

DOCTORAL CONSORTIUM

ENTERPRISE ARCHITECTURE FOR NETWORK ORGANIZATIONS: A RESEARCH DESIGN TO INVESTIGATE WHAT ELEMENTS OF EA HELP TO REDUCE ADMINISTRATIVE BURDENS IN HEALTHCARE

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Abstract Healthcare organizations operate within a network of governments, insurers, inspection services and other healthcare organizations to provide clients with the best possible care. The parties involved must collaborate and are accountable to each other for the care provided. This has led to a diversity of administrative processes that are supported by a multi-system landscape, resulting in administrative burdens among healthcare professionals. Management methods, such as Enterprise Architecture (EA), should help to develop and manage such landscapes, but they are systematic, while the network of healthcare parties is dynamic. The aim of this research is therefore to develop an EA framework that fits the dynamics of network organizations (such as long-term healthcare). This research proposal outlines the practical and scientific relevance of this research and the proposed method. The current status and next steps are also described.

Keywords:

network
governance,
enterprise
architecture,
dynamic
context,
long-term
healthcare,
administrative
burdens.

1 Introduction

Administrative burdens in Dutch healthcare have been increasing for decades, despite all initiatives to reduce them (Veenendaal et al., 2008; Joldersma et al., 2016; Ministry of VWS, 2018; Lint, 2019; Hanekamp et al., 2020; Keuper et al., 2022). Foreign healthcare institutions face the same problem (Cebul et al., 2008; Brown et al., 2021; Chernew & Mintz, 2021). This has a serious negative impact on the functioning and satisfaction of healthcare staff (V&VN, 2019) and is one of the most frequently cited reasons for resigning (Ahli, 2019).

Administrations support the need for cooperation and accountability between healthcare management and its stakeholders (Oude Vrielink et al., 2009). The stakeholders of Dutch healthcare management are:

- *The healthcare professional*, who see the usefulness and necessity of the administrative activities, as long as they are directly related to the care of the client and registration systems are fit for purpose and easy to use (Bronkhorst, 2019; Michel, 2017). Healthcare management determines which administrative activities are carried out by the healthcare professionals.
- *The client, and its relatives* for whom healthcare is all about (Koopmans et al., 2015). In many cases the client has multiple illnesses (multimorbidity). In order to best assist the client in coping with multimorbidity, healthcare professionals need to work together and exchange information in dynamic networks.
- *The government*, which strives for public value through legislation and regulations (Jørgensen & Bozeman, 2007; Steen, 2019), from which administrative burdens arise (Maris et al., 2021).
- *Market(-forces)*, which have resulted in parts of healthcare being standardized and specialized (Varda, 2011). In combination with the various laws and regulations and multimorbidity, this has resulted in a complex reimbursement structure and therefore complicated accountability to fellow healthcare organizations, healthcare insurers and governments (Ministry of VWS, 2020).
- *Inspection*, who monitors the quality, safety and accessibility of healthcare on the basis of the healthcare administrations. Additional administration may be required for the inspection due to external variables, such as an infectious disease, research results, or technological innovations (Kenis et al., 2019).

So healthcare is organized in a network of various parties that are related and accountable to each other. Due to the dynamics of the care to be delivered to the client and due to external variables such as legislation and regulations, a pandemic, research results and technological innovations, the cooperation structures between the stakeholders are constantly changing. Governing such an environment is also referred to as network governance (NG) (Berthod et al., 2017).

The result of the collaboration and accountability relationships mentioned is that they work with a diversity of automated administrations, a multi-system landscape. Enterprise Architecture (EA) is a management and technology practice to have and hold a holistic and integrated understanding of such landscapes in terms of strategic direction, business practices, information flows and technological resources (da L. Júnior et al., 2021), with the aim of optimally aligning them. Nowadays a broad variety of EA frameworks exist and are applied in the healthcare sector (da L. Júnior et al., 2020, 2021). In addition, EA is an emerging topic of research in healthcare (Wichmann & Wißotzki, 2019).

2 Problem definition

EA frameworks are based on the assumption that strategy is plannable and that multisystem landscapes can be developed and managed systematically to contribute to organizational strategy (Winter et al., 2010). Mintzberg et al. (1998) distinguished ten 'schools' of thinking about strategy. Only three of them are based on a plannable enterprise. The other seven schools of thought regard strategy more as continuous development in a dynamic organizational context. The perspective of these seven schools and the observation that collaboration and accountability in healthcare require dynamic NG makes the assumption behind EA frameworks even more questionable. This is in line with the conclusions of Lapalme (2012), Muller et al. (2013) and Kotusev et al. (2020).

In most organizations, EA frameworks will not align with organizational strategy (Kotusev et al., 2020). Current EA frameworks have limitations within dynamic contexts (Nouwens et al., 2022), such as healthcare. Lapalme et al. (2016) and Nouwens et al. (2022) see possibilities with EA to manage multisystem landscapes in such contexts and describe possible solutions and challenges. However, they do

not demonstrate whether these are effective in terms of reducing administrative burdens.. The research question of this study is therefore: *What elements of EA frameworks help to manage a multisystem landscape in order to reduce administrative burden within (healthcare) organizations with a network governance structure?*

As mentioned is the healthcare sector organized in a network structure. Most administrative burdens within the healthcare sector are experienced within long-term care, such as mental health care, care for the disabled and nursing and home care (Bronkhorst, 2019). On average 40% of the available time in long-term care is spent on administrative activities related to laws and legislation (Hanekamp et al., 2020; Maris et al., 2021). Together with the fact that long-term care is confronted with a complex reimbursement structure and therefore complicated accountability to health insurers and governments (Ministry of VWS, 2020), the long-term care has been chosen as the most appropriate research context focus for now.

3 Methodology

The research question is divided into four sub-studies. Each sub-study has its own question:

S1: Which elements of EA frameworks are related to the characteristics of NG?

S2: What are the most relevant elements of EA frameworks derived in S1 for EA architects of organizations operating in a NG context?

S3: Which EA based actions lead to a reduction of administrative burdens in long-term care?

S4: Which EA framework elements lead to a reduction of administrative burdens within a NG context?

The study is designed (Figure 1) in such a way that the results of each sub-study are analyzed chronologically and serve as input for the next sub-study.

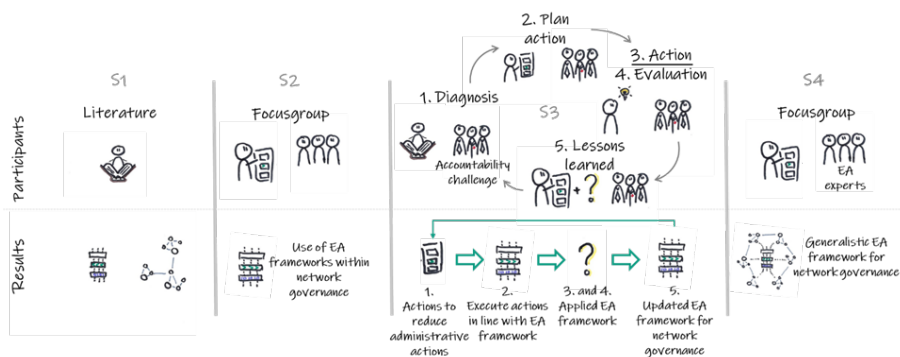


Figure 1: Research design

Study 1: EA framework elements related to characteristics of network governance

To reveal the elements of EA that are related to the characteristics of NG a structured literature review (SLR) (Denyer & Tranfield, 2009) will be performed. This method helps to uncover the known (international) evidence, confirm current practices, address variations and identify areas for future research (Munn et al., 2018). Denyer & Tranfield (2009) suggest that SLRs in management and organization studies should be tested for their transparency (which processes and models are employed), inclusivity (what are the inclusion/exclusion criteria), explanatory (how are the individual results combined into one story) and heuristic nature (the output may help managers, but shall not be the truth or valid evidence).

The process that will be applied is as follows: Together with a SLR expert and a short exploratory study, meta search terms and relevant databanks will be chosen to use in creating the search strings for relevant EA and NG articles. After the search results are retrieved on one particular day, the duplicates are reduced according to the protocol of Bramer et al. (2016). The search results are then assessed for relevance on title, abstract and keywords.

In order to minimize possible bias from researchers, this is done by at least two people and with the help of Rayyan (Johnson & Phillips, 2018). Conflicting articles will be discussed with the aim of reaching consensus.

The inclusion criteria for this assessment are: no foreign language instead of Dutch, English and German, peer-reviewed journal/conference article or dissertation, and the article is useful to answer (one of) the following questions:

1. What is the definition of EA and NG?
2. What is the history of EA and NG (in healthcare)?
3. What are the known benefits/success factors of EA?
4. What are the known characteristics of NG?
5. What factors of EA are related to the characteristics of NG?

The articles included are then plotted in a citation network using Gephi and VosViewer to gain insight into the most cited articles. Together with the amount of articles by the author, background author and journal/conference rating of the article, the most relevant articles will be selected for the full paper review.

The results are combined with Atlas.ti. All articles are grouped first into 'literature reviews', EA, NG and 'exclude'. Subsequently, the full text per group will be scanned and coded via open coded techniques.

The output of this sub-study will be a list of EA elements related to the characteristics of NG.

Study 2: *The most relevant elements of EA frameworks in a NG context*

A focus group is used to examine how current EA frameworks are deployed within an NG environment and to identify the most relevant elements of EA frameworks derived in S1 in a NG context. The focus group participants will be Enterprise Architects working in Dutch public organizations dealing with NG.

A focus group combines interviews, participant observation and group interaction (Plummer-D'Amato P, 2008; Luke & Goodrich, 2019). This sub-study focuses on how architects work with EA frameworks in a NG context and what support and limitations they experience from the EA methodologies. By involving several architects at the same time and confronting them with issues from a NG context, various application possibilities are brought to light and discussed directly by the participants. The interaction between participants can provide additional insights that might not be revealed during an interview.

Based on the output of S1 and the results of S2, a list of possible EA best practices in an NG context will be composed.

Study 3: *EA based actions related to a reduction of administrative burdens*

Most available EA publications, in turn, are non-empirical, although the use of empirical methods in EA research is increasing (Kotusev, 2017). Empirical knowledge development at the interface of EA and administrative burden reduction is lacking, in general and in long-term care. That is why in this study the sub-question ‘*Which EA based actions lead to a reduction of administrative burdens in long-term care?*’ will be answered by means of three action studies that connect to each other. The aim of action research is to influence the nature of organizations and the professionalism of those involved during the research, so that changes are immediately realized and take root through a thorough evaluation and recording. Knowledge is built up on the basis of evaluation of actions. This action research therefore aims to develop knowledge and contribute to solving the acute need for administrative burdens in healthcare at the same time.

This study consists of three action studies in three different care organizations within the long-term care sector of the Netherlands. Based on the phasing of Susman and Evered (1978), the following approach has been determined that applies to each healthcare organization:

Diagnosis (identifying or defining the problem): Together with the care management of a long-term care institution, an accountability challenge related to network governance is formulated.

Action planning (weighing alternative actions to solve the problem): together with the care management, based on the EA insights from studies 1 and 2, possible actions and approaches are determined that could work.

Take action (select a method): The action that is most promising and feasible according to the care management will be carried out together with the care management.

Evaluate action (study the consequences of the action): The consequences of the action are evaluated together with healthcare management and involved healthcare professionals. The reflection will focus on the way in which the action has been carried out, to what extent the result has been achieved and whether the administrative burden has been limited (has the problem been solved) and to what extent the action has contributed to this (relevance of the action).

Specify the teaching (identify general findings): The approach chosen will be discussed with care management. If necessary, the chosen approach is refined, so that it is ready for the next accountability challenge and a common way of working within a network governance context is discovered.

In order to measure the impact of the actions on the administrative burden, a survey is sent out to the stakeholders who are directly part of the accountability challenge before and after the action research.

To guarantee the quality of this study, the five quality principles of Action Research (Davison et al., 2004) are used:

- the principle of the researcher-client agreement;
- the principle of the cyclical process model;
- the principle of theory;
- the principle of change through action and
- the principle of learning through reflection.

Each principle has its own set of quality criteria. In broad terms, this means that a researcher-customer agreement will be drawn up for each healthcare organization that participates in this study. This agreement includes the goal (solving the accountability challenge), the research method to be followed (five steps of action research), the parties involved with their role and responsibility, the duration of the research and the evaluation criteria. This ties in with the first principle. The second principle is aimed at going through the phases of action research in a structured way, as already explained. As indicated, actions are determined based on the EA insights to solve the accountability challenge. These insights are based on the results of the structured literature review (S1) and discussed with EA experts from the field through the focus group (S2). This is in line with the third principle.

The aim of action research is that a change will occur through an action (fourth principle). Ultimately, this action and the approach followed will be evaluated with those involved within the care organization. These reflections ensure that what has been learned is also recorded which is of added value for science (5th principle).

To minimize possible researcher bias, the researcher will only share the insights of S1 and S2 before the planning action phase. The care managers then choose the approach that suits them best and implement it themselves. After a predetermined period, the chosen approach and implementation will be evaluated by the care managers. The researcher will observe all phases. The results will be input for fine-tuning the insights of S1 and S2. That in turn is input to take on the next organizational challenge.

Study 4: *Focus group*

In order to place the results of the third study in a broader context, a focus group will provide an answer to the fourth sub-question ' *Which EA framework elements lead to a reduction of administrative burdens within a NG context?*' from Enterprise Architects who work in organizations dealing with network governance. The set-up of this focus group is similar to the focus group of the second study. The outcomes of this focus group will contribute to the generalizability of the EA framework properties retrieved in the action research phase.

4 Preliminary results

This investigation started at the beginning of 2021. In collaboration with an SLR expert, an exploratory study was conducted with which a search string was drawn up for EA and NG in a healthcare environment. Possible keywords and meta terms were derived from relevant (structured literature) research papers and tested. This process resulted in two searches, one for EA (Example 1) and the other for NG (Example 2).

Example 1: EA search string for Cinahl

S1 TX ((Enterprise N1 Architect) OR Togaf OR Feaf OR Archimate OR (Service N1 oriented N1 Architecture) OR ((Zachman OR Pulkkinen OR Schekkerman) N1 Framework*) OR (((Architect*N1 Framework*) OR (Organisational N1 Architecture)) AND (Health* N1 System*))*

Example 2: NG search string for Cinahl

S1 TI ((network OR collaborat* OR cooperat* OR multisector* OR intersector* OR partnership* OR (multi N1 stakeholder*)) N1 (governance* OR governing)) OR AB ((network* OR collaborat* OR cooperat* OR multisector* OR intersector* OR partnership* OR (multi N1 stakeholder*)) N1 (governance* OR governing)) OR SU ((network* OR collaborat* OR cooperat* OR multisector* OR intersector* OR partnership* OR (multi N1 stakeholder*)) N1 (governance* OR governing)) OR KW ((network* OR collaborat* OR cooperat* OR multisector* OR intersector* OR partnership* OR (multi N1 stakeholder*)) N1 (governance* OR governing))*

S2 TX "lead organization-governed"

S3 TX "participant-governed"

S4 TX "network administrative organization"

S5 TI (health N1 (system OR sector) N1 governance) OR AB (health N1 (system OR sector) N1 governance) OR SU (health N1 (system OR sector) N1 governance) OR KW (health N1 (system OR sector) N1 governance)

S6 S1 OR S2 OR S3 OR S4 OR S5

Both searches were conducted on June 30, 2021 in six different databanks (Table 1). To be as complete as possible, both searches also included the first 200 hits from Google Scholar. Because EA is a specific IT-based concept, the databases ACM, AIS and IEEE were also included in the search.

Table 1: Search results

Databank	Amount EA	Amount NG
ACM	53	
AIS	266	
BSU	142	244
Cinahl	270	357
Embase	331	451
IEEE	24	
Medline	343	521
PsycInfo	115	418
Web Of Science	230	598
Google Scholar	200	200
Total	1974	2789

Next step was to reduce the duplicates. This was done in the week after the search was conducted. Based on seven rounds (Bramer et al., 2016) the search amount was reduced to 1384 EA articles and 1600 NG articles.

After removing the duplicates, the results were uploaded into Rayyan (Johnson & Phillips, 2018) and appointed to two senior researchers in the field of Business and Information Management. Based on the criteria mentioned in section 3, all titles, abstracts and keywords of the articles have been scanned for relevance to this research. For the EA articles this resulted in 99 articles included and 90 articles on which the researchers initially disagreed. For the NG articles 64 articles were included and 179 articles where a conflict. The conflicting articles were discussed by the researchers, resulting in a total of 149 EA articles and 141 NG articles included.

During the search for full paper versions of the articles 129 EA articles and 127 NG articles were found and translated into Gephi compatible files for Graph Edges and Nodes based on the quotes using a python script (Mass & Faler, 2020). The citations of the articles in the largest citation clusters were scanned for possibly relevant missed articles. The citations of the articles in the largest citation clusters were scanned for possibly relevant missed articles. This resulted in the inclusion of 5 additional EA and 4 NG articles. Figure 2 shows the end results. To improve the readability, this result was converted to VosViewer (Levallois, 2021).

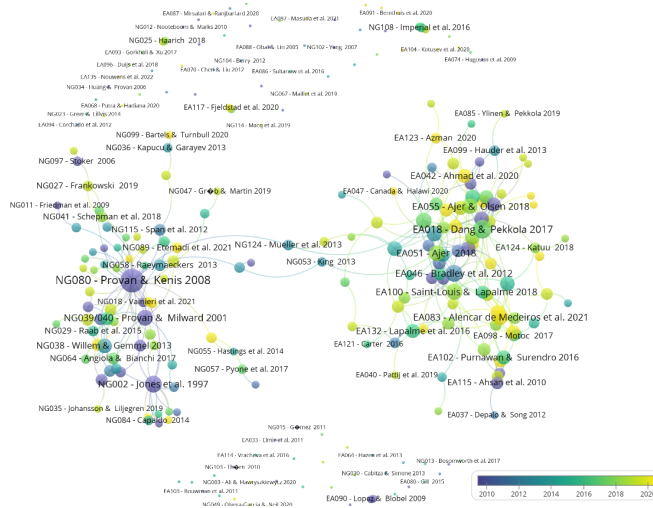


Figure 2: Citation map of EA and NG articles

Figure 2 shows that a citation map can be generated automatically, which helps to select the most relevant articles for the full paper phase of the SLR.

5 Future development

The findings of the first sub-study are expected to provide a list of EA elements associated with the characteristics of NG. On the basis of the first selection of articles, the following picture can be carefully drawn:

1. EA frameworks were originally intended to map the as-is and to-be coherence (eg Zachmann, BPMN and Archimate). Then there were frameworks that also support the process (e.g. TOGAF and DyA) and nowadays we also see frameworks exist and are further developed that deal with managing EA (e.g. SAFe, Sensemaking and Situational architecture).
2. In general, EA assumes that 'the basics' can and must be put in order. As long as the basics are not in order, people are unable to respond flexibly to organizational issues. Unfortunately, it is unclear what exactly is meant by 'the base'.
3. NG can be classified into gradations based on hierarchical relationships between network parties. For example, a supply chain has a different management structure than a crisis organization. In addition, the parties involved will have different EA maturity levels. This means that mapping

the as-is and to-be coherence (in terms of model, process and organization) within a network is situational.

My own vision is that in networks 'the basis' is a digital twin of the network. In other words, the data of the organizational network. I am curious whether this image is recognized and whether data in the case of NG can act as a starting point in addition to or even instead of determining the common goal.

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