Enhanced Enterprise Architecture Framework for M&A PMI

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Abstract

Consolidation of companies or assets through mergers and acquisitions (M&A) is a popular growth strategy for organisations. However, despite the growing number of M&A cases, their results often do not achieve the stated goals. The unsuccessful Post Merger Integration (PMI) phase, when the physical integration of several companies into one is executed, has been mentioned as one of the causes of this problem. For solving it, the means of Enterprise Architecture (EA), as the discipline that has been focusing on effective organisational transformation for years, could be applied in the PMI context. To this end, existing EA frameworks should be adapted to PMI specifics such as time pressure and high uncertainty. This work explores the hypothesis that EA means enhanced Knowledge management (KM) and Requirements engineering (RE) could lead to better PMI results.

Keywords

Mergers & Acquisitions, Post Merger Integration, Enterprise Architecture, Knowledge management, RE

1. Introduction

Consolidation of companies or assets through mergers and acquisitions (M&A) is one of the strategies for how organisations can grow [43]. M&A can help grow faster and on a larger scale. With increasing competition and market expectations, more and more organisations choose to grow using M&A [44].

However, given the benefits that M&A can offer, many M&A initiatives fail to achieve their stated growth goals [45]. Although many research groups are focused on M&A failure reasons and potential solutions, so far, no improvements can be noticed in statistical data of M&A results [6].

One of the main reasons for M&A failure is an unsuccessful integration phase [42]. The integration phase, often called Post Merger Integration (PMI), is part of the overall M&A process, when a physical merger takes place. The main goal for PMI is to create a new consolidated organisation, which has all the properties, required for achieving goals defined for the M&A initiative, such as growing market share, strengthening resources, expanding product portfolio, and others [34]. An additional, but similarly important, goal is to create a new organisation, which is sustainable in the long term. We can summarize that the main goal of PMI is to transform several organisations that cannot achieve defined goals independently into a new organisations which can. What can lead to the unsuccessful PMI is either the failed transformation as such or the misalignment with strategic goals when the resulting organisation is still incapable to achieve its M&A vision [8].

As an example, an M&A case can be considered when organisation A acquires another organisation B. Stronger product portfolio, higher revenues and lower operational costs could be the main goals for this M&A. Each of these goals requires some integration between organisations A and B. For instance, to decrease operational costs, more efficient manufacturing processes from one company can be applied to another company. Higher revenues could be achieved by merging marketing and launching cross-selling initiatives. A stronger product portfolio could be achieved by collaborating between creative

Baltic DB&IS 2022 Doctoral Consortium and Forum, July 03-06, 2022, Riga, LATVIA
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departments and contributing to R&D activities. Such integration requires changes and transformation regarding different organisational aspects – organisational structure, processes, assets, etc.

Organisational transformation is the main concern of the EA discipline [46]. This discipline is also dedicated to the alignment between different organisational levels – from strategy to execution. This makes the use of EA promising potential solutions for achieving better PMI results.

EA can align all integration components towards integration goals, as well as support integration decisions with full-fledged models of the current and future states. EA also can help to define and implement additional required transformations after the PMI process is finished, so that long term strategy can be achieved. Although EA can be considered a promising amplifier for PMI success, current EA approaches do not have all the required qualities to be effectively applied in the PMI context. Two critical qualities for EA to be advanced for PMI are engaged quality and holistic quality. These qualities require EA capabilities that are missing in the standard EA approaches [1].

Engaged EA should be more integrated into the PMI process. This requires changes in the EA approach itself, switching from the passive descriptor of current and future states to the active participant (or even the driver) of the organisations' transformation processes. To play an active role in the transformation process, EA requires deeper elicitation of underlying reasons for PMI, stating goals for the transformation, and decomposing goals into clear requirements for the change. Only in the future state, the gap between the current and future state can be defined. These capabilities can be obtained by enhancing EA with the RE practice. The main goal of RE is to define the difference between the current and desired states and define a solution required for the change. Nevertheless, standard RE practice is focused on information system development, but, to be applicable for PMI, it may need respect all change perspectives – social, cyber, and physical. Additionally, PMI may require more agile and lightweight RE approaches.

The holistic quality of the EA could be tightly related to the organisational learning within the scope of PMI initiatives. Organisational learning the ability of the organisation to acquire, accumulate, process and transfer knowledge. For PMI, thus, organisational learning should be established across all involved parties that are in the scope of a specific PMI initiative, and, also, across several sequential PMI initiatives. Organisational learning can be supported by integrating the KM practice into the EA approach. However, PMI KM should be able to address the PMI specifics – high uncertainty and time pressure.

2. Research problem

As stated by [1], none of the EA frameworks has engaged and holistic qualities on the level required for PMI support.

Therefore this research focused on the following questions:

- How RE practice can improve the engaging quality of Enterprise Architecture frameworks;
- How KM practice can improve the holistic quality of Enterprise Architecture frameworks.

Respecting that these qualities are not the result, but just a means to achieve better PMI results, the main research question should be formulated as follows – "Can EA enhanced by RE and KM can contribute to better PMI results?"

In other words, this research hypothesizes that EA as a discipline can be enhanced by RE and KM practices in a way that EA artefacts created in the scope of the specific PMI initiative will lead to better results in PMI initiatives where this EA is applied.

3. Outline of objectives

The main goal of this research is to test the hypothesis that EA with an additional focus on RE and KM can contribute to better PMI results. This leads us to the following two research objectives:

1. Define PMI specific RE and KM practices as a framework (REKM) that can lead to better PMI results;

2. Select the EA framework that is most suitable for PMI and enhance it with the REKMEA framework for defining the PMI results from the evaluation method and validating the proposed REKMEA framework.
3. If the REKMEA framework will be proven to be the solution for better PMI results, an additional goal of this research would be to define how this framework can be automated using existing tools or by creating new tools.

The research methodology is described in section 5.

4. State of the art

For testing the hypotheses of this research, insight into the related work is required as a prerequisite. This section summarizes research in the related domains – Post Merger Integration in Mergers & Acquisitions, EA, RE, and KM. For each domain, the current state of the art is described, as well as how it can contribute to this research. We can observe that all four research domains have overlapping areas and cross-domain research works. However, there is no existing research which would holistically bring all four areas together in the context of PMI.

4.1. Post-merger integration in mergers & acquisitions

The first M&A initiatives were recorded already in the 19th century [11]. As M&A is perceived as the arrangement between several organisations leading to the restructured architectures, enabled growth, and strengthened capabilities [34]. However, active research in this field was initiated only in the 1970s (from the financial perspective of M&A performance) [10]. The research was focused on finding the success factors for M&A success. The following characteristics of merging organisations were defined as the prerequisites [29] − market share, relative size, previous experience in M&A, and relatedness. However, the evidence showed that, even if all these prerequisites were in place, a big part of M&A initiatives did not achieve the stated goals. This forced researchers to seek additional factors related to the M&A initiative itself, that could have a positive or negative impact on M&A outcomes [6]. As the M&A initiative is a complex and multidimensional endeavor, interdisciplinary research and a wider research context were required.

Later M&A research has evolved and expanded in several perspectives [10] – psychology perspective, HR perspective, marketing perspective, and process perspective. However, even with a comprehensive research volume over decades, it is still criticized for contradicting results and controversies [12]. One of the reasons for these limitations is insufficient collaboration between different research areas [10]. Psychology, HR, marketing, processes, and additional organisational aspects should be seen as a whole during an M&A initiative. Additionally, recent studies highlight a popular trend to replace short term goals for M&A, such as profitability and stock value, with long term goals, such as sustainability and responsibility. EA discipline in its place is intended to see the organisation as one system and focus on long term strategic goals [1].

Process related research emerged in the 1980s and changed the research focus from efficiency theory to process-related theory [11]. This research area is based on the assumption that overall M&A success is strictly related to post-merger integration execution. Post-merger integration is perceived as a critical tool allowing organisations to reconfigure resources, product lines, and business units to achieve M&A goals [34]. The major part of process-related research reviews possible integration strategies – preservation, symbiosis, holding, and absorption [33]. Nevertheless, there is no existing research proposing detailed PMI processes and potential process configurations for different PMI cases.

As information systems play a crucial role in organisations, it is recognized that IS integration is an important enabler for overall PMI success [8].

Although each specific PMI case may require a different adjusted approach [7], several common success factors are stressed [13] − integration strategy, integration team, communication, speed, and aligned measures.

The majority of these success factors can be enabled by the EA discipline [1].

4.2. Enterprise architecture

The concept of EA first appeared in the late eighties. This discipline emerged as a potential solution to the problem of misalignment between IT and the business. As several researchers at the same time started to work in this direction, several similar solution approaches appeared, later combined into one research topic [5].

ISO/IEC/IEEE 42010:2011 standard defines the EA as: "The fundamental organisation of a system, embodied in its components, their relationships to each other and the environment, and the principles governing its design and evolution". EA is recognized for the following benefits it can bring – enabled innovation, strategy adaptability, business process excellence, and customer orientation [2]. The first two can contribute to the short-term goal of Post PMI – transforming an organisation with an alignment to a growth strategy in limited time and high uncertainty. Last two help to support an organisation in a long term – so that during transformation and after it the organisation still could function effectively and concentrate on its customers.

As building EA is not an easy task, during these years, several frameworks have been defined to help EA practitioners with a clear process, guidelines, and artefact blueprints [4]. Many frameworks were dedicated to supporting nuances of EA for the specific industry. There are several attempts to evaluate the efficiency of existing EA frameworks, but the majority of them focus on the internal qualities of a framework (number of models, flexibility, scalability, etc) [4], and only part on the external relationships between specific framework application and EA contribution to the organisational goals [3].

During all these years EA research evolved through several main focus areas. In the beginning, the main research focus was on the understanding of the discipline as such. This included questions about the architectural content and its representation. Later, the research emphasis changed to the modelling perspective. At this stage, popular topics of the research were modelling languages and tools. EA mainly remains a snapshot of the current or future organisation's state and does not to the full extent considers the gap between these states and required changes. Finally, research concentrated on the management of EA with research problems related to how the discipline can be applied and managed itself. Nowadays, EA is seen as a supporter of the decision-making process, not as an active participant in stating goals and requirements [5]. As EA's active role is crucial in PMI, EA's practices should be transformed into an integral part of PMI activities throughout the PMI process.

There is no known research on EA from the KM perspective. However, EA for PMI should be organised in a way that it can effectively acquire, process and apply diverse knowledge about PMI, its integration objects, and its context.

4.3. Knowledge management

KM research started in the 1980s and was focused on best practices on how to apply knowledge as a competitive advantage for organisations [21].

Research topics under consideration were, cultural aspects, organisational learning, as well as strategic aspects, and KM related technologies [25]. The most influential contributors and founders of the KM phenomenon were Nonaka, Takeuchi, Davenport and Prusak [25].

In the 2000s sustainability became an additional direction of KM research. This direction of research is concerned with how KM can help to achieve long term strategic goals such as performance, sharing culture, and innovation. KM for sustainability is proposed as a comprehensive process for knowledge creation, acquisition, sharing, application, and transfer across several levels starting with the individual, proceeding with unit and company and ending with the country [22]. As mentioned above, sustainability is also a recent trend for M&A initiatives.

One of the KM research areas is related to effective knowledge sharing practices in big, cross-border multi-language organisations [23], [24]. Practises for knowledge transfer and alignment proposed in these studies could be applicable to M&A initiatives [9], [23], [24].

There is dedicated research for Architecture KM aiming to frame this research topic as such and state some best KM practices for architecture-specific knowledge [26], [27], [28].

There is also KM research directly related to M&A [31]. This research is focused on the KM for synergy and innovation, enabled by mixing old and new knowledge through knowledge integration activities [29], [30], as well as on the investigation of what factors can contribute to better knowledge transformation [32].

4.4. Requirements engineering

RE as a research discipline appeared in the 1970s, but more actively started to evolve in the 1990s. This discipline is closely related to information system development and was impacted by research trends in this area [15], [14]. Despite the initial relationship with software engineering, RE application was researched in many other contexts and RE principles can be generalised to other application domains [15].

RE has a goal to define stakeholder goals (why?), map required system features (what?) and specify how these features should work to achieve stated goals (how?) [14]. More than 20 years ago main requirements for engineering activities and techniques were defined [16]. These activities were practically applied, tested and improved during the last 20 years [15]. Nowadays several standards exist on the RE process organisation, stating the main steps, such as eliciting requirements, analysing requirements, documenting requirements, accepting requirements and managing requirements [35]. RE process models could be applied for EA to organise more active EA involvement in PMI activity.

It is recognized that the RE process plays a crucial role in the overall project success. However, still almost half of all project failure reasons are related to issues in requirements [17].

For almost five decades, RE related research was focused on the question of how to organise the process more efficiently. Several major research streams were formed, each of them defining requirements for engineering practice with incorporated potential solutions [14]. Findings in these streams could be used in EA to facilitate the transformation process in the scope of PMI.

One research stream considers modelling as a core part of the RE process. This stream also includes requirements specification issues [14]. Another stream is formed around the agents and their behaviours, as well as scenario-based RE, centred around requirements for real-life scenarios [14]. One more stream is value-oriented and goal-oriented and proposes more advanced practices for goal identification and mapping requirements to goals to focus on project results, not implementation itself [14], [15]. Additionally, there is a stream that is dedicated to so-called non-functional requirements, such as security, usability, and others [14], [15]. And the final stream highlights the importance of conflict resolution in RE. This stream is also concerned about different stakeholders' perspectives and alignment between them [14].

Still some requirements related issues are mentioned as problems by practitioners – incomplete requirements, poor communication, and moving targets [17]. These problems could potentially be solved by replacing standard plan-driven RE approaches shifted with more flexible Agile approaches [19]. Agile can bring benefits for RE, such as enhanced communication, flexibility, and faster planning. At the same time, Agile RE should deal with potential risks of Agile – such as not sufficient documentation, not realistic plans and technical depth [20].

There are also RE studies focusing on the importance of knowledge in the quality of requirements, especially domain knowledge and knowledge representation [40], [41]. Interesting studies are also related to goal orientation enhanced with KM [18].

5. Methodology

As the first step of this research, we verified the assumption that M&A results are related to PMI results, as well as that PMI results are related to IS integration and could be supported by enterprise architecture. We explored related research studies and found evidence for this assumption [36]. In the following sections, a more detailed research process is defined for each of the research objectives. Each objective research process includes the following main steps – objective related problem research, objective related problem definition, solution hypothesis definition, and hypothesis validation.

5.1. RE and KM for PMI

The first objective of the research is "Define PMI specific RE and KM practices as a framework (REKM) that can lead to better PMI results".

To achieve this objective, we first investigated existing PMI research to identify PMI success criteria, blocking issues, and enabling factors. Based on these findings the hypothesis was stated that the practices from KM could contribute to solving identified issues and intensify identified enabling factors. As a next step, existing KM research was studied to find corresponding practices. As a result, we listed KM practices that are related to PMI blockers or enablers [37].

As IS integration is an important part of PMI activities, the results of IS integration should correlate with overall PMI results. The crucial success factor of IS development is obtaining high-quality requirements. RE is a discipline stressing the importance of an organised process for requirements and providing several possible RE frameworks. In recent years RE context is widening from just IS to socio-cyber-physical systems, and many merging organisations can be seen as SCPS. We then stated another hypothesis that existing RE frameworks applied for PMI could improve PMI results. As PMI is related to existing system integration, not new system development, and additional KM practices should be supported during PMI, we stated additional requirements for the PMI RE framework and studied current research on RE frameworks to select frameworks supporting such requirements. We reviewed and evaluated each of the selected frameworks and concluded that none of them supported all criteria. However, this allowed us to state the next hypothesis – that we can propose PMI specific RE framework, as a combination of selected frameworks in a way that all stated requirements would be supported. We defined the conceptual REKM framework and validated its applicability to the simplified real-life example [38]. As an additional framework validation step, we elaborated one of the framework phases into a more detailed process and artefact model and executed this model for a real-life PMI scenario [39].

The described research process is illustrated visually in Figure 1.

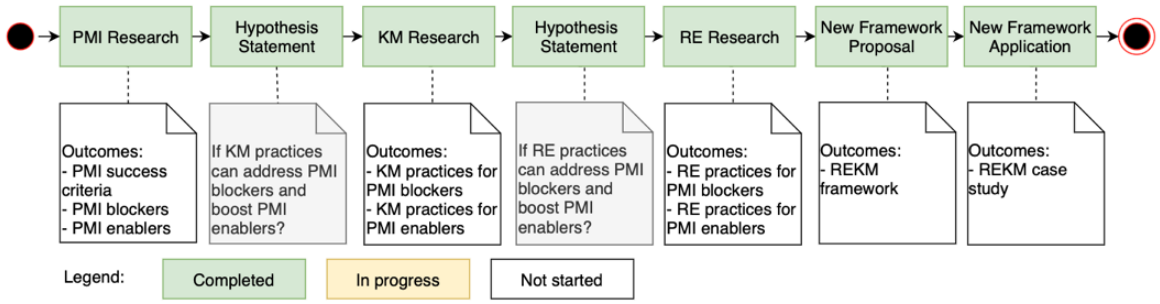

Figure 1: The research process for REKM definition

5.2. REKMEA framework

The second objective of the research is to "Select (develop) the EA framework most suitable for PMI and enhance it with selected RE and KM practices (REKMEA framework). Define PMI results evaluation method and validate proposed REKMEA framework".

As a first step, we defined the hypothesis that we can identify existing EA architecture frameworks, which would support PMI specifics and improve PMI results. We plan to research PMI requirements for EA architecture and state quality criteria for such a framework to test this hypothesis. The engaged and holistic properties of the EA should also be respected. With quality criteria in place, we plan to review existing EA frameworks and evaluate how much they comply with these criteria. Based on the evaluation results, we will detect which of the current EA frameworks is most suitable for PMI. The next step of the research will be to test the hypothesis that, if we extend this framework with practices from the REKM framework, it will comply with even more quality criteria specified and will lead to better PMI results. For this, we will propose a new REKMEA framework and validate it using two

parallel approaches. As the first validation approach, we will apply the same PMI scenario for the initial EA framework and the REKMEA framework and will compare the results in the PMI context. For comparison, we will need to define a method for evaluating PMI results. As the second validation approach, we will run a survey among professionals working within PMI initiatives and will ask them to review the REKMEA framework using previously stated quality criteria for PMI specific EA frameworks.

The described research process is illustrated visually in Figure 2.

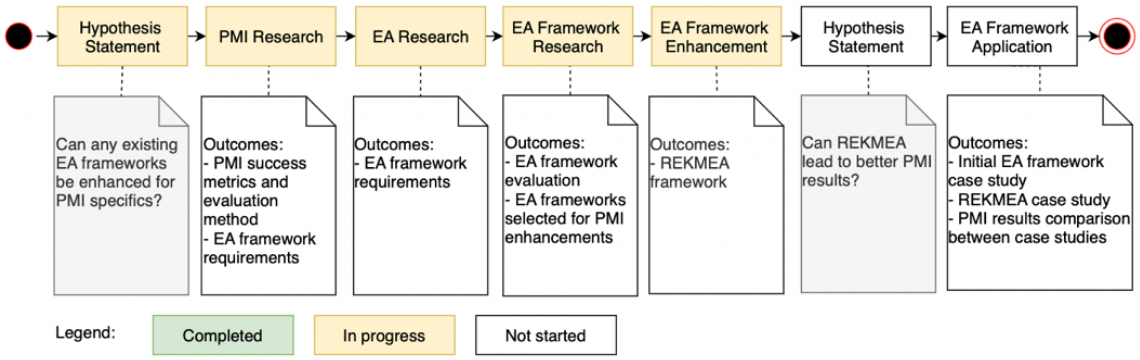

Figure 2: The research process for REKMEA definition

5.3. REKMEA automation

The third objective of the research is "If REKMEA framework will be proved as a solution for better PMI results, an additional goal for this research would be to define how this framework can be automated using existing tools or by creating a new tool".

To achieve this objective, we first plan to define quality criteria for EA automation and requirements for automation tools. Then we will test the hypothesis that there is an existing tool, supporting these requirements and suited for REKMEA framework automation. We will explore existing EA tools and evaluate each of them from two perspectives – 1) tool score by defined requirements and 2) tool gap for REKMEA support. Based on the evaluation results, we will be able to decide if any of the current tools could be used without adjustments, if any of the tools could be used with adjustments or if we need to create a new EA tool for REKMEA support. In case tool adjustments or new tool development is required, we plan to create a specification for tool implementation that later could be used as a basis for tool prototype creation. For qualitative validation, user testing will be organised and feedback gathered from tool target audience representatives. For quantitative validation, the created prototype will be applied for PMI real scenarios and results evaluated based on the defined quality criteria for the PMI tool. As an additional validation step, it is planned to apply the REKMEA framework for the same PMI scenario with and without automation and compare PMI results.

The described research process is illustrated visually in see Figure 3.

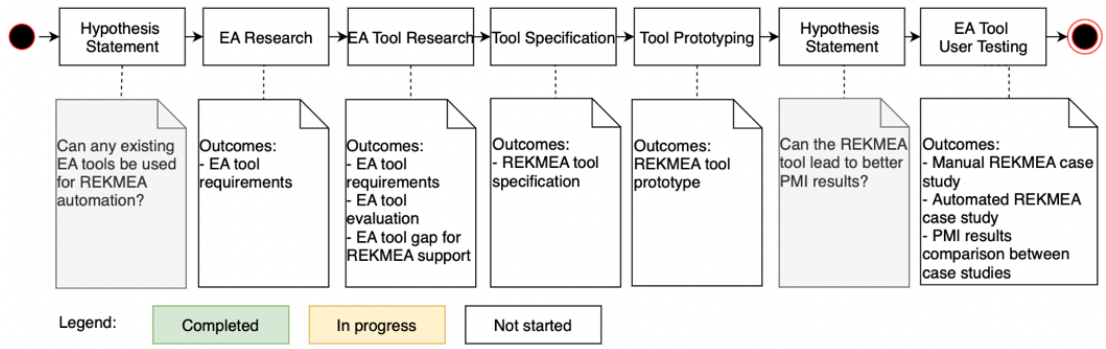

Figure 3: The research process for REKMEA automation

6. Expected outcome

The expected outcome of the research project is the development of PMI specific EA framework. This framework must meet all defined quality criteria and must be proven to contribute to better PMI results through practical application.

Presumptive enhancements for EA are illustrated visually in Figure 4 where EA activities are organised around PMI goals in smaller iterations. For each of the PMI goals current and future states should combine all EA layers (instead of creating separate current and future states for each of the EA layers). The technology layer, specifically the information system layer, should gain more focus.

The current state should be reflected for each of the PMI participants (merging organisations). The current state should also cover the PMI context. Current states should be explored for similarities, differences, and strong and weak sides for achieving stated PMI goals, before moving to future state identification.

The future state should be defined only after PMI requirements are defined and current states analysed. The ability to define the future state through PMI decisions (preservation, symbiosis, holding and absorption) should be supported.

A gap analysis should be performed for each of the PMI participants. A more detailed gap description needs to be created and represented as a solution specification covering the socio-cyber-physical space.

RE activities should be incorporated throughout the process.

Requirements elicitation should be incorporated as a separate phase. PMI requirements specification, validation, and agreement should become part of the process. Requirements change management phase should be incorporated together with corresponding EA changes. However, RE should not make a process more complicated and long, thus Agile practices should be applied instead of more formal methods.

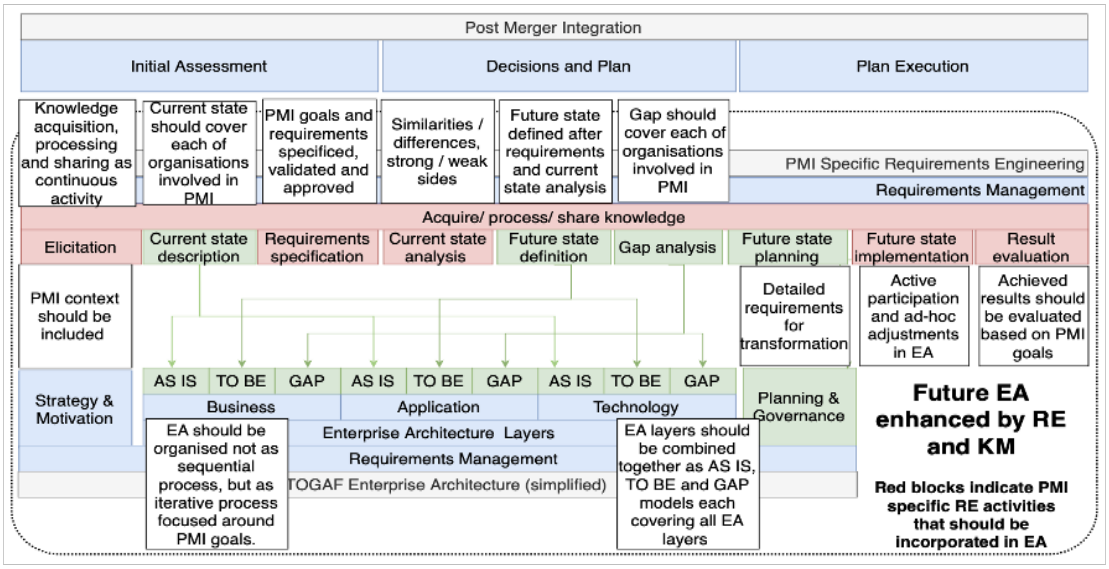

Figure 4: EA Enhancements with PMI Specific RE

Each process phase should be accompanied by knowledge acquisition, processing and sharing activities.

These enhancements are a preliminary list, that could be adjusted during the next phases of research.

Another outcome is the prototype of a tool for PMI specific EA automation. This tool should correspond to all defined quality criteria and prove its contribution to better PMI results through practical application.

7. State of the research

At this stage, the first objective of the research is achieved and PMI specific RE framework REKM is proposed and validated [38].

The second objective is currently in progress. Existing research about EA frameworks is investigated and quality criteria for PMI specific EA frameworks are defined. Publication of findings, as well as current EA framework evaluation, is in progress. According to the research methodology, the next research phases are planned during the upcoming year.

In the scope of this research, the existing RE and KM frameworks are explored, and a new PMI specific framework is proposed and validated by practical application.

In the next steps of the research, the proposed framework will be merged into one of the existing EA frameworks which will be recognised as the most suitable for the PMI context. That way a holistic framework will be created, addressing the need to focus on EA, and keep it engaged (through RE) and holistic (through KM).

As a final step of the research, the solution for REKMEA automation will be proposed.

8. Conclusion

This summary of PhD research highlights the importance of the PMI phase for overall M&A results and focuses on the solving research problem of defining an EA, improved by RE and KM, that can lead to better PMI results. Three phases of the research are defined. Currently, only the first phase and some parts of the second phase of research have been accomplished and their results reported. For the rest of the work, only the plan is presented in this paper.

9. Acknowledgements

I would like to thank professor Marite Kirikova (https://orcid.org/0000-0002-1678-9523) for her support in this research.

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