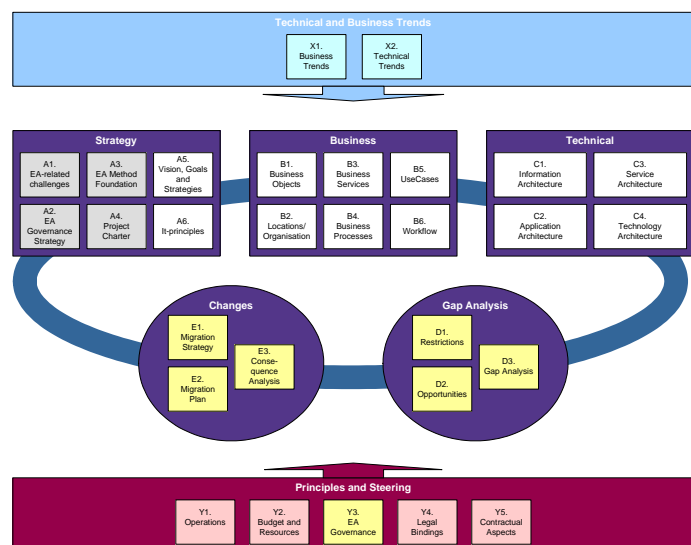OIO Enterprise Architecture

Introduction to the OIO Enterprise Architecture Method (OIO EA)
Version 1.0

About this Document

This document surveys the OIO EA method and the thoughts behind it. The OIO EA method is a pragmatic approach to enterprise architecture, based on practical experience as well as proven theory. The document gives examples on how to use OIO EA, as well as a survey of the activities and steps being part of OIO EA.

The document is intended for decision makers and it/business/enterprise architects in the public sector, who wishes a fast introduction as to what OIO EA is, and how it can be applied. Online, as well as in other documents there are more detailed descriptions of the single steps in the method, of scenarios, of competence profiles, and other stuff that might help in the application of the method to a given real-life case.

☞ **Note**: "OIO" is a Danish acronym for what translates to "Official Information Online" – a vast set of public initiatives to coordinate and help the public sector to use it for a better public service and "digital administration". The results from these initiatives can be found at www.oio.dk – most in Danish, though.

The National IT and Telecom has sought to create and present an effective, efficient and pragmatic enterprise architecture method and –framework, based on well-proven theory as well as practical experience.

The National IT and Telecom can however not be held responsible for the result of the use of the OIO EA method, neither used internally nor used as foundation for services offered to others.

A successful outcome of the use of the method/framework requires the proper resources with the proper skills, project management, etc. – matters that are outside the scope of OIO EA.

Table of contents

1 Introduction

The Danish Ministry of Science, Technology and Innovation published in October 2004 "Architecture for Digital Administration – Handbook on Concepts, Frameworks and Processes", also just known as "The Handbook". The document described how the public administration faces new challenges and demands that can only be met through a systematic planning of the use of it. The planning must compare the needs of the business with what the systems and technologies in use currently offer, consider the opportunities that new technologies offer, and based on this define the future system landscape and a plan for realizing this. A plan for this is called an e**nterprise architecture**, abbreviated **EA**.

"The Handbook" drafted an approach to develop such an enterprise architecture. It described which considerations to make in the individual steps, and gave examples on which methods to use. The overall framework method was the one depicted below.
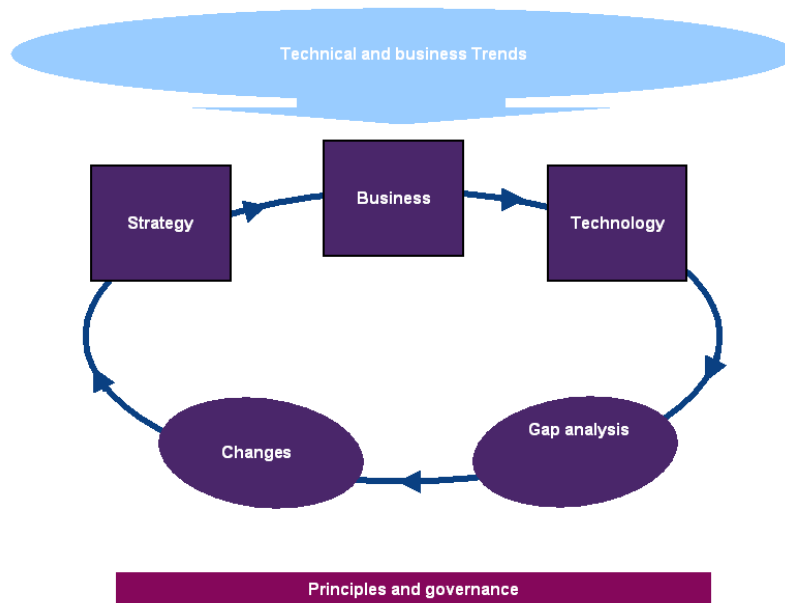

Figure 1: The Handbook's EA Method Framework.

The work on the OIO enterprise erchitecture method sought to make this rather general framework more operational. Each of the activities has been broken down to 2-6 steps, and each step has been described systematically. For each step has been described:

- Purpose – why do the step, how does it help to realize an enterprise architecture?
- Actors – who will typically participate in the step?
- Input – what is the foundation for the step (under this: which output from which previously conducted steps will be used?)
- Output – what will be the deliverables from the step?
- Method (in survey) – how will the step typically be approached?
- Good advices – "best practice" experiences that adds to the brief description of the method.
- Examples – for many steps an example illustrates how the output could be.
- References to relevant documents and templates, links to documents that may give inspiration and more insight in how to conduct the individual step. There are also references to similar steps in other methods and to other frameworks (however, there may not be an exact 1:1 correspondence between OIO EA steps and those in other methods/frameworks).

OIO EA comes in a static and a dynamic version. The static comprises a number of documents, including an Introduction to OIO EA, a description of the individual steps, a collection of scenarios, and a description of the

OIO EA framework. These documents can be downloaded and printed. The dynamic version is an interactive handbook with links to other resources within and outside the OIO EA portal. The OIO EA portal is ongoing being expanded with new, relevant content.

OIO EA can be used for various purposes, including:

- Implementation of an it project.
- The conduct of an it Request-for-Proposal.
- Consolidation of workflows in relation to a harmonisation effort.
- Consolidation of the information architecture at an enterprise level.
- Development of a partial enterprise architecture, for instance infrastructure consolidation.
- Development of a full enterprise architecture for a public authority.
- Development of an architecture for data infrastructure in a domain, in cross-domains or common public.
- Development of an architecture for a common public infrastructure.

OIO EA incorporates more detailed OIO standards and guides, for instance the OIO catalogue of technology standards, OIOXML data standards (the "InfraStructureBase"), OIO web services, etc.

2 Survey of the OIO Enterprise Architecture Method

OIO EA is a breakdown of The Handbook's EA frame. The method, with the individual steps in each activity, is depicted below:
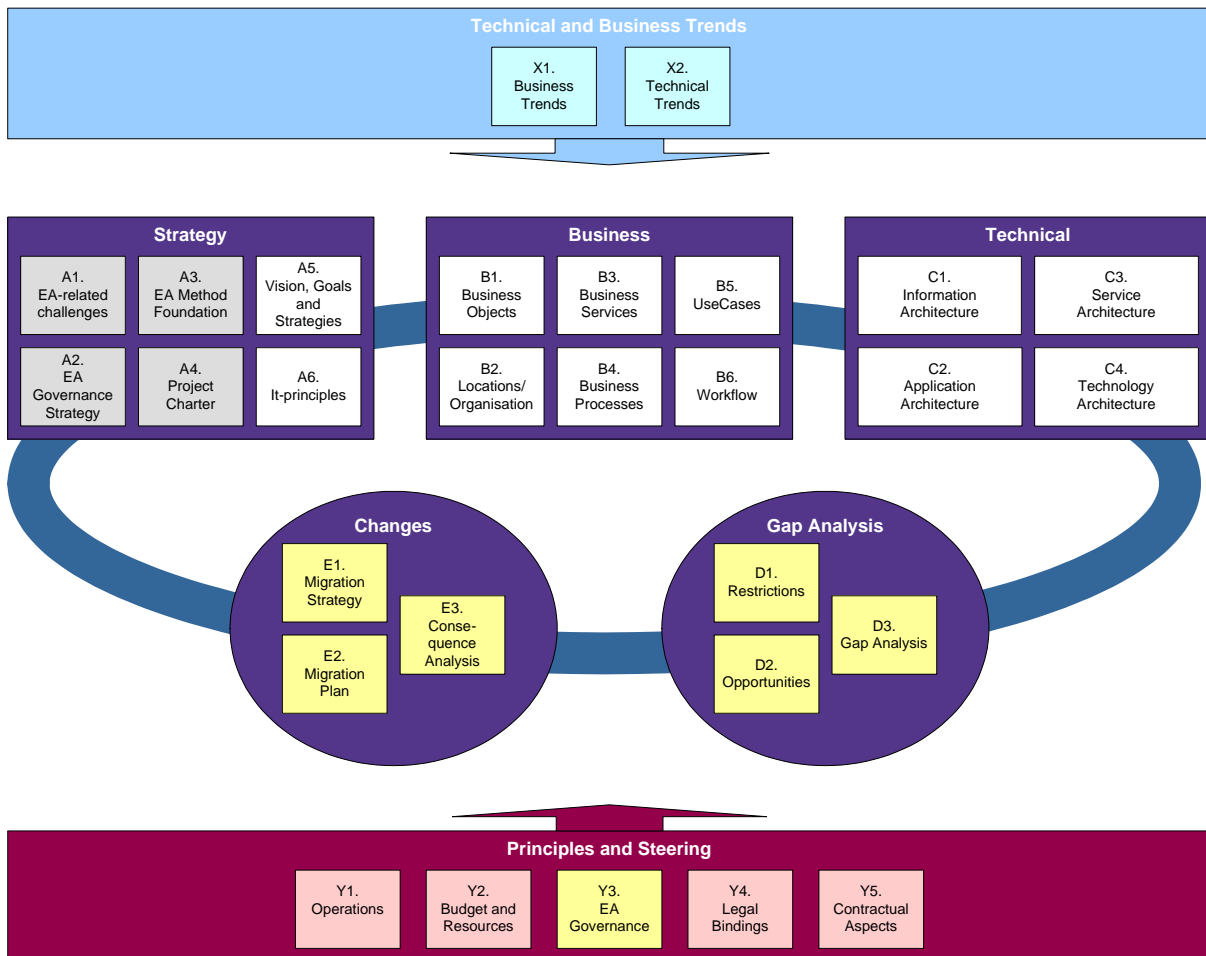

Figure 2: The Handbook's EA framework method refined into the OIO EA method.

The OIO EA method focuses on the steps within the five central activities (marked blue-violet) – the steps from A1 to E3. The steps X1-X2 and Y1-Y5 are interacting with the core OIO EA method, and are also described here. These are however normally conducted by others than the ones responsible for the enterprise architecture, except for step Y3 EA governance, which is a step central for the maintenance of the architecture.

As for the OIO EA method, it is important to notice the following:

1. **It is an ongoing, iterative process to develop and maintain an enterprise architecture.**

2. **The OIO EA method is a method, not an architectural framework**. However a part of the OIO EA guide is an OIO EA framework. Output produced using the OIO EA method can be classified according to the OIO EA framework, the Zachman framework or other frameworks.

3. **The individual steps are not carried out in a pre-described order**. The numbering indicates one that often will be appropriate (since the output of one step gives input to other steps). However, the order is not fixed. For instance, one can conduct the steps B5 and B6 before conducting the steps B1-B4. Likewise one can start on documenting the current architecture in the "AS-IS" parts of steps independent on when the steps in A and B are conducted. However, the design of the future "TO-BE" architecture will require input from the A-B steps.

4. **Steps can** (and will often) **be conducted in parallel**. For instance, the "AS-IS" parts of the four steps C1-C4 can and should be done in parallel (to speed up the delivery). Even where there is no parallelism, it will happen frequently that one step leads to the modification of deliverables from steps already conducted.

5. **Only rarely are all steps in the OIO EA method conducted**, the use of the method is adjusted to the specific needs. For instance, the focus can be on infrastructure consolidation. Then parts of step C1 and all of C4 becomes key. Or the focus could be on process optimization, in which case steps B3/B4 and C2/C3 are crucial.
Chapter 3 exemplifies how OIO EA can be used in a given scenario. A separate document describes other common scenarios.

6. **Not all output deliverables in a step are necessarily produced**. For instance, C1 comprises two main parts:
- C1.1 describes the logical data model – as an extension and detailing of the business object model from B1.
- C1.2-3 describes locations and data flows between physical databases implementing the models described in B1 and C1.1.
These can be done rather independent of one another, both based on input from step B1.

7. **It is not an objective in itself to do Enterprise Architecture work**. Hence, one should focus on areas where one with less effort needed arrives at the good answers for how technology should be used to achieve the business' goals.

8. **The EA architect is a common actor for all steps A-E**. Not necessarily as the driver of the step, but responsible for ensuring consistency across, and to identify opportunities for synergy, where relevant. In case of inconsistencies between deliverables (for instance that the proposed technology architecture does not properly support the future application architecture) the EA architect shall seek to resolve this. Typically, one will gather the architects who developed the deliverables, and see to find a solution.

When starting an EA project, aimed at establishing or modifying an enterprise architecture, one determines the specific use of the OIO EA method, as indicated in item 3-6 above.

3   The Connecting Thread in OIO EA

The OIO EA method forms a frame which should always be adjusted to the needs of the individual organisation, and taking into account what already exists on the business side and on the technology side. The prime purpose of OIO EA is to ensure that **decisions on technology and it-projects are well anchored in the objectives and strategies of the business, and helps achieve these**. In brief, OIO EA shall be used to prioritize and justify all major technology investments made by an organisation.

The connecting thread in the OIO EA method is thus to build the bridge between business and information technology. Below is given an example on how this can be carried out, in a specific scenario.

3.1 Example: OIO EA used for Infrastructure Consolidation

Scenario: Two or more organisations are to be united, and different infrastructures consolidated. In this scenario the focus is on ensuring the fast establishment of the basic infrastructure, so that it might deliver the more basic services and at the same time support future applications – though these may not yet have been defined precisely.

OIO EA can in this scenario be used as described below (red arrows indicates that the future "TO-BE" architectures are being defined at the area where the arrow ends; blue that the current "AS-IS" architectures for where the arrow ends are being documented; and stipulated lines that the step is only carried out to a certain extent):
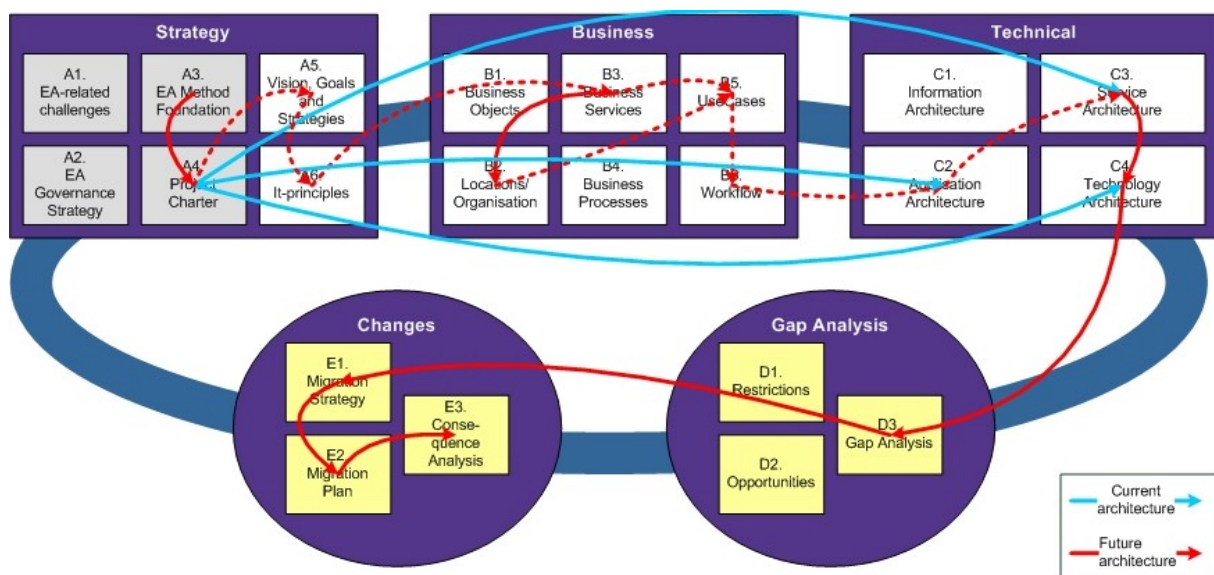

Figure 3: OIO EA used for Infrastructure consolidation.

One starts in step A3 to define the adjustment of the OIO EA method to this scenario, as indicated here, only with more detail on the output from the individual steps. This is included in the project charter in A4, where project activities, timelines and responsibilities for each of the steps are defined.

After this, the core of the EA project is initiated. Notice that it is desirable – and possible – to have a large extend of parallelism, in order to speed up the infrastructure consolidation:

> At the **technical side** one immediately starts the documentation of the current architecture (blue arrows). Even here, it is possible to document the current application-, service- and technology architecture in parallel. The technology architecture (C4) will get most attention, but it is necessary to have a certain understanding of which technology requirements the current applications (C2) and services (C3) poses on the underlying infrastructure, in order to be able to meet these in the future architecture.

> At the **strategy/business side** one will, to a certain extent, make sure that the goals and strategies of the business are documented, to ensure that they are fresh in mind. Likewise, one will to a degree describe the business services that will be delivered in the future (B3). These can with advantage be further specified by selecting use cases (B5) and workflows (B6), although these two steps should not form a major task. More important in the business activity is to define which future locations and organisational units (B2) the future organisation will have, and thus which the future infrastructure must support.

When the current technical architecture and the future business architecture are both well documented, the work on designing the future infrastructure begins:

One will, to some extent, draft which **future applications** (C2) and **future services** (C3) need to be supported by an infrastructure. This is not to define them in much detail (like functionality, specific choice of software packages, data exchange formats, etc.), but merely to uncover the requirements from the future applications and services to the future infrastructure – development environments, network structures, etc.

After this is defined the **future technology architecture** (C4) shall be defined – i.e. network, operating systems on clients and servers, infrastructure services such as email, intra/extranet and portal technologies, database technologies, development environments, etc. This technology architecture will be defined rather thoroughly, with precise specifications of infrastructure topologies and choices of technologies and technology standards for the individual nodes (building blocks) in the topologies. It will also be most relevant to specify system management and security aspects of the infrastructure.

The project now continues with a **gap analysis** (D3) that compares the current technology architecture and the future, and based on this defines a **migration strategy** (E1) and subsequently a detailed **migration plan** (E2), describing migration projects and their relations, and estimate resource needs. This can with advantage be combined with a **consequence analysis** (E3), which among other identifies organisational aspects to be addressed, although these aspects may not be part of the implementation of the technology architecture.

4   The OIO EA Methods Activities and Steps

Each blue-violet box is denoted an **activity**. Each box holds several **steps**, and each step can lead to various deliverables, also denoted OIO EA products. A survey of possible OIO EA activities and steps is given below.

4.1   OIO EA – The Strategy Activity

The goal of the strategy activity is to ensure that the enterprise architecture is anchored in the needs of the business.
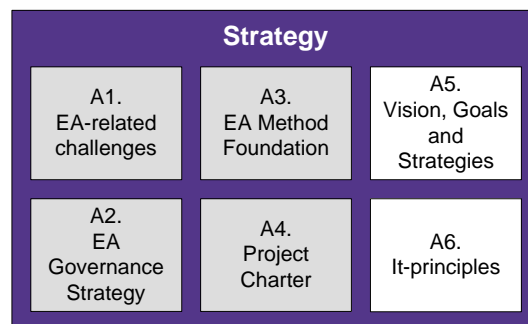

Figure 4: OIO EA Method – Strategy.

The grey steps are start-up activities, carried out to establish the foundation for the OIO EA efforts.

- A1 reveals which challenges – problems and opportunities – OIO EA should address.

- A2 address up-front in an EA project how architecture can be realized in the organization present, and starts the mobilization of an EA governance structure.

- A3 adjusts the general OIO EA method to the needs of the organisation in an actual enterprise architecture project. This is, defining which steps to omit, and making very explicit which are the tasks and deliverables of the steps to be conducted.

- A4 then defines the project, with input from A1-A3. The deliverable from this step will become a project handbook for the participants of the project.

In summary, step A1-A4 defines the frames for an OIO EA project. The following steps defines the strategic directions for the continuation:

- A5 synthesizes the organisations business direction, in terms of vision, goals and strategies, and from that derives the critical success factors. Also a stakeholder analysis, and an analysis of the strong and weak sides, opportunities and threats (SWOT), could be part of this step.

- A6 defines the it-principles for the organisation; principles that guides the later choice of technology.

4.2 OIO EA – The Business Activity

The purpose of the business activity is to have the business – with focus on the *future business* – defined in operational terms. This is a step towards ensuring that it-usage is focused on supporting the business operation.
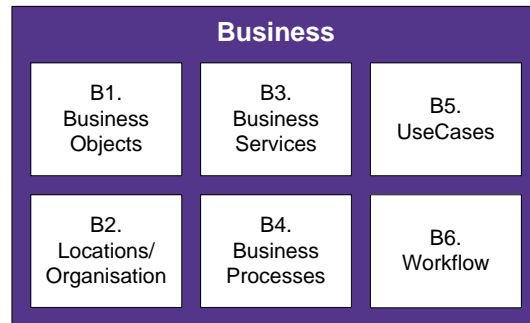
Business		
B1. Business Objects	B3. Business Services	B5. UseCases
B2. Locations/ Organisation	B4. Business Processes	B6. Workflow

Figure 5: OIO EA Method – Business.

The individual steps can be conducted in varying order, also in parallel. They are:

- B1 identifies the concepts – "business objects" – that are used by the business side of the organisation. This could be "citizen", "request", "area", "building", etc.

- B2 describes the organisational units and/or location types that need a strategic it support in order to better conduct their work and thereby realising the goals of the business.

- B3 describes the business-oriented services that the organisation offers to its stakeholders – citizens, companies, employees, etc.

- B4 describes the business processes following in the organisation. There will be main processes, which results in the delivery of the organisations business services, and support processes to assist in this.

- B5 describes Use Cases – this is, which tasks are solved by which actors. Focus is on *what* is being done, not *how*.

- B6 details B5 by describing more operational *how* the individual tasks are being solved.

4.3 OIO EA – The Technical Activity

The purpose of the Technical Activity is to document the current technical architectures, and to define the future technical architecture (3-5 years ahead). As well the current as the future architecture will be defined within four select areas:
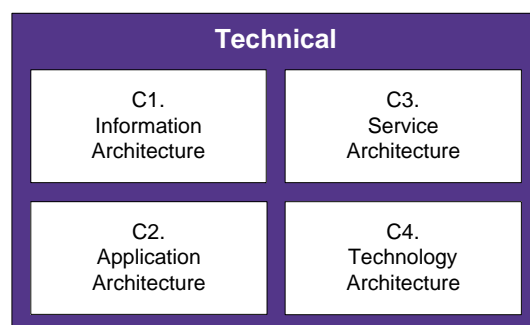
Technical	
C1. Information Architecture	C3. Service Architecture
C2. Application Architecture	C4. Technology Architecture

Figure 6: OIO EA Method – Technical.

The individual steps are:

- C1 documents the current, and designs the future information architecture. Both comprise logical data models, physical database structures and data distribution schemes.

- C2 documents the current, and designs the future applications architecture. Focus is on describing the application and integration landscape, including the functionality of the individual applications, and on which integrations exist and need to be made. C2 also describes how the applications are used, and which information they generate and use – but not how the applications should be constructed or provided.

- C3 complements C2, in the manner that is takes a look inside the individual applications, with the objective to make them component-based, and to identify services that with benefit can be made common for several applications, and implemented as web services.

- C4 documents the current, and designs the future technology architecture, which is the underlying platform for applications and data. This comprises the infrastructure itself (like clients, servers and network) as well as management of this (systems management, security).

4.4   OIO EA – The Gap Analysis Activity

The purpose of the gap analysis activity is to ensure that the difference between the current and the future architecture is being analysed, so that a solid foundation for a migration plan is being provided.
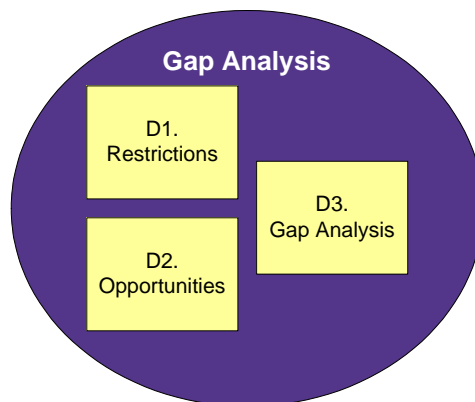

Figure 7: OIO EA Method – Gap Analysis.

The individual steps are:

- D1 surveys the restrictions that should be factored in, in a migration plan.

- D2 uncovers opportunities (project suggestions) that will benefit the organisation, business-wise, technology-wise, or organisationally.

- D3 analyses the differences between the current and the future architecture, as a foundation for a migration plan.

4.5   OIO EA – The Changes Activity

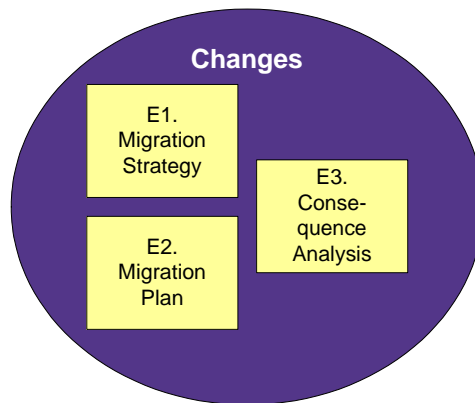The purpose of the change activity is to ensure that the future enterprise architecture is realised.

Figure 8: OIO EA Method – Changes.

The individual steps are:

- ▪ E1 provides general directions on how a migration to the desired future it project can be realised.

- ▪ E2 develops the E1 general directions into a more specific plan that identifies and to some extent describes major it projects for the coming 3-5 years.

- ▪ E3 identifies the consequences that the proposed migration projects might have, not least how they might affect employees and users, and suggests how to mitigate negative effects.

4.6   Activity X: Technical and Business Trends

The X-activity comprises steps concerned with trends – that is, opportunities that the organisation might (but do not necessarily need to) factor in.
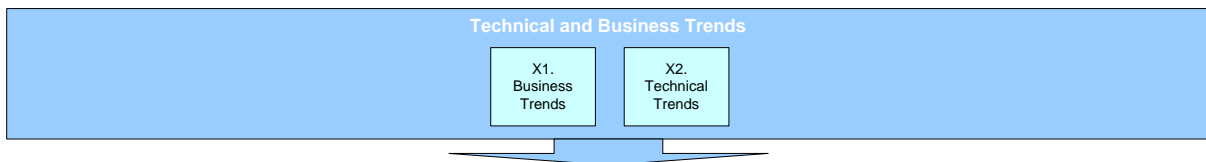

Figure 9: OIO EA Method – Technical and Business Trends.

The individual steps are:

- ▪ X1 gives input in the form of a survey of which business trends to consider factored into the enterprise architecture.

- ▪ X1 giver input in the form of a survey of which technical trends to consider factored into the enterprise architecture.

4.7   Activity Y: Principles and Steering

The Y-activity comprises steps addressing all the steering mechanisms and boundaries there are, regarding legal and contractual matters, and concerning the steering of budget/resources and the operations.
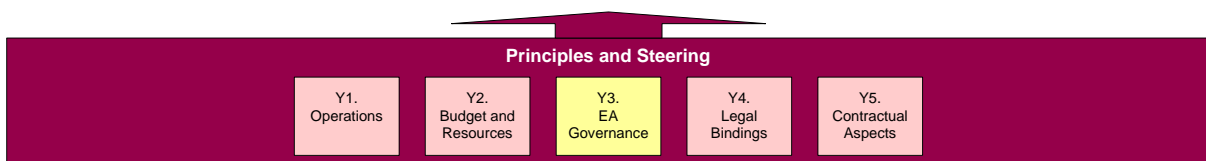

Figure 10: OIO EA Method – Principles and Steering.

The individual steps are:

- Y1 comprises those tasks that maintain the operation of it systems. The documentation from this step comprises operation manuals, procedures on how to handle requests from it users, and so on.

- Y2 is concerned with the steering of resources and budgets that, among others, shall ensure that the enterprise architecture is being implemented.

- Y3 is central in the EA context, since it establishes structures and processes that will ensure that the enterprise architecture is kept alive, updated, communicated, and applied.

- Y4 surveys the legal restrictions that must be factored into the enterprise architecture.

- Y5 surveys the contractual obligations that can affect the plans for realising the enterprise architecture.