how much of the knowledge is in-house.

The strategic elements of ITDD can be skipped in this case, since the merger will have limited impact on the IT strategy and no integration template has to be defined.

The legal side of ITDD can be less extensive as well, since no systems will be replaced and therefore no vendor or license agreements have to be terminated early. However, all contracts should still be evaluated to determine the influence of changing the title of ownership. The agreed prices could rise when the target company is no longer part of a bigger overarching agreement with the previous mother company. On the other hand, costs could decrease if the acquiring company already has similar contracts with the same vendors.

The financial elements remain important, as especially the future IT investments give a good indication of which systems need to be replaced soon and periodical costs will remain the same.

7.2.2 ITDD for Absorption
When the IT integration strategy is takeover, the scalability of the systems becomes very important. It must be ensured that the systems that will take over the load are able to scale up properly. When the IT integration strategy is renewal the technological elements do not have to be covered in as much detail since completely new systems will be designed.

The organizational elements are more important for absorption than for the preservation case as there will be more interaction between the employees of the two companies. Since the absorption has a direct influence on the employees’ daily work, employee retention is an important concern.

The legal elements are very important in this case, since most systems will be completely replaced: either by the acquiring company’s IT systems, or by completely new systems. It is likely that this will result in early termination of vendor agreements and any costs that could result in should be taken into account during the deal price negotiations. Intellectual property topics of existing systems are not very important in this case, since the current systems will be replaced.

The financial elements are now also less important, as the costs for current systems will soon not be relevant anymore. The future IT investments do not have to be evaluated in as much detail now, since current systems will cease to exist.

7.2.3 ITDD for Symbiosis
In case of symbiosis the two organizations will remain partly intact and systems from both companies will be combined to benefit form the best of both systems. Since IT integration is most complex for this strategy, it also has the most extensive ITDD. The technological and organizational elements should be evaluated for the acquiring as well as the target company, to be able to ‘mirror’ the fit between both IT systems and organizations.

All technological factors are important because some systems will remain unchanged (but may have to support higher loads) and some systems will be combined. With these combinations differences in culture are most likely to cause problems. The impact of the symbiosis merger for employees is also highest and therefore IT organizational elements are very important. All strategic elements are important and it would be good to design an initial template of the IT integration process during ITDD.

Intellectual property is important in symbiosis mergers, since software systems will be adapted and merged. Since some systems might be completely replaced, the implications of change of title and early termination of current contracts should still be evaluated as well. For the financial side of ITDD the symbiosis integration project costs should be taken into account.

7.2.4 IT Dependence and Innovation
When IT dependence is higher, the technological elements should be considered more thoroughly since IT is more critical for merger success. In companies with strategic and turnaround IT modes, where the need for new IT systems is high, the legal element becomes more important, since it is important that the duration of the contracts is not too long and penalties for early termination are limited. For companies with strategic and factory IT modes, where the need for reliable IT is high, the technological elements of ITDD are especially important and should be covered in more detail. For both absorption and symbiosis it applies that when the adoption of IT innovations by the acquiring company does not match that of the target company, the technological and legal elements should be examined more thoroughly.

8. CONCLUSION
M&A value greatly depends on successful post-merger IT integration, so it is important to consider IT during the due diligence phase.

This research identified elements for the basic version of a new ITDD method by evaluating existing ITDD methods, by identifying post-merger IT integration success factors from previous case studies and by interviewing ITDD experts. The elements in the new ITDD method are divided into technological, organizational, strategic, legal and financial elements.

The method to follow for ITDD is influenced by contextual factors. Depending on the merger type, overall merger strategy, IT integration strategy, IT dependence level and adoption of IT innovations several elements in the basic version are more or less important. Three adapted versions of the ITDD method were introduced for preservation, absorption and symbiosis strategies. In addition to these three main versions there are also adaption suggestions for different IT dependency and IT innovation adoption levels. ITDD should be most extensive in horizontal mergers for companies with high IT dependence.
with symbiosis as the overall M&A strategy and standardization as the IT integration strategy.

The newly designed ITDD method contributes to literature as well as practice. Its elements have a solid basis in literature, previous case studies and expert interviews. It is the first ITDD method which is adaptable to merger context. This makes ITDD easier for merger teams, since it helps them to balance how comprehensively to be. By increasing awareness of the importance of ITDD and by designing a new ITDD method, this research helps companies to value their M&A deals more accurately and to signal risks for IT integration early on.

9. DISCUSSION
The influence of five contextual factors on ITDD was determined while designing the new ITDD method. The method is adaptable based on those factors in a particular merger, but there might be more contextual factors. More research is needed to identify other contextual factors in ITDD and corresponding adjustment options. More research is also needed to verify the new ITDD method. Most of its elements stem from literature and even though interviews were held with experts, it is important to test the method in several real M&A cases. Further research should also explore ways to link results from evaluating the elements to the deal-no-deal decision and the deal price. It would also be interesting to explore how synergy identification and estimation can be incorporated in ITDD.

Identifying the challenges in conducting ITDD and ways to overcome them is another direction for future ITDD research. Obtaining the necessary information from a target company can be challenging. Public information, like annual reports, often contains little details on the IT systems. If a target company is a member of the public Information Week 500 List, this can be a good indication of high IT capabilities. Most of the information on IT infrastructure and IT systems won’t be made available until after signing a letter of intent. Even once companies have started negotiations it is not always easy to obtain the information required.

10. ACKNOWLEDGEMENTS
This paper would not have existed in its current form without the guidance and coaching by my thesis supervisor, Dr. A.B.J.M. Wijnhoven. An additional thanks goes to the six industry experts who cleared time on their busy schedules for an interview and provided me with valuable insights and examples from their own experiences. I would also like to thank the fellow student who peer-reviewed my research proposal and this paper and provided several suggestions and critical remarks for improvement.

11. REFERENCES


APPENDIX

A. LITERATURE REVIEW

A.1 Literature Identification

To identify relevant literature, a three step identification process [30] was used.

The first step was to define a set of keywords corresponding to the research questions. Search phrases were formed from these keywords and entered into databases like Web of Science, Scopus and Google Scholar to search for literature. From these search results, the articles from the leading journals in the field were assessed first. Then the most cited and most recent articles were scanned. The second step was using backward citation. This way, the reference list from articles found in the first step was used to identify new articles that the initial keyword search missed. The third step was to do forward citation, which resulted in additional articles that had cited the articles found in step one and two. The literature was further selected based on the relevance of the abstract and conclusion to the research questions in this paper. To ensure reproducibility of the review, the keywords that were used to start the first step are included in the table below:

<table>
<thead>
<tr>
<th>Question</th>
<th>Keywords</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>IT / IS, IT due diligence, integration analysis, due diligence framework, technology due diligence, auditing, merger / acquisition</td>
</tr>
<tr>
<td>B</td>
<td>IT / IS, dependence, complexity, intensive, industries, markets, merger / acquisition</td>
</tr>
<tr>
<td>C</td>
<td>Merger / acquisition, types, objectives, goals, strategies, IT integration methods, IT integration strategies, business-IT alignment</td>
</tr>
<tr>
<td>D</td>
<td>IT innovations, Cloud computing, due diligence, merger / acquisition</td>
</tr>
<tr>
<td>E</td>
<td>IT integration success factors, IT integration failure, case, M&amp;A success, M&amp;A failure, due diligence process, post-merger integration</td>
</tr>
</tbody>
</table>

The keywords were combined to make multiple search phrases, for example:

“(Information Technology OR Information Systems) AND (IT Integration OR IS Integration) AND (Merger OR Acquisition OR M&A)”

“(IT Due Diligence OR IS Due Diligence OR Technology Due Diligence OR IS Integration Analysis) AND (Information Technology Or Information Systems)”

B. EXPERT INTERVIEWS

B.1 Interview Setup

The interviews were conducted by telephone or face-to-face and had a total duration of around 35-50 minutes. In either case, the interview started with a short meet & greet session of maximum 5 minutes. The interviewer then introduced the purpose of the interview and the way the results would be processed. Permission was asked to record the interview.

During the next 30 to 45 minutes IT due diligence was discussed. Since the interviews were semi-structured, a guideline for the interview was created beforehand, but there was also room for the interviewees to introduce other relevant topics or their own experiences. Several areas of interest were discussed with all interviewees as the goal was to obtain information on:

- The ITDD method they followed
  - the elements in it and the outcome
- Whether and how this method was adapted to the context of particular mergers
  - IT dependency, merger type, merger strategy, IT integration strategy and IT innovations
- Application of this method in practice
  - common practice, case examples, challenges, changes over the years

These different areas of interest were then transformed to the following questions, which were not always discussed in the same order. Follow-up questions ensured getting in-depth answers from the interviewees. Depending on what an interviewee had most experience with, certain questions were discussed in more detail than others.

- Do you believe ITDD is already common practice?
- Do you follow any particular method for ITDD?
- With what goal do you conduct ITDD? What is the outcome?
- Which topics / elements should definitely be considered during ITDD?
- What are the general steps in the ITDD process?
- To what extent do you customize the followed ITDD method to the particular case context? Which context factors change the way you do ITDD?
- How does IT-dependency influence ITDD?
- How does ITDD differ for different merger types?
- How does ITDD differ for different overall M&A and IT integration strategies?
- What are success factors for IT integration? Could these success factors be signaled during ITDD?
- Could you give an example of a case in which IT integration was particularly easy / difficult?
- Do you think IT innovations influence ITDD? Has ITDD changed over the years? How have cloud solutions influenced ITDD?
- What are the challenges when doing IT due diligence? Is it possible to obtain all desired information during the pre-merger phase?

The interviews have been recorded and were transcribed afterwards. All interviews were processed anonymously. The order in which the experts are introduced and the order in which statements appear in this paper is random.

B.2 Interviewee Characteristics

Six experts on IT within M&A have been interviewed. A mixed pool of interviewees was selected based on their backgrounds and publications. All six interviewees are experienced with conducting ITDD. Four of the experts also have experience with post-merger IT integration projects, so they could provide insights from the post-merger phase as well and link that to an ITDD method. One of the experts even experienced ITDD during his time as CIO.

All six experts are from The Netherlands and are male. Three interviewees had over 20 years of experience in the field. Three younger experts, with 1-10 years of experience, were interviewed as well to learn more about the newest insights in ITDD and how IT innovations influence it.

Experts were interviewed from three of the four biggest companies doing ITDD in The Netherlands. Five interviewees are working or have worked for those companies. The six interviewees are now working at five different companies.

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