A theory for Enterprise Coherence Governance

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Abstract. In this chapter, the authors pose a theory for the governance of enterprise coherence. The proposed theory consists of three key ingredients: an Enterprise Coherence-governance Assessment (ECA), an Enterprise Coherence Framework (ECF) and an Enterprise Coherence Governance (ECG) approach. The ECA provides an explicit indication of the degree at which an organisation governs its coherence, while also providing a base to achieve a shared understanding of the level of coherence, and actions needed to improve it. The ECF is a practice-based framework that enables enterprises to make the coherence between key aspects, such as business, finance, culture, IT, etc., explicit. The ECG approach offers the instruments to guard/improve the level of coherence in enterprises during transformations.

An important trigger to develop this new theory was the observation that many transformation projects fail. These failures even included projects that used an explicit enterprise architecture to steer the transformation. The theory was developed as part of the GEA (General Enterprise Architecting) research programme, involving twenty client organizations. Based on a survey of the possible causes for the project failures, the requirements for the research programme were identified. In developing the theory on enterprise coherence, the following hypothesis was used as a starting point: *the overall performance of an enterprise is positively influenced by a strong coherence among the key aspects of the enterprise, including business processes, organizational culture, product portfolio, human resources, information systems, IT support, etc*. The research programme used a combination of design science based iterations and case study based research, to develop and iterate the theory for enterprise coherence governance.

In this chapter, we will also elaborately discuss one of the conducted (real world) case studies, showing the application of the enterprise coherence theory.

Keywords: **enterprise coherence governance, enterprise architecture**

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[1] The Enterprise Engineering Team (EE-Team) is a collaboration between Public Research Centre Henri Tudor, Radboud University Nijmegen and HAN University of Applied Sciences (www.ee-team.eu).

1 Introduction

Developments in the last two decades, such as the globalisation of trade, the fusion of business and IT, the introduction of new technologies, the emergence of novel business models, etc., pose many challenges to modern day enterprises (Op't Land, Proper, Waage, Cloo & Steghuis, 2008). More recently, the economic crises, the growing pains of the Eurozone, also drive companies to find new competitive advantages. As a result, enterprises need to cope with a rapidly changing environment. This means that enterprises need the ability to transform themselves (at least) as quickly as their environment does. Such enterprise transformations may range from changes in value propositions and business processes, via changes to the information systems used to support the business processes, to changes of the underlying IT infrastructures. They may be the result of a 'premeditated' top-down (strategy driven) desire to change, but they can also be the outcome of numerous 'spontaneous' bottom-up changes as a result of locally needed changes. Finally, the required/desired transformations will typically touch upon several additional aspects of the enterprise, such as human resourcing, finance, organisational structures, reporting structures, etc.

To make large enterprise transformations feasible and manageable, they are typically managed as a portfolio of transformation programmes, where these programmes are split further into projects. Even more, the portfolio of programmes and projects that make up an enterprise transformation need to be mutually coordinated, as well as being aligned with the enterprise's strategy. Therefore, a coordination mechanism is needed that connects the strategic considerations at the strategy level to the execution of the different programmes and projects involved in the transformation as a whole. This coordination generally also requires a further elaboration of the enterprise's strategy, since these tend to be too unspecific to indeed steer the programmes and projects within the transformation (Op't Land, Proper, Waage, Cloo & Steghuis, 2008). In addition, the needed coordination mechanism must allow the coherence between the different aspects of an enterprise to be guarded across the programmes and projects transforming the enterprise (Op't Land, Proper, Waage, Cloo & Steghuis, 2008; Wagter, Berg van den, Luijpers & Steenbergen van, 2005).

Already in 1957, Drucker argued for an integral and complete approach as a pre-requisite to success. Traditionally, project management and programme

management are put forward as being responsible for these coordination tasks (The Stationary Office, 2009; The Project Management Institute, 2001). However, these approaches focus primarily on the management of typical project parameters such as budgets, resource use, deadlines, etc. When indeed only considering the typical project parameters, one runs the risk of conducting only *local and or partial improvements* at the level of specific projects. For example, when making design decisions that have an impact which transcend a specific project, projects are likely to aim for solutions that provide the best cost/benefits trade-off within the scope of that specific project, while not looking at the overall picture. Regretfully, however, in practice such local optimisations do not just remain a potential risk. The risk actually materializes, and consequently damages the overall quality of the result of the transformation (Op't Land, Proper, Waage, Cloo & Steghuis, 2008). This type of risk generally occurs when interests regarding general infrastructural elements of an enterprise collide with local short-term needs. This especially endangers the needed coherence and alignment between different aspects within an enterprise (such as human resources, services, customers, processes, marketing, finance, physical infrastructures, IT, etc.). As a result, more often than not, enterprises fail to actually realise the desired transformation even though it might be the case that all projects are finished on time and within budget. In addition, Bower (2000, p. 83-95) acknowledges the presence of multiple levels of management, such as directing the company, directing management and directing staff and labor. He stresses the need to treat these different management levels in *coherence* to avoid a partial but rigorous theory in solving business issues.

This raises a key question: *How can a company escape from partial improvements on a local scale, and subsequent loss of business value?* In finding an answer to this question, we have to expand our (project) managerial dimensions with the governance of enterprise coherence. To be able to do this, we have to make the enterprise coherence explicit and apt to intervene on all levels of decision making, keeping track of the causal effects on these levels as well as between them. Architecture is a school of thought pre-eminently suitable for this purpose.

Slot (2010) has shown that a correlation exists between the performance of IT projects and the use of architecture to steer/coordinate these projects; i.e. projects being implemented under architecture. IT projects implemented under architecture result in 19% less budget over-runs. In principle, one might expect that such a positive effect would be discernable when working under architecture would be applied to enterprise transformations as a whole as well. Regretfully, however, in various transformation assignments in practice[2], we

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[2] The authors either currently work for a consultancy firm, or have worked for one in the past.

have been confronted with the situation that transformation projects fail due to budget overruns, or a failure to meet objectives and expectations (Wagter, Proper & Witte, 2011 p. 28-52). Our informal experiences and observations are also supported by the (Dutch) General Court of Auditors (De Algemene Rekenkamer, 2008), who has produced a report on the cause of failures in ICT projects. In Op't Land et al. (2008), the authors also provide a summary of possible causes for failures of strategic initiatives, as well as the need to develop a solution for them: "*The road from strategy formulation to strategy execution, including the use of programmatic steering, is certainly not an easy one to travel. Research shows that less than 60% of the strategic objectives in organisations are reached (Smit, 2007). When considering the possible failures in strategy execution … an instrument is needed to support this process*". In (Hoogervorst, 2004, p. 213-233; Hoogervorst, 2009), Hoogervorst also argues in favour of using enterprise architecture as a means to govern coherence in enterprises.

Our own experiences[2], and the above discussed general insights, seem to indicate that achieving and maintaining enterprise coherence between different aspects of an organisation, by applying an architectural line of thinking, is a crucial factor with regard to change processes and the achievement of strategic objectives. Therefore the governance of enterprise coherence deserves a closer study of causes and potential solutions in the field of enterprise transformation.

The general concept of coherence is described in the MacMillan English dictionary (2010) as: "*in which all the different parts fit together in a sensible or pleasing way*", while the Van Dale (2010) dictionary describes coherence as: "*the extent in which several aspects are connected*". In line with these definitions, we define enterprise coherence as follows (Wagter, Proper & Witte, 2012a):

> *Enterprise coherence is the extent to which all relevant aspects of an enterprise are connected, necessary to let the enterprise meet its desired results.*

What is to be regarded as *relevant aspects*, as referred to in the above definition, is organization dependent. Even more, the clarity (and resolve) with which an organization has identified/prioritized these aspects is one of the parameters determining their ability/maturity to govern enterprise coherence. In (Wagter, Proper & Witte, 2011 p. 28-52) we have discussed the concept of the (organization specific) coherence dashboard, which enables organizations to precisely express the relevant aspects that need to be connected.

Since achieving, and/or maintaining enterprise coherence seems to be an important capability in the realm of enterprise performance (there is a potential positive correlation with the performance) there is a reason to govern en-

terprise coherence (Wagter, Proper & Witte, 2011 p. 28-52). This insight triggered the multi-client General Enterprise Architecting (GEA) research programme (Wagter, Nijkamp & Proper, 2007)[3]. The aim of this programme was to make enterprise coherence explicit and to find ways to govern it. The results of the first iterations of this research programme have been reported in (Wagter, 2009)[4]. Important triggers for the GEA research programme were:

- Many enterprise transformation efforts fail.
- Failure to adopt a holistic approach to address key business issues, frequently leading to a unilateral approach from an IT oriented angle.
- Existing architecture methods do not meet their promises because:
  o they are set up from an IT perspective only,
  o they hardly address the strategic level of the organisation,
  o they are set up in terms of the Business/IT gap and
  o their underlying IT architectures applied on the enterprise-wide level are unjustly called Enterprise Architectures.

A fundamental first step in the GEA programme was the development of an Enterprise Coherence-governance Assessment (ECA) to attain a clearer understanding of the challenges to enterprise coherence and its associated governance of coherence (Wagter, Proper & Witte, 2011 p. 28-52), as well as the impact of enterprise coherence governance on organizational performance. This assessment has shown that more then 85% of the organisations involved in the first ECA studies lack enterprise coherence governance. This demonstrated the need for further research into enterprise coherence governance and in particular as next step to develop a theory for this issue.

The remainder of this chapter is structured as follows. Section 2 provides a discussion on the research context of this chapter, in terms of the driving research questions and research objectives, the research methodology we used as well as the organisation and planning of the actual research programme. Section 3 provides an extended insight in the requirements for Enterprise Coherence Governnance and the foundation for the further development of a theory for it. Section 4, and 5 describes the development and content of the enterprise coherence governance theory and the relationship with the requirements of section 3. Before concluding, section 6 discuses a case study, which

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[3] During different stages of the GEA research programme, the members of the programme included: ABN AMRO; ANWB; Achmea; Belastingdienst – Centrum voor ICT; ICTU; ING; Kappa Holding; Ministerie van Binnenlandse Zaken en Koninkrijksrelaties; Ministerie van Defensie; Ministerie van Justitie – Dienst Justitiële Inrichtingen; Ministerie van LNV – Dienst Regelingen; Ministerie van Landbouw, Natuur en Voedselkwaliteit; Nederlandse Spoorwegen; Ordina; PGGM; Politie Nederland; Prorail; Provincie Flevoland; Rabobank; Radboud University Nijmegen; Rijkswaterstaat; UWV; Wehkamp.

4 For strategic reason, the initial target of the results was the Dutch language community, as most participating organisations where also based in the Dutch language area, while also having a national/local focus. In the near future, these initial results will be made available in English as well.

shows the application of this new theory in practice and the results that have been achieved so-far.

2 Research context

The development of the ECA (Enterprise Coherence-governance Assessment) was the first step in the more comprehensive, and still ongoing, GEA research programme. In this section we provide more background to this research programme, as well as the research method used in developing the ECA.

2.1 Focus of the research programme

The GEA research programme (Wagter, Nijkamp & Proper, 2007) is based on the aforementioned triggers. The requirements of the programme, and its driving hypothesis, originate from four key research questions:
1. What are the core factors that influence/define enterprise coherence?
2. What is (in practice) the impact of enterprise coherence on the performance of an enterprise?
3. How can enterprise coherence be expressed explicitly?
4. How can enterprise coherence be governed?

More specifically, the research objectives of the GEA programme are:
1. Definition of the core indicators and factors that influence/define enterprise coherence.
2. Identification of the impact of enterprise coherence on the organisational performance.
3. An instrument to assess an enterprise's level of coherence.
4. Instruments to guard/improve the level of coherence in enterprises during transformations.

The Enterprise Coherence-governance Assessment (ECA) was developed to gain initial insight into the first two questions. On the one hand, the answer to these questions provide insight into the need to carry out further research into the governance of enterprise coherence, while on the other hand providing a first refined definition of enterprise coherence and its practical impact on organisational performance.

At its start, the partners in the GEA programme formulated the criterion that if more than 50% of the organisations involved in the first ECA studies lack enterprise coherence governance, it was safe to assume that *the lack of*

enterprise coherence governance is indeed a relevant issue that needs further elaboration. The first ECA study involved seven large Dutch organisations (members of the GEA programme). At the start of the GEA programme, the intention was to execute the ECA assessment (for each of the participating organisations) in three stages:

1. A first assessment at the start of the programme, providing a baseline measure.
2. A second assessment once a shared understanding of enterprise coherence was reached. By comparing the results to the baseline, the effect of having a shared awareness of the forces that influence coherence should be measurable.
3. A final assessment once proper/full governance of enterprise coherence was put in place in a participating organization. By comparing these final assessment results to the earlier ones, the additional effect of coherence governance could be made explicit.

Nevertheless, soon after the start of the programme, it became apparant that doing these three assessments was not   feasible. In the time needed for such longitudinal assessments, the composition of the involved organisations, as well as the people involved, would change so much that the results would no longer be comparable. We have therefore modified this idea to only implement the first assessment in the form of the ECA assessment instrument, while using a case based research methodology (Yin, 2009) to further evolve the instrument. See figures 1, 2 and 3.

The ECA assessment that was carried out at the start of the GEA programme indeed showed that more then 85% of the involved organisations lack enterprise coherence governance (Wagter, Proper & Witte, 2011 p. 28-52). These results convinced the participants of the GEA programme that there was enough evidence that argued for the development of effective instruments to govern enterprise coherence. The resulting set of instruments, based on additional multiple case studies (Wagter, Proper & Witte, 2012b), is called GEA, General Enterprise Architecting, (Wagter, 2009).
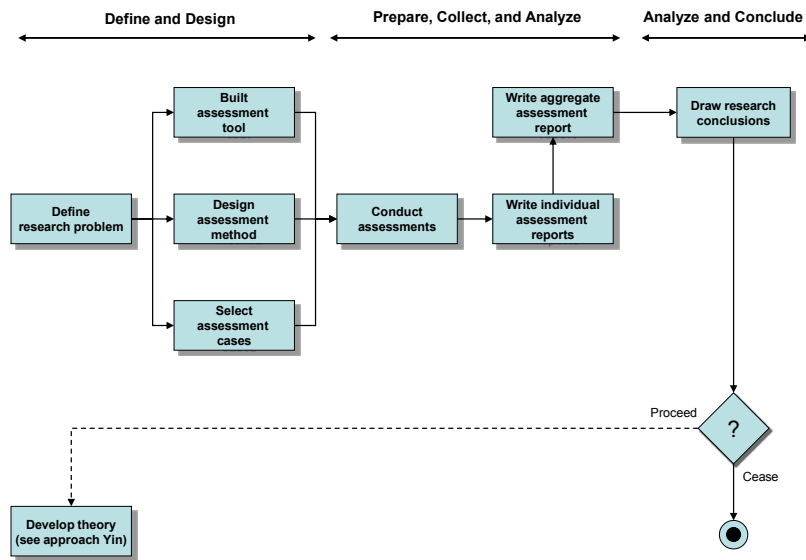.

Fig. 1. Preliminary research approach for the development of the ECA, based on Yin (2009)
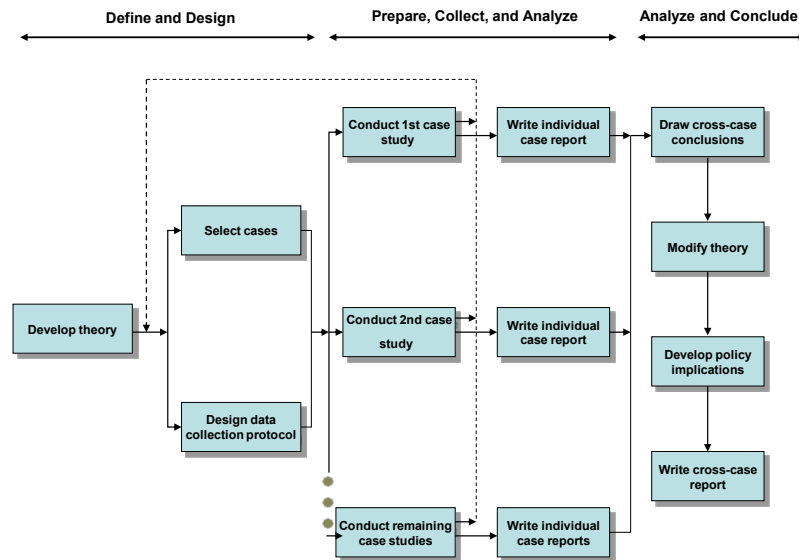
Fig. 2 Multiple case study research approach, adopted from Yin (2009)

In developing the theory, we followed the route as pictured in figure 3. Based on the triggers and results of the aforementioned ECA we identified the research questions, and associated objectives, of the GEA research programme. More specifically, in order to meet these research questions, the research programme:

1. Gathered the requirements on enterprise coherence governance,
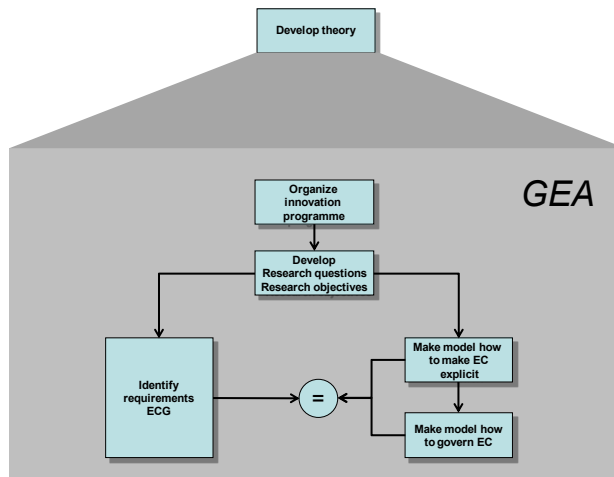2. Developed a theorical model, based on these requirements, to make enterprise coherence explicit and governable.

Fig. 3 Detailed approach of the theory of enterprise coherence governance (ECG)

2.2 Organisation of the GEA research programme

The GEA programme was organized in terms of four groups:
- a core team consisting of 6 to 8 people;
- a, co-financing, customer reference group of 20 major organizations;
- an expert review team of 30 lead architects;
- a steering committee composed of 7 leading representatives from science and business.

The actual involvement (and composition) of these groups depended on the specific phase of the GEA programme. The core team and the customer reference group performed the actual development activities. The members of the expert review team were charged with the task to attempt to falsify everything the core team and the customer reference group developed. The development strategy was also assessed regurlarly by the steering committee.

2.2.1 The development phases

In 2006, the GEA programme started with the development of the EA-vision, as well as the scientific foundation of GEA. In the ensuing years 2007 and 2008, the EA vision was transformed into an EA governance tool. In 2009, the resulting GEA method was published. Since the start of 2007, the GEA method has been applied in several organizations. Evaluations of these applications resulted in feedback on the GEA method fuelling further im-

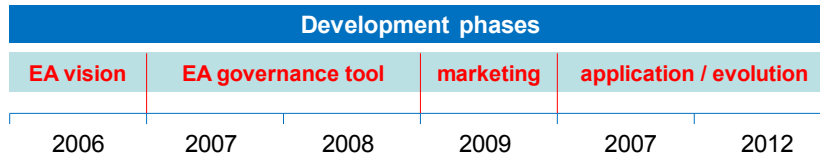provemets of the method. The GEA method is now also declared to be an open standard. See figure 4.

Development phases			
EA vision	**EA governance tool**	**marketing**	**application / evolution**
2006	2007 2008	2009	2007 2012

Fig. 4. Development phases of the research programme GEA

2.2.2 Design of the data collection protocol

As mentioned above, the GEA programme used the case-study based research approach from Yin (2009) to improve the GEA method based on input from the different situations in which it was applied. In line with this methodology, we distinguish five levels of questions:

1. Questions to specific interviewees.
2. Questions at the level of an individual case (these are the questions in the case study protocol to be answered by the investigator during a single case, even when the single case is part of a larger, multiple-case study).
3. Questions focused on finding patterns across multiple cases.
4. Questions at the level of the entire research effort (for example, calling on information beyond the case study evidence and including literature or published data that may have been reviewed).
5. Normative questions about policy recommendations and conclusions, going beyond the narrow scope of the study.

Below we give, for each level, a few examples of questions as set up by GEA's core team

Level 1:
- At the time of the validation process of the ECF:
    1. Are the guiding statements valid and up to date?
    2. Do the representatives of the perspectives agree with the identified perspectives, the identified core concepts within it and the related guiding statements?
- At the time of the ECG analysis process of a major business issue:
    1. Do the causes, triggers, subproblems, risks, implications, etc. of the business issue lead to change initiatives?
    2. Do the (existing) guiding statements result in additional change initiatives or restrictions (the so called solution space)?

Level 2:

- Are the documents at the level of purpose present and accessible?
- Does the definition of the level or purpose result in a clear understanding of the sense of purpose and design of the organization? (Do we get all the desired cohesive elements of GEA?)
- Is one capable to identify, and engage, the right representatives for each of the perspectives? This engagement should cover both the identification and validation of the cohesive GEA elements (ECF), and the GEA analysis processes to solve the business issue.
- Are the representatives of the perspectives able to validate the ECF?
- Are the representatives of the perspectives, using the validated ECF, able to execute the analysis processes to solve major business issues?
- Does the development of the ECF lead to increase coherence?
- Does the use of GEA lead to an integral solution that contributes to the coherence of the organization?
- Is the organisation able to, independently, specify a business issue that can serve as input to a GEA based analys?
- Do the owners of the business issue succeed in specifying the business issue in such a way the representatives of the prospects can perform the complete GEA analysis and develop an integral solution?

Level 3:
- The level 3 questions about the pattern of findings across multiple cases are:
    1. Degree of acceptance by stakeholders?
    2. Extent of applicability?
    3. Extent of matching required dynamics?
    4. Extent of compliance with required integrality?
    5. Degree of accessibility?
    6. Degree of transferability?
    7. Extent of balance of interests?
    8. Degree of innovativeness?

Level 4:
- Did the execution of the cases result into detectable performance improvements?
- Does the literature support the answers to the above findings?

Level 5:
- What recommendations can be made towards the further development and expansion of the area of enterprise coherence?

For the case as discussed in this chapter, only the questions of level 1 and 2 are relevant.

3 Requirements on Enterprise Coherence Governance

As argued in (Op't Land, Proper, Waage, Cloo & Steghuis, 2008; Wagter, 2009), architecture offers a means for management to obtain insight in the organizational structure, as well as to make decisions about the direction of enterprise transformations. As such, it should act as a means to steer enterprise transformations, while in particular enabling senior management to govern the enterprise's coherence. We regard enterprise architecture as the appropriate means to make enterprise coherence explicit, as well as controllable/manageable, or at least influenceable.

3.1 General requirements on GEA

Effective governance of enterprise coherence requires an active involvement of senior management. This, however, implies two important requirements:

1. *Strategy driven* – It is necessary to take the concerns, and associated strategic dialogues, of senior management as a starting point. In other words, the way in which architecture is integrated into the strategic dialogue should take the concerns, language, and style of communication of senior management as a starting point. When not doing so, it will be difficult to really involve senior management. Even more, the strategic dialogues provide the starting point for steering enterprise transformations and to guard coherence.

2. *Respecting social forces* – The social forces, be they of political, informal, or cultural nature, within an enterprise should be a leading element in governing enterprise coherence. As discussed in the introduction, an important reason for using architecture to steer and coordinate enterprise transformations is the fact that those design decisions which, in principle, transcend the interests of a specific project can be guarded/enforced that way. Doing so, however, also requires a strong commitment from senior management to these design decisions. Local business stakeholders, such as business unit managers, who have a direct interest in the outcome of a project, may want to lead projects in a different direction (more favorable to their own local/short-term interests) than would be desirable from an enterprise-wide perspective. Such divergent forces are also likely to lead

to erosion of the desired enterprise coherence. This explains the need to reduce the space for own interpretation on lower management levels by substantiating the decisions, made on strategic level, with unambiguous arguments harmonizing all concerns at stake.

We argue that existing approaches and frameworks, such as, Zachman (Sowa & Zachman, 1992), DYA (Wagter, Berg van den, Luijpers & Steenbergen van, 2005), Abcouwer (Abcouwer, Maes & Truijens, 1997), Henderson & Venkatraman (1993), TOGAF (The Open Group, 2009), IAF (Van't Wout, Waage, Hartman, Stahlecker & Hofman, 2010), ArchiMate (Lankhorst et al., 2005); (Iacob, Jonkers, Lankhorst & Proper, 2009), take an 'engineering oriented' style of communicating with senior management and stakeholders in general. The architecture frameworks underlying each of these approaches are very much driven by 'engineering principles', and as such correspond to a Blue-print style of thinking about change (De Caluwé & Vermaak, 2003).

The above requirements, however, suggest the use of another style of thinking in terms of stakeholder interests, formal and informal power structures within enterprises, as well as the associated processes of creating win-win situations and forming coalitions. In terms of De Caluwé (De Caluwé & Vermaak, 2003), this is more the Yellow-print style of thinking about change. In the GEA programme, this line of thinking was taken as a starting point, by taking the perspective that the actual social forces and associated strategic dialogues within an enterprise should be taken as a starting point, rather than the frameworks of existing architecture approaches suggesting the full make-ability of an organization.

In future research, we intent to position governing coherence in relation to the Green, Red and White 'colors' of De Caluwé as well. This does not imply that the existing Blue-print style frameworks and approaches are not useful. On the contrary, the engineering perspective is much needed. At the same time, it needs to be embedded in a Yellow-print oriented process. Architecture models produced from an engineering perspective potentially provide thorough underpinning of the views, sketches and models used in the strategic dialogues with senior management. However, rather than structuring the models and views in terms of 'information architecture', 'application architecture' and 'infrastructure', they would have to be structured based on those domains that are meaningful within the strategic and political dialogue in an enterprise. For example, in terms of 'human resourcing', 'clients', 'regulators', 'culture', 'intellectual property', 'suppliers', etc. Needless to say that this is also highly organisation specific.

This leads to the situation as suggested in figure 5, where we find on the left hand side the Blue-print style of thinking and associated frameworks, and on the right hand side the Yellow-print oriented approach. Note the (tentative) position of the Zachman framework. More so than frameworks such as IAF,

ArchiMate or TOGAF's content framework, the Zachman framework clearly suggests to tune the models and views to the interests/concerns of the stakeholders, and even suggests a classification of stakeholders. In our view, however, it still does so from a Blue-print thinking perspective and certainly does not take the stakeholder interests, formal and informal power structures in an organisation into account.
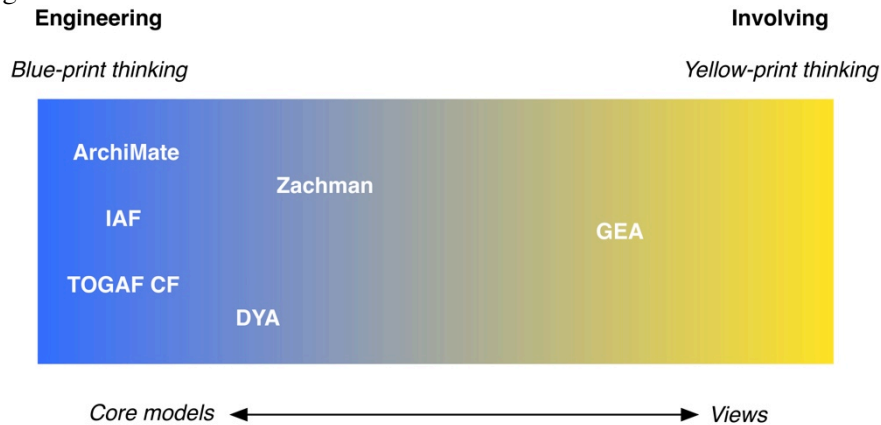

Fig. 5. Bridging Blue-print thinking to Yellow-print thinking

The initial application of the Enterprise Coherence-governance Assessment among the GEA members provided a more specific list of requirements regarding enterprise coherence. Combined with the generic requirements as discussed above, this resulted in the list of requirements as shown in table 1; also referred to as *EA success factors* (Wagter, Proper & Witte, 2012a).

GEA research programme	
EA success factor	**EA Requirement**
Strategy driven	1) It is necessary to take the concerns, and associated strategic dialogues, of senior management as a starting point.
Social forces	2) Forces, be they of political, informal, or cultural nature, within an enterprise should be a leading element in governing enterprise coherence.
E.A. Vision	3) One must have an EA vision in order to be able to establish EA as a business value driver and make explicit how coherence contributes to both the image and opinion formation phases of the decision-making process and must closely resemble and simulate the way of thinking. One pre-requisite is that the top of the organisation holds

GEA research programme	
EA success factor	**EA Requirement**
	this EA vision.
Commitment	4) The added value of EA as a governance tool should be recognized and promoted by all parties concerned. Also the added value of EA compared with other control tools that are in use.
Organisation	5) To establish the EA function, an integral approach to EA vision development, EA processes, EA products, EA people and EA resources needed for EA, is necessary.
Customization	6) EA is a flexible concept, which means that the number and character of organisational angles to govern the enterprise and their associated relationships depend on the situation.
Customer orientation	7) The EA processes and products should support the control processes of the enterprise in a tailor made way, by supplying the necessary results supporting these control processes.
Scope	8) EA moves at a strategic level and gives direction in decision-making on tactical and operational levels by means of lines of policy and must be done in an independent way to include all angles at stake in decision-making processes.
Product distinction	9) From the point of accessibility and understanding it is necessary to distinguish between EA management products and EA specialist products. This means that it is possible to communicate with the right target groups and with the right EA products.
Resource allocation	10) Management must provide the EA function with people with the necessary competencies, time, budget and other resources for EA to realize the added value of EA. In addition to provide EA function with people and other resources, should sufficient authority be given to the EA function so the EA function can implement governance.
Participation	11) Enterprise architects must participate in the organisation's governance processes and must have direct access to managers on a peer-to-peer basis.
Direction	12) The EA governance products must provide direction to change programmes and the existing organisation.

GEA research programme	
EA success fac-tor	**EA Requirement**
Completeness	13) A complete, and coherent, set of organisational perspectives must be brought together for/by the decision makers.
Permanence	14) EA must be designated as a permanent process whereby coherence is continuously adjusted to the dynamics of the internal and external environment.
Event driven	15) EA must be applied as a governance instrument at the moment major business issues arise in order to establish integral solutions and approaches on time.

Table 1. EA Requirements for the GEA programme

As a next step, sources from relevant adjacent domains were studied, with the aim to identify additional requirements to strengthen the development of GEA. The adjacent domains were selected based on the daily experience of the GEA members, resulting in three key domains: *management control*, *cybernetics* and *change management*.

3.2 Management control

One of the leading theories in the field of management control is the work of Simons' "*Levers of Control*" (Simons, 1995). Simons identifies the following levers of control:

1. Diagnostic control systems used to monitor and adjust operating performance.
2. Belief systems that communicate core values such as mission statements, credos and vision statements.
3. Boundary systems that define the limits of freedom, such as codes of conduct and statements of ethics.
4. Interactive control systems that provide strategic feedback and vehicles to update and redirect strategy such as competitive analysis and market reports.

These levers of control led us to the following insights. To give direction on a strategic level we have to distinguish between a 'sustainable' purpose and a 'changeable' shape of an organisation. The purpose is formulated on the level of purpose and the shape is described on the design level. Belief systems typically contribute to the level of purpose. Inspired by these levers of control we derived the following requirements for the development of GEA.

Management control	
Lever of control	**EA Requirement**
Diagnostic control systems	1) Goals have to be an element of enterprise coherence at the level of the purpose of an organization and objectives an element of enterprise coherence at the design level of an organization.
Belief systems	2) The level of purpose of the organization must be within the scope of EA. This requirement is associated with the previous mentioned requirement 'scope'.
Boundary systems	3) Boundaries must be made explicit since boundaries define relations between angles of an organization, and as such form a basic asset of enterprise coherence.
Interactive control systems	4) The effect of intended strategic interventions on the enterprise coherence should be made clear interactively and beforehand.

Table 2. EA Requirements from management control theory

3.3 Cybernetics

The second theoretical foundation concerns the cybernetic perspective, where an organisation is seen as a controllable open system (De Leeuw, 1982). The control paradigm, as introduced in e.g. (De Leeuw, 1982), identifies a set of conditions for effective control. Compliance with these conditions also implies a promise, namely to achieve an effective control situation. These conditions are (De Leeuw, 1982):

1. The controlling system must have a goal to guide it in governing the controlled system.
2. The controlling system must have a model of the controlled system.
3. The controlling system must have information about the controlled system, namely the state of the specified system parameters and subsequent acting environment variables.
4. The controlling system must have sufficient control variety.
5. The controlling system must have sufficient information processing capacity to transform information (3), using a model (2), taking into account the objectives (1) into effective control measures (4).

Inspired by these conditions for effective control we derived the requirements for the development of GEA as listed in Table 3.

Cybernetics

Conditions for effective control	EA Requirement
Specify a goal to the controlled system	1) Objectives have to be an element of enterprise coherence at the design level of an organization. (This requirement is also formulated from the theory of management control in table 2 requirement no. 1)
Have a model of the controlled system	2) The model of enterprise coherence must represent the dynamics of the design level of an organization.
Have actual information about the controlled system	3) The actual state of enterprise coherence must be represented on a permanent basis including current state as well as future directions.
Have sufficient control variety	4) Enterprise coherence governance must have sufficient levers to influence enterprise coherence on the design level, and support the interdependancy with the level of purpose as well. The latter should include: forward and backward governance, event driven and cyclic governance, single and multi level governance (recursivity and projection).
Have sufficient information processing capacity	5) Restrict the complexity and information overload by differentiating enterprise coherence in several interdependent levels. Allocate sufficient resources to enterprise coherence governance, distinguished by processes, products, peo ple, means, governance, methodology and all based on a clear vision.

Table 3. EA Requirements from a cybernetic perspective.

3.4 Change management

A third theoretical foundation for GEA is based on the notion that organisations are a social technical combination of humans and supporting technology. Here we refer to the work of Julia Balogun and Veronica Hope Hailey: "*Exploring Strategic Change*" (Balogun & Hope Hailey, 2004). The basic idea is that every choice made in a change process should be based on the context and the purpose of the change process. A study conducted in 2004 by Deloitte & Touche "*What is the best change approach*" (Reitsma, Jansen, Werf van der & Steenhoven van den, 2004) has enhanced this basic idea with the statement that there is a link between the choice of approach and purpose of the change. Since this study concerns successful change processes (in various

sectors), the conclusion has been drawn that it is sensible regarding change processes to consider on which organizational aspects the change is essentially focussed and in line with this to choose an appropriate approach.

Inspired by these insights we derived additional requirements for the development of GEA as listed in Table 4.

Change management	
Socio-technical combinations	**EA Requirement**
Choice made in a change process should be based on the context and the purpose	1) The scope of enterprise coherence governance should include both internal and external angles of the organizational transaction environment. 2) The purpose of a change process should be in line with the goals on the level of purpose and objectives on the design level. 3) The organizational aspects that are dominant in the solution for a business issue, determine the choice of approach. 4) Every change process should be argued by the application of the enterprise coherence governance before execution.
Choice of an appropriate approach determines the success	5) The 'solution direction and choice of approach' should be just one element of the decision. 6) Regarding the decision-making process, enterprise coherence governance should contribute to both the solution direction and choice of approach of a business issue. 7) Enterprise coherence governance should guide the realisation of the 'solution direction and choice of approach' of a business issue. 8) An appropriate approach needs appropriate enterprise coherence products.

Table 4. EA Requirements from a change management perspective

At the end of this exploration, we were able to establish the basic philosophy of GEA. In this philosophy, the following hypothesis was used as a starting point:

The overall performance of an enterprise is positively influenced by a strong coherence among the key aspects of the enterprise, including business processes, organizational culture, product portfolio, human resources, information systems, IT support, etc.

When indeed taking this hypothesis as a starting point, it is natural to accept that coherence is an important issue. More importantly, an issue that senior management of an enterprise would wants to influence and govern. To govern coherence one needs the levers to adjust the coherence and to be able to do this one has to make coherence explicit. Taking our definition of coherence into account and the fact that organisations are living organisms delivers the insight that coherence has a fluid character, which implies the governance should be carried out permanently. These insights triggered us to pose the question *"by means of which concepts, and when, is the coherence of the enterprise improved or decreased?"*. Coherence will especially be influenced at the moment an organisation formulates answers on major business issues. So coherence governance must be part of, and contribute to, these processes of formulating answers. Using coherence governance in these processes leads to integral solutions and approaches and via this a permanently improvement of the organisational coherence.

These aggregated requirements formed the starting point to develop a new approach to govern enterprise coherence. The first step is to develop a theory for enterprise coherence governance that answers our research questions and meets these requirements.

4 The Enterprise Coherence Framework

The Enterprise Coherence Framework (ECF) (Wagter, Proper & Witte, 2012a) defines a series of cohesive elements and cohesive relationships, which together define the playing field for an enterprise's coherence. For a more comprehensive description of the ECF we refer to our earlier work as reported in (Wagter, Proper & Witte, 2012a). By making the definition of these elements explicit in a specific enterprise, a coherence dashboard results in terms of which one can gain insight in the 'state of coherence' while also being able to assess the impact of potential/ongoing transformations. This then enables a deliberate governance of enterprise coherence during/driving transformations.

The ECF is defined in terms of two levels and their connections: the level of purpose and the level of design. At the level of purpose, the cohesive elements that have been identified, correspond to the commonly known concepts from strategy formulation (Senge, 1990; Kaplan, Norton & Barrows, 2008; Thenmozi, 2012; Collins & Porras, 1996; Chandler, 1969; Ahaus, 1998): *Mission*, *Vision*, *Core Values*, *Goals* and *Strategy*. To bring these cohesive elements to life, a few examples are provided in table 5.

Cohesive elements	Statements
Mission	• To make people happy (Walt Disney) • To experience the joy of advancing and applying technology for the benefit of the public (Sony) • To bring inspiration and innovation to every athlete in the world (Nike) • To help leading corporations and governments be more successful (McKinsey)
Vision	Walt Disney: • Creativity + Innovation = Profits • One of the world's leading producers and providers of entertainment and information Sony: • We anticipate in the changing relationship between content, technology and the consumer by our four pillars: e-

Cohesive elements	Statements
	Entertainment, Digital Cinema, High-er Definition and PlayStation Nike: • Sustainable Business and Innovation is an integral part of how we can use the power of our brand, the energy and passion of our people, and the scale of our business to create meaningful change • The opportunity is greater than ever for sustainability principles and practices to deliver business returns and become a driver of growth, to build deeper consumer and community connections and to create positive social and environmental impact in the world
Core values	• Creativity, dreams, imagination, consistency, detail, preservation of the magic (Walt Disney) • Being a pioneer, authentic, doing the impossible, individual ability and creativity (Sony)
Goals	• To build a radically new kind of amusement park, known as Disneyland (in 1950s, Walt Disney) • Become the company most known for changing the worldwide poor-quality image of Japanese products (1950s, Sony)
Strategy	• Continued diversification consistent with Walt Disney's early actions. • The company's increased focus on Sustainable Business and Innovation (SB&I) will be more seamlessly integrated across Nike's business strategies. • Nike utilizes innovation to produce top quality athletic footwear and apparel.

Table 5. Examples of cohesive elements on the level of purpose of an organisation

The design level complements the level of purpose, by zooming in to more design oriented concepts. The cohesive elements at the design level are:

Perspective – an angle from which one wishes to govern/steer/influence enterprise transformations. The set of perspectives used in a specific enterprise depend very much on its formal and informal power structures; both internally and externally. Typical examples include culture, customer, products/services, business processes, information provision, finance, value chain, corporate governance, etc.

Core concept – a concept, within a perspective, that plays a key role in governing the organization from that perspective. Examples of core concepts within the perspective Finance are, for instance, 'Financing' and 'Budgeting'.

Guiding statement – an internally agreed and published statement, which directs desirable behaviour. They only have to express a desire and/or give direction. Guiding statements may therefore cover policy statements, (normative) principles (Greefhorst & Proper, 2011) and objectives.

Core model – a high level view of a perspective, based on, and in line with, the guiding statements of the corresponding perspective.

Relevant relationship – a description of the connection between two guiding statements of different perspectives.

The presence of a well documented enterprise mission, vision, core values, goals and strategy are preconditions to be able to determine the content of the cohesive elements on the design level of the organization and they are the essential resources for this determination. See figure 6.
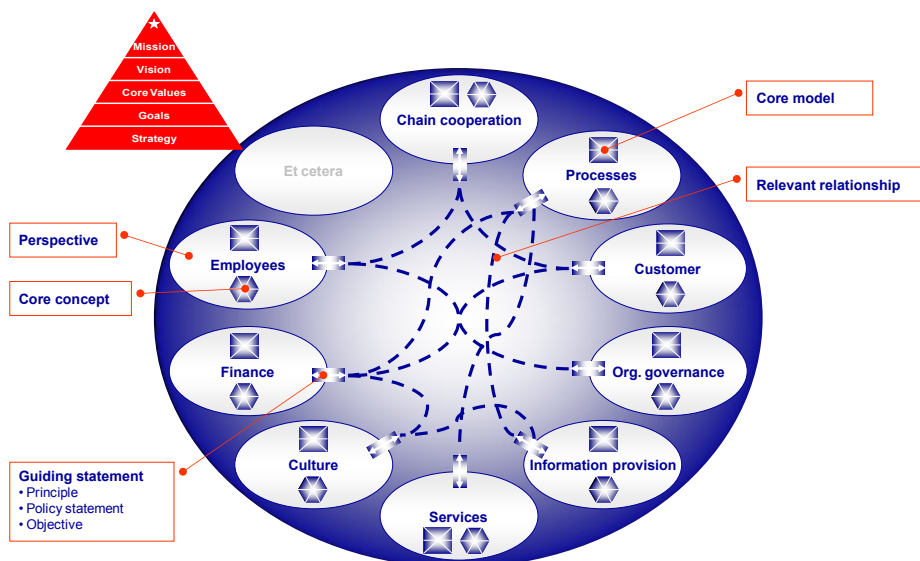

Fig. 6. Cohesive elements at design level

In a workshop, the core team of the research program GEA assessed the extend to which the identification (in a specific enterprise) of the five cohesive elements of the design level, would already meet the requirements of the pro-

gramme. It was established that these cohesive elements contribute to, and substantiate, requirements 1, 2, 8 and 13 of table 1, requirements 1, 2, 3 and 4 of table 2, requirements 1, 3 and 4 of table 3 and requirements 1, 2 and 6 of table 4.

With the cohesive elements at the design level in place, we now have an integrated framework of cohesive elements that shape an organisation on both the level of purpose and the design level. Later in this chapter we will demonstrate how we utilise this framework as a steering mechanism in order to formulate answers to major business issues and how this way of working strengthens the enterprise coherence. In figure 7, a visualization is provided on how occurrences of the cohesive elements on the design level of an organisation are derived from the level of purpose. The metaphor shows the transition from an unstructured set of control information on the level of purpose into a structured coherent set of content, differentiated into the cohesive elements on the design level.
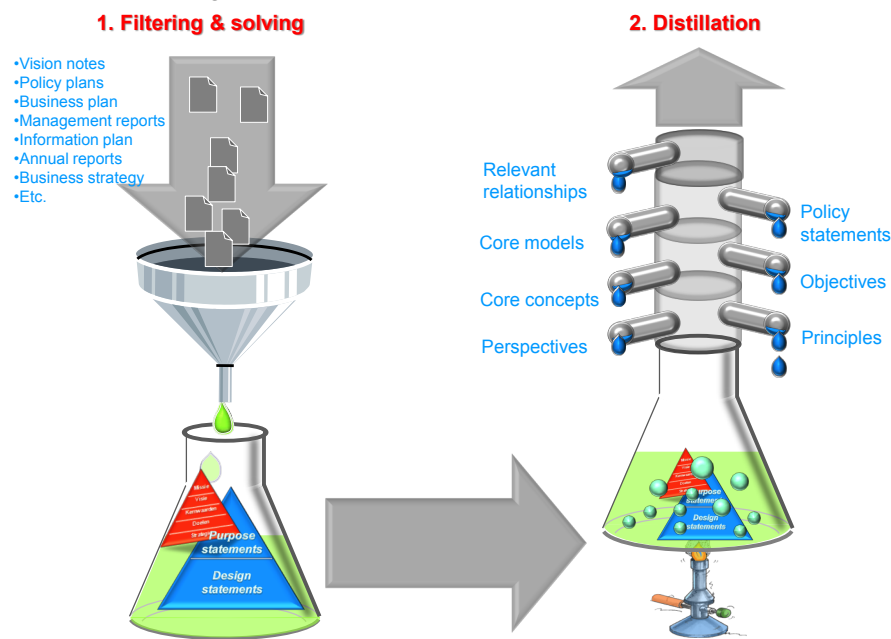
Fig. 7. Metaphor for the derivation of cohesive elements on the design level

At this stage in the development of GEA it was possible to make the coherence of a given enterprise explicit. This provided the answer to the research questions 'what are the core factors that influence/define enterprise coherence?' and 'how can enterprise coherence be expressed explicitly?'. In doing so, we also met the research objective 'definition of the core indicators and factors influencing/defining enterprise coherence'. In the next section we will answer the research question 'how can enterprise coherence be governed?',

while meeting the research objective 'development of instruments to guard/improve the level of coherence in enterprises during transformations'.

5 Enterprise coherence governance

After making enterprise coherence explicit, as discussed above, a survey was conducted to assess the extent to which the original requirements on the GEA programme were indeed met. The results of this survey, held among the core members of the programme, are shown in table 6.

Requirement table	Requirement nrs. contributed	Requirement nrs. not contributed
1	$1, 2, 3, 5, 6, 7, 8, 9, 12, 13, 14$	$4, 10, 11, 15$
2	$1, 2, 3, 4$	
3	$1, 2, 3, 4,5$	
4	$1, 2, 3, 6, 7, 8$	$4, 5$
Total	26	6

Table 6. Requirements contributed/not contributed by making coherence explicit

The survey also shows that solely making the enterprise coherence explicit does not suffice. The necessity to meet all these requirements and the desire to make enterprise coherence governable, led to the initiative to develop the following GEA-components (see figure 8): EA-vision, EA-processes, EA-products, EA-people, EA-means, EA-governance and EA-methodology. Making a distinction of these GEA components is based on and in line with the framework for understanding methods for information system development from Seligman, et al. (Seligmann, Wijers & Sol, 1989). We have adopted this framework in the development of the GEA components. This framework was originally developed as a framework to describe, and compare, information system development methods and approaches. It distinguishes the following aspects: a *way of thinking*, a *way of modelling*, a *way of working*, a *way of supporting* and a *way of controlling*. In table 7 we show which method aspect corresponds to the different GEA components.

Way of:	Corresponds with GEA-components:
Thinking	EA-vision and EA-methodology
Modelling	EA-products
Working	EA-processes and EA-people
Supporting	EA-means
Controlling	EA-governance

Table 7 Relationship between the 'way of' aspects and GEA-components.

By developing these components in addition to the cohesive elements we aimed to achieve the research objective 'development of instruments to guard/improve the level of coherence in enterprises during transformations' and answer the research question 'how can enterprise coherence be governed'. Furthermore, the EA requirements also resulted in the insights needed to develop the GEA-components. More specifically, table 8 shows which EA requirements stimulated to the development of which GEA-component.

Tables	GEA Components						
	EA-vision	EA-processes	EA-products	EA-people	EA-means	EA-governance	EA methodology
1	1, 2, 3, 5, 6, 8, 14	1, 2, 3, 5, 7, 8, 11, 14, 15	5, 6, 7, 9, 12, 13, 15	1, 2, 4, 5, 10, 11, 13	5, 10	5	
2	1, 2, 4	3, 4	1, 3, 4				
3	1, 4, 5	3, 4, 5	1, 2, 3, 4, 5	5	5	5	5
4	1	2, 3, 4, 6, 7	1, 3, 5, 6, 7, 8				

Table 8. Overview which EA-requirements led to develop which GEA-components

In table 8, one can see how quite a number of EA requirements, that were already addressed by the cohesive elements, still triggered the development of additional GEA-components. This might seem odd, but can be explained by the fact that the cohesive elements indeed contributed to a large number of EA requirements, but have not fully met them. The GEA components should indeed fully meet these requirements.

There is a strong coherence among the GEA components themselves as well. The promises held by an EA-vision, such as improving the coherence of the organisation, should be achieved through the execution of EA-processes. In their turn, the execution of the EA-processes results in EA-products that will direct change programmes and via this the enterprise coherence. EA-people are needed to carry out the EA-processes and produce the EA-products. The EA-people need, to execute the EA-processes, allocation of means in terms of time, budgets and tools. The EA-people and the execution of EA-processes need to be governed by EA-governance. And finally to store a maintainable formal description of the formulation of the EA-Vision, EA-processes, EA-products, EA-people and EA-governance there is need for an EA-methodology. In appendix 1 it is shown how each of the GEA compo-

nents meets specific GEA requirements. In the remainder of this section, we give a brief explanation of the GEA-components.
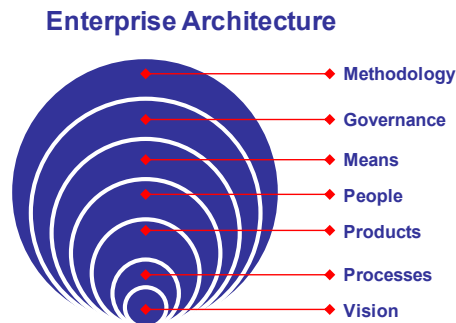
Enterprise Architecture

Methodology

Governance

Means

People

Products

Processes

Vision

Fig. 8. Coherent set of GEA-components

5.1 EA Vision (way of thinking)

An important part of the EA vision is the identification of GEA's essence in terms of three key questions:

1. *What is it?*
   GEA is a set of statements, processes, products, people and resources, that guides the development of an organization with a focus on coherence.
2. *What is the intended effect?*
   The implementation of GEA permanently increase the governnace capacity of an organization and thus its strength, speed and flexibility required in certain situations.
3. *How does it meet what it desires?*
   GEA achieves this guiding by participating the control processes actively and afford insight into the coherence of organizational components and aspects as the relevant environment on a permanent basis.

The EA-vision of GEA consists of the following elements:

1. the triggers and the definition of enterprise coherence as described in section 1,
2. the requirements as shown in section 3,
3. the basic philosophy of GEA as described at the end of section 3,
4. the description of the cohesive elements of enterprise coherence described in section 4,
5. the coherent set of 7 GEA components as show in figure 8.

Below we give a brief explanation of another number of important aspects of the EA-vision based on the EA-requirements. The other EA-vision aspects are:

- Scope of GEA: the cohesive elements on both the level of purpose and the design level of the organization gives direction to the deeper levels behind the perspectives of GEA. See EA-requirement 8 table 1.
- Relationship between GEA-processes/GEA-products and the organisational control processes: the execution processes of GEA that contribute to the organizational control processes and the GEA-products that are involved. See EA-requirement 7 and 12 of table 1 and EA-requirement 4 of table 3.
- Organizational embedding of GEA: the way the GEA function is organized. This can be a virtual GEA function or a real allocation of an organizational unit. A special attention is needed for the role of the GEA function in the light of the degree of independency. See EA-requirement 5 and 8 of table 1.
- Recursivity of the GEA governance instrument: the possibilities of applying the GEA model in the strategic, tactical and operational levels of the organization and establishing the relationships between these levels. See EA-requirement 4 of table 3.
- Projection of the GEA governance instrument: the possibilities of applying the GEA model on a concern level and respective divisions, alliances, supply chains and networks of organizations and their relationships. See EA-requirement 4 of table 3.

5.2 EA Processes (way of working)

Based on the seminal work by Deming (http://nl.wikipedia.org/wiki/Kwaliteitscirkel_van_Deming), we distinguish the following types of processes: planning, execution, review and adjustment; see figure 9 and figure 12. The planning, review and adjustment processes (the lowest row in figure 9) concern the governance of GEA itself and must be tailored to the existing control processes of the organization.

In the context of the execution of GEA, we actually distinguish two types of processes: *steering* processes (steering the GEA activities) and *performance* processes (the actual GEA 'work'). The steering processes are geared towards supporting the control processes of the organization, while the performance processes are aimed at developing and maintaining the GEA deliverables/products. The processes (see figure 9) 'Make Enterprise Coherence Explicit' and 'Maintain Enterprise Architecture' are *performance* processes. The processes 'Develop Integral Solutions', 'Develop Program Start Architec-

tures' and 'Check Change Programs by applying PgSA' are steering process-
es. To understand the working of the steering processes we now give a brief
explanation of the process 'Develop Integral Solutions'.

Once an organization has identified the aforementioned GEA cohesive el-
ements, the organisation is able to continue with the process 'Develop Integral
Solutions' to solve actual business issues. In this process, based on the theory
of Sol (Sol, 1988), a business issue will be fully analyzed, aiming to develop
the solution and approach to the problem. The analysis of the business issue
will be presented in a meeting with the representatives of the different per-
spectives. This enables each of the participants is able to appreciate the issue
and reflect on the consequences and necessary change initiatives to solve the
problem. Then, in close collaboration with the representatives of the perspec-
tives, it is determined which of the perspectives should be considered domi-
nant and which ones should be considered sub-ordinate, with respect to the
business issue at hand. The reason for this distinction is needed to raise the
awareness of which elements of the organization offer the highest possible
contribution towards a solution.

After this step, four sub-analyses are to be carried out. In the first sub-
analysis, the impact of the issue on the dominant perspectives is determined.
The second sub-analysis is used to determine the impact of the issue on the
sub-ordinate perspectives. In the third sub-analysis, the possibilities and im-
possibilities from the viewpoint of the dominant perspectives in relation to the
issue are determined. Finally, the fourth sub-analysis is used to determine the
possibilities and impossibilities from the viewpoint of the sub-ordinate per-
spectives in relation to the business issue at hand.

The synthesis between these four analyses leads to the integral solution of
the business issue at hand, including an approach to implement the solution.
This result serves as a basis for further decisions by the board members of the
organization, while serving as a directional framework for the development of
a Program Start Architecture (PgSA) (Wagter, 2009), which support the actual
change. The integral solution, and associated implementation approach, may
also include several scenarios to allow for a final choice to be made by the
board members. In the next section, we will discuss a practical (real world)
case in which this process was applied.

Fig. 9. Main processes and products of GEA

5.2.1 EA Products (way of modelling)

The EA products consist of two main groups: EA *control* products and EA *operational* products. The EA control products control the EA function itself and are used to plan, manage and evaluate the EA work. Examples of this type of products are a GEA development plan and a periodic GEA evaluation report.

On their turn the EA operational products consists of two types: the EA *performance* products and the EA *steering* products, produced by the *performance* and *steering* processes respectively. Examples of EA performance products are: the content of perspectives, core concepts, guiding statements, relevant relationships and core models. These EA performance products form the basis for shaping the EA steering products such as Impact Analysis Reports with recommendations for solutions and approach choices and Program Start Architectures to govern change programmes. This latter category is concerned with products that support the enterprise coherence governance of the organization; i.e. the rationale of GEA. In figure 9 a summary is given of the main processes and products of GEA and in figure 10 their relationship in-

cluding a classification by task areas. This classification will be used in the next section concerning EA People.

TASK AREAS	
PROCESSES	PRODUCTS
Initialising & mobilising	
Organising sessions	Enough sessions and a high attendance for realizing enterprise coherence framework
Inventory of cohesive elements	All cohesive elements with appropriate depth
Set up enterprise coherence framework	Coherent enterprise coherence framework, consistent, supported
Advisory	
Integral coherence analyses	Relevant relationships between perspectives, core concepts, etc.
Integral solutions major business issues	Integral solutions including choices of approach
Strategy fit analyses	Strategy impacts
Frameworking	
Programme start architectures	Programme Start Architectures and affiliation with derived Project Start Architectures
Aspect and domain architectures	Relevant sub, domain and aspect architectures
Programme- and project evaluation	Assessment Reports regarding Program Start Architectures
Grant permission	Start Licenses Programme phases
Maintaining	
Enterprise coherence framework actualisation	Releases enterprise coherence framework
Governance	
EA-plan	Enterprise Coherence Development plan, EC annual plan and EC detailed plans
EA-check	Enterprise Coherence Progress reports , Enterprise Coherence Audit reports
EA-act	Decision Enterprise Coherence Change report

Fig. 10. Task areas, processes and products of the enterprise architecture function

5.3 EA People (way of working)

The GEA processes, and the corresponding products, require people with specific competencies in terms of knowledge, attitude and skills. These people are known as enterprise architects. This component makes clear how the competencies, responsibilities, powers and duties are to be arranged when working with GEA. In figure 11 one can see how, based on the theory of Luken (Luken, 2004), we distinguish between a *vertical*-axis with the task areas of the EA-function and a *horizontal*-axis with the necessary competencies of the enterprise architects. The task areas are distinguished by Initialising & mobilising tasks, Advisory tasks, Frameworking tasks, Maintaining tasks and Governance tasks. The task areas are derived from the above-discussed process activities. In the cells one can see the importance of the competencies for the task areas. In figure 11, when the relevance of competence for a task exceeds 15 percent, the value is shaded. This allows one to quickly see the major required competencies for a task. The matrix in figure 11 also includes the management function of the enterprise architecture function.

Fig. 11. GEA competence profile

Competences / Task areas	Knowledge & Insight	Subject knowledge	Branche knowledge	Relevant work experience	Academic think & work level	Attitude	Result driven	Organisational sensitivity	Flexibility	Ambition	Professional integrity	Stress resistance	Service oriented	Visionary	Skills	Planning & Organisation	Networking	Collaboration	Management	Decisiveness	Communicative	Work independence	Persuasiveness	Effective judgement	Creativity	Analytical ability	Total	Number of competence > 10%	Biggest
Basis score Enterprise Architect	12,2	2,2	5,9	1,2	2,9	30,7	3,4	14,6	1,0	0,2	4,9	0,0	1,1	5,5	45,3	0,2	5,5	3,1	0,4	4,7	8,5	0,0	8,3	4,2	3,3	7,1	88		
Percentile score	13,8	2,5	6,7	1,4	3,3	34,8	3,9	16,6	1,1	0,2	5,6	0,0	1,2	6,2	51,4	0,2	6,2	3,5	0,5	5,3	9,6	0,0	9,4	4,8	3,7	8,0	100		
Initialising & mobilising																													
Organising sessions		0	0	18	3		10	17	23	10	2	29	18	2		32	32	7	15	3	17	0	10	2	5	0	255	10	32
Inventory of cohesive elements		5	15	2	7		2	5	5	3	7	4	0	5		0	13	12	2	5	15	7	0	8	7	10	137	4	15
Set up enterprise coherence framework		12	7	8	10		7	7	11	14	15	4	0	22		0	7	10	2	13	13	10	3	5	25	8	211	8	25
Advisory																													
Integral coherence analyses		10	22	5	28		0	19	4	5	10	4	7	13		0	7	15	0	0	8	5	15	12	10	20	218	8	28
Integral solutions major business issues		7	18	8	15		8	14	7	5	7	11	15	18		2	5	10	2	5	12	7	12	15	13	18	233	11	18
Strategy fit analyses		7	22	10	17		5	17	7	15	10	9	9	20		0	5	3	2	2	12	7	13	23	12	17	242	10	23
Frameworking																													
Programme start architectures		20	3	5	8		22	5	7	7	11	5	9	5		2	7	13	2	15	8	8	13	5	8	12	202	7	22
Aspect and domain architectures		18	7	10	7		7	2	4	8	3	5	7	7		2	3	12	5	2	7	18	10	7	10	8	158	3	18
Programme- and project evaluation		2	0	5	0		7	0	4	8	7	7	7	2		2	3	2	7	5	13	7	10	0	0	5	108	1	13
Grant permission		2	2	0	0		3	3	4	3	8	5	7	0		2	3	0	5	22	2	0	5	2	0	0	78	1	22
Maintaining																													
Enterprise coherence framework actualisation		13	0	5	0		5	2	5	2	2	2	18	0		8	0	7	7	2	0	13	2	2	5	0	99	3	18
Governance																													
EA-plan		0	5	10	0		12	5	11	19	2	5	0	7		31	3	3	25	7	2	7	3	0	3	2	161	5	31
EA-check		3	0	5	3		7	0	4	0	7	4	0	0		7	3	2	12	7	3	3	0	8	0	0	77	1	12
EA-act		2	0	8	2		7	5	5	11	7	2	0	0		14	5	3	20	12	2	3	7	2	2	0	123	4	20
(column totals)		100	100	100	100		100	100	100	100	100	100	100	100		100	100	100	100	100	100	100	100	100	100	100			
Number of competence > 10%		4	4	1	3		2	4	3	4	3	2	3	4		3	4	4	5	3	4	5	3	4	3	4			
Biggest		20	21,7	18,3	28,3		21,7	18,6	23,2	18,6	14,8	28,6	18,2	21,7		32,2	31,7	15	25,4	21,7	16,7	18	15	23,3	25	20			

The GEA competence profile can amongst others be used for:

- selecting the right people for giving content to the enterprise architecture function,
- supporting potential candidates in their development process into a role within this function and
- identifying and giving content to the roles within the enterprise architecture function.

The GEA-competence profile is the result of an extensive study conducted in 2007 at seven major organizations of the research program GEA. More details of this study can be found in (Wagter, Proper & Witte, 2007; Wagter, Proper & Witte, 2012c).

5.4 EA Means (way of supporting)

Templates and other support means, such as reference architectures, indeed play an important role in standardizing and enhancing the EA productivity. Therefore it is necessary to develop advanced tooling to support the EA-function. An important element in this is a clear meta-model of GEA. Therefore, the GEA programme also developed such a meta-model, covering the GEA-processes, the GEA-products as well for the GEA concept as a whole. These meta-models are a part of the EA methodology.

In addition, various architecture frameworks, architecture languages and architecture tools are available to enterprise architects. For instance, the John Zachman framework (Sowa & Zachman, 1992) was one of the first and probably the best-known enterprise architecture frameworks. After this one many followed. In addition, in recent years, tools have been developed that claim to support enterprise architecture. Examples include enterprise architecture languages like ArchiMate (Lankhorst et al., 2005) with associated tools such as Architect (http://www.bizzdesign.nl/tools/architect) and ARIS (http://www.ids-scheer.nl/nl/ARIS/ARIS_ARIS_Platform/28569.html), and the enterprise architecture language and associated tool MEGA (http://www.mega.com/en/c/product). However, these languages and tools take a traditionanal 'Business-to-IT' stack perspective, rather than a true enterprise coherence perspective.

5.5   EA governance (way of controlling)

We combine the EA processes planning, review and adjustment (plan, check, act) under the name of EA governance. By carefully performing these processes, organisations can achieve more control over their architecture function. It is important for organizations to achieve this control to obtain the added value of GEA. Key in this remains the question: *Does the EA supply the intended added value?*

The purpose of EA governance is to have a permanent and critical look if the effects of enterprise architecture can be achieved that will meet the agreed goals. In other words, ensuring that the contribution of EA to the control function of an organization is continuously made explicit in terms of its costs and benefits; see also figure 12. Depending on the specific situation of an organization, it can be necessary to set up the EA function as a formal organizational unit, while in other cases it may be possible to organize the EA function as a virtual one.
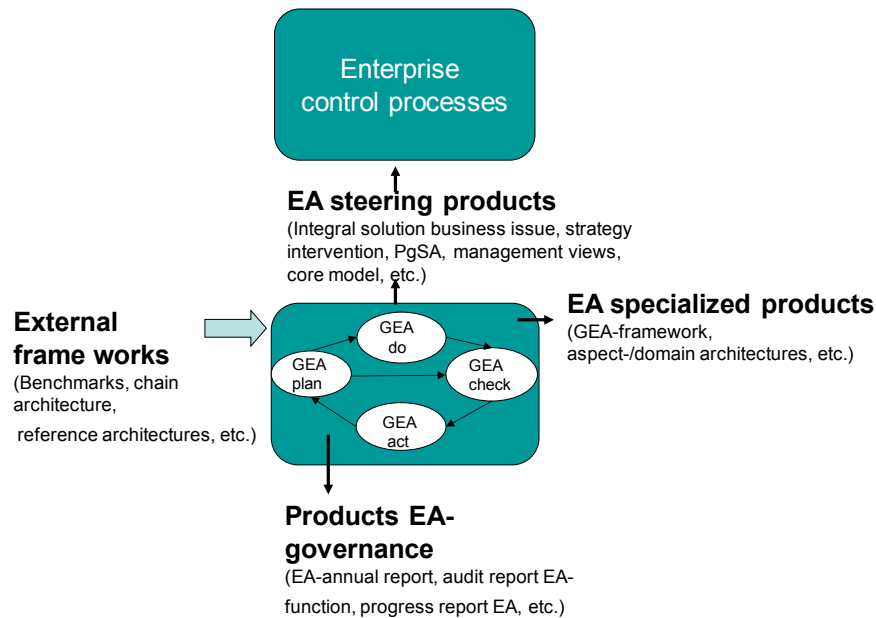
Fig. 12. Overview EA governance.

5.6 EA methodology (way of thinking)

The EA methodology includes (1) the formal descriptions of the GEA components EA-vision, EA-processes, EA-products, EA-people, EA-means and EA-governance, (2) all the developed figures of these components as represented in this chapter and, (3) the meta-model of the entire GEA concept including meta-models of both the GEA processes and products. For further details of this meta-models see (Wagter, 2009).

6 Case study

6.1 Introduction

This section is concerned with a real world case study in Business/IT alignment (or rather enterprise coherence) at the strategic level. The case is situated in the Dutch public sector, involving a Dutch government agency[5] (Dga). This agency has to deal with a business issue on the subject of operational excellence and lack of management control, while carrying out a number of European subsidy arrangements. These subsidy arrangements cover thousands of companies whom, to be eligible for these subsidies, submit an annual application.

For a smooth execution of all this work, about thirty internal and external parties, whose contributions are interdependent and time critical, have to collaborate. Besides these collaborative challenges, the complexity of the process is also increased by outsourcing factors, as well as factors pertaining to the communication channels used to lodge and process the actual applications. In the past, two of the core, massively batch-oriented, processes have already been outsourced. Besides traditional paper-form based subsidy applications, applications are now also lodged by way of the Internet.

The processing of these subsidies has a high degree of political exposure, in the sense that a flaw, or even a drop in the performance, will immediately become public knowledge by way of the national press. This would cause serious damage to the reputation of the organization. Furthermore more non-compliance of the processing of subsidies with, national and EU, laws and regulations will lead to heavy financial fines.

After outsourcing the batch-oriented processes, the outsourcing party remained in default with respect to the quality of the services to be provided. Partly due to the fact that these services were on the critical path, the primary processes got out of control as well. As a result, approximately 60 percent of the client dossiers had to be returned to the applicants without proper processing, while about 20 percent of the subsidy applications resulted in submitted objections by the clients (due to faulty processing of the subsidies). The latter also caused the statutory deadlines to be exceeded, which ultimately

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[5] We cannot disclose the specific government agency. Hence the anonomized name "Dga".

resulted in the risk of twenty million Euros in fine. As a result, the very existence of this government agency was put at risk, while the situation quickly raised critical question in the Dutch parlement. As a result, the business issue with which the GEA analysis of the situation at hand was: *how can the execution of the subsidy submission, evaluation, and allocation process be made more manageable and efficient?* In this regard it was also argued that the failing outsourcing situation was not the only symptom of the real problem, and that more causes were at play.

The case will also illustrate that Business/IT alignment is not only a matter of aligning 'the business' and 'the IT' aspects of an enterprise. The case suggests that a more refined approach is called for. More specifically, we will see how 'the business' is not just a single aspect that needs to be aligned to 'the IT', but rather that it involves many more aspects that need mutual alignment as well. This is actually why we also prefer to use the term enterprise coherence rather than Business/IT alignment. It more clearly expresses the fact that it is more about achieving coherence between multiple aspects, than merely aligning the business and IT aspect. The use of GEA, and the ECF (Enterprise Coherence Framework) as a part of GEA in particular, provided insight into these other elements, as well as their relations and mutual influences (i.e. their *coherence*). This insight allowed the government agency to formulate a strategy to improve matters.

In the case at Dga, just like in other cases, the GEA (General Enterprise Architecting) method was used. As the GEA method was/is developed using a design science driven approach (Hevner, March, Park & Ram, 2004) in combination with case study research (Yin, 2009). The different cases conducted with GEA, also provided feedback on the method. Therefore, we will also explicitly discuss the feedback on the design of the method that follows from this application of the GEA method.

6.2   The coherence dashboard for Dga

Since this was the first time for Dga to apply/use the GEA method, it was necessary to first develop an organization specific coherence dashboard. To this end, the Dga cases started with an intensive desk research activity, conducted by a small team of architects. This team studied relevant policy documents from Dga, resulting in the first version of the coherence dashboard for the agency, in terms of a list of the cohesive elements and their definitions, covering both the purpose level and design level. Starting point for creating this list were the strategic documents of the organization such as the mission statement, vision notes, policy plans, business strategy, business plan, etc. In a validation workshop this draft coherence dashboard was then validated with

the major stakeholders and approved after some modifications. This validation workshop involved the executives of Dga, complemented with a number of (internal) opinion leaders and key stakeholders.

In Table 10 the perspectives that were selected by Dga are shown, while as an example the core concepts of five of the perspectives are listed in Table 11.

Perspective	Definition:
ICT	All processes, activities, people and resources for obtaining, processing and delivery of relevant information for Dga.
Chain cooperation	The collaboration of the parties involved in the subsidy arrangement chain.
Processes	A coherent set of activities needed to deliver results of Dga.
Organic structure	The governance and organizational structure of the DGA organisation so that desired goals are attained.
Employees	All persons who execute tasks or activities within the Dga-organization.
Suppliers	Companies or organisations that supplies or sells products and/or servives at Dga.
Culture	Explicit and implicit norms, values and behaviors within the Dga organization.
Services	All services that Dga within legal frameworks, or through agreed appointments with statutory authorities, establishes and delivers to applicants.
Customer	The applicant of a service of Dga.
Law & regulations	All legal frameworks that form the basis for the task performance of Dga.

Table 10. Definitions of perspectives for the Dga-organisation.

This set of perspectives already illustrates the need to align more aspects of an enterprise rather than just business and IT. The chosen set of perspectives shows that when it comes to alignment, the stakeholders do not think in terms of Business/IT alignment, but rather in a much more refined web of aspects that need alignment. During the desk research phase more than 200 guiding statements were derived from the aforementioned policy documents. Needless to say that presenting all guiding statements goes beyond the purpose of this chapter. Therefore, as an example Table 12 only shows those guiding statements that turned out to be relevant to the processes perspective.

Organic structure	Customer	Chain cooperation	Processes	ICT
Governance	Applicants	Collaboration	Formal checks	Standardization
Political leadership	Third parties	Chain test	Material checks	Architecture
Responsibilities & tasks	Channel selection	Chain parties	Seasonal peaks	Integrality
Organizational division	Internet	Chain mandate	Efficiency	Security
Employer ship	Supply coordination	Service level agreements	Effectiveness	Facilities
Policy cores	Objections	Chain management	Predictability	Information
Program management	Switchers		Transparency	Maintenance
Scaling up			Planning	Systems
Combined arrangements			Procedures	Ownership
Works Council			Regulations	Storage

Table 11. Core concepts for Dga

Processes
Execute three subsidy arrangements through one application'
Execution of the subsidy arrangements should be compliant to legislation
All sub-processes should contribute to sustainability
All processes must be described and provided with work instructions
Of all the processes timely progress reports have to be delivered to the control department
Processes should be implemented more cost efficient
Our aim for Dga is an agile, transparent and fast operation
Factory work as data entry and scanning of maps are outsourced
All process activities must be performed within the statutory time limits
Parallel to the 3rd main process 'judge', the initialization activities of the new subsidy year should start
The processes of the various partners must connect seamlessly
Also determined by the number of subsidy applications received, we aim to compile an optimal size of batches to be processed
Batches of subsidy applications may only move to the next procedure after approval through formal and material checks
Objections should as much as possible be prevented by means of an active application of the possibility of administrative modification
As a result of far-reaching expected changes in European legislation, only the most needed process improvements should be performed.

Table 12. Guiding statements relevant to the processes perspective

6.3   The process followed in the case study

With the dashboard in place, the next step was to organize a workshop, where the business issue at hand was put central and analysed in terms of four questions. During the workshop, each of the ten perspectives of Table 10 had an explicit representative with clear (delegated) ownership of the cohesive elements (in the real organisation, i.e. not just the documentation) of that perspective.

According to the GEA method, at the start of this workshop the owner(s) of the business issue gave a thorough introduction of the issue in terms of causes, degree of urgency, degree of interest, implications, risks, etc. This introduction gave the representatives of the perspectives a deeper insight into the associated issues of this business issue, enabling them to make a translation of the issue to their own perspective. Consequently, the representatives of the perspectives were capable of determining *jointly*, which perspectives were most affected by/related to the business issue at hand. This resulted in the identification of the dominant and sub-ordinate (for the issue at hand) perspectives.

The core business issue: "*How can the execution of the subsidy submission, evaluation, and allocation process be made more manageable and efficient?*" was then addressed in terms of four questions, leading to four sub-analyses of the business issue:
1. Determine the impact of the business issue on the dominant perspectives.
2. Determine the impact of the business issue on the sub-ordinate perspectives.
3. Determine the solution space for the business issue from the dominant perspectives.

4. Determine the solution space for the business issue from the sub dominant perspectives.

The first two sub-analyses started from the business issue. This resulted in the identification of the potential impact as well as the necessary change initiatives (originating from the different perspectives) to solve the business issue. The last two sub-analyses were conducted using the guiding statements from the different perspectives as a starting point. This resulted in an identification of the possible/necessary change initiatives, as well as possible limitations (e.g. as a result of architecture principles) with respect to the solution of the business issue. This was then used as a base to synthesize possible solution scenario's that would fit within the context (as captured in the cohese elements) of the organization. Conversely, the insights gleaned from this exercise also made it clear which cohesive elements should be adjusted to continue giving direction to the further evolution of the organization. The synthesis of the results from these sub-analyses then formed the integral solution and preferred approach to meet the business issue at hand.

The results of the four sub-analysis are given in Table 13, Table 14, Table 15 and Table 16 respectively. As a start, consider Table 13 and Table 14. The second column 'Problem' shows the sub-problems that were expressed by the problem owners. The third column 'Perspective' shows the perspectives, which the representatives perceived as most relevant to a sub-problem. The impact on this perspective is expressed in terms of new or modified guiding statements in the adjacent column 'Guiding statement' (column 4). The impacts resulting from this sub-problem on other possible perspectives (column 5 and 7) are expressed adjacently in terms of guiding statements (column 6 and 8). The last column shows the formulated solutions of the sub-problems in which the representatives reached consensus as part of the integral solution.

Sub-analysis 1: impact on the dominant perspectives							
Nr.	Problem	Perspective	Guiding statement (GS)	Perspective	Guiding statement	Perspective	Guiding statement	Elements of the integral solution
1	Many complaints from customers about not knowing the state of progress	Customer	New GS: status of progress file logistics must always be visible to customer	Processes	New GS: transparency per file in massive processing			Automate logistics on file level
2	Many discussions and problems with suppliers on their payments	Supplier	New GS: No deals with operational staff	Processes	New GS: Manage suppliers by supply management.	Org. structure	New GS: Separation of functions and performance accountability.	Organize professional supply management
3	Major problems due to file loss	Processes	New GS: file loss at all times avoid	Suppliers	New GS: File loss sanction	Services	New GS: Only supply and purchase through SLA	Develop SLA's and sanctions
4	Inadequate cooperation of chain parties led to a lot of money, quality and time loss.	Chain cooperation	New GS: We carry out chain management	Org. structure	New GS: We have the mandate chain management	Processes	New GS: Carry out a chain test prior to the execution.	Organize chain management including chain mandate and development of a chain-test.
5	Execution costs too high	Processes	New GS: Recovery and failure costs are from now in line with the market	Processes	New GS: Checks as early as possible in the process			Redesign the primary processes

Table 13: Sub-analysis 1: impact on the dominant perspectives

Sub-analysis 2: impact on the subdominant perspectives							
Nr.	Problem	Perspective	Guiding statement (GS)	Perspective	Guiding statement	Perspective	Guiding statement	Elements of the integral solution
1	Awareness of low change ability towards the necessary interventions.	Org. structure	New GS: The change ability must continually adjust our ambitions.	Chain cooperation	New GS: Entire Chain management under program control.			Remove the steering from the line organization and bring it in under program control. Organize program management.
2	Execution is insufficient compliant with international laws.	Laws & regulations	Existing GS: execution should be compliant to legislation	Processes	New GS: Checks should be carried out at the place of execution by authorized officials.	Suppliers	New GS: All outsourced activities shall be performed in the Netherlands.	Renew the outsourcing parties and outsourcing contracts and refocus them on legal regulations.
3	ICT support is insufficient.	ICT	New GS: ICT must support the entire chain.	Chain cooperation	New GS: Support and control the chain at the level of file sharing.	Services	New GS: We communicate only by mail, telephone and internet.	Picture the file exchange and govern this exchange. Organize multi-channel support.

Table 14: Sub-analysis 2: impact on the sub-ordinate perspectives

We continue with an explanation of Table 15 and Table 16. In the column 'Solution idea', ideas are expressed which emerged when determining the solution space. In the third column 'Perspective' the perspectives are shown the representatives in the session perceived as most relevant to the solution idea. In the adjacent columns the guiding statements are shown that form the framework for the idea in terms of possibilities and impossibilities. Also newly developed guiding statements are listed here. In the last column the solutions toward the ideas are expressed in which the representatives reached consensus.

Sub-analysis 3: exploring solution space from the dominant perspectives							
Nr.	Solution idea	Perspective	Guiding statement (GS)	Perspective	Guiding statement	Perspective	Guiding statement	Elements of the integral solution
1	Applications only via Internet in order to reduce number of objections.	Customer	Existing GS: The customer has free choice of channels.	Services	New GS: Applications preferably via the Internet.			Encourage internet channel, maintaining freedom of choice of channels. Redevelop Internet application.
2	Unbundle the combined subsidy arrangement into 3 separate arrangements to reduce complexity	Customer	Existing GS: Approach the customer as little as possible for gathering data	Processes	Existing GS: 3 subsidy arrangements via one application.	Services	Existing GS: Combine gathering data from multiple arrangements	Proposed unbundling is not accepted, and the status quo maintained.
3	Fill in on forehand previously known information from applicants to reduce many complaints	Customer	New GS: Once gathering, multiple use.	Services	New GS: The applicant receives pre-completed forms and a personalized web site.	Processes	New GS: Forms including logos, etc. are completely printed.	Insert pre-filled forms and complete printing solution at the solution "Redesigning primary processes". Insert personified web site solution at the solution "redevelop internet application".

Table 15: Sub-analysis 3: exploring solution space from the dominant perspectives

Sub-analysis 4: exploring solution space from the subdominant perspectives							
Nr.	Solution idea	Perspective	Guiding statement(GS)	Perspective	Guiding statement	Perspective	Guiding statement	Elements of the integral solution
1	Work with multiple work shifts to meet the legal deadlines for the subsidy arrangements.	Culture	Existing GS: We will respectful to the interests of our employees.	Processes	New GS: Overtime or multiple shifts only in exceptional circumstances and after approval of the works council.			Working in multiple shifts was no longer seen as a solution.
2	No longer outsourcing of massive routinely sub processes, but carry out these processes themselves to hold more control.	Culture	Existing GS: We will respectful to the interests of our employees.	Processes	New GS: Highly skilled employees carry out highly skilled work.			Maintain the outsourcing, and govern the outsourcing professional.

Table 16: Sub-analysis 4: exploring solution space from the sub-ordinate perspectives

To better appreciate the results of the sub-analysis, we will now discuss a concrete example. Consider Figure 13, as an illustration for problem number 4 from sub-analysis 1: '*The non-cooperative attitude of many parties in the chain resulted in a loss of money, quality and time*'. Experience has shown that working together seamlessly with twenty-eight partners, is no simple task. Many of the problems were related to this aspect. Examples include misunderstandings between the parties, not delivering on time, not being able to read each other's file formats, etc. The discussion provided the perspective 'Chain cooperation' with a new guiding statement 'we carry out chain management'. The effect on the perspective 'Processes' was the addition of the guiding statement 'carry out a chain test prior to the execution', and on the perspective 'Organization structure' the addition of the guiding statement, 'we have the mandate on chain management'. The reached solution for this problem was: 'organize chain management including a clear mandate, and develop

a chain integration test'. When the mandate for the chain authority had been arranged, all the activities in the chain could be governed in a coherent way. An important consequence of the introduction of a clearer chain authority was the development and execution of a comprehensive test programme to test the integrity of the chain. Many problems regarding the required collaboration of the involved parties, especially in the area of data exchange, could be avoided as a result of having this test.
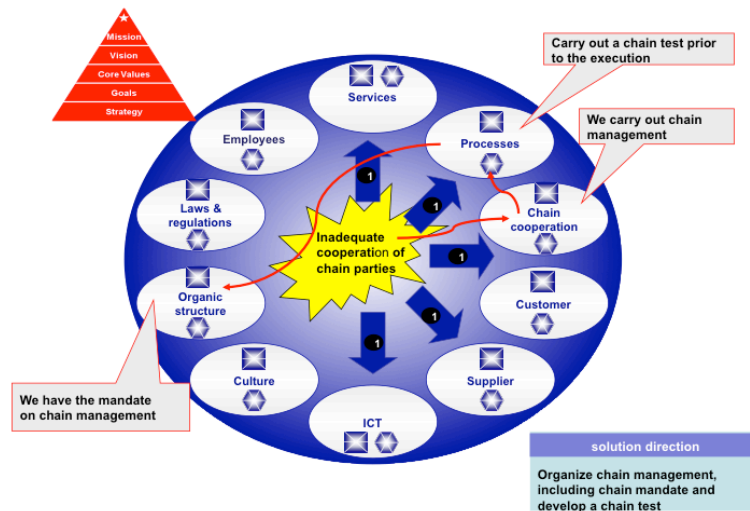

Fig. 13: Sub-analysis nr 1, problem nr 4

As a second example, consider sub-analysis 2, problem number 2: '*The execution was not sufficiently compliant with international laws*', as illustrated in Figure 14. Every year, a number of checks are conducted by European officials on the degree of compliance with European laws and regulations. There was a need for better anticipation to these checks. This provided a further confirmation of the existing guiding statement at the perspective 'Laws and regulations': '*the execution should be compliant to the international law*'. In addition, a new guiding statement was created at the perspective Processes '*the checks have to be carried out on the place of execution by authorized officials*'. Finally, a new guiding statement to the perspective 'Suppliers' was added, '*all outsourced activities shall be performed in the Netherlands*'. The reached solution for this problem was: '*Renew outsourcing parties and outsourcing contracts and refocus them on the legal regulations*'. This solution meant that the involved suppliers could not re-outsource the activities to a lower wage country and that the outsourced processes could be monitored in an easier way.
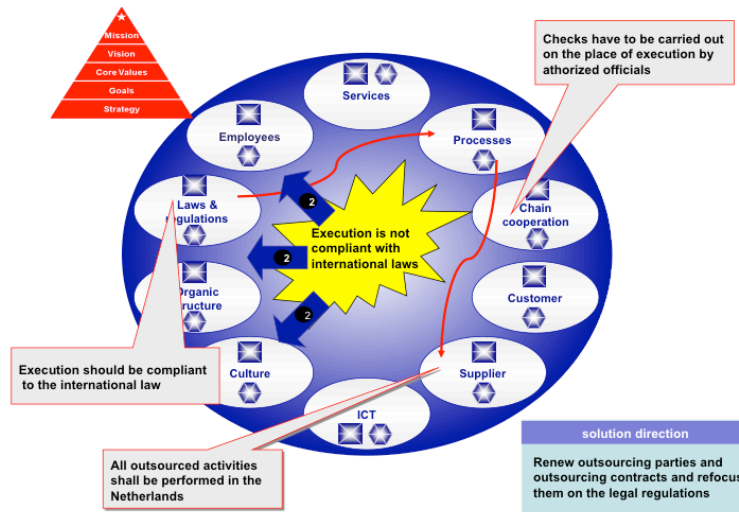
Fig. 14: Sub-analysis nr 2, problem nr 2

As a third example, consider sub-analysis 3, solution idea number 2: '*Unbundle the combined subsidy arrangement into three separate arrangements to reduce complexity*', as illustrated in Figure 15. To try to reduce the overall complexity, some representatives suggested ceasing the current situation in which three (very different) subsidy arrangements were bundled in one application. This would imply that the applicants should be approached three times with subsidy forms. The existing principle from the perspective 'Customer': '*approach the customer as little as possible for gathering data*' persisted. From the perspective 'Processes' the guiding statement: '*execute three subsidy arrangements through one application*' remained also, as well as the principle from the perspective 'Services': '*combine gathering data from multiple arrangements*'. Maintaining the guiding statements here means a limitation of the solution space. The idea to cease the combination of three subsidy arrangements in one application was not accepted and the final decision for this solution idea was: '*proposal unbundling is not accepted, and the status quo will be maintained*'.
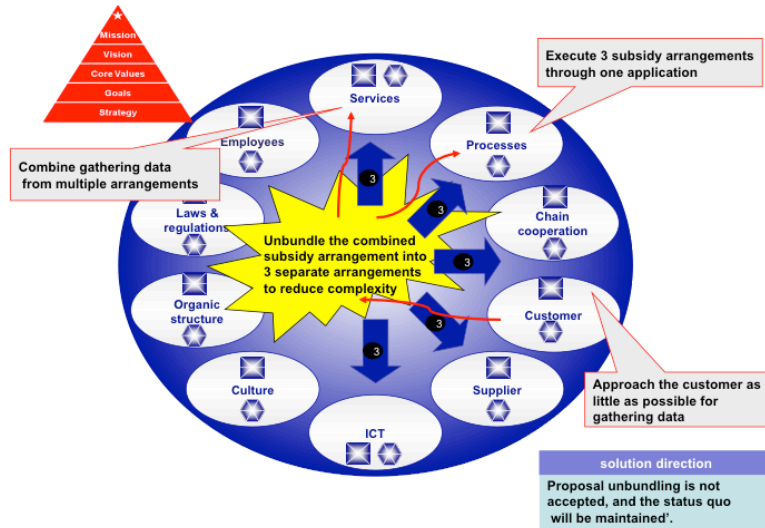
Fig. 15: Sub-analysis nr 3, problem nr 2

As a final example, consider sub-analysis 4, solution idea number 2: '*No longer outsourcing of massive routinely sub processes, but carry out these processes in-house to remain more in control*', as illustrated in Figure 16. This discussion concerned the consideration to, given the bad experiences, stop outsourcing critical sub-processes. This situation was rejected based on the principle '*We show respect for the interests of our employee*' from the perspective 'Culture'. Apparently there was a mismatch between the fact that the initially outsourced activities had a very massive and routine character, while the employees were generally highly educated. This understanding resulted in a new principle in the perspective 'Processes': '*highly skilled employees carry out highly skilled work*'. The final outcome for this solution idea was: "*continue to outsource, but govern this professionally*".
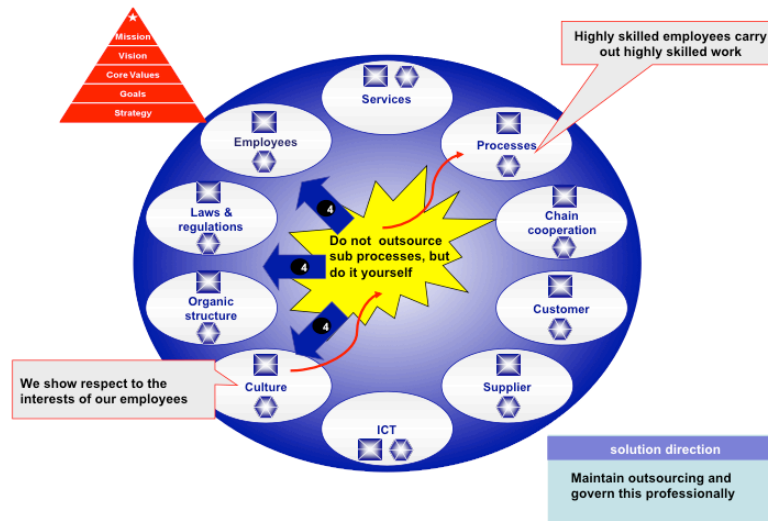
Fig. 16: Sub-analysis nr 4, problem nr 2

Clustering sub-solutions	
Clusters of the integral solution	**Sub-solutions from subanalyses**
Organize supply management	• Organize professional supply management • Develop SLA's and sanctions
Govern the chain	• Remove the steering from the line organization and bring it in under program control. • Organize program management. • Organize chain management including chain mandate and development of a chain-test.
Redesign processes	• Redesign the primary processes • Insert pre-filled forms and complete printing solution at the solution "Redesigning primary processes". • Organize multi-channel support. • Automate logistics on file level
Renew outsourcing:	• Renew the outsourcing parties and outsourcing contracts and refocus them on legal regulations. • Maintain the outsourcing, and govern the outsourcing professional.
Govern file exchange	• Picture the file exchange and govern this exchange.
Renew internet application	• Redevelop Internet application. • Encourage internet channel, maintaining freedom of choice of channels. • Insert personified web site solution at the solution "redevelop internet application".
Remain combined data gathering	• Proposed unbundling is not accepted, and the status quo maintained • Working in multiple shifts was no longer seen as a solution

Table17: Clustering sub-solutions

6.4 Results of the GEA case study

As a first step in the synthesis process that followed, the participants clustered the sub-solutions of the four sub-analyses (see the right side of Table 17 that corresponds to the elements of the integral solution shown in Tables 13 to 16) into clusters of the integral solution and choice of approach of the business issue at hand (see the left side of Table 17). During this synthesis process, the participants could add sub-solutions. These additions where based, on the one hand, on the new established guiding statements, and on the other hand, on the

overall insight of the integral solution chosen approach. In Table 18 we give some examples of added sub-solutions to the clusters Renew outsourcing and Govern the chain.

Added sub-solutions from synthesis process			
Cluster of integral solution	Sub-solutions, source sub-analyzes	Sub-solutions added during synthesis process based on overall insight	Sub-solutions added during synthesis process based on new Guiding Statements (GS)
Renew Outsourcing.	• Renew the outsourcing parties. and outsourcing contracts and refocus them on legal regulations. • Maintain the outsourcing, and govern the outsourcing professional.	• Set the existing outsourcing parties liable for damages suffered. • Retraining of employees.	• Measurements of throughput include in the contract. (see new GS Table 1: status of progress file logistics must always be visible to customer; transparency per file in massive processing). • Sanction of € 5,000 per lost record in the contract file. (see GS Table 1: file loss at all times avoid; file loss sanction). • Suppliers carry out outsource activities under one roof.(see GS Table 1: file loss at all times avoid).
Govern the chain	• Remove the steering from the line organization and bring it in under program control. • Organize program management. • Organize chain management including chain mandate and development of a chain-test.	• Organize a quality assurance project.	

Table 18: Added sub-solutions from the synthesis process

At the end of the synthesis process the participants evaluated the GEA approach based on a number of criteria set up by the core team of the GEA programme. See table 19.

Evaluation GEA approach			
Criteria	High	Average	Low
Acceptance by stakeholders		*	
Extent of applicability	*		
Matching required dynamics	*		
Extent of compliance with required integrality	*		
Degree of accessibility		*	
Degree of transferability			*
Extent of balance of interests	*		
Degree of innovativeness	*		

Table 19: Evaluation of the GEA approach

The elaboration of the solution and the associated implementation approach, resulted in a Program Start Architecture (PgSA) for controlling the subsequent change program. A PgSA is a GEA product that is produced to control a change program from an architectural point of view. It is produced after a positive decision on the integral solution and approach is obtained. In the PgSA the integral solution and choice of approach is included, as well as the cohesive elements of the ECF relevant for the change program. Finally the PgSA is supplemented by the organizations accepted norms and standards for relevant aspects of the change program such as eg norms and standards in the areas of security, process design, et cetera. Such a PgSA was the first part of the contract with the designated Program Manager. The execution of the change program according to the PgSA led to the following results and associated benefits:

- The execution of the subsidy arrangement is now conducted within the set time limits, and agreed budget.
- The return of application forms due to application errors was reduced from 62 percent to 35 percent, and now falls within the error tolerance.
- The number of objections was reduced from 22.000 to 7.000 with corresponding reduction in associated costs.
- The Internet based participation of applicants rose from 0.5 percent to 6 percent.

- The European supervisory authority and the Dutch parliament were satisfied about the results and answers on their submitted questions.
- With regard to the new outsourcing parties:
  o Their performance was in line with the agreed quality, time and budget.
  o Not one client dossier has been lost.
  o Given the good performance all contracts were subsequently prolonged.

6.5 Discussion and conclusions towards the GEA method

The Dga case study has brought us the following insights on the application of GEA:
- The initial investment by making the enterprise coherence explicit in terms of the ECF is repaid in terms of a better understanding of the enterprise's environment, the stimulation of innovation within (and beyond) the boundaries of the enterprise and a vast improvement of the collaboration of all parties involved.
- Application of GEA leads to achievable and high quality solutions. The execution of the subsidy arrangements was within time and within agreed budget, while substantial savings in operating costs were achieved. More specifically, in the Dga case, a reduction from 22.000 to 7.000 applications, with an average of 10 hours spent per application by lawyers, resulted in a saving of millions Euros.
- Application of GEA implies the involvement of the key social forces in an organization and redirects these into a valuable business asset. More specifically, the key players of the organization, the representatives of the perspectives in this case, did not only know and trust each other more during the design of the GEA framework, but gained also a better insight into and understanding of each other's domains. They were also willing, at the end of sub analysis 1, to transfer the responsibility and the associated power to a chain program manager. At last the decision on the proposed solution, could soon take place because the decision makers knew that it was developed integrally and supported by all parties involved.
- The process of bringing and keeping the key players together in the workshop sessions does a strong appeal on the required competencies of the facilitators (enterprise architects).
- The quality with which the business issue in all its facets is introduced determines the quality of integrated solution. The business issue at hand has been thoroughly analyzed by the problem owners prior to the impact analysis sessions in terms of causes, degree of urgency and importance, and has been presented clearly at the beginning of the impact analysis ses-

sions. Based on this presentation the perspective-owners were able to make a translation to their own part of the enterprise environment.

- A major business issue can perturb the enterprise coherence in all its facets at the moment an organization decides to react on it. This means that all the preserved, newly added, eliminated and modified cohesive elements must be established in a new actual state of the enterprise coherence at the moment the decision to adopt an integral solution is made! By doing this, the organization is ready to develop an integral solution for a next business issue.

- In the future of the further development of GEA, we should pay more attention to the following lessons learned:
    1. Application of GEA has a strong increase in transparency as a result. Not all managers are equally happy about it as this offers the possibility for criticizing others on their functioning.
    2. Success as a result of application of GEA get used quickly, the acquisition of working methods according to GEA requires more effort. The organization felt relatively soon back to old inefficient behaviour after our departure. (See also the low-score on transferability in Table 19).

In summary, we conclude that the case study shows that an incoherent, chaotic situation after application of the enterprise coherence governance instrument GEA, was transformed into a coherent, regulated organization. The presented case study demonstrated that with the application of GEA substantial performance improvements can be achieved. In this real world case study a totally derailed organization has been brought back in control within a single year, while also making substantial savings. In our further research we will, in line with the research methodology used, continue to conduct case studies and based on the findings elaborate and perfect the theory.

7 Conclusions

The theory, as proposed in this chapter, was developed by the GEA research programme. The theory answers research questions 1, 3 and 4 as listed in section 2:

- What are the core factors that influence/define enterprise coherence?
- How can enterprise coherence be expressed explicitly?
- How can enterprise coherence be governed?

The triggers of the GEA research programme were discussed in section 1, while these triggers where translated to a set of requirements on the GEA programme as discussed in section 3. Based on the requirements, we developed the theory of enterprise coherence governance (section 4, 5 and 6). With the elaborated case study in section 7 we have shown how this theory has been put into practice. This case also demonstrated that the application of GEA can be used to achieve substantial performance improvements. In this case within one year a totally derailed organization was been brought back into control while also making substantial savings.

This paper is a first step in providing an answer to the aforementioned research questions and achieving our research objectives. In our further research we will, according to our research methodology as described in section 2, execute several cases (see fore instance Wagter, Proper & Witte, 2012b), and based on the findings elaborate and evolve the theory.

Acknowledgements

Appendix 1

As mentioned in section 2 'Research context', the EA requirements form the basis to make the enterprise coherence explicit and to govern the enterprise coherence. In this chapter we have shown that we make the enterprise coherence explicit by cohesive elements and we realize the enterprise coherence governance by applying the GEA components using the cohesive elements. In table 9 we show the relationships between the cohesive elements and the EA requirements as well as the relationships between the GEA components and the EA requirements.

The confrontation of the Cohesive elements and the GEA-components with the EA requirements, shows that all requirements has been contributed. Conversely, the coherence between the Cohesive elements and the GEA components is made explicit by the requirements that shape both categories. See table 9.

Table 9 — Relationship EA requirements / Cohesive elements / GEA components

Table reference	Requirements	On the level of purpose	Perspective	Core concepts	Guiding statement	Core model	Relevant relationship	EA vision	EA processes	EA products	EA people	EA means	EA governance	EA methodology
		Cohesive elements	**On the design level**					**EA function Components**						
1.1	It is necessary to take the concerns, and associated strategic dialogues, of senior management as a starting point.	√	√		√			√	√		√			
1.2	Forces be they of political, informal, or cultural nature, within an enterprise should be a leading element in governing enterprise coherence.	√	√		√			√	√		√			
1.3	One must have an EA vision in order to be able to establish EA as a business value driver and make explicit how coherence contributes to both the image and opinion formation phases of the decision making process and must closely resemble and simulate the way of thinking. One pre-requisite is that the top of the organisation holds this EA vision.						√	√	√					
1.4	The added value of EA as a governance tool should be recognized and promoted by all parties concerned. Also the added value of EA compared with other control tools that are in use.										√			
1.5	To establish the EA function an integral approach to EA vision development, EA processes, EA products, EA people and EA resources needed for EA is necessary.					√	√	√	√	√	√	√	√	√
1.6	EA is a flexible model, which means that the number and character of organisational angles to govern the enterprise and their associated relationships depend on the situation.		√	√			√	√		√				
1.7	The EA processes and products should support the control processes of the enterprise in a tailor made way, by supplying the necessary results supporting these control processes.					√	√		√	√				
1.8	EA moves at a strategic level and gives direction in decision making on tactical and operational levels by means of lines of policy and must be done in an independent way to include all angles at stake in decision making processes.	√	√	√	√	√	√	√	√					
1.9	From the point of accessibility and understanding it is necessary to distinguish between EA management products and EA specialist products. This means that it is possible to communicate with the right target groups and with the right EA products.					√				√				
1.10	Management must provide the EA function with people with the necessary competencies, time, budget and other resources for EA to realize the added value of EA.										√	√		
1.11	Enterprise architects must participate in the organisation's governance processes and must have direct access to managers on a peer to peer basis.								√		√			
1.12	The EA governance products must provide direction to change programmes and the existing organisation.				√	√	√			√				
1.13	A complete and coherent set of organisational angles must be brought together by the decision makers.	√	√	√			√		√	√				
1.14	EA must be arranged as a continuous process whereby coherence is permanently adjusted to the dynamics of the internal and external environment.		√	√			√	√	√					
1.15	EA must be applied as a governance instrument at the moment major business issues arise in order to establish integral solutions and approaches on time.								√	√				
2.1	Goals have to be an element of enterprise coherence at the level of purpose of an organization and objectives an element of enterprise coherence at the design level of an organization.	√			√			√		√				
2.2	The level of purpose of the organization must be within the scope of EA. This requirement is associated with the previous mentioned requirement "scope".	√			√			√						
2.3	Boundaries must be made explicit since boundaries define relations between angles of an organization, and as such form a basic asset of enterprise coherence.	√	√	√	√	√	√		√	√				
2.4	The effect of intended strategic interventions on the enterprise coherence should be made clear interactively and beforehand.	√				√	√	√	√	√				
3.1	Objectives have to be an element of enterprise coherence at the design level of an organization. (This requirement is also formulated from the theory of management control in table 2 requirement no. 1)	√			√			√		√				
3.2	The model of enterprise coherence must represent the dynamics of the design level of an organization.		√	√	√	√	√			√				
3.3	The actual state of enterprise coherence must be represented on a permanent basis including current state as well as future directions.	√	√	√	√	√			√	√				
3.4	Enterprise coherence governance must have sufficient levers to influence enterprise coherence on the design level and support the interdependancy with the level of purpose as well, including: forward and backward governance, event driven and cyclic governance, single and multi level governance (recursivity and projection).	√	√	√	√	√	√	√	√	√				
3.5	Restrict the complexity and information overload by differentiating enterprise coherence in several interdependent levels. Allocate sufficient resources to enterprise coherence governance, distinguished by processes, products, people, means, governance, methodology and all based on an vision.			√			√	√	√	√	√	√	√	√
4.1	The scope of enterprise coherence governance should include both internal and external angles of the organizational transaction environment.	√	√	√			√	√		√				
4.2	The purpose of a change process should be in line with the goals on the level of purpose and objectives on the design level.	√			√		√		√					
4.3	The organizational aspects that are dominant in the solution for a business problem, determine the choice of approach.		√	√					√	√				
4.4	Every change process should be argued by the application of the enterprise coherence governance before execution.								√					
4.5	The "direction of solution and choice of approach" should be just one element of decision.									√				
4.6	Regarding the decision making process, enterprise coherence governance should contribute both the solution direction and choice of approach of a business issue.	√							√	√				
4.7	Enterprise coherence governance should guide the realisation of the "solution direction and choice of approach" of a business issue.				√	√	√		√	√				
4.8	An appropriate approach needs appropriate enterprise coherence products.					√	√			√				

Table 9: Relationship EA requirements/Cohesive elements/GEA components

Appendix 2

Terms with their description frequently used in this chapter are:

Enterprise: enterprise in this thesis is an organization in the public or industrial area with more than 200 employees and a high degree of multiple forms of labor division.

Enterprise coherence: enterprise coherence is the extent to which all relevant aspects of an enterprise are connected, in such a way that these connections facilitate an enterprise obtaining/meeting its desired results.

Enterprise coherence governance: enterprise coherence governance is the process of managing, controlling and monitoring the enterprise coherence.

Enterprise coherence-governance assessment (ECA): ECA is an instrument that allows the level of enterprise coherence governance in organizations can be measured.

Extended enterprise coherence-governance assessment (eECA): eECA is an instrument that allows the level of enterprise coherence governance in organizations can be extended measured.

Enterprise coherence framework (ECF): ECF is an instrument that allows to make the enterprise coherence explicit.

Enterprise coherence governance-approach (ECG): ECG is an instrument that allows to govern the enterprise coherence.

Program start architecture (PgSA): A PgSA is a GEA product that is produced to control a change program from an architectural point of view.

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