Consolidating Enterprise Architecture Management Research

Svyatoslav Kotusev
School of Business IT and Logistics
RMIT, Melbourne, Australia
kotusev@kotusev.com

Mohini Singh
School of Business IT and Logistics
RMIT, Melbourne, Australia
mohini.singh@rmit.edu.au

Ian Storey
School of Business IT and Logistics
RMIT, Melbourne, Australia
ian.storey@rmit.edu.au

Abstract

Enterprise architecture (EA) is a description of an enterprise from an integrated business and IT perspective. Enterprise architecture management (EAM) is a management practice of using EA aiming to achieve business/IT alignment. Popular EA literature states that EA always includes a documentation of current and future states of enterprises and describes EAM as an iterative step-wise process. However, plenty of evidence suggests that the real situation in EA practice and theory is much more diverse but a consolidated understanding of EAM is absent. In this paper we consolidate EAM research and present (1) a reasonable definition of EA taking into account all that we know about EA practice and (2) a consolidated view of EAM describing what we know about it beyond the most popular approaches. We also discuss the relationship between our consolidated view of EAM and the previous research, its implications and directions for future research.

1. Introduction

The role of IT for modern companies is tremendous. Companies spend huge amounts of money investing in IT. However, in order to realize the full potential value of IT investments, IT strategy of a company should be aligned with its business strategy. Enterprise architecture (EA) is a description of an enterprise from an integrated business and IT perspective recognized as a proven instrument to facilitate business/IT alignment. Enterprise architecture management (EAM) is a management practice embracing all the management processes related to EA aiming to achieve business/IT alignment [1].

Mainstream EA literature [2-4] states that EA includes a description of a current state of an enterprise, a description of a future state of an enterprise and a transition plan. Popular EA literature [5-8] describes EAM roughly as a four-step iterative process: (1) document a current state of an enterprise, (2) develop a desired future state of an enterprise, (3) develop a transition plan describing how to migrate from the current state to the future state and (4) implement the plan. However, the surveys [9-11] demonstrate that EA in real companies often does not include current states, future states and transition plans. The case studies [12-14] demonstrate that EAM in real companies often does not resemble the four-step iterative process described above. Moreover, significantly different descriptions of EAM also exist in literature [15, 16]. Therefore, dominant understanding of EA and EAM [2, 5-7] does not reflect accurately the whole theoretical and practical picture of EA. This inaccuracy has detrimental implications for both EA theory and practice.

From the theoretical point of view, many authors [17-21] take the dominating step-wise description of EAM [5] as a reference model of EAM for their research. However, as the surveys [9-11] demonstrate, EAM in real companies can differ significantly from this model. Consequentially, the research based on the popular step-wise description of EAM has low credibility. At the same time, arguably no alternative models describing EAM in a general case were proposed in literature. More realistic conceptualization of EAM is needed.

From the practical point of view, the wide-spread misconception that EAM always implies following formal processes and a creation of volumes of documentation [2, 5, 6] prevents practitioners from considering and adopting more flexible and pragmatic approaches to EAM [15, 16] and often leads to the failures of EA initiatives [22].

We argue that these theoretical and practical problems result from a lack of consolidated understanding of EA and EAM [1, 23] often leading to situations when researchers [17-21] and practitioners [22] identify EAM only with the most popular approaches to EAM [2, 5, 6] ignoring less popular but not less important ones [15, 16]. In this

1530-1605/15 $31.00 © 2015 Crown Copyright
DOI 10.1109/HICSS.2015.489

paper we try to consolidate EAM research and present (1) a reasonable definition of EA taking into account all that we know about EA practice and (2) a consolidated view of EAM describing what we know about it beyond the most popular approaches [2, 5, 6].

This paper continues as follows: (1) we formulate a reasonable definition of EA and explain the reasons behind it, (2) we review and analyze all the approaches to EAM described in literature, (3) we present a consolidated view of EAM, (4) we discuss how our consolidated view of EAM relates to other attempts to consolidate EA research, (5) we discuss its implications for EA theory and practice and (6) we discuss directions for future research.

2. Reasonable definition of EA

As a first step to consolidate EAM research we need to formulate a reasonable definition of EA. Different authors [2, 15, 24] give different definitions of EA. Despite the calls for establishing a clear academic definition of EA [25], commonly accepted definition of EA still does not exist [1, 25-28].

Reasonable common definition of EA should respect and suit all the different ways how EA can be managed [5, 15, 16], otherwise it can never become commonly accepted. We should distinguish EA from EAM because EA is a description and EAM is what we do with this description. Therefore, reasonable definition of EA should include only the information on this description, but not on how it is developed, managed or used because this information is relevant to EAM instead of EA. In the next paragraphs we will discuss several popular definitions of EA and explain how they break this rule.

Bernard [2] gives the following definition of EA:

"[EA is] the analysis and documentation of an enterprise in its current and future states from an integrated strategy, business, and technology perspective"

This definition explicitly says that EA should always include a description of current and future states. However, it depends on how EA is going to be managed. Some approaches to EAM [2, 5, 6] use descriptions of the both states, while others [15, 16] use only one of them. Moreover, less than a half of all companies document the both states [9]. Therefore, this definition can never become a commonly accepted one.

Ross et al. [15] give the following definition of EA:

"EA is the organizing logic for business processes and IT infrastructure reflecting the integration and standardization requirements of the company's operating model"

This definition explicitly says that EA development should be based on operating model. However, other approaches to EAM [2, 6] state that EA should be developed based on business strategy instead of operating model. Therefore, this definition can never become a commonly accepted one.

Lankhorst [24] gives the following definition of EA:

"[EA is] a coherent whole of principles, methods, and models that are used in the design and realization of an enterprise's organizational structure, business processes, information systems, and infrastructure"

This definition explicitly says how EA should be used. However, this information is relevant to EAM but not to EA. Moreover, we did not find any approaches to EAM describing how exactly EA can be used for design and realization of organizational structures. Therefore, this definition can never become a commonly accepted one.

All the definitions of EA discussed above include the information on how EA should be developed, managed or used which can vary depending on a chosen approach to EAM. That is why none of these definitions can become a commonly accepted one.

However, the nature of EA as a description also depends on intended approach to EAM because particular set of artifacts used to describe EA can vary significantly depending on the chosen approach to EAM. For instance, Van't Wout et al. [29] propose to use close to a hundred of various formal artifacts to describe EA, while Ross et al. [15] propose to use essentially only one artifact, a core diagram. Means proposed to describe EA vary substantially from rigid and detailed blueprints drawn according to strict notation [30] to flexible and abstract verbal principles [16]. Therefore, particular artifacts which can be potentially used to describe EA, their types and numbers, can vary significantly from one approach to EAM to another. Consequentially, the definitions of EA [30, 31] describing which particular artifacts should be used to describe it can never become commonly accepted ones.

At the same time, some definitions of EA [4, 5, 32] do not state explicitly that EA is related specifically to business and IT. Arguably, a reasonable definition of EA should reflect this fact because EA is about business capabilities and information systems but not about floor plans or building architectures.

Therefore, it can be summarized that a reasonable common definition of EA (1) should not include any details relevant to EAM because they can vary depending on a chosen approach, (2) should not

include any particular artifacts used to describe it because they can vary depending on a chosen approach to EAM and (3) should explicitly state that EA is about business and IT.

From this point of view, many EA definitions found in literature look unreasonable. We suggest that if we will ever see a commonly accepted definition of EA it will not contain any references to intended approach [2, 4], development [2, 15], artifacts [30, 31], usage [24] or any other details relevant only to a limited number of possible approaches to EAM because truly general definition of EA should be relevant to all the possible approaches to EAM. All the definitions discussed above and many others found in literature [3, 6, 16, 33, 34] are not bad. Probably they adequately describe a specific approach to EAM, a concrete EA practice in some enterprise or a particular author's experience with EA. However, the majority of them contain specific details of EAM which can vary and are, in a general case, wrong. Therefore, the majority of existing definitions of EA does not reflect the whole multitude of possible approaches to EAM (even a limited number of approaches described in literature).

According to the three requirements to EA definition formulated and discussed above, we argue that a reasonable common definition of EA could hardly be more detailed and precise than the definition of EA we gave earlier:

"Enterprise Architecture is a description of an enterprise from an integrated business and IT perspective"

3. Different approaches to EAM

As a second step to consolidate EAM research we need to study and analyze all the different approaches to EAM described in literature. For that purpose we conducted a comprehensive literature analysis aiming to find all the different consistent descriptions of EAM.

3.1. Literature analysis method

In our literature review on EA we did not concentrate only on the top journals and conferences [35] and, taking into account the dearth of EA publications in the leading IS journals and the influence of non-academic EA publications [3, 23], industry publications on EA were also reviewed. Therefore, our literature analysis in this paper is based on 229 ranked IS journals [36, 37], 234 ranked IS conferences [38] and books for EA practitioners.

We were interested only in papers published in English and sourced with keywords "Enterprise Architecture", "Enterprise Architectures", "Enterprise Architecting", "Enterprise Architectural", "Enterprise Architect", "Enterprise Architects" as well as the popular abbreviations "EA" and "EAM".

We used the Google Scholar as a primary search engine for our review. However, we also used IEEE Xplore, AIS Electronic Library, SpringerLink and ACM Digital Library as secondary search engines to double check all the results. Additionally, the available books for EA practitioners were searched from the Amazon website.

Our literature review was conducted in 2013 and its results were double-checked in the beginning of 2014 in order to cover all the available EA publications up to date. Totally we identified and studied 919 publications (290 journal articles, 454 conference proceedings, 45 books, 93 book chapters and 37 other publications) potentially relevant to EA. However, only the 15 of all these publications [2, 5-8, 15, 16, 29, 30, 39-44] provided independent and consistent description of EAM.

From our analysis of these 15 publications describing EAM we identified the three different consistent approaches to EAM which we will discuss further under the titles Traditional (because it was described first), MIT (because it was developed at MIT) and DYA (because this title is given by its authors) since they do not have any established titles in literature. Each of these approaches describes a significantly different way of doing EAM. In the next sections we will briefly describe each of them and compare them with each other.

3.2. Traditional approach

The traditional approach to EAM was initially presented by Spewak and Hill [6]. Their seminal publication inspired many other similar EAM methodologies [45]. We found 13 independent publications [2, 5-8, 29, 30, 39-44] giving more or less detailed description of the traditional approach to EAM. The traditional approach to EAM can be generally described as a four-step sequential process: (1) document the current (as-is, baseline) state, (2) develop the desired future (to-be, target) state, (3) develop the transition plan (roadmap) to migrate from the current to the future state, (4) implement the plan and then repeat the whole process all over again. EA in the traditional approach is represented by the three more or less detailed documents: a description of the current state, a description of the future state and a transition plan. The traditional approach to EAM relies on a detailed long-term centralized

architectural planning. EAM in the traditional approach is implemented either as a long-term project or as an iterative process. Some variations of the traditional approach [5, 6] emphasize the importance of a formal EA development process while others [30, 44] emphasize the importance of an extensive modeling, however all of them support the original four-step logic of EAM.

3.3. MIT approach

The MIT approach to EAM was developed in Massachusetts Institute of Technology (MIT) by Ross et al. [15]. The MIT approach advocates the development of a core diagram reflecting a long-term enterprise-level architectural vision. This abstract architectural vision should be later translated into concrete project-level decisions through IT governance mechanisms involving business and IT managers on different organizational levels. The essence of EA in the MIT approach is represented by the core diagram. The MIT approach relies on the top management setting the architectural direction and the subsequent translation of this direction into concrete project-level decisions. EAM in the MIT approach is an integral part of organizational decision-making processes.

3.4. DYA approach

The DYA (DYnamic Architecture) approach to EAM was developed in Sogeti Nederland in 2001 and presented internationally by Wagter et al. [16]. DYA advocates "just enough, just in time" architecture, no EA is designed until there is a need for it. EAM activities in the DYA approach are triggered by concrete business initiatives appearing in the process of a strategic dialogue. As a response to a new business initiative, architectural services update EA if necessary and prepare a project-start architecture for a new project in order to ensure that this new project fits nicely into existing EA and larger picture. Development teams typically use provided project-start architectures in their projects (development with architecture), however sometimes they do not do so if there are justifiable reasons for it (development without architecture). EA in the DYA approach is represented mostly by a set of architectural principles. Detailed architectural diagrams play only a secondary temporary role in DYA. They are developed only when necessary to facilitate discussions but not maintained purposefully afterwards, however, they are reused when possible. The DYA approach relies on the ability to support emergent business initiatives with adequate project-start architectures in order to preserve the overall architectural consistency. EA in the DYA approach helps to do things right, but not to do the right things. EAM in the DYA approach is tightly integrated with other organizational processes.

3.5. Comparison of the three approaches

Each of these three approaches to EAM employs EA to facilitate business/IT alignment, however each of them employs it in a different manner, moreover the very nature of EA is different in each of them. EA in the traditional approach describes a desired future state in detail as well as a detailed plan on how to get there. EA in the MIT approach sets only a direction of a desired future but does not describe it in detail and in the DYA approach provides only the efficient means to achieve any desired future state but does not describe it at all. EA in the traditional approach describes what exactly should be developed, in the MIT approach it describes what approximately should be developed, in the DYA approach it describes only how it should be done. EAM in the traditional approach is completely proactive because it provides an organization with detailed plans on its future in advance. EAM in the MIT approach combines both proactive and reactive features because it provides an organization with a direction of its future in advance while leaving enough leeway for following this direction and reacting to emergent needs. EAM in the DYA approach is completely reactive because it does not provide an organization with any plans in advance but gives it a full freedom in chasing unexpected business opportunities. Comparison of the three approaches to EAM is summarized in Table 1.

Looking at the three different approaches to EAM described in literature it is hard not to ask which one of them is more suitable for different companies and situations. Present EA literature does not give any answers to this question. None of the publications describing any particular approach to EAM compares it with any other approaches or discusses its advantages, limitations, applicability or situations when it should and should not be employed. Moreover, the very existence of different approaches to EAM is not recognized by other authors while the vast majority of present EA publications revolve only around the traditional approach. We did not find any publications discussing together or comparing any two of these approaches.

Table 1. Comparison of the three approaches to EAM

Approach to EAM	Traditional	MIT	DYA
Definitive source(s)	13 different publications	Ross et al. [15]	Wagter et al. [16]
Temporal nature	Iterative, step-wise	Continuous	Event-driven
When to develop or update EA	In the beginning of iteration or project	When business changes severely	When EA is needed
How to develop EA	Formal process	Informal process	No process
EA states	Current and future states	Future state	Current state
Essential EA artifacts	Detailed current and future states, detailed transition plan (roadmap)	Architectural vision (core diagram)	Architectural principles
How to use EA	Implement transition plan	Influence project-level decisions through architecture linkage	Prepare project-start architecture derived from EA for each new project
Key terms	Current/future (as-is/to-be) state, gap analysis, transition plan, iteration, transformation	Core diagram, IT engagement model, architecture linkage	Strategic dialogue, architectural services, development with(out) architecture, project-start architecture
Relationship between EA and organization	EAM is a separate program or project	EAM is an integral part of decision-making processes	EAM is tightly integrated with other organizational processes
Relationship between EA and IT projects	EA describes necessary IT projects	EA guides and directs IT projects development	EA responds to emergent IT projects needs
Attitude	Proactive	Proactive and reactive	Reactive
Direction	Top-down	Top-down and bottom-up	Bottom-up
Flexibility	Rigid	Compromising	Flexible
Vision of the future	Detailed	Abstract	No
Upfront planning	Extensive	Limited	No
Level of detail	High	Moderate	Low
Role of EA	Prescribing	Directing	Supporting
What is EA	Destination	Direction	Means
Who is EA	Master	Mentor	Servant

4. Consolidated view of EAM

As a last step to consolidate EAM research we need to present a broad picture describing EAM. This broad picture should demonstrate what we know about EAM.

In the previous section we discussed the three different approaches to EAM described in 15 independent publications. In order to present a consolidated view of EAM we should reconcile these publications and join them into a single picture. However, all these publications are purely prescriptive. Moreover, only one of them [15] is based on empirical research while all the others are based only on anecdotal evidence. Therefore, it is not clear whether real companies follow these approaches and to what extent they reflect the actual EAM in real companies.

A number of case studies [12-14, 46, 47] demonstrate that EAM in the real companies rarely conforms to any one of these approaches in every detail but combines various elements from different approaches. The surveys also demonstrate that real companies employ different EA documentation patterns [9, 11], produce different EA deliverables [10] and update EA at different moments [11].

Therefore, these three consistent approaches to EAM described in literature do not represent the only possible three stable discrete states of EAM but rather three considerable points in a continuum of possible approaches to EAM ranging from rigid and heavyweight approaches to flexible and lightweight ones. Figure 1 shows the consolidated view of EAM demonstrating the continuum of possible approaches to EAM with their essential elements: development, description and usage.

Figure 1. Consolidated view of EAM

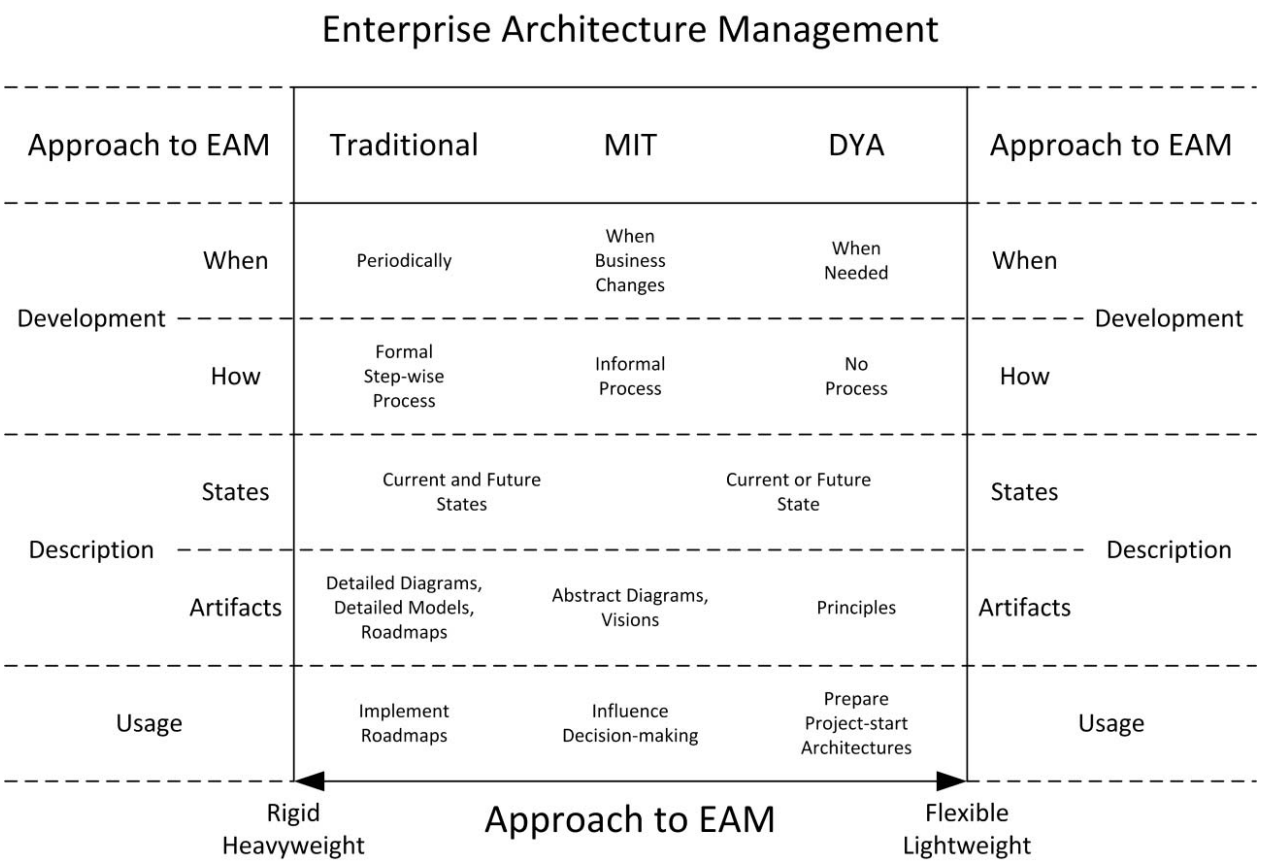


Figure 1 shows that each essential element of EAM (development, description and usage) can vary significantly in a continuum of possible options from more rigid ones to more flexible ones. Each element has a certain degree of independence from other elements. However, development, description and usage elements are not completely independent. For instance, if chosen approach to EAM implies implementing roadmaps than these roadmaps should be properly developed and described.

Companies choosing more rigid and heavyweight options for each element implement the traditional approach to EAM advocated by Bernard [2], Spewak and Hill [6] and other authors [5, 7, 8, 44]. They follow formal step-wise processes to develop EA, document both current and future states with a huge number of diagrams, create roadmaps and then implement them. Companies choosing more flexible and lightweight options for each element implement the DYA approach to EAM advocated by Wagter et al. [16]. They update EA only when it is necessary without following any formal processes, describe current state with a number of simple principles and prepare project-start architectures for emerging projects. Companies choosing moderate options for each element implement the approach to EAM similar to the MIT approach described by Ross et al. [15]. However, many companies [12-14, 46, 47] chose different combinations of options for each element and implement their own unique approaches to EAM.

5. Related works

Many papers related to EA were published since its appearance as an established academic topic [1]. Unsurprisingly, many authors [1, 23, 26, 27, 48-52] aimed to consolidate EA research or analyze its current state. Therefore, it is necessary to discuss how the consolidated view of EAM (see Figure 1) based on the three approaches to EAM (Traditional, MIT and DYA) is related to the previous works intended to analyze or consolidate EA research.

Firstly, several authors [1, 23, 27, 48, 51] aimed to consolidate EA research with formal comprehensive EA literature reviews. The issues addressed in these reviews include topics, communities and reference disciplines of EA publications [48], language communities of EA

research [51], theory types and empirical validity of EA publications [27], origins and geographical distribution of EA publications [23], bibliometric and content analysis of EA publications [1]. However, none of these reviews was specifically focused on analyzing EAM.

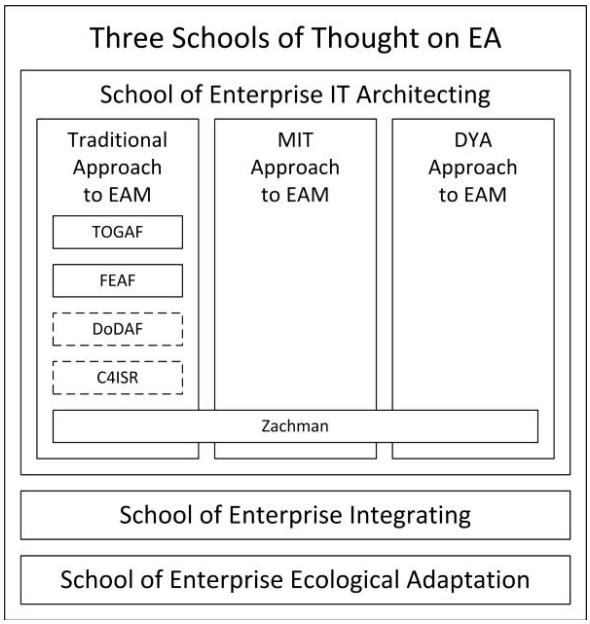
Secondly, a number of authors presented EA literature reviews focused on specific EA-related topics: benefits of using EA [3], EA principles [53, 54], EA and strategic change [55] and some other topics [56, 57]. However, none of these reviews addressed EAM.

Thirdly, Lapalme [26] analyzed EA research and identified the three different schools of thought on EA: Enterprise IT Architecting, Enterprise Integrating and Enterprise Ecological Adaptation. However, as he posited, these three schools represent only the ways of thinking about EA rather than the ways of doing EA. Therefore, his taxonomy describes only the three different systems of beliefs about EA rather than different ways to organize EAM. All the identified approaches to EAM belong to Enterprise IT Architecting school of thought because they were either allocated to it by Lapalme [5, 6, 15] or arguably fall under a school's description [16].

Forthly, many authors [49, 50, 52] describe or analyze the current state of EA research through comparing or analyzing existing EA frameworks. All EA frameworks could be loosely allocated to the three categories on the basis of their relation to the three approaches to EAM: traditional approach supporters, conditional traditional approach supporters and approach-independent frameworks. The traditional approach supporters category includes all the frameworks explicitly prescribing to organize EAM in a traditional way, that is to document a current state, develop a future state, prepare a transition plan and implement it [5, 43]. The conditional traditional approach supporters category includes all the frameworks which, though do not describe the whole approach to EAM in detail, describe various elements of EAM which correlate only with the traditional approach to EAM, for instance, creation and relying on an extensive detailed documentation or a formal step-wise architecture development process [58, 59]. Approach-independent frameworks provide only a structure for EA artifacts but do not describe any elements of EAM at all, therefore, could be potentially used in all approaches to EAM [60].

The described relationship between the three approaches to EAM, the three schools of thought on EA and several popular EA frameworks is illustrated graphically on Figure 2.

Figure 2. Approaches to EAM, schools of thought on EA and EA frameworks



6. Implications for theory and practice

The consolidated view of EAM (see Figure 1) has important implications for both EA theory and practice. From the theoretical point of view, the consolidated view of EAM clearly demonstrates that EAM does not always include step-wise development processes, transition plans, current and future states. This circumstance is often ignored by EA researchers [17-21] who take the traditional step-wise approach to EAM as a reference model of EAM for their research presuming that this approach is the only possible one. Taking into account the variety of possible approaches to EAM demonstrated by the consolidated view of EAM, their research can be considered as questionable because its underlying presumption is false.

From the practical point of view, the consolidated view of EAM demonstrates that many different approaches to EAM are available for organizations to choose from instead of blindly following the traditional heavyweight approach to EAM often leading to severe problems [22]. The consolidated view of EAM demonstrates that there is no one "right" solution and explains the various possible options for different elements of EAM (development, description and usage). It can help EA practitioners to establish more pragmatic approaches to EAM in their organizations suitable for their unique environments.

7. Directions for future research

As we have already discussed above, the consolidated view of EAM (see Figure 1) demonstrates that the traditional step-wise approach to EAM cannot be used as a reference model of EAM in EA research because it is only the one of many possible approaches to EAM used in organizations. However, no models explaining EAM in a general case were proposed in literature. Therefore, we do not have any reference models of EAM to base the future research on. We argue that the development of a meaningful generic model of EAM which can be used to represent EAM in all possible cases can make a valuable contribution to EA theory and call for a development of such a model.

In order to develop a generic reference model of EAM, it is necessary to study EAM in real companies and distinguish common patterns among different possible variations of EAM. These patterns, if discovered, can be used as a basis for development of a generic model of EAM. This model, after being developed, can serve as a sound basis for the future research in EA.

8. Conclusion

In this paper we tried to consolidate EAM research and summarize what we know about EA and EAM. Firstly, we explained why many popular existing definitions of EA seem unreasonable taking into account all the information we know about EA practice today. We formulated the three rules which a definition of EA should satisfy in order to become commonly accepted and presented a possible reasonable definition of EA satisfying these rules. Secondly, we reviewed and analyzed all the approaches to EAM described in literature and presented a consolidated view of EAM demonstrating what we know about it (see Figure 1). Our consolidated view of EAM clearly shows that EAM can be very different and, contrary to the popular opinion, does not always include documenting both current and future states, developing and implementing transition plans.

After presenting the consolidated view of EAM we discussed how it is related to other numerous attempts to consolidate EA research and explained its relationship to EA frameworks and to the three schools of thought on EA proposed by Lapalme [26]. Then we discussed the implications of the consolidated view of EAM for EA theory and practice. For EA theory, we showed that a step-wise traditional approach to EAM cannot be used as a reference model of EAM because it is only the one of many possible approaches to EAM and is often not used in practice. For EA practice, we showed the EA practitioners are not limited to the traditional heavyweight approach to EAM but have a wide variety of possible approaches to EAM to choose from and showed the possible options for different elements of EAM (development, description and usage).

Since a generic reference model of EAM able to describe EAM in all possible variations does not exist, we called for a development of such a model and discussed how it can be developed. This model, after being developed, can serve as a sound basis for the future research in EA.

9. References

[1] Simon, D., Fischbach, K., and Schoder, D., "An Exploration of Enterprise Architecture Research", Communications of the Association for Information Systems, 32(1), 2013, pp. 1-72.

[2] Bernard, S.A., An Introduction to Enterprise Architecture, AuthorHouse, 3rd edn, Bloomington, IN, 2012.

[3] Tamm, T., Seddon, P.B., Shanks, G., and Reynolds, P., "How Does Enterprise Architecture Add Value to Organisations?", Communications of the Association for Information Systems, 28(1), 2011, pp. 141-168.

[4] Fea, "A Practical Guide to Federal Enterprise Architecture, Version 1.0", Chief Information Officer Council, Springfield, VA, 2001,

[5] Togaf, "Togaf Version 9.1", G116, The Open Group, 2011,

[6] Spewak, S.H., and Hill, S.C., Enterprise Architecture Planning: Developing a Blueprint for Data, Applications and Technology, QED Information Sciences, Inc., Boston, MA, 1993.

[7] Armour, F.J., Kaisler, S.H., and Liu, S.Y., "Building an Enterprise Architecture Step by Step", IT professional, 1(4), 1999, pp. 31-39.

[8] Schekkerman, J., Enterprise Architecture Good Practices Guide: How to Manage the Enterprise Architecture Practice, Trafford Publishing, Victoria, BC, 2008.

[9] Winter, K., Buckl, S., Matthes, F., and Schweda, C.M., "Investigating the State-of-the-Art in Enterprise Architecture Management Methods in Literature and Practice", Proceedings of the 5th Mediterranean Conference on Information Systems, 2010, pp. 1-12.

[10] Obitz, T., and Babu, M., "Infosys Enterprise Architecture Survey 2008/2009", Infosys, Bangalore, India, 2009, pp. 1-27.

[11] Roth, S., Hauder, M., Farwick, M., Breu, R., and Matthes, F., "Enterprise Architecture Documentation: Current Practices and Future Directions", Proceedings of the 11th International Conference on Wirtschaftsinformatik, 2013, pp. 911-925.

[12] Erder, M., and Pureur, P., "Transitional Architectures for Enterprise Evolution", IT professional, 8(3), 2006, pp. 10-17.

[13] Murer, S., Bonati, B., and Furrer, F.J., Managed Evolution: A Strategy for Very Large Information Systems, Springer, Berlin, 2011.

[14] Holst, M.S., and Steensen, T.W., "The Successful Enterprise Architecture Effort", Journal of Enterprise Architecture, 7(4), 2011, pp. 16-22.

[15] Ross, J.W., Weill, P., and Robertson, D.C., Enterprise Architecture as Strategy: Creating a Foundation for Business Execution, Harvard Business School Press, Boston, MA, 2006.

[16] Wagter, R., Van Den Berg, M., Luijpers, J., and Van Steenbergen, M., Dynamic Enterprise Architecture: How to Make It Work, Wiley, Hoboken, NJ, 2005.

[17] Lucke, C., Krell, S., and Lechner, U., "Critical Issues in Enterprise Architecting - a Literature Review", Proceedings of the 16th Americas Conference on Information Systems, 2010, pp. 1-11.

[18] Rohloff, M., "Integrating Innovation into Enterprise Architecture Management", Proceedings of the 9th International Conference on Wirtschaftsinformatik, 2011, pp. 776-786.

[19] Barateiro, J., Antunes, G., and Borbinha, J., "Manage Risks through the Enterprise Architecture", Proceedings of the 45th Hawaii International Conference on System Sciences, 2012, pp. 3297-3306.

[20] Pruijt, L., Slot, R., Plessius, H., Bos, R., and Brinkkemper, S., "The Enterprise Architecture Realization Scorecard: A Result Oriented Assessment Instrument", Proceedings of the 7th Trends in Enterprise Architecture Research Workshop, 2012, pp. 300-318.

[21] Espinosa, J.A., and Boh, W.F., "Coordination and Governance in Geographically Distributed Enterprise Architecting: An Empirical Research Design", Proceedings of the 42nd Hawaii International Conference on System Sciences, 2009, pp. 1-10.

[22] Löhe, J., and Legner, C., "Overcoming Implementation Challenges in Enterprise Architecture Management: A Design Theory for Architecture-Driven It Management (Adrima)", Information Systems and e-Business Management, 12(1), 2014, pp. 101-137.

[23] Mykhashchuk, M., Buckl, S., Dierl, T., and Schweda, C.M., "Charting the Landscape of Enterprise Architecture Management", Proceedings of the 9th International Conference on Wirtschaftsinformatik, 2011, pp. 570-577.

[24] Lankhorst, M., Enterprise Architecture at Work: Modelling, Communication and Analysis, Springer, 3rd edn, Berlin, 2013.

[25] Kappelman, L., Mcginnis, T., Pettite, A., and Sidorova, A., "Enterprise Architecture: Charting the Territory for Academic Research", Proceedings of the 14th Americas Conference on Information Systems, 2008, pp. 1-10.

[26] Lapalme, J., "Three Schools of Thought on Enterprise Architecture", IT professional, 14(6), 2012, pp. 37-43.

[27] Radeke, F., "Awaiting Explanation in the Field of Enterprise Architecture Management", Proceedings of the 16th Americas Conference on Information Systems, 2010, pp. 1-10.

[28] Schöenherr, M., "Towards a Common Terminology in the Discipline of Enterprise Architecture", Proceedings of the 3rd Trends in Enterprise Architecture Research Workshop, 2008, pp. 400-413.

[29] Van't Wout, J., Waage, M., Hartman, H., Stahlecker, M., and Hofman, A., The Integrated Architecture Framework Explained: Why, What, How, Springer, Berlin, 2010.

[30] Boar, B.H., Constructing Blueprints for Enterprise It Architectures, Wiley, New York, NY, 1999.

[31] Alaeddini, M., and Salekfard, S., "Investigating the Role of an Enterprise Architecture Project in the Business-It Alignment in Iran", Information Systems Frontiers, 15(1), 2013, pp. 67-88.

[32] Zachman, J.A., "Enterprise Architecture: The Issue of the Century", Database Programming and Design, 10(3), 1997, pp. 44-53.

[33] Richardson, G.L., Jackson, B.M., and Dickson, G.W., "A Principles-Based Enterprise Architecture: Lessons from Texaco and Star Enterprise", MIS quarterly, 14(4), 1990, pp. 385-403.

[34] Ross, J.W., "Creating a Strategic It Architecture Competency: Learning in Stages", MIS Quarterly Executive, 2(1), 2003, pp. 31-43.

[35] Webster, J., and Watson, R.T., "Analyzing the Past to Prepare for the Future: Writing a Literature Review", MIS quarterly, 26(2), 2002, pp. xiii-xxiii.

[36] Abdc, "Abdc Journal Quality List 2013", 2013, http://www.abdc.edu.au/data/ABDC_Journal_Quality_List_2013.xlsx, accessed 8 April, 2014.

[37] Acphis, "Is Journals Ranking", 2013, http://www.acphis.org.au/index.php/is-journal-ranking/rank-order, accessed 8 April, 2014.

[38] Arc, "Era 2010 Conference List", 2010, http://mro.unimelb.edu.au/sites/default/files/public/data-collections/publications-collection/ERA2010_conference_list.xls, accessed 8 April, 2014.

[39] Bittler, R.S., and Kreizman, G., "Gartner Enterprise Architecture Process: Evolution 2005", G00130849, Gartner, Stamford, CT, 2005, pp. 1-12.

[40] Covington, R., and Jahangir, H., "The Oracle Enterprise Architecture Framework", Oracle, Redwood Shores, CA, 2009,

[41] Theuerkorn, F., Lightweight Enterprise Architectures, Auerbach Publications, Boca Raton, FL, 2004.

[42] Niemann, K.D., From Enterprise Architecture to It Governance: Elements of Effective It Management, Vieweg, Wiesbaden, 2006.

[43] Feaf, "Federal Enterprise Architecture Framework, Version 1.1", Chief Information Officer Council, Springfield, VA, 1999,

[44] Longépé, C., The Enterprise Architecture It Project: The Urbanisation Paradigm, Kogan Page Science, London, 2003.

[45] Spewak, S., and Tiemann, M., "Updating the Enterprise Architecture Planning Model", Journal of Enterprise Architecture, 2(2), 2006, pp. 11-19.

[46] Haki, M.K., Legner, C., and Ahlemann, F., "Beyond Ea Frameworks: Towards an Understanding of the Adoption of Enterprise Architecture Management", Proceedings of the 20th European Conference on Information Systems, 2012, pp. 1-12.

[47] Smith, H.A., Watson, R.T., and Sullivan, P., "Delivering an Effective Enterprise Architecture at Chubb Insurance", MIS Quarterly Executive, 11(2), 2012, pp. 75-85.

[48] Langenberg, K., and Wegmann, A., "Enterprise Architecture: What Aspects Is Current Research Targeting?", IC/2004/77, Ecole Polytechnique Federale de Lausanne, Lausanne, Switzerland, 2004, pp. 1-12.

[49] Greefhorst, D., Koning, H., and Van Vliet, H., "The Many Faces of Architectural Descriptions", Information Systems Frontiers, 8(2), 2006, pp. 103-113.

[50] Sessions, R., "A Comparison of the Top Four Enterprise-Architecture Methodologies", 2007, http://msdn.microsoft.com/en-us/library/bb466232.aspx, accessed 8 April, 2014.

[51] Schelp, J., and Winter, R., "Language Communities in Enterprise Architecture Research", Proceedings of the 4th International Conference on Design Science Research in Information Systems and Technology, 2009, pp. 1-10.

[52] Leist, S., and Zellner, G., "Evaluation of Current Architecture Frameworks", Proceedings of the 21th ACM Symposium on Applied Computing, 2006, pp. 1546-1553.

[53] Haki, M.K., and Legner, C., "New Avenues for Theoretical Contributions in Enterprise Architecture Principles - a Literature Review", Proceedings of the 7th Trends in Enterprise Architecture Research Workshop, 2012, pp. 182-197.

[54] Stelzer, D., "Enterprise Architecture Principles: Literature Review and Research Directions", Proceedings of the 4th Trends in Enterprise Architecture Research Workshop, 2009, pp. 12-21.

[55] Radeke, F., "Toward Understanding Enterprise Architecture Management's Role in Strategic Change: Antecedents, Processes, Outcomes", Proceedings of the 9th International Conference on Wirtschaftsinformatik, 2011, pp. 497-507.

[56] Labusch, N., and Winter, R., "Towards a Conceptualization of Architectural Support for Enterprise Transformation", Proceedings of the 21st European Conference on Information Systems, 2013, pp. 1-12.

[57] Mueller, T., Schuldt, D., Sewald, B., Morisse, M., and Petrikina, J., "Towards Inter-Organizational Enterprise Architecture Management - Applicability of Togaf 9.1 for Network Organizations", Proceedings of the 19th Americas Conference on Information Systems, 2013, pp. 1-13.

[58] Dodaf, "The Dodaf Architecture Framework, Version 2.0", United States Department of Defense, 2009,

[59] C4isr, "C4isr Architecture Framework, Version 2.0", United States Department of Defense, 1997,

[60] Zachman, J.A., "A Framework for Information Systems Architecture", IBM systems journal, 26(3), 1987, pp. 276-292.