Article

The Dutch State of the Practice of Architecture Principles

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Abstract

Architecture principles are the cornerstones of Enterprise Architecture (EA) and guide enterprises in their transformations. The Architecture Principles working group of the Netherlands Architecture Forum (NAF) wanted to gain more insight into the current practice of architecture principles. To do this, the working group has performed a survey amongst practitioners. The survey results show how practitioners actually specify architecture principles, how they value them, and what other areas of applications they see for principles. This article provides an overview of the most interesting results of the survey. In addition, it provides insights gained from a workshop that was organized in which the survey results were presented.

Keywords

Principles, architecture principles, state-of-practice, Enterprise Architecture (EA)

INTRODUCTION

Architecture principles guide enterprises in their transformations. They are declarative statements that normatively prescribe a property of an enterprise's design. We consider architecture principles as a specific form of design principles that describe essential aspects. They are normative principles, since they intend to provide a norm that people should adhere to. Architecture principles provide the foundation for Enterprise Architecture (EA) models and decisions. They provide an important rationale for these models and decisions. The use of principles can be traced back to the PRISM report that appeared in 1986 and that described an architecture principles-based architecture framework (CSC Index, Inc. 1986).

In May 2011, the book "Architecture Principles – The Cornerstones of Enterprise Architecture" was published (Greefhorst & Proper 2011). This was an important result of the Architecture Principles working Group of the Netherlands Architecture Forum (NAF). The book provides conceptual foundations and practical tips for using architecture principles. Although the book explicitly looked at current practice and provided a number of case studies, the focus was on providing a good conceptual basis. As a next step, the working group wanted to gain more insight into the actual application and value of architecture principles. A survey was conducted to provide such insights.

The survey was combined with a workshop on the subject, organized in April 2013 by the NAF, in which the survey results were presented and in which additional discussions on the state-of-practice took place. A total of 65 people started the survey, 35 of which finished it. The majority of the participants were of Dutch nationality, and had at least several years of professional experience in EA. The survey consisted of a mix of structured and closed questions. The questions were divided into three groups. The first group focused on the specification of architecture principles and the design decisions that are based on them. The second looked at the value of using architecture principles. The third group of questions touched upon other areas of application for principles, outside of EA.

Another part of the survey did not focus specifically on the use of architecture principles, and was used for a separate research program. This research program, EA Anamnesis, involves an approach and corresponding meta-model for rationalizing architectural designs. EA Anamnesis captures the motivations of design decisions in EA in general, alternative designs, design criteria, observed impacts of a design decision, and more. The survey was used to provide a first empirical grounding for the practical usefulness of EA Anamnesis. That part of the survey has resulted in a separate publication (Plataniotis et al. 2013), and is not included in this article.

This article provides a summary of the results of the survey, focusing on the most interesting insights and providing additional context and reflection. The three parts of the survey are used as the main structure for the article. Insights gained from the workshop that was organized to discuss the results of the survey are also included at the end of the article.

SPECIFICATION OF ARCHITECTURE PRINCIPLES

This section of the survey focused on specifying architecture principles.

We asked participants which aspects of architecture principles they consider to be important to document, whether they are described, and whether they support the actual decision-making based on these architecture principles. The aggregated results are described in Table 1. The scorings are calculated by counting "disagree" as 0, "agree" as 1, and "strongly agree" as 2, and dividing the result by 2, resulting in a number between 0 and 1. The scorings should not be interpreted as exact values. They are only intended to be used as relative values; to show whether they are higher or lower than other scores.

Table 1: Aspects Documented in Architecture Principles

Aspect	Important	Current Practice	Support Decision-making
Statement	0,76	0,66	0,61
Rationale	0,90	0,60	0,57
Implications	0,82	0,61	0,50
Alternatives	0,47	0,19	0,27
Name	0,55	0,54	0,22
Actions	0,54	0,24	0,35
Definitions of concepts	0,61	0,33	0,21
Compliance assessment	0,68	0,33	0,37
Visualization	0,38	0,20	0,24
Current practice	0,42	0,17	0,24
Desired practice	0,51	0,26	0,34
Examples of current practice	0,50	0,22	0,28
Applicable situations	0,57	0,24	0,23
Obstacles	0,53	0,17	0,30
Implementation guidance	0,46	0,18	0,15
Open issues	0,46	0,14	0,18
Assumptions	0,56	0,17	0,21
Solutions that are available	0,44	0,14	0,17
Person that is accountable	0,54	0,21	0,20
Person that maintains	0,50	0,30	0,18
External sources used	0,35	0,20	0,11
Importance/priority	0,49	0,26	0,27
Related principles	0,62	0,29	0,27

It is not surprising that the name, statement, rationale, and implications score relatively high on the first two

questions; they are part of the TOGAF template and considered as a minimal form of specification. What is surprising is that a lot of other aspects also score high in importance, whilst at the same time scoring low on current practice. This suggests that practitioners feel that it is valuable to construct more elaborate specifications of architecture principles than the current practice. An explanation for the current practice may be that more elaborate specifications cost more time to construct and read. Only 29% of the participants indicate that they differentiate the specification of architecture principles to specific audiences.

Most organizations use a standard template for architecture principles (94%) but not for the architectural decisions that are based upon them (52%). This is in line with our general observation that EAs focus on architecture principles and models, and provide concrete architectural decisions to a lesser extent. Participants indicate that time is not a reason to use a template or not.

We also asked participants which drivers they consider as being important for identifying architecture principles, what the current practice is, and whether including these drivers supports the actual decision-making based upon the architecture principles. The results are presented in Table 2. The scoring is calculated similar to Table 1.

Table 2: Drivers for Architecture Principles

Driver	Important	Current Practice	Support Decision-making
Goals and objectives	0,86	0,50	0,73
Values	0,70	0,47	0,50
Issues	0,65	0,47	0,55
EA design issues	0,52	0,39	0,30
Risks	0,70	0,31	0,56
Potential rewards	0,58	0,28	0,44
Constraints	0,67	0,39	0,55
Observed impacts	0,50	0,22	0,42

Goals and objectives are the drivers that score highest on importance and contribution to decision-making, which is in line with what we would expect. Surprisingly the current practice is significantly lower, indicating that a lot of architecture principles are not actually based on goals and objectives. Most drivers score relatively high on importance, but significantly lower in current practice. In a separate question participants state that only 20% of

the architecture principles are explicitly linked to the drivers that they are based upon. We believe that it is important to explicitly link architecture principles to drivers to show why they are important. The survey results seem to support that importance, but also indicate that the current practice is far from the ideal situation. Similarly, only 26% of the participants indicate that system requirements are explicitly linked to the architecture principles that they are based upon.

Participants indicated that most architecture principles are organization-wide guiding principles (76%) and describe IT aspects (76%). Architecture principles that describe business-specific areas (36%), specific divisions within the organization (28%), or specific solutions (32%) are less frequent. This is in line with our general observation that EA is still very much focused on IT. Also, we believe that the application of architecture principles in solution architectures is still an area that practitioners need to explore. In contrast, the HP IT Strategy and Architecture (ITSA) method (Beijer De Klerk 2010), which is centered around architecture principles, is primarily targeted at solution architecture.

On average, organizations have 13 guiding architecture principles and 44 architecture principles in total. Participants indicate that only around 26% of their architecture principles are very specific for their organization. This is in line with our observation that architecture principles are generic in nature. However, we do feel that it is very important to make an organization-specific selection and customization based on the specific organizational context and drivers.

On average, organizations have had only two major releases of organization-wide guiding architecture principles over all the years. This is an indication that the experience with specifying architecture principles in organizations is still fairly limited. It is also in line with our observation that the EA field is still relatively immature and that more experience is needed.

We asked participants which people in their organization are actively involved (at least consulted in the RACI sense) in the definition of the organization-wide guiding architecture principles. The results are provided in Table 3. In the category "other" mostly various types of architect were mentioned.

Table 3: Stakeholders Involved

Stakeholders	%
Board of directors	36%
Senior management (direct reports to board of directors)	68%
Second-level management (direct reports to senior management)	32%

Stakeholders	%
Business managers	48%
Business transformation employees (such as business analysts)	28%
Business operations employees	16%
IT managers	68%
IT design/transformation employees (such as functional designers and developers)	28%
IT operations employees	20%
Other	28%

The fact that IT-related stakeholders are involved more often than business stakeholders is in line with our earlier observation that EA is still very focused on IT. It is good to see that involvement of senior management scores relatively high. The relatively low scoring of involvement of the board of directors indicates that EA is not really positioned at that level. Also, we were surprised by the relatively low involvement of employees in operations.

VALUE OF ARCHITECTURE PRINCIPLES

This section of the survey focused on the (perceived) value of architecture principles.

In general, participants have a positive attitude towards architecture principles. 95% of the participants feel that architecture principles help in better understanding an EA document. 70% indicate that people in the organization are satisfied with the architecture principles. 52% of the participants indicate that architecture principles have led to significant improvements in the organization. It is, however, difficult to quantify the value of architecture principles. Only 4% of the participants indicate that metrics on their value is available in the organization.

We asked participants to score the usage of architecture principles in a number of predefined categories. Table 4 shows the results.

Table 4: Common Usage of Architecture Principles

Usage	%
Support strategic decision-making	32%
Support tactical decision-making (including architectural design decisions)	84%
Support operational decision-making (including design decisions)	68%
Specify architectural contracts and/or project start architectures	68%
Determine system requirements	40%
Compliance testing	8%

Usage	%
Transfer knowledge	28%
Support portfolio management	28%
Stimulate discussion	36%
Capability-based planning	4%

The scoring is mostly in line with our expectations. We had expected that "compliance testing" would score higher, because architecture principles are really well suited as concrete norms to test designs (architecture compliance). We speculate that participants may not have understood what was meant with "compliance testing". Another usage that scores relatively low is knowledge transfer. We feel that architecture principles are also a means to codify knowledge, especially in generic areas such as IT. Capability-based planning is not seen as an application area for architecture principles. We do know of organizations that have actually used them as dimensions in capability-based plans to determine capability increments.

We also asked participants what has been the greatest advantage of using architecture principles in their organization. Some of the answers provided are:

- Generate discussion during the definition of them
- Supporting decision-making
- Raising awareness
- Clarity on issues where people had different opinions, but didn't realize that
- Alignment of strategic goals with design of business and IT
- Understanding of EA
- One common way of validating EAs and business cases
- Cost reduction and knowing why
- Make explicit what is most important for the business
- Make an end to discussions
- Simplification and insight
- Discussing them is easy since they are high-level
- Buy-in from all the various business domains on a consistent approach to strategic decision-making
- The insight that all different parts of the organization have a common mission and strategy
- Providing clear boundaries for projects

There were also a few participants that had negative experiences with architecture principles. One participant states:

"What I have experienced is mostly ill-advised and poor attempts by IT staff to impose what are tantamount to

suggestions, or guidelines, in an effort to provide what they regards as consistent governance."

This can be explained by earlier results that indicate that EA is still focused on IT, that mostly IT-related employees are involved, and that architecture principles are often not explicitly linked to drivers.

We also asked participants to indicate what can be improved in the way they use architecture principles. Some of the answers provided are:

- Better dissemination
- Embedding in projects
- Commitment and support of senior management
- Value tracking
- Projects to apply and use them automatically without being asked explicitly
- Less principles
- Better motivation/rationale
- Create roadmaps to achieve objectives and get buy-in for to-be state
- Greater application at a strategic and tactical level
- The set of principles should be (more) coherent and should be based on a sound foundation of context
- The architecture principles are too much owned by the IT department

These answers support earlier results around lack of traceability to drivers and lack of involvement of business stakeholders.

OTHER APPLICATIONS OF PRINCIPLES

This section of the survey focused on other areas in which principles can be used.

Architecture principles are a specific form of normative principle. Principles are often an expression of fundamental beliefs; they are an instrument to codify what people feel is important. As such, they can be used in areas outside EA. This could improve current practices around areas such as strategic planning, policy-making, design, and business operations. We asked participants whether they see the advantages of using architecture principles in these areas and whether their organization has used it in that area. Table 5 shows the results.

Table 5: Other Application Areas of Principles

Application Area	Advantage	Current Practice
Strategic planning	87%	22%
Policy making	82%	38%
Design	87%	70%
Business operations	68%	29%

The results are in line with our own expectations in the sense that participants also see the advantages of application of principles in these other areas. The current practice is also in line with our expectations. Given that architecture and design have such a strong relationship it is no surprise that the current practice for design scores high.

We also asked participants what other areas of applications they see or that their organization has experience with. Some of the answers provided are:

- Application portfolio management
- Purchase management
- Security
- Chains
- Technology
- Data exchange
- Law and legal decisions
- Organizational context of application development
- Corporate values

INSIGHTS FROM THE WORKSHOP

A workshop was organized on April 4, 2013 in which the results of the survey were presented, and in which additional discussions on the use of architecture principles took place. These discussions were based on questions that participants of the survey had provided, and that were amended in the session with additional questions. There were around 30 participants, all with Dutch nationality and with several years of professional experience in EA. In the rest of this section we will present the most important insights that came out of this workshop.

An important question that was raised is how to find the right principles; those that describe the things that are really important and that can truly provide guidance. Commonplaces that do not describe any decision should be prevented. The participants agreed that the perspective of senior management is very important, as well as what they want to influence and control. It is important to look from a top-down as well as a bottom-up perspective, combining mission, vision, and identity with issues and opportunities for improvement.

Participants also indicated that it is important to find employees that can be accountable for principles, so it is clear whose interests are represented and also who will really defend a principle when needed. The question is how to find such people. One should try to find people with vested interests in the business. It is not always easy to find people with a combination of sufficient influence and enough detailed knowledge and insight to oversee the consequences of decisions.

Another question that was raised is how to communicate architecture principles. It is clear that different communication goals and target audiences must be clearly distinguished. Business, information systems, and technology aspects typically have specific target audiences. Also, strategic, tactical, and operational levels typically require specific communication approaches. Broad communications should be easy to digest and can, for example, use visualizations.

Another question identified is how to ensure usage of architecture principles. Involvement of the right people early in the process is strongly advised. Special care should be taken to find a representative group of people in the organization, with enough formal and/or informal influence. Important stakeholders are management and project-related employees such as designers and project managers. Architecture governance should be embedded in the project management approach. The use of Project Start Architectures (architecture contracts) is advised. Designers should be supported in the actual application of architecture principles.

Participants also highlighted the importance of the evaluation and adjustment of architecture principles so that they remain relevant. The question is how to perform this evaluation and what to measure. Ideally, this is determined during the development of the architecture principles. The ultimate test is whether they have added enough value to the organization, which is something that the person accountable should be able to estimate. Has the principle actually influenced the behaviour of people?

CONCLUSION

The results of the survey have mostly supported our expectations. We believe that the development of and use of architecture principles in practice can be improved by a more explicit linkage to drivers, adaptation to the organizational context, and involvement of business management. This does not only apply to architecture principles; it applies to Enterprise Architecture in general. It is also clear that the experience that organizations have with specifying architecture principles is still fairly limited. The results of the survey have also strengthened our belief that principles are also a powerful instrument outside Enterprise Architecture.

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