Architecture and his concepts

Introduction

In current business practice, an integrated approach to business and IT is indispensable. As a real-life example, take the Dutch government, who are currently undertaking a massive redesign of the entire chain of organisations involved in the social security system. Within this context, the collection of employees' social security premiums is transferred from the central social security organisation to the tax administration. This sounds logical, since collecting taxes is superficially very similar to collecting social security premiums. However, this seemingly simple change entails a major redesign of organisational structures, business processes, IT applications, and technical infrastructure. Enormous flows of data need to be redirected within and among the different organisations: more than 600,000 payroll tax returns are filed each month, a large proportion of which arrive within a peak period of a couple of days.
Controlling such changes cannot be done by just 'winging it'. But how can we get to grips with this complex, multi-faceted world?

Architecture

It is often said that to manage the complexity of any large organisation or system, you need architecture. But what exactly does 'architecture' mean? Of course, we have long known this notion from building and construction.

Suppose you contract an architect to design your house. You discuss how rooms, staircases, windows, bathrooms, balconies, doors, a roof, etc., will be put together. You agree on a master plan, on the basis of which the architect will produce detailed specifications, to be used by the engineers and builders.

How is it that you can communicate so efficiently about that master plan? We think it is because you share a common frame of reference: you both know what a 'room' is, a 'balcony', a 'staircase', etc. You know their function and their relation. A 'room', for example, serves as a shelter and is connected to another 'room' via a 'door'. You both use, mentally, an architectural model of a house. This model defines its major functions and

how they are structured. It provides an abstract design, ignoring manydetails. These details, like the number of rooms, dimensions, materials to be used, and colours, will be filled in later.

A similar frame of reference is needed in designing an enterprise. To create an overview of the structure of an organisation, its business processes, their application support, and the technical infrastructure, you need to express the different aspects and domains, and their relations.
But what is 'architecture' exactly? Even in building and construction, the term is not without ambiguity. It can signify the art and science of designing the built environment, or the product of such a design. Thus, the term architecture can encompass both the blueprint for a building and the
general underlying principles such as its style, as in 'gothic architecture'.
There are different schools of thought on this. Some say we should reserve the term 'architecture' in the context of IT solely for such principles and constraints on the design space, as e.g. Dietz argues (2006), who uses the term 'enterprise ontology' for the actual designs. In this book, we will use the IEEE 1471-2000 / ISO/IEC 42010:2007 (IEEE Computer Society
2000; see also Sect. 2.2.2) definition of architecture:

Architecture is the fundamental organisation of a system embodied in its components, their relationships to each other, and to the environment, and the principle guiding its design and evolution.

This definition accommodates both the blueprint and the general principles. More succinctly, we could define architecture as 'structure with a vision'. An architecture provides an integrated view of the system being designed or studied.

As well as the definition of architecture, we will use two other important notions from the IEEE standard. First, a 'stakeholder' is defined as follows:

Stakeholder: an individual, team, or organisation (or classes thereof) with interests in, or concerns relative to, a system.

Most stakeholders of a system are probably not interested in its architecture, but only in the impact of this on their concerns. However, an architect needs to be aware of these concerns and discuss them with the stakeholders, and thus should be able to explain the architecture to all stakeholders involved, who will often have completely different backgrounds.

Enterprise Architecture

More and more, the notion of architecture is applied with a broader scope than just in the technical and IT domains. The emerging discipline of enterprise engineering views enterprises as a whole as purposefully designed systems that can be adapted and redesigned in a systematic and controlled way. An 'enterprise' in this context can be defined as follows (The Open Group 2009a):

Enterprise: any collection of organisations that has a common set of goals and/or a single bottom line.
Architecture at the level of an entire organisation is commonly referred to as 'enterprise architecture'. This leads us to the definition of enterprise architecture:

Enterprise architecture: a coherent whole of principles, methods, and models that are used in the design and realisation of an enterprise's organisational structure, business processes, information systems and infrastructure.

Enterprise architecture captures the essentials of the business, IT and its evolution. The idea is that the essentials are much more stable than the specific solutions that are found for the problems currently at hand. Architecture is therefore helpful in guarding the essentials of the business, while
still allowing for maximal flexibility and adaptivity. Without good architecture,
it is difficult to achieve business success.

The most important characteristic of an enterprise architecture is that it provides a holistic view of the enterprise. Within individual domains local optimisation will take place and from a reductionistic point of view, the architectures within this domain may be optimal. However, this need not lead to a desired situation for the company as a whole. For example, a highly optimised technical infrastructure that offers great performance at ow cost might turn out to be too rigid and inflexible if it needs to support highly agile and rapidly changing business processes. A good enterprise architecture provides the insight needed to balance these requirements and acilitates the translation from corporate strategy to daily operations.

To achieve this quality in enterprise architecture, bringing together information from formerly unrelated domains necessitates an approach that is understood by all those involved from these different domains. In contrast to building architecture, which has a history over millennia in which a common language and culture has been established, such a shared frame of reference is still lacking in business and IT. In current practice, architecture descriptions are heterogeneous in nature: each domain has its own description techniques, either textual or graphical, either informal or with a precise meaning. Different fields speak their own languages, draw their own models, and use their own techniques and tools. Communication and decision making across these domains is seriously impaired.

What is part of the enterprise architecture, and what is only an implementation within that architecture, is a matter of what the business defines to be the architecture, and what not. The architecture marks the separation between what should not be tampered with and what can be filled in more freely. This places a high demand for quality on the architecture. Quality means that the architecture actually helps in achieving essential business objectives. In constructing and maintaining architecture, choices should therefore be related to the business objectives, i.e., they should be rational