Shaping the Future of Your Applications with IT Architecture Analysis

White Paper

AdNovum

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Shaping the Future of Your Applications with IT Architecture Analysis

In view of rapidly changing technological and business environments, companies are facing major challenges. They have to adapt their strategies and business processes in increasingly shorter periods of time. This trend also impacts their application requirements. In some cases, the user interface of an application fails to meet users' needs only a few months after its introduction. In other cases, maintenance of an application may become difficult because of dependencies to components that have reached the end of their life cycle.

In such cases, structured approaches are required. This white paper describes how a gap analysis of the IT architecture can help those in charge to plan and control the evolution of an application environment.

Initial situation

The fast-changing technological and business environments have a major impact on application landscapes. Applications must constantly be adapted to current needs and business requirements quickly implemented.

The following factors have an influence:

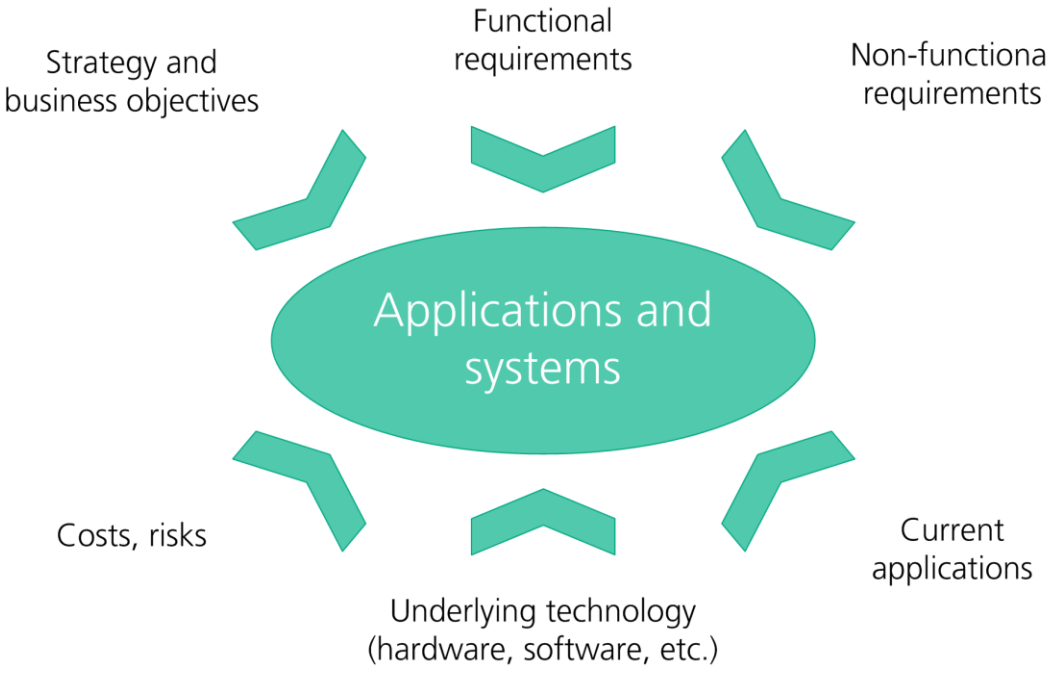

Figure 1: Application landscapes under pressure to change

- **Strategy and business objectives** must be aligned to the development of the business environment. In the process, new application requirements emerge. The review of the business strategy may trigger major changes, e.g. when switching from a customer-oriented to a product-oriented approach, which fundamentally influences the company's organization. Another example is compliance requirements: If new compliance requirements cannot be met because the software does not archive modifications in a traceable way, management may be personally liable.

Continued **technological development** influences the strategy of the company, as the relevance of emerging topics needs to be assessed and taken into account. For example: The increasing number of mobile devices has a major impact on the business environment. Users expect to be able to use applications on their smartphones or tablets.

- **Functional requirements** describe the functionality an application has to provide in order to support a business process. Often, existing applications cannot fulfill new requirements because they are not based on extendable architectures.
- **Non-functional requirements** relate to the characteristics of an application, such as perfomance and availability. While in earlier days it was usually sufficient for applications to be available during office hours, they are now expected to be available 24/7. However, numerous applications and systems are not designed for permanent availability. In addition, performance expectations have risen as these applications and systems are often used through the Internet.
- User interfaces of **existing applications** no longer satisfy user expectations, although functionality, business logic and data management still meet business requirements. The lack of usability significantly reduces the application's value. Here, new needs resulting from the use of smartphones and tablets play an important role.
  In addition, existing applications may have specific deficiencies in terms of efficiency, stability or reliability. Targeted structural improvements may in some cases help to eliminate the sins of the past. In other cases, the effort required to fix them would simply be too high.
- Furthermore, applications sometimes must be replaced because the **underlying technology** is outdated. Such applications run on older releases of the basic software, i.e. operating systems and database management systems that often are no longer supported by vendors. Other applications reach the end of their life cycle because they can no longer be upgraded. Or even worse: Computer models or operating systems are withdrawn from the market, making the further use of the application impossible.
- A number of **risks and costs,** partially resulting from the aspects mentioned above, also need to be taken into account. For example, omitting release updates may considerably increase the security risk because patches for operating systems are no longer installed. Significant additional costs are incurred when a company needs to continue to run an older release, which requires internal efforts. As a result, maintenance costs may exceed the budget.

The influencing factors mentioned above force IT departments to trigger an evolution of the application landscape despite or often because of reduced financial resources. In the process, the most important pain points need to be addressed and solutions provided within a reasonable period of time. Today, "reasonable period of time" rather means months than years. Therefore, focusing on the major steps is particularly important. To define them, the gap analysis has proven useful.

Analysis of the current situation and possible solutions

The first step of a gap analysis is to assess the current situation and define the target state.

The analysis shows the current state with its pain points and strengths, while assessing the existing applications and their benefit for the business. Furthermore, the analysis

defines the scope of the application landscape, identifying relationships and dependencies of the environment.

When defining the target state, the focus is on the future benefit which existing and new functionality provides to perform tasks. The target state mainly depends on the business objectives and requirements. Once defined, a "blueprint" for the evolution of the applications is created. Cost and risk considerations help evaluate various options.

The delta between the current and the target state serves as a basis for a roadmap for the near future. An overall assessment of the current situation and the discussion of potential target states help to identify the necessary steps for an evolution of the application landscape and trigger projects.

Scenarios

The following scenarios illustrate frequent pain points and possible solutions to develop the applications or the application environments further.

User interface does no longer meet the requirements

Parts or all of the user interface of an existing application cannot be used on smartphones or tablets. A new frontend with apps for various mobile devices is developed to enhance the existing application. The application's business logic basically remains the same.

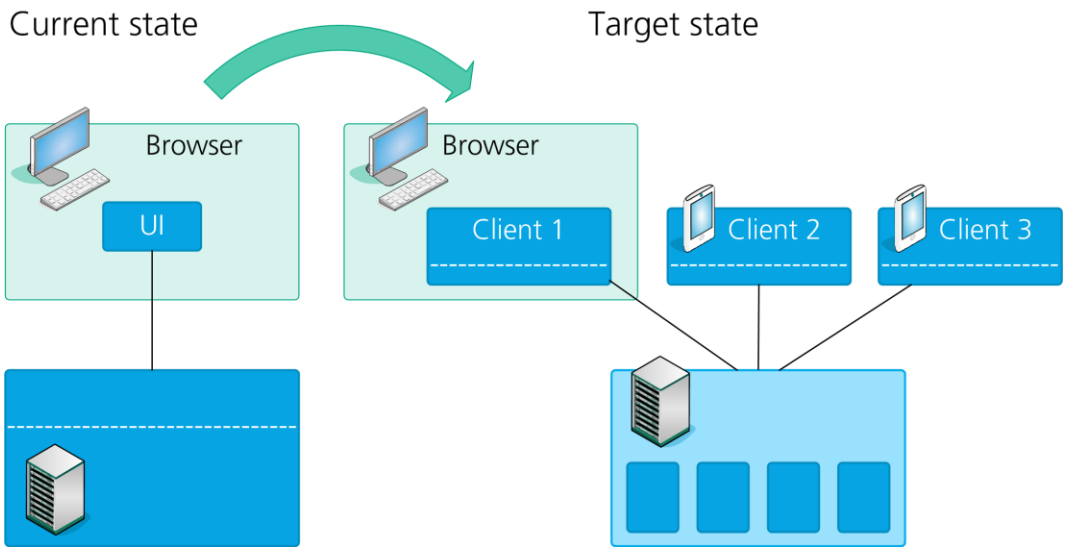

Figure 2: New frontend with several rich clients

As the diagram shows, separate rich clients for browsers and different mobile devices are implemented for the new frontend (apps for Android or iOS). Due to the characteristics of apps, part of the functionality is moved to the clients. To ensure uniformity of the solution despite the variety of devices, the application is restructured such that the three clients implement the same logic for different devices, while the backend provides the services for all clients. The services (the four small boxes of the backend in the diagram) either contain the business logic of the "old" application in smaller components or "wrap" an existing application. As a rule, services are more coarse-grained than business objects.

Business functionality cannot be implemented

If an application's business logic does not meet current requirements, e.g. because it is lacking important data areas and essential functionality, it is high time to engineer a new application or to licence the application as a package. In both cases, existing data needs to be migrated and the new application integrated into the overall landscape.

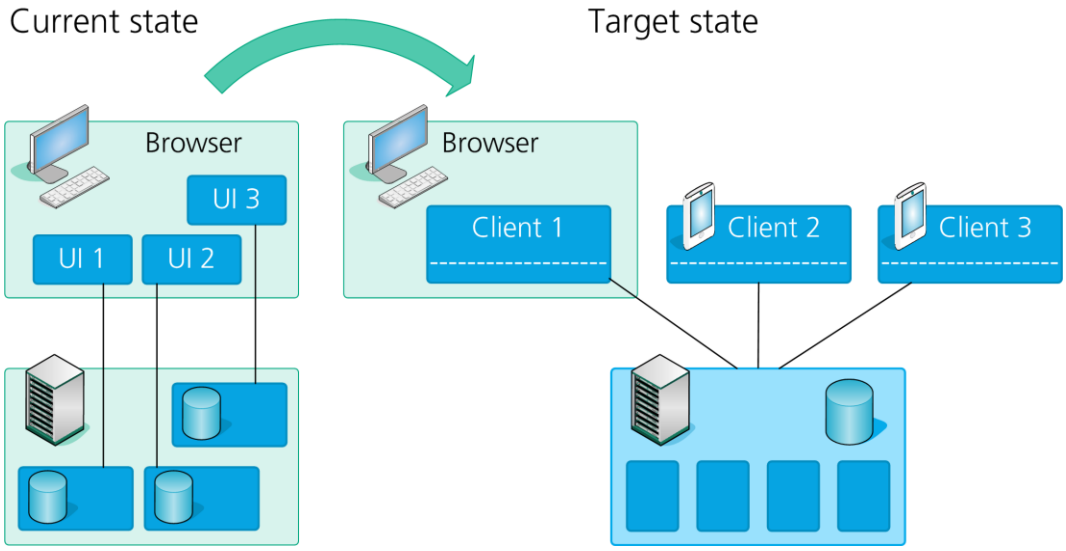

Figure 3: New frontend and new services in the backend

The diagram above illustrates the replacement of several existing applications or parts thereof with a new application. Parts of the "old" applications are implemented as services.

Operating and maintenance costs for existing applications are too high

If operating and maintenance costs are too high, applications or parts thereof may be outsourced to a cloud ("private" or "public"). This reduces costs and effort, while at the same time increasing flexibility. However, a simple upload of existing components is not sufficient. In order to avoid operational problems, interaction of the individual components needs to be considered. In addition, certain cloud characteristics may have undesirable effects (e.g. on data consistency and transaction security). Therefore, it is necessary to assess the "cloud readiness" of the involved applications and to plan the migration from an on-premises solution to a virtual platform.

Business processes are not sufficiently supported

If applications carry out certain tasks, but the overall business process is not supported sufficiently, the entire application environment needs to be analyzed. One option is a business process management approach, whereby individual applications are integrated via service interfaces.

Architecture: integrated view needed

The scenarios above show how new requirements, technological progress (e.g. mobile devices or cloud computing) and changing business needs call for new solutions.

Currently, there is a trend towards application environments with more flexible solutions and increased agility. The systems themselves, however, remain just as complex, as complexity of the solutions increases. This makes it rather difficult to find a suitable approach for further development.

This is where methodical approaches come into play, allowing an overall view on today's application environments. Architecture analyses have proven successful to get an overview of an application environment's momentum and complexity. On a coarse-grained level, the architecture overview shows how the application environment is structured and how the individual components and the relationships between them build a system. The IT architecture is outlined and discussed in different views, namely an overview, a logical view and a physical view. Every system and every application has an architecture, even if it is not explicitly described.

Methodical approaches

For an architecture analysis, various methodical approaches and tools can be employed:

- **Architecture standards,** such as TOGAF – The Open Group Architecture Framework, provide suitable terminology and an architecture framework
- **Architecture patterns** describe possible solutions that are tailored to a specific situation. Similar to design patterns, architecture patterns are geared towards specific problems, e.g. there is a pattern for the use of firewalls and related components by applications with Internet access.
- **Reference architectures** provide guidance for the structuring of application environments up to entire enterprise environments. There are also reference architectures for specific industries such as Telecom.
- Architectures are represented from different **viewpoints** (according to IEEE1471 and other standards), with each viewpoint emphasizing specific aspects. The views reflect the information needs of different stakeholders. A technical view for IT managers will differ from the more functional view for the users of an application.
- **Diagrams** represent the main components and their relation from various perspectives.
- Various **models** represent the details of an architecture. For example: A component model shows the various components and their relationships, a process model illustrates process steps and tasks. Every model follows a particular **semantics** that pre-defines the structure of the model (e.g. all UML models are based on a semantics that is defined in the UML standard). The advantage of a defined semantics is that the logic of the model is specified and, as a result, can be checked for correctness. A process model can even be used to manage and control a process instance at runtime.
- In addition to methodical know-how, the architect's **experience** is key, in particular his/her know-how of anti-patterns, i.e. unsuccessful patterns. A typical example of an anti-pattern is that the time horizon is too long, while the benefits of a project for the near future are neglected.

Gap analysis: process model

In a systematic approach, as a first step, the current architecture is represented in a view that mainly shows the existing components and their relationships, providing an overview of the application's internal structures. The same process is applied for the target state.

The business objectives serve as the starting point for an IT architecture assessment by defining so-called capabilities, which are assessed from a business perspective. Requirements that are a bit more detailed and specific reflect functionality desired by the users as well as system requirements.

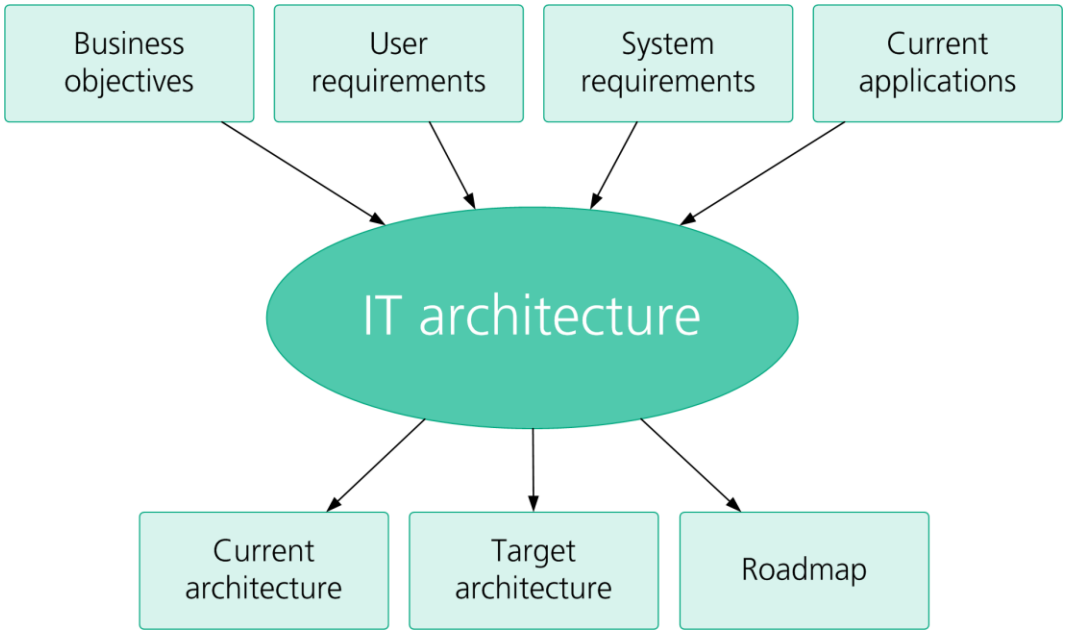

Figure 3: Gap analysis of an IT architecture

By means of diagrams and models, the IT architecture is illustrated from different views for both the current and the target state. Applying different principles of architecture allows to systematically differentiate between aspects, based on a "separation of concerns". In a next step, a roadmap is created defining upcoming actions.

Workshops are a good starting point to ensure that all stakeholders follow the same focused approach. It is crucial that representatives from both business and IT present their interests at the workshop to assess the current situation and constructively discuss potential target states.

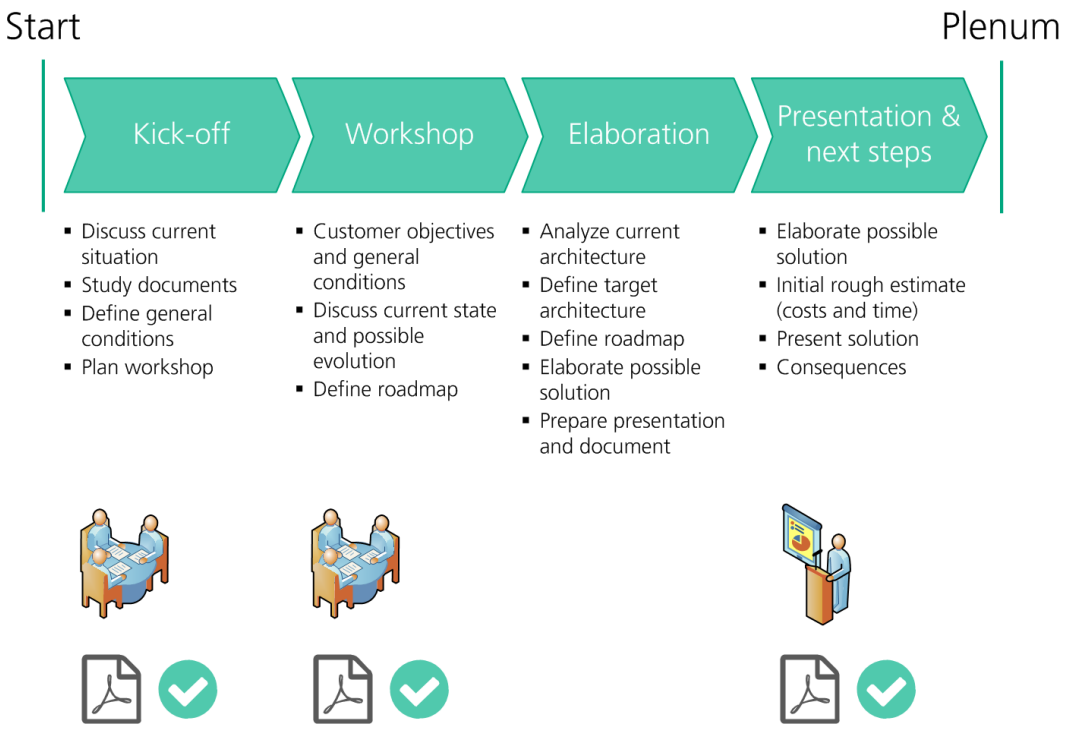

Figure 4: Different steps of a gap analysis

Conclusion

Today, application landscapes are subject to considerable pressure due to rapidly changing technological and business environments. Applications must be adapted continuously to comply with emerging needs, because business requirements must be implemented in increasingly shorter periods of time. To avoid wrong decisions, it is key to take into account and balance the requirements of all business and IT stakeholders at an early stage.

In this process, structured approaches such as an architecture assessment have proven successful.

In a workshop or a series of workshops, current and target architectures are analyzed and discussed. This approach allows all parties involved to systematically analyze the application landscape from different viewpoints and to create a roadmap for its further development.

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