Understanding Coordination Support of Enterprise Architecture Management – Empirical Analysis and Implications for Practice

Completed Research Paper

Ralf Abraham
University of St. Gallen,
Institute of Information Management
ralf.abraham@unisg.ch

Stephan Aier
University of St. Gallen,
Institute of Information Management
stephan.aier@unisg.ch

Nils Labusch
University of St. Gallen,
Institute of Information Management
nils.labusch@unisg.ch

Robert Winter
University of St. Gallen,
Institute of Information Management
robert.winter@unisg.ch

ABSTRACT

Enterprise architecture management (EAM) is a means to guide the consistent evolution of business and IT artifacts from an enterprise-wide perspective. This paper aims at understanding the means by which EAM supports this coordination task. Informed by theory of coordination and based on empirical data (n=95) we group participating enterprises in different clusters: (1) non-coordinators, (2) dominators and (3) negotiators. We find that a similar awareness of opportunities exists in all three clusters, yet there are gaps in the realization of EAM coordination support: non-coordinators show the lowest realization, negotiators the highest. Based on this clustering and two follow-up focus groups, we provide implications about the occurrence of the clusters in enterprises and on further EAM development options.

Keywords

enterprise architecture management, coordination mechanisms, empirical study, focus group.

INTRODUCTION

Enterprise architecture (EA) describes the fundamental structures of an enterprise (company, government agency) and the principles guiding its evolution in a business-to-IT view (ISO/IEC/IEEE, 2011). Enterprise architecture management (EAM) is concerned with the establishment and development of EA in order to consistently respond to business and IT goals, opportunities, and necessities. The notion of EAM goes beyond EA modeling and includes as one of its main goals establishment and maintenance of alignment between business and IT. Alignment partially can be seen as a coordination task, following the notion of coordination as "managing dependencies between activities" (Malone and Crowston, 1994).

While EAM is often seen as a means to support coordination (Pulkkinen, Naumenko and Luostarinen, 2007), the issue of coordination between different organizational units and stakeholders is still one of the most important issues to be addressed by EAM research (Lucke, Krell and Lechner, 2010; Niemi, 2007). While acknowledging that coordination is a core management task (Mintzberg, 1983) and therefore supported by a variety of disciplines in an enterprise, we aim at exploring the specific kind of coordination support that EAM can provide. Building on foundational work on coordination, we aim to discuss how EAM currently supports individual coordination mechanisms, and where there are discrepancies between actual and desired support. We summarize these efforts in the following research question:

RQ: How can EAM support coordination?

In order to gain a broad perspective on this question we conducted a survey with 95 participants. We further discussed the findings in two focus groups. We proceed as follows: We briefly discuss the foundations of EAM. We go on with the research design and results from survey and focus groups. Implications for EAM design are discussed before the paper ends with a conclusion.[1]

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[1]   An earlier version of this paper (Abraham, Aier and Labusch, 2012) presented first results of the empirical analysis. The original contribution of the paper at hand is the discussion of our findings' implications for EAM design which again is based on the discussion of the three clusters identified from the data as well as the follow-up focus groups. The latter two points also represent original contributions of the paper at hand.

BACKGROUND

Enterprise Architecture Management

Recently, aspects of EAM that enable coordination gained attention by the research community. For example, a discussion about EA principles emerged (Proper and Greefhorst, 2010). EA principles allow for coordination by providing guidelines and rules that help actors to take decisions leading the enterprise in the same direction of action (The Open Group, 2011). Principles may be defined based on knowledge, experience and opinions of all kinds of people in an organization. This mixture of people is also the target audience of the principles (Proper and Greefhorst, 2010). Another coordination approach is EA planning (Pulkkinen et al., 2007), which produces to-be models of future EA states. Still, coordination between different units and stakeholders in an enterprise is seen as one of the most critical issues that EAM needs to address in the future (Lucke et al., 2010; Niemi, 2007).

Malone and Crowston (1990) describe coordination as the "act of working together harmoniously" and as "managing dependencies between activities" (Malone and Crowston, 1994). Coordination can be achieved through different mechanisms. March and Simon (1958), Thompson (1967) and Mintzberg (1983) identified coordination mechanisms in organizations. Martinez and Jarillo (1989) provide an extensive review of literature on coordination mechanisms in multinational corporations. Their work is still considered relevant concerning the classification of coordination mechanisms (Schmid and Kretschmer, 2009) and used as a foundation in many research projects in the field (e.g. Schmid and Kretschmer, 2009; Vahlne, Schweizer and Johanson, 2012). Martinez and Jarillo (1989) synthesize two primary classes of coordination mechanisms: (1) structural and (2) informal mechanisms. Table 1 provides an overview of the classification.

Structural	Informal
(1) Departmentalization or grouping of organizational units	(6) Lateral or cross-departmental relations
(2) Centralization or decentralization of decision making	(7) Informal communication
(3) Formalization and standardization	(8) Socialization
(4) Planning	
(5) Output and behavior control	

Table 1. Overview of coordination mechanisms (Martinez and Jarillo, 1989)

Combining EA and coordination, (Espinosa, Armour and Boh, 2011) discuss coordination challenges among EA stakeholders and practices leading to EA success. We are, however, taking a slightly different perspective and investigate how EAM supports coordination rather than how the activities of EA stakeholders are coordinated.

RESEARCH DESIGN

Overall Design

In the first step, we intend to get a broad view on coordination in the field, covering a larger number of organizations. For this reason, we conduct a questionnaire-based survey. The relations we are interested in are illustrated in Figure 1, which denotes a conceptual overview of the research design, rather than a set of hypotheses to be tested empirically.
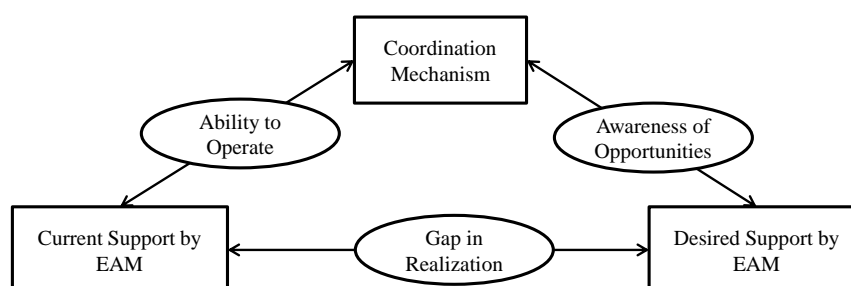

Figure. 1. Relations between Coordination Mechanism and EAM Support

First, we are interested in prevalent coordination mechanisms and clusters of enterprises concerning these mechanisms. Second, concerning the support of EAM we are interested in the current and desired support by EAM within these enterprise clusters. The relation between the prevalent coordination mechanism and the current support by EAM we consider to be the ability to operate. The relation between the prevalent coordination mechanism and the desired support concerning the coordination mechanism we consider to be the awareness of opportunities. Between the current and the desired support of coordination by EAM there might be a gap in realization.

In the second step of our research design, we move from a broad to an in-depth perspective on coordination by discussing the empirical results from the questionnaire in two focus groups of EAM experts. We are especially interested in possible sequences of coordination mechanisms and the contingency factors that lead enterprises to choose one set of mechanisms over another in specific situations.

Questionnaire Design and Data Set

The participants were enterprise architects, consultants and further experts concerned with EAM. We decided to provide the questionnaire to this group because architects usually are interested in a holistic perspective of the enterprise (Niemi, 2007; Winter and Fischer, 2007) and not in single projects or deliverables. Corporate users account for 53.7%, consultants and vendors for 37.9% of the participants. The remainder stated belonging to another group. Since consultants and other experts that are involved in EAM initiatives usually are dealing for longer periods of time with one customer, we instructed them to answer the questionnaire from the perspective of the customer project they were most knowledgeable about. We conducted the survey during an event held in Switzerland in late 2011. The questionnaire was administered in German language. The parts of the questionnaire that are reported in this paper have been translated to English. Participants of the survey were mostly employed in mid-level management positions in their respective organizations. 95 questionnaires were returned in total. The researchers were present at the event in order to provide assistance if questions were not understood properly.

We asked respondents about the size and industries of their organizations and adopted the categorizations provided by Eurostat (2008) and the European Commission (2005). Most questionnaires were filled in by participants working for large enterprises: 38 indicate an enterprise size between 1000 and 4999 employees, 37 a size of over 5000 employees. Regarding industries, enterprises from the insurance industry (25), information and communication systems industry (ICT; 21) financial services industry (20) form the dominant parts which might limit the generalizability of the findings to this areas.

The questionnaire contained statements covering the presence of individual coordination mechanisms in the organization. Respondents were asked about current and desired EA support for these mechanisms. In each case, answers were given on a 5-point Likert scale.

Focus Group Evaluation

We opted for a qualitative addition to the quantitative questionnaire design for three reasons. First, as the topic is complex we decided to include further highly knowledgeable informants in the analysis of the survey results. Second, focus groups are a valuable tool to evaluate researchers' analytical conclusions (Tremblay, Hevner and Berndt, 2010). Third, the discussion with experts helped to derive insights for future EAM design.

In order to validate the findings based on the questionnaires, we conducted two workshop sessions guided by design principles for focus group evaluations (Tremblay et al., 2010) at two follow-up events. Both events took place in Switzerland (June 2012). Such an evaluation provides the opportunity to discuss the findings with experts in the field and to receive feedback about the feasibility and relevance of the findings (Gibson and Arnott, 2007). We presented the findings of the questionnaire evaluation to a first group of seven informants. All informants work for organizations in different industries, e.g. insurance, logistics, consulting services or public organizations in Europe. All participants are holding positions related to EAM, IT or business strategy. We fostered open discussions between the participants, to find out if and where they agree or disagree with our findings.

We further conducted a second focus group with 10 participants where we again discussed the findings. The second group was comprised of other experts than the first group except for one informant and the authors who were present in both groups.

SURVEY RESULTS

Coordination Mechanisms

In order to identify the underlying dimensions of the coordination mechanisms used, we applied an exploratory factor analysis using principal component analysis. The analysis aims at extracting a number of latent factors and allows for an abstraction in order to sharpen the description of data clusters later on (Schendera, 2009). Missing values have been excluded pair-wise – this resulted in the exclusion of 3 cases, leaving 92 cases. The data set at

hand met three important quality criteria that determine its suitability for factor analysis: First, the percentage of non-diagonal elements of the anti-image covariance matrix that are non-zero (>0.09) has to be below a threshold of 25% (Dziuban and Shirkey, 1974). Second, the Kaiser-Mayer-Olkin criterion for measuring sampling adequacy is 0.760, which defines the intercorrelation of the factors as "middling" (Kaiser and Rice, 1974). Third, the amount of cases should at least be three times as much as the amount of variables (which in our analysis would be 10*3 = 30 cases) (Backhaus, Erichson, Plinke and Weiber, 2006). Since all three criteria are given, we consider our data set suitable for a factor analysis.

We used Varimax rotation with Kaiser normalization for the factor analysis. Item 1.11, concerning the control of compliance with formal hierarchies and standards has been dropped because it did not contribute to the factor identification. This led to 3 factors for the remaining 10 items, which account for 63.5 percent of the total variance.

To test the reliability of the factor scale, we calculated Cronbach's Alpha for each factor. Values above 0.7 indicate adequate reliability, which holds true for our data set. It must be noted, however, that the values for some factors are only slightly larger than the 0.7 threshold, e.g. 0.715 for factor 3. In order to assign items to factors, factor loadings must not be below 0.3 to 0.4 (Hair Jr, Black, Babin, Anderson and Tatham, 2006). For an unambiguous assignment of an item to a factor, loadings of at least 0.5 are generally seen as the minimum threshold. This is the case for our data set, with all items assigned to their respective factors by a loading of more than 0.5. We identified the following three factors. For a detailed discussion of the individual factors, see (Abraham et al., 2012).

- Factor 1 is represented by 5 items that indicate intensive communication to reach common objectives. It could be characterized as *coordination by all-embracing decision making*.

- Factor 2 is represented by 2 items and forms an antipole to the two other factors. We call this factor *coordination by vertical structure*. Items in this factor describe strict communication channels in forms of organizational hierarchy and high regulation of the work done.

- Factor 3 is represented by 3 items. We consider the factor as *coordination by horizontal structure*. The factor is located in between of the two extremes represented by factors 1 and 2. Coordination is supported by communication, yet communication occurs in a more institutionalized way (e.g., via boards or task forces) than in the case of factor 1.

To distinguish groups of respondents that rely on similar mechanisms of coordination, we performed a cluster analysis. We chose a hierarchical clustering algorithm because these algorithms do not include any ex-ante assumptions on the eventual number of clusters (Hair Jr, Ringle and Sarstedt, 2011). We used the "average within-group linkage" clustering algorithm and selected "squared Euclidean distance" as the distance measure. Using the agglomeration schedule and dendrogram proposed by the algorithm, we identified three clusters. Due to missing values, 3 cases had to be excluded, so the clustering was performed on the remaining 92 cases.

In order to analyze and compare the clusters, we identified their centroids, by considering the mean factor values within each cluster. This led to the following net diagram shown in Figure. 2.
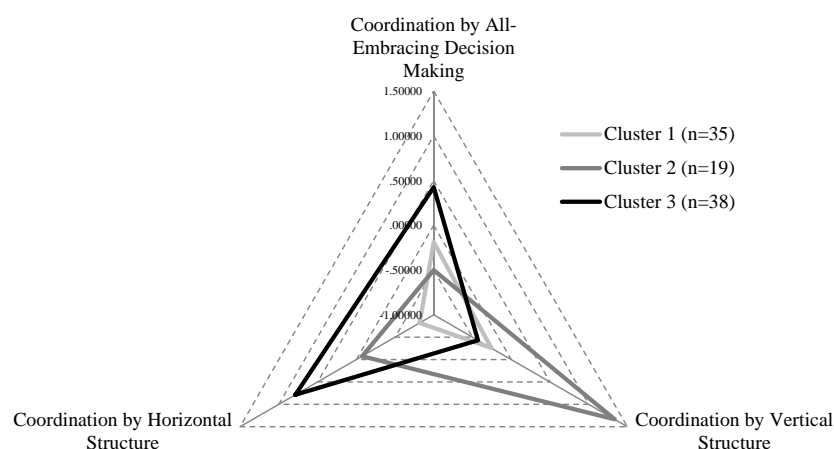

Figure 2. Net diagram of identified clusters

We identified three clusters by applying the described method.

- Cluster 1 has overall small means for all three factors. Coordination by horizontal structure is almost non-existent; the other two factors roughly exist to the same weak extent. The enterprises in this cluster seem to employ a pragmatic approach, coordinating only as much as necessary or possible. To emphasize the overall low level of coordination, we further address this cluster as *non-coordinators*.

- Cluster 2 has a high preference for coordination by vertical structure. Enterprises in this cluster have strict hierarchies and strongly restrict freedom in decision making by applying rules and standards. Communication tends to be guided by the horizontal structure, e.g. by defining committees and official channels of communication. We further address this cluster as *dominators*.

- Cluster 3 includes enterprises that have formal coordination up to a certain extent, but focus more on coordination driven by communication – either in a more structured or informal way. These enterprises are characterized by seeking broad consensus on planned goals and some commonly defined rules, yet they grant a high degree of discretion related to execution. We further address this cluster as *negotiators*.

While clusters two and three can in some way be considered antipodes, cluster one represents enterprises with coordination mechanisms established on a low level.

Desired and Current Coordination Support of EAM

We asked about EAM supporting coordination in another section of the questionnaire. Values are given on a Likert scale ranging from 1 (no agreement) to 5 (full agreement). A graphical representation is given in Figure 3.
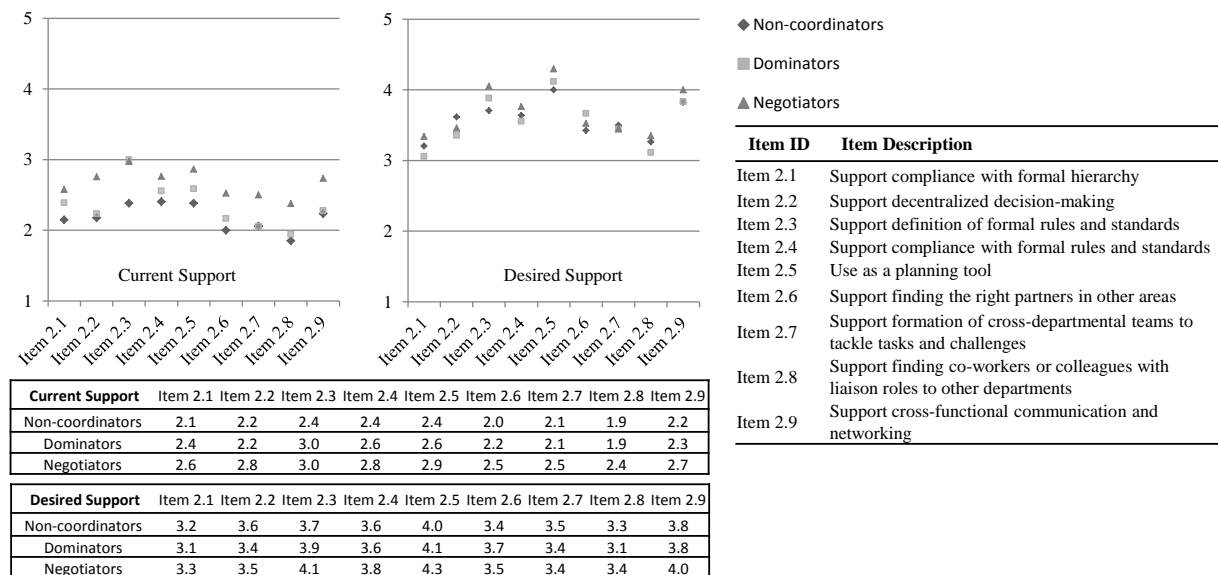

	Non-coordinators
	Dominators
	Negotiators

Item ID	Item Description
Item 2.1	Support compliance with formal hierarchy
Item 2.2	Support decentralized decision-making
Item 2.3	Support definition of formal rules and standards
Item 2.4	Support compliance with formal rules and standards
Item 2.5	Use as a planning tool
Item 2.6	Support finding the right partners in other areas
Item 2.7	Support formation of cross-departmental teams to tackle tasks and challenges
Item 2.8	Support finding co-workers or colleagues with liaison roles to other departments
Item 2.9	Support cross-functional communication and networking

Current Support	Item 2.1	Item 2.2	Item 2.3	Item 2.4	Item 2.5	Item 2.6	Item 2.7	Item 2.8	Item 2.9
Non-coordinators	2.1	2.2	2.4	2.4	2.4	2.0	2.1	1.9	2.2
Dominators	2.4	2.2	3.0	2.6	2.6	2.2	2.1	1.9	2.3
Negotiators	2.6	2.8	3.0	2.8	2.9	2.5	2.5	2.4	2.7

Desired Support	Item 2.1	Item 2.2	Item 2.3	Item 2.4	Item 2.5	Item 2.6	Item 2.7	Item 2.8	Item 2.9
Non-coordinators	3.2	3.6	3.7	3.6	4.0	3.4	3.5	3.3	3.8
Dominators	3.1	3.4	3.9	3.6	4.1	3.7	3.4	3.1	3.8
Negotiators	3.3	3.5	4.1	3.8	4.3	3.5	3.4	3.4	4.0

Figure 3. Means of and difference between current and desired EAM coordination support

Since our informants might be biased "pro EAM" and overemphasize the utility of EAM, we cannot argue based on the absolute values but need to analyze the differences.

The *negotiators* show the highest values for both current and desired EAM coordination support, whereas the difference between both is the lowest among all three clusters. This cluster appears to group the most ambitious enterprises with respect to EAM's role in assisting coordination.

The *dominators* are characterized by medium to high values regarding current EAM support of structural coordination mechanisms (items 2.1; 2.3), but comparatively low values regarding EAM support of informal mechanisms like assisting horizontally structured communication (items 2.7; 2.8) or fostering networking (items 2.6; 2.9). However, the difference between current and desired EAM support with respect to informal coordination mechanisms is among the highest for this cluster.

In the *non-coordinators* cluster, values for both current and desired EAM coordination support tend to be the lowest among all three clusters. An exception is item 2.2 (desired support for decentralized decision-making), which is a highly desired support in this cluster. This may be indicative of the autonomous nature of enterprises in this cluster and the overall low presence of coordination mechanisms.

Discussion of Clusters

From the cluster analysis we learn that there is a gap between our clusters about the extent to which they currently support coordination by means of EAM. Hence, we conclude that enterprises have a differing ability to operate with their EAM approach in general. Overall, the negotiators show the strongest current implementation values of EAM coordination support. On the other hand, the non-coordinators show the smallest values, which indicates an overall lesser degree of EAM support for coordination mechanisms in this cluster, be they more structural or more informal. It is remarkable that the differences in the desired support of coordination are less strong – the three clusters show rather similar values here. Thus, an awareness of opportunities concerning EA and coordination exists in almost all enterprises.

Based on the results, we need to differentiate the appropriate mechanisms of EAM that can support coordination in enterprises. The evolutionary paths for EAM as a coordination supporting means in each enterprise are mostly influenced by two factors: First, the prevalent set of coordination mechanisms, and second, their current degree of EAM development in general.

Non-coordinators: Concerning the current low prevalence of EAM as a coordination support function in these enterprises, a first step may be using EAM to improve transparency about existing structures of business processes and information systems. By supplying models to provide a common language, enterprises in this cluster may support decentralized decision making. Achieving this transparency forms the foundation for further EAM coordination support like providing guidelines or fostering networking. However, the overall low need for coordination mechanisms as much as their low presence in these enterprises must be kept in mind. A discipline like EAM that takes by design an integrative, enterprise-wide focus may have a lower use-potential in this cluster and coordination support in particular might eventually not exceed a certain level (Aier and Weiss, 2012).

Dominators: Enterprises in this cluster already use EAM to a certain extent to support formal rules and standards, which form a cornerstone of their coordination activities. The EAM function may be extended to provide a more active support for e.g. planning of future process- or application states. EAM may also be used to support horizontal coordination by forming cross-departmental teams or finding the right cooperation partners in other organizational units. This may be achieved by increasing transparency and mutual understanding of stakeholders. However, the emphasis on hierarchical coordination mechanisms must be kept in mind to offer EAM coordination support accordingly.

Negotiators: The gap to the desired support is the least for this cluster. Enterprises in this cluster may be regarded as having achieved a fair degree of EAM maturity. These enterprises might leverage their experiences to increase EAM support for planning, as this mechanism plays an important role in their overall set of coordination mechanisms. For example, information on financial or strategic planning may be incorporated into EAM models. By further increasing transparency and shared understanding between stakeholders, the support for tasks like cross-functional communication and networking may be increased.

FOCUS GROUP RESULTS

We discussed the three clusters and their implications in focus groups of experts in the field of EAM. We derived the following insights from the focus groups.

First, the coordination style may vary with regard to primary dimensions of structuration like *organizational unit, level of hierarchy or national culture.* Depending on whether a culture emphasizes hierarchy or consensus-seeking, enterprises tend to follow a dominators or negotiators approach. This is especially important for multi-national companies with subsidiaries in different geographic regions.

Second, especially in the case of enterprise transformation, i.e. fundamental changes affecting major parts or even the whole organization (Rouse and Baba, 2006), coordination mechanisms change during different project phases. In the (high-level) planning phase, top management follows a dominators' approach to establish overall transformation goals and an accompanying enterprise strategy. Business impact is high in this phase, as major parts of the enterprise are likely to be affected. In the detailed planning phase, the overall transformation goals are broken down for various enterprise domains. While the business impact is high from the perspective of the affected domains, it is medium from an enterprise perspective. Here, the negotiators style plays an important role since it is critical to initiate a dialogue with stakeholders to get commitment, and there are likely interdependencies between different domains. Once the planning phase is over, enterprises move from the negotiators cluster to dominators or non-coordinators cluster to ensure efficient implementation – at this point, decisions have been taken and dependencies have been identified. Implementation of these decisions is controlled rather than coordinated via a dominators approach, while independent activities can run in parallel, without a need for coordination (non-coordinators). Figure 4 illustrates this process.
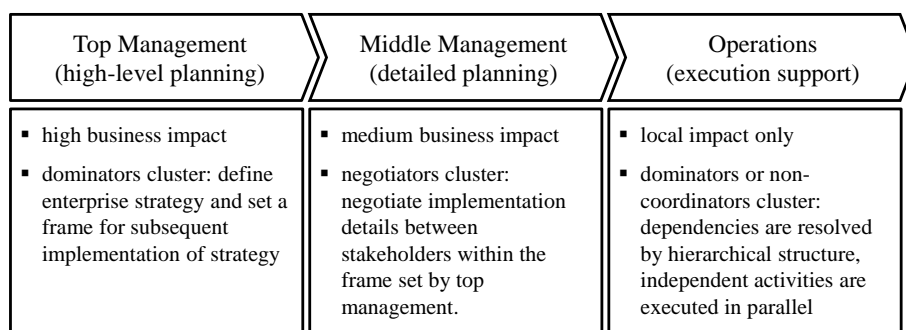
Top Management (high-level planning)		Middle Management (detailed planning)		Operations (execution support)	
▪ high business impact ▪ dominators cluster: define enterprise strategy and set a frame for subsequent implementation of strategy		▪ medium business impact ▪ negotiators cluster: negotiate implementation details between stakeholders within the frame set by top management.		▪ local impact only ▪ dominators or non-coordinators cluster: dependencies are resolved by hierarchical structure, independent activities are executed in parallel	

Figure 4. Alternation of coordination clusters in different project phases

Third, the focus groups corroborated the findings on the different *sets of EAM services* used in each cluster: The non-coordination cluster relies on the narrowest set of EAM services, while in the negotiators cluster, the widest set of EAM services is applied. This can be attributed to the abstraction level of the problem descriptions each of the planning phases is confronted with: Strategy definition in the high-level planning phase is mostly a heuristic process guided by a couple of high-level models, and EAM principles providing the overall framework for strategy implementation. Managers on such level rely rather on gut feeling and personal believes than on formal models. It is in the planning phase where detailed EA models and principles can unfold their greatest potential, since this phase is characterized by intense discussions between diverse stakeholders and contains problem descriptions at an abstraction level which is concrete enough to be supported by models and dependency analyses, yet still generic enough to warrant coordination efforts. Finally, in the operations phase, the need for coordination and the applicability of EAM services diminish as coordination gives way to control.

DISCUSSION

Implications for EAM Design

Can EAM support coordination in enterprises? Taking the results from the survey and the focus groups into account, we conclude it can indeed. However, the coordination support must take the distinct properties of the coordination clusters and the contingencies favoring their application into account, in particular the organizational level where activities are to be coordinated.

Possible benefits from enterprise-wide coordination need to be put in relation to the accompanying risk: high implementation efforts and possible organizational resistance. Given a setting with conflicting interests amongst organizational actors, it is paramount for the EAM function to be perceived as a neutral provider of information. This is especially important in the negotiators cluster, where a large number of middle management-level stakeholders need to negotiate how to successfully implement enterprise strategy. In such negotiations, EAM should be perceived as a kind of corporate encyclopedia, an unbiased information source.

In the dominators cluster – if applied at the top management level – high-level models and principles are the tools that should be used since stakeholders are interested in aggregate level skills and capabilities – at this level, basic structures and dependencies are important information, not an overly detailed representation of operational complexity. Therefore, EAM takes a sort of world map functionality to provide rough orientation and assist in formulating overall principles that leave sufficient discretion for implementation by middle management.

At the operational level, where the dominators cluster gradually gives way to the non-coordinators cluster, the applicability of EAM diminishes accordingly. After all, EAM services are aimed at managing architecture at an enterprise level, as opposed to operational control.

Limitations

While offering an understanding of EAM coordination support drawing from empirical data, the current work is based on a very aggregate view of coordination mechanisms and EAM methods and models supporting these. This constitutes an important limitation of our work: While providing a first overview, the high level of abstraction clearly limits a detailed mapping of individual coordination mechanisms (e.g., planning) to concrete EAM deliverables (e.g., dependency models, principles with a certain granularity). Moreover, the focus group sessions consisted exclusively of EA experts. To explore coordination support by EAM, an outside perspective from other management functions such as portfolio planning would be appealing.

CONCLUSION

Informed by theory of coordination and based on the analysis of empirical data from a questionnaire, we identified three factors that determine the mix of coordination mechanisms used – *coordination by all-embracing*

decision making, coordination by vertical structure and coordination by horizontal structure. Based on these factors, we identified three clusters of enterprises – *non-coordinators, dominators and negotiators*. The results were corroborated by a focus group: Enterprises do not just apply a single cluster of coordination mechanisms; rather, they may apply each cluster's mechanisms based on different contingencies (prominent instances are project phase and national culture).

We provide two contributions to EAM practice and research: (1) The functionality that EAM provides needs to adapt to the coordination cluster that should be supported and (2) such clusters are dominators, negotiators and non-coordinators. As future work, we therefore suggest gathering both qualitative and quantitative data on individual coordination mechanisms and their support by specific EAM deliverables. Further, it is interesting to investigate, how enterprises can manage the occurrence of the different coordination clusters within their structures. This again should be input to design-oriented research projects that develop concrete artifacts like business or transformation centric EAM approaches.

Acknowledgement

REFERENCES

1. Abraham, R., Aier, S. and Labusch, N. (2012) Enterprise Architecture as a Means for Coordination – An Empirical Study on Actual and Potential Practice, *Proceedings of the 7th Mediterranean Conference on Information Systems*, Guimarães, Paper 33.

2. Aier, S. and Weiss, S. (2012) An Institutional Framework for Analyzing Organizational Responses to the Establishment of Architectural Transformation, *Proceedings of the 20th European Conference on Information Systems*, Barcelona.

3. Backhaus, K., Erichson, B., Plinke, W. and Weiber, R. (2006) *Multivariate Analysemethoden - Eine anwendungsorientierte Einführung*, Springer, Berlin.

4. Dziuban, C.D. and Shirkey, E.C. (1974) When is a Correlation Matrix Appropriate for Factor Analysis?, *Psychological Bulletin,* 81, 6, 358-361.

5. Espinosa, J.A., Armour, F. and Boh, W.F. (2011) The Role of Group Cognition in Enterprise Architecting, *Proceedings of the 44th Hawaii International Conference on System Sciences*, Honolulu, Hawaii.

6. European Commission (2005) *The new SME definition: user guide and model declaration*, Office for Official Publications of the European Communities, Luxembourg, 2005.

7. Eurostat (2008). *NACE Rev. 2 Statistical classification of economic activities in the European Community*, Luxembourg

8. Gibson, M. and Arnott, D. (2007) The Use of Focus Groups in Design Science Research, *Proceedings of the 18th Australasian Conference on Information Systems*, Toowoomba, Australia.

9. Hair Jr, J.F., Black, W.C., Babin, B.J., Anderson, R.E. and Tatham, R.L. (2006) *Multivariate Data Analysis*, Pearson Prentice Hall, Upper Saddle River, New Jersey.

10. Hair Jr, J.F., Ringle, C.M. and Sarstedt, M. (2011) PLS-SEM: Indeed a Silver Bullet, *Journal of Marketing Theory and Practice,* 19, 2, 139–151.

11. ISO/IEC/IEEE (2011) Systems and software engineering – Architecture description (ISO/IEC/IEEE 42010:2011),

12. Kaiser, H.F. and Rice, J. (1974) Little Jiffy, Mark Iv, *Educational and Psychological Measurement,* 34, 1, 111-117.

13. Lucke, C., Krell, S. and Lechner, U. (2010) Critical Issues in Enterprise Architecting – A Literature Review.

14. Malone, T.W. and Crowston, K. (1990) What is coordination theory and how can it help design cooperative work systems?

15. Malone, T.W. and Crowston, K. (1994) The Interdisciplinary Study of Coordination, *ACM Computing Surveys,* 26, 1, 87-119.

16. March, J.G. and Simon, H.A. (1958) *Organizations*, Wiley and Sons, New York.

17. Martinez, J.I. and Jarillo, J.C. (1989) The Evolution of Research on Coordination Mechanisms in Multinational Corporations, *Journal of International Business Studies,* 20, 3, 489-514.

18. Mintzberg, H. (1983) *Power in and around organizations*, Prentice Hall Inc., Englewood-Cliffs, N.J.

19. Niemi, E. (2007) Enterprise Architecture Stakeholders – A holistic view, *Proceedings of the The 13th Americas Conference on Information Systems (AMCIS 2007)*, Keystone, CO.

20. Proper, E. and Greefhorst, D. (2010) The Roles of Principles in Enterprise Architecture, *Proceedings of the Trends in Enterprise Architecture Research (TEAR)*, Delft, 57-70.

21. Pulkkinen, M., Naumenko, A. and Luostarinen, K. (2007) Managing information security in a business network of machinery maintenance services business – Enterprise architecture as a coordination tool, *Journal Of Systems And Software,* 80, 10, 1607–1620.

22. Rouse, W.B. and Baba, M.L. (2006) Enterprise transformation, *Communications of the ACM,* 49, 7, 67-72.

23. Schendera, C.F.G. (2009) *Clusteranalyse mit SPSS. Mit Faktorenanalyse*, Oldenbourg, München.

24. Schmid, S. and Kretschmer, K. (2009) Performance Evaluation of Foreign Subsidiaries: A Review of the Literature and a Contingency Framework, *International Journal of Management Reviews,* 12, 3, 219-258.

25. The Open Group (2011) TOGAF Version 9.1,

26. Thompson, J.D. (1967) *Organizations in action: social science bases of administrative theory*, McGraw-Hill, New York, NY.

27. Tremblay, M.C., Hevner, A.R. and Berndt, D.J. (2010) Focus Groups for Artifact Refinement and Evaluation in Design Research, *Communications of the Association for Information Systems,* 26, 27, 599-618.

28. Vahlne, J.E., Schweizer, R. and Johanson, J. (2012) Overcoming the Liability of Outsidership —The Challenge of HQ of the Global Firm, *Journal of International Management,* 18, 3, 224-232.

29. Winter, R. and Fischer, R. (2007) Essential Layers, Artifacts, and Dependencies of Enterprise Architecture, *Journal of Enterprise Architecture,* 3, 2, 7-18.