

## HOLISTIC APPROACH TO ALIGN ICT CAPABILITIES WITH BUSINESS INTEGRATION

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## ABSTRACT

In this ever faster changing world, organizations have to adapt quickly to the changes in the market or its environment. Business integration, within one or between multiple organizations, is one of these changes imposed on organizations. In some cases ICT is to be found an enabler of an effective and efficient integration but in other cases ICT is one of the reasons of failure to this integration. In this chapter a holistic approach to align ICT capabilities with business integration is proposed. In this proposal a broader perspective is taken in which not only ICT by itself, but also cultural and social aspects are taken into account.

Keywords: Interdisciplinary forum, holistic, capabilities, strategy, ICT, integration

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## INTRODUCTION

Business integration is becoming more and more important in the current business landscape due to a.o. changing market dynamics, changing legislation, mergers and acquisitions. Business integration however doesn't stand on its own. The need for integration is a demand from the business, emerging from the business strategy of a company, itself derived from the grand strategy of that enterprise.

On the other hand the need for business integration implies challenges on an enterprise's ICT department and the ICT capabilities it puts to the disposition of the business in order to assist in realising the business strategy.

In this chapter, a holistic approach for the alignment of the business integration with the necessary ICT capabilities is described. This holistic approach encompasses the set up of an interdisciplinary forum whose task is to align the business strategy with the resource strategy and whose output consists of Service Level Agreements (SLAs) for a.o. HR, finance, ICT. The Interdisciplinary Forum is the implementation of the holistic approach and therefore it cannot solely be a collection of technocrats. The Interdisciplinary Forum takes into account the mission statement, the vision and the values of an enterprise. Especially the values are a differentiating factor between organisations and define the organisation's culture, a typical social phenomenon.

For every SLA a steering plan and a steering group is formed guarding the negotiated SLA. In the holistic approach, the interdisciplinary forum further delegates the SLA for ICT to the Enterprise Architecture which serves as the guardian of the ICT capabilities and the ICT assets.

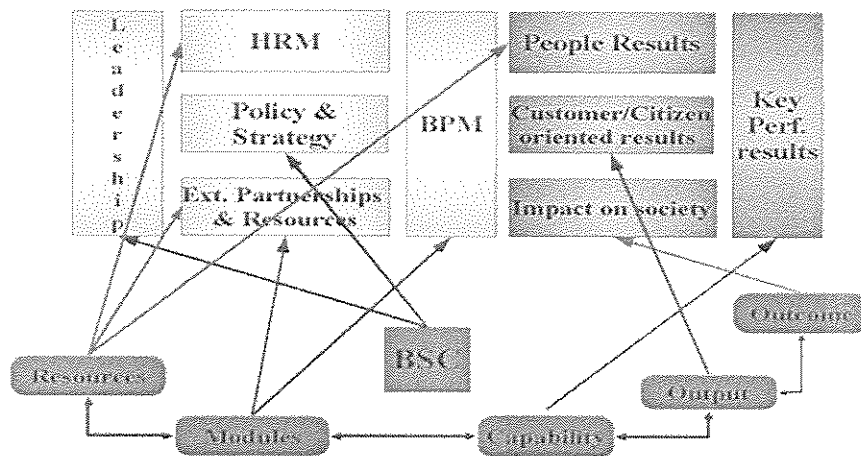


Figure 1: Relationship CAF, BSC and BPM

In the remainder of this chapter we will first discuss the Interdisciplinary Forum in general. After the discussion of the Interdisciplinary Forum, we discuss our view on Enterprise Architecture and how it relates to the Interdisciplinary Forum. After the discussion of the Enterprise Architecture and its role towards the Interdisciplinary Forum, it is time to tackle business integration's impact on Enterprise Architecture. The theoretical foundations as laid down in this chapter are evaluated against a case. We conclude with a summary.

## THE INTERDISCIPLINARY FORUM

### Context

Business integration, be it within the boundaries of one enterprise or between enterprises, is about the business value that is expected to be obtained through exchanging services and information between business processes. How to exchange the information is a technical challenge whose solution depends on the technology portfolio and the ICT capabilities of the ICT departments responsible for the implementation of the business integration. Why the information should be exchanged and exactly what information should be exchanged are questions that are answered by analysing the business needs. Hence the information to be exchanged is dependent on the business strategy which is in turn an outcome of the grand strategy of the enterprise.

Rabaey et al. (2004) argue, through a mapping of military strategy to civilian organisations, that for each resource an own resource strategy has to be developed in function of the core business and in doing so maximize the achievement of the enterprise's main objectives. This resource strategy is, in contrast with the business strategy, not a direct derivative of the grand strategy but is aligned with this grand strategy.

Therefore, considering the differences in defining business and resource strategies, an alignment between these two has to be put in place. This is done through setting up an "Interdisciplinary Forum" (IF) which consists of as well experts in the field of the business strategy as well experts from each resource field. The output of this interdisciplinary forum is descriptions of services (through Service Level Agreements: SLAs) and Resource

Allocation Agreements (RAA) delivered by the different resource fields to the core business processes. For that reason, the supportive business units are made accountable for realising the business strategy.

The discussion framework is based on a self-assessment technique as Malcolm Baldrige, European Foundation of Quality Management (EFQM) and Common Assessment Framework (CAF). These frameworks take topics as strategy, process management, leadership, partners and personnel into account. In the results, indicators are defined to check the critical issues.

The advantage of choosing a self assessment technique as foundation for the working of the IF is that in doing so, the social and cultural characteristics of an enterprise or network of enterprises are taken into account. Considering business integration, the IF brings a consensus on (enterprise) cultural differences and establishes an appropriate culture (values) for the particular business processes.

Figure 1 shows in the upper part the CAF model, in which Business Process Management (BPM) is a separate criterion. Much attention is given to BPM because business processes deliver the capabilities to attain the goals set by the business strategy. These capabilities in turn deliver the output to achieve the desired effects (outcome). In order to be able to compare the effects resulting from a business process with its desired effects, performance management should be integrated.

Regarding performance management, Kaplan and Norton (1996) have proposed the Balanced Scorecard (BSC). The four perspectives in their original work are “financial”, “clients”, “Internal processes” and “Learning & Growth”. The main advantages of this model are its balancing of long term with short term objectives, its balancing of financial with non-financial objectives, but above all, the strategy map (cause-and-effect diagram).

Self assessment techniques however overlap a lot with the BSC: ‘BPM’ with ‘Internal Processes’, ‘Customer’ with ‘Clients’ and indicators and initiatives often tend to be the same. Therefore, the BSC should focus on the performance of an organisation, however still balanced: the generation of capabilities and the (operational) use of these capabilities. This leads to an adaptation of the BSC as introduced on the Second European CAF Event (Rabaey 2005) and here illustrated in the lower part of Figure 1. The complementarity, as explained below, between the adapted BSC and CAF is also illustrated in Figure 1. **Error! Reference source not found..**

The business unit wishes to have effects (*outcome*) in the society (CAF criterion 8) by giving a good service or product (*output*) to the citizens and organisations (Crit 6). Therefore it needs *capabilities* (measured by Crit 9), which are generated by *modules* (processes, Crit 5), using resources (Crit. 3, 6, 4). The mission statement, vision and values are defined by the managers of the operational strategy (Crit. 1, 2). This leads to the following five perspectives in the adapted BSC: outcome – output – capabilities – modules - resources. Regarding investments and evaluation of the business unit, this type of BSC is an extension of the CAF implemented in the IF, the IF serving as the global framework.

To avoid the sub-optimal deployment of all resources in the whole organisation, a global IF session has to be held at corporate level. The same type of Balanced Scorecard as for the business units may be used to guide the strategic leadership of the organisation.

## Business Architecture as input for the IF

Business processes are dependent on changes in the internal or external environment. These changes may force the organisation to adapt its business processes. A description of the adaptation of the business process, taking as well the former as the new situation into account, must include the process' desired effect, the SLAs the process provides, the SLAs the process is dependent on and the current RAA for that process. This kind of description of a business process is part of the business architecture of that process and will be discussed in depth in the paragraph about Enterprise Architecture.

The description of the changes needed in the business process and the impact of these changes serves as input to the IF.

## Decision Process

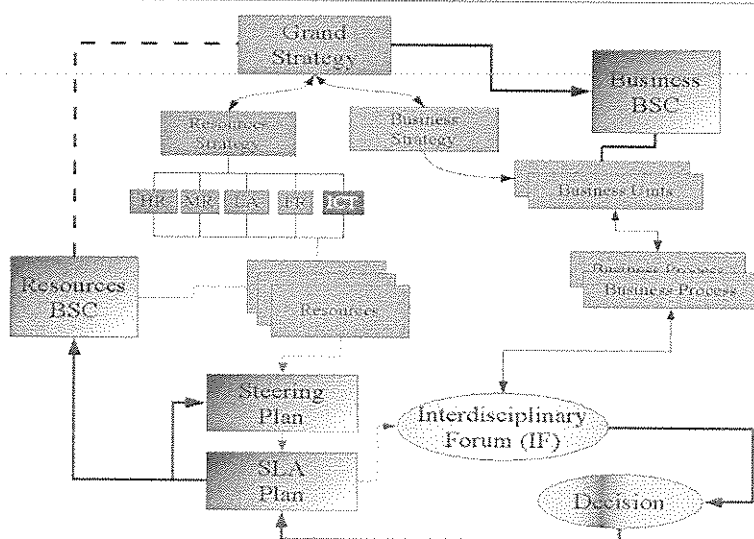


Figure 2: Interdisciplinary Forum: Decision Process

The IF evaluates the proposals it receives based on the pros and cons of the suggested business process adaptation, the cost involved, the SLAs the business process delivers, the SLAs the process is dependent on and the RAAs. The evaluation is based on a self assessment technique, for instance Malcolm Balridge. The last step in the evaluation of the proposals for changes in business processes is a prioritisation and from this prioritisation choices are made. Once the choices are approved by the decision taker, the elaboration of the changes can be started.

For every resource involved in the change, the steering plan needs to be adapted, the SLAs are refined starting from the embryonic description of the SLAs in the proposal for the change to the business process and new RAAs must be negotiated. This decision process is illustrated in Figure 2 **Error! Reference source not found.**

Worthy to note is that SLAs can be provided by external partners.

Although it is clear that the IF is not an ICT specific forum, it also deals with finance, human resources..., we limit ourselves in the remainder of this chapter to discussing the cooperation between the IF and ICT.

## ENTERPRISE ARCHITECTURE

### *Enterprise Architecture's role*

Lots of different interpretations of the term Enterprise Architecture do exist. These interpretations range from, at one end of the spectrum, the list of technological choices made in an organisation concerning infrastructure and application design to the other end of the spectrum wherein Enterprise Architecture encompasses these technological decisions but also sets guidelines to information architecture and business architecture.

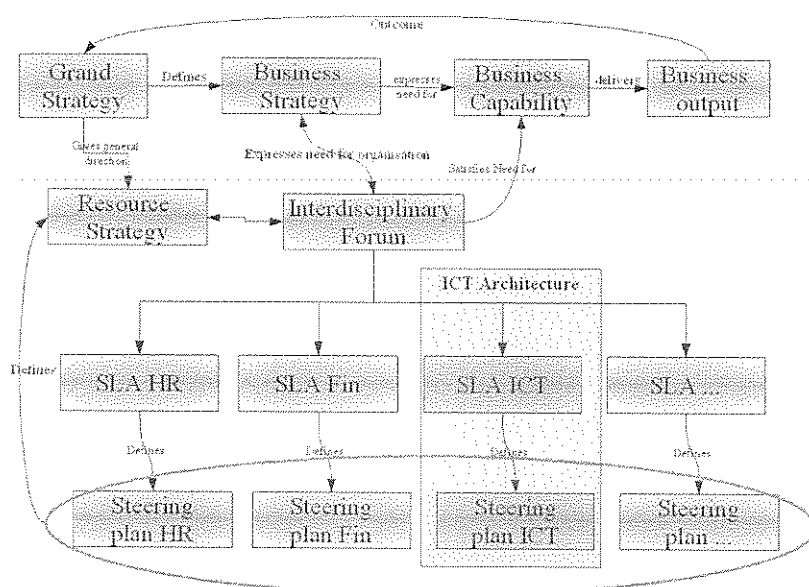


Figure 3: Interdisciplinary Forum and Enterprise Architecture's role

From observations and day to day practice in large scale organizations we learned that it is a necessity to consider Enterprise Architecture broader than merely infrastructure architecture and application architecture. This necessity stems from the fact that applications are built to support business processes and operate on information gathered through these business processes. Hence, architecture only concerned with infrastructure and application design is

insufficient to support a business because such an Enterprise Architecture has no view on the business and its dynamics and hence it cannot take precautions for changing business requirements or the reuse of certain artefacts in other business domains.

For these reasons, we always consider an Enterprise Architecture as consisting of distinguished levels. The naming of the distinguished levels may be different but at least the general ideas as described hereunder should be part of the Enterprise Architecture:

- Business Architecture
- Information Architecture

Application Architecture  
Infrastructure Architecture

Business Architecture is about the description of the business processes as viewed from a business perspective and not, as is often misinterpreted, an ICT perspective. This description must certainly include how the business process is operated, which tasks or sub processes are done by people, which tasks or sub-processes are automated, which SLAs the business process delivers to other processes, which SLAs from other business processes it is dependent on and what the RAAs involved are.

Information Architecture describes the information the business is dependent on. This description must pay attention to where information enters the business processes, how this information enters the process, electronically or by other means, who is the owner of the information, by whom it is used. A very important artefact in Information Architecture is a matrix describing which information entities play a role in which business processes, which information entities are implemented in which applications and which applications serve which business processes. This matrix is often called the city map. State of the art information architecture is an invaluable asset for Decision Support Systems (DSS) as described by Rabaey et al. (2005b).

Application Architecture is about how to implement the applications or IT systems, the programming paradigms and languages, the development environment, software documentation guidelines, release to production procedures...

Infrastructure Architecture deals with guidelines concerning hardware platforms, network infrastructure, operating systems...

A definition for Enterprise Architecture taking into account the above requirements is given by Ross (2003): "An Enterprise Architecture is the organizing logic for applications, data and infrastructure technologies, as captured in a set of policies and technical choices, intended to enable the firm's business strategy".

As a consequence of taking the above definition of Enterprise Architecture, the negotiation, implementation and maintenance of the ICT related SLAs, following from the Interdisciplinary Forum is the task of the Enterprise Architecture.

Schematically this can be depicted as in Figure 3 **Error! Reference source not found.**

### ***Prerequisites for a successful Enterprise Architecture***

Identifying the need for an Enterprise Architecture, as a business supportive entity and giving it the responsibilities to realise its specific SLAs as defined in the interdisciplinary forum is a major step. But it is by itself not sufficient to have a successful Enterprise Architecture. Many other considerations play a role. For Enterprise Architecture to accomplish a successful realisation of strategic business benefits, it must satisfy three major characteristics as described by Ross (2004) are about senior management involvement, project methodology and the level of architecture maturity.

Firstly, senior management involvement stretched in time further than the initial planning phase, with active involvement and having knowledge about ICT architectural principles and implementation.

Secondly, Enterprise Architecture must be built into the project methodology. Every business supporting project formulated through a business case can no longer, as was in the past often the case, be build as a silo application without taking into account past implementations and future directions. This however has a repercussion on the way people are used to work and from change management it is known that people are quite resistant to changes in the way they work. This again implies that a long time senior management involvement, combined with a change management track is an inevitable stage in order to attain a successful Enterprise Architecture. Furthermore, the project methodology should be extended with stages in which enterprise architects validate a proposed solution to an implementation against the set of policies forming the Enterprise Architecture. Again this is a change in the way of working and is often considered to be a delay for the project at hand.

Thirdly, the level of Architecture maturity, as described by Ross (2003). An organisation cannot decide from one day to another to install an Enterprise Architecture. This is a process that takes quite some time depending on the size of the organization and the organization's implicit ability to react agile and flexible to new conditions. The four stages identified by Ross (2003) are:

Application Silo Stage in which the Enterprise Architecture is just the collection of the architectures of isolated applications, often implemented in different technologies. Integration and information exchange efforts are characterized by being point to point and ad hoc. In this stage, resources are focused on delivering individual applications through own development or vendor package installation. A typical characteristic of this phase is that each application defines its own transactional data.

Technology Standardization Stage as the first step towards an enterprise wide Enterprise Architecture in which technology gets standardized and often centralization is put in place. The deployment of resources shifts from application development into the development of a shared infrastructure. This phase is further often characterized by the introduction of data warehouses and sporadic and not institutionalized business management participation.

Data Rationalization Stage characterized by an expansion of the enterprise architecture to include process and data standardization. The deployment of resources shifts from application development into data management and infrastructure development. The involvement of senior business managers becomes institutionalized and a dialog between business managers and IT becomes common practice. Very important in this phase is the shift of data ownership from IT towards the business. This phase is further often supported by tools like ERP, CRM...

A Modular Architecture characterized by enterprise wide global standards with loosely coupled applications. , data and technology components to preserve the global standards while enabling local differences through modules extending the core processes.

How to set up an Enterprise Architecture in practice within an enterprise is described in great detail by Heinckiens (2004), based on experiences gathered in the actual set up of an Enterprise Architecture department within a multinational organisation.



## ICT Governance

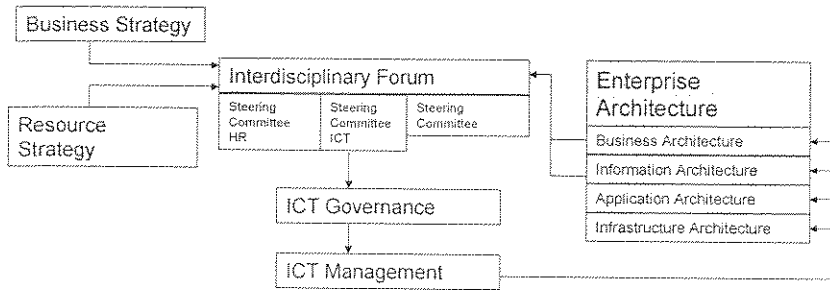


Figure 4: ICT Governance in relation to the Interdisciplinary Forum

Since the concept of ICT Governance is becoming more and more important in larger organizations concerned with ICT technology, it is relevant to map the suggestions made in this chapter to notions of ICT Governance in industry.

Quoting Broadbent (2003): “IT Governance is about who is entitled to make major decisions, who has input and who is accountable for implementing those decisions. It is not synonymous with IT Management. IT governance is about decision rights, whereas IT management is about making and implementing specific IT decisions.”

Therefore, the IT Governance processes put in place must be aligned with the Interdisciplinary Forum and will have repercussions on the ICT SLAs and the ICT Steering Plan. Broadbent and Weill (2003) argue that IT Governance combines three components:

IT Domains being the areas where decisions need to be made at the intersection of business and information technology. Five main IT domains are distinguished: IT Principles, IT infrastructure strategies, IT Architecture, Business application needs and IT investment and prioritisation.

IT Governance styles specifying who delivers input for the decisions and who makes the decisions. Six different governance styles are distinguished, involving different combinations of business and IT executives at different organization levels.

		Service Providers						
		Business Process 1	Business Process 2	...	HR	ICT	...	External Processes
Service Clients	Business Process 1					SLA		
	Business Process 2					SLA		
	...							
	HR					SLA		
	ICT					SLA		
	...							
						ICT SLA Plan		

Figure 5: SLA Plan for ICT

IT governance mechanisms, which are used to make and enact the decisions. Amongst the frequently used mechanisms Broadbent and Weill (2003) refer to the executive committee, IT councils, the IT leadership group, business/IT relationship managers and service-level agreements.

Combining the observations from Broadbent and Weill (2003) with the principles leading to the Interdisciplinary Forum leads to Figure 3.

The ICT Steering Committee is responsible for the definition of the SLAs and RAAs concerning ICT. In the adapted BSC, as introduced in paragraph "The interdisciplinary Forum: Context", this is the output level. Taking the steering plan as input, ICT Governance defines the tasks for the ICT Management which in turn is responsible for the implementation of the decisions made on ICT level. The day to day follow up of these activities in the four defined architectural areas is the responsibility of the ICT Management.

### ***Service Level Agreements for ICT***

Rabaey et al. (2004) define a matrix leading to as well plans for the different business processes in an organisation as for the SLA plans for the different business and business supportive domains. This matrix contains in one dimension the service providers and in the other dimension the service clients. Note that a business process or a supportive domain can act at the same time as service provider and as service client. The SLA plan for ICT is the union of the SLAs ICT has to deliver towards its clients. Figure 5 **Error! Reference source not found.** illustrates this graphically.

As stated in the previous paragraph on ICT Governance the SLA plan is the outcome in the adapted BSC. How the investment or disinvestments in resources and modules should generate the capabilities to be able to come to this output is part of the steering plan for ICT.

### ***Limitations on ICT***

Despite the ubiquitous presence of information technology tools, ranging from BP tools, workflows, programming languages, database management systems... organizations and business users are still confronted with lots of difficulties in automating their processes, just think about the number of projects failing to stay within time and / or budget.

Lots of effort has been put in trying to capture the richness of the business landscape into ICT artefacts, we mention for instance ERP packages, IBM's San Francisco project, EDI, XML... and still business users are confronted with very limited reuse of very expensive ICT artefacts. This leads us to the question why ICT is still not able to fulfil business needs.

Crucial to the correct working of the automated processes is the correctness, the availability and the quality of the information these processes operate on. This information is fetched and stored in databases, which get accessed through programs developed aligned with the application architecture and which are stored on the hardware platforms as defined in the infrastructure architecture. From this point of view, it is the database that contains the information the processes rely on. Hence, the database, enriched with programming logic, dictates how information is stored and what the semantics of the information are.

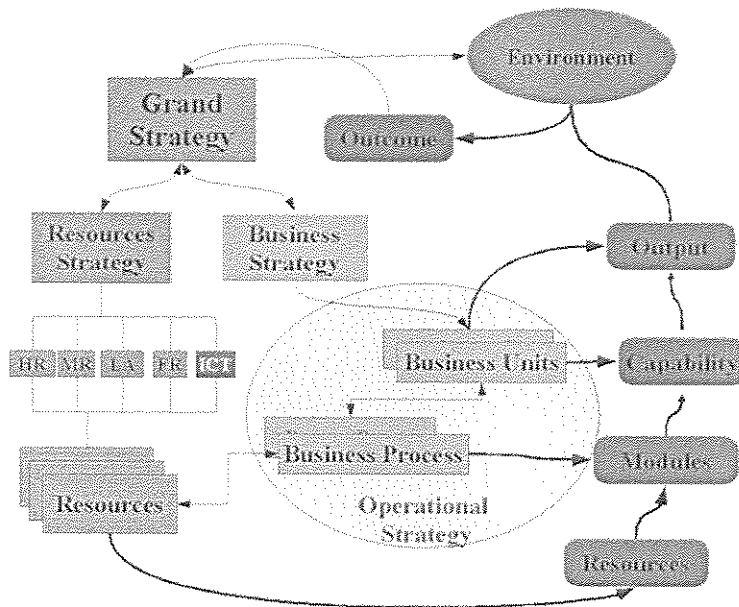


Figure 6: Relationship between different strategy levels

Semantics of information are deduced from business requirements gathering and are for instance described through the use of “Use Cases”. Afterwards these requirements are translated into programming language and database artefacts. This means that the full richness of the business problem at hand has to be written down in programming language and database constructs. The expressiveness of programming languages and databases however is much lower than the expressiveness of natural languages. Furthermore, the relations between software artefacts, be it objects in an object oriented language, tables in a database or the relations to map the objects to the database are not flexible. So it takes a lot of development and testing effort to change relations between software artefacts. This has as a consequence that if for instance a relation between software artefacts is misconceived in the gathering of the requirements, or the relation has to change due to a change in the business process or due to external circumstances (for instance a changing legislation) the database, the access logic to the database and possibly the presentation logic has (partially) to be redeveloped and retested.

As an example we describe what happened in a rather small but business wise significant project. The original project was estimated to be two hundred man-days and was to be delivered within 3 months. In the requirements gathering it was stated and confirmed by the business user that there was “one national representative organisation per country”. In ICT terminology this means that there was a one to one relation between the national representative and a country.

The application was built according to this requirement. During development of the questionnaire, an essential part of the application, where the requirements stated that next to a general list of questions, each national representative organisation had to be able to add specific questions it was discovered that the relation between the national representative organisations and countries was many to many, meaning that one national representative organisation could be responsible for more than one country and that in one country there could be more than one national representative organisation.

The impact on the application was enormous; the total effort due to the misconception of this relation was approximately 20 man-days, being 10% of the initial estimated effort. Even more unfortunately, there was no time to do the necessary changes and an emergency solution was put in place. This emergency solution solved the problem technically but ruined the possible reuse of parts of the application due to the application specific interpretation that was given to certain data in the database.

## BUSINESS INTEGRATION'S IMPACT ON ENTERPRISE ARCHITECTURE

Figure 6Error! Reference source not found. gives an overview of the relationships between the different levels of strategy. The Grand Strategy determines the Business Strategy and defines the principles of the Resources Strategy. ICT is part of the Resources strategy. If the Grand Strategy states that synergy with other companies has to be sought, then a principle for ICT may be to conceive an architecture based on open standards or a Service Oriented Architecture.

Business people and Resources delegates meet each other in the Interdisciplinary Forum, where the Operational Strategy is defined. Business processes are designed to achieve the goals (effectiveness) with the most optimal use of resources (efficiency).

Business integration is about the cooperation of two or more entities acting as a single unit to obtain a certain goal. If for each involved entity the model, as described in the previous paragraph is used, decisions must be taken on the level of integration of business strategy, resource strategy and Enterprise Architecture. The possible levels of integration, looked upon from a strategy perspective, are described in the following paragraphs.

### Strategy Integration

By the term "Strategy Integration" is meant the deduction of a common Business Strategy BS(AB) based on the Grand Strategy of two participants A and B together with a common Resource Strategy RS(AB).

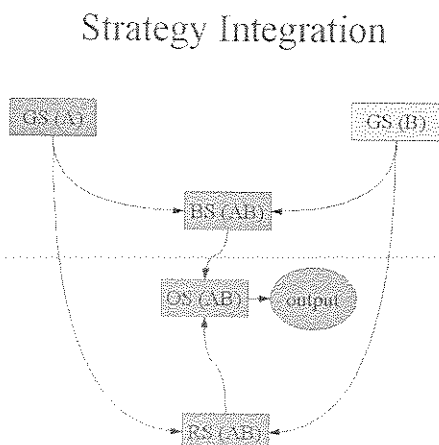


Figure 7: Strategy Integration

We do not further consider the case for Strategy Integration for it means that everything is integrated. The impact on the Enterprise Architecture in this case is that the respective

individual Enterprise Architectures cease to exist and merge into a common Enterprise Architecture AB.

### Strategic Integration

#### Strategic Integration

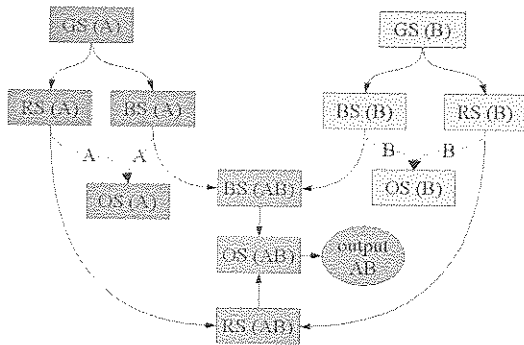


Figure 8: Strategic Integration

If the common interest of two or more parties is of such a strategic importance that one or more business processes are integrated and possibly business units are integrated, the term Strategic Integration is used. Its main characteristics are the set up of a common Business and Resource Strategy, next to the individual Business and Resource Strategies of the involved parties. The impact of this kind of integration on Enterprise Architecture is that for the integration purposes a common SLA and Steering Committee is formed which will exist for the duration of the integration effort. Parts of the Business Strategy and Resource Strategy of as well A as B are separated from A and B and put in the common Business and Resource Strategy of A and B. This has as implication that also part of the SLAs of A and B are split of in a common SLA for A and B.

### Operational Integration

#### Operational Integration

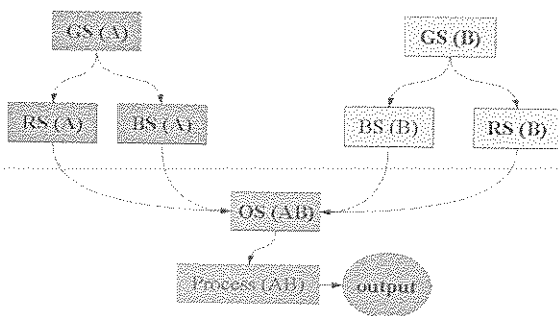


Figure 9: Operational Integration

Within Operational Integration, no common Business and Resource Strategy is set up. From the respective individual Business and Resource Strategies of A and B, a common Operational Strategy is deduced. For the Enterprise Architecture this means that again the

respective individual Enterprise Architectures of the individual involved parties are conserved, however, in contrast to the case of Strategic Integration, no common SLAs are defined and no common Steering Committee is formed. This has as implication that part of the SLAs for as well A as B contains SLAs for A and B. The same goes for the Steering Plan.

## Operative Integration

### Operative Integration

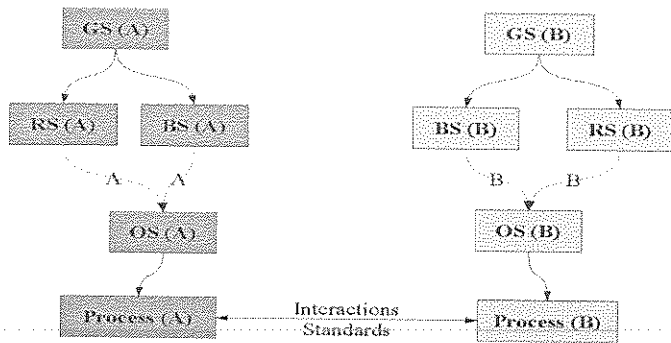


Figure 10: Operative Integration

Operative Integration is, looked upon from a strategic point of view, the weakest of the possible forms of integration. In this case, no common Business Strategy, no common Resource Strategy and even no common Operational Strategy are formed. The impact on Enterprise Architecture is that for the realisation of the integration merely interaction standards between business processes have to be defined. For these purposes, no SLA or Steering Plan has to be defined, a merely commercial contract between two or more parties is sufficient.

It is very useful to take another view (see Figure 11 [Error! Reference source not found.](#)) on these different possible forms of integration, based on the adaptation of the Balanced Scorecard of Kaplan and Norton (1996) to non-commercial organisations as described by Rabaey (2005).

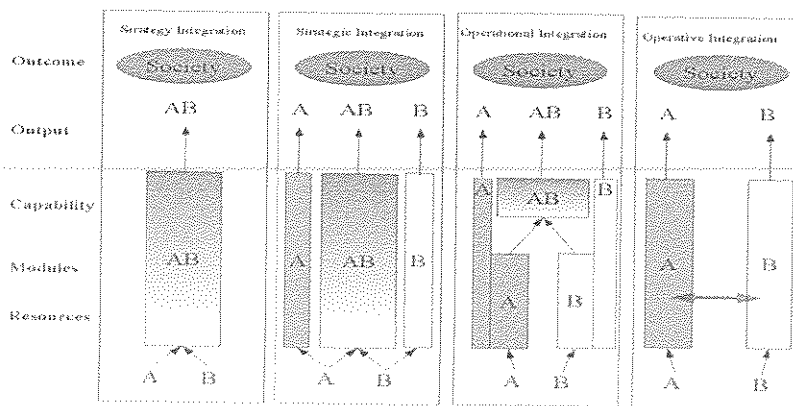


Figure 11: Balanced Scorecard Extension: Capability Generation

For what concerns the set up of the resource strategy for Enterprise Architecture, 5 key management mechanisms have been defined by Ross (2004):

- Clear Statement of ICT Architecture guiding principles
- The writing of business cases for architecture investments (see the case description for BIRB in the next paragraph)
- The forming of an IT Steering Committee
- A one page graphic depicting the high-level architecture
- A technology research and adoption process enabling project architects to align with the Enterprise Architecture

## **CASE: BIRB**

### ***The company***

Within the framework of the agriculture policy of the European Union, the Belgian Office of Intervention and Refunds (BIRB) is a federal agency, which is charged with Interventions, Refunds and Support Measures payments of financial subsidies to economic organisations that are not producers. The tasks of BIRB are:

Payment of Refunds: A refund is a subsidy when agricultural products are exported outside the European Union (EU).

Issue of certificates: A certificate is a document needed for import and export of agricultural products.

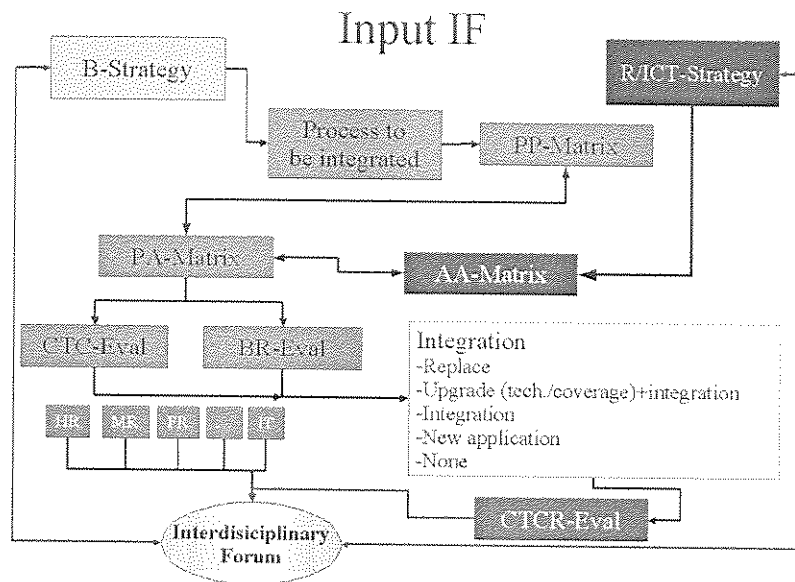
Management of intervention measures: An intervention can be a direct purchase or direct support of storage of surpluses

Management of support measures: Support for production, treatment and market promotion of agricultural products

BIRB's business partners are manifold and have very heterogeneous ICT-systems. Regarding business integration, at the strategic integration level, BIRB hosts common applications. Next to these strategic integrations, BIRB has a case for operational integration; however most of the cases are based on operative integration. It is BIRB's strategy to integrate its processes with its partners' processes in order to provide a better service.

### ***Free Food Distribution***

Free Food Distribution (FFD) is an instrument of social aid of the European Union. The surplus of agricultural raw produce is transformed into food, which is freely distributed to people in (social) distress.



**Figure 12: Cross Border Business Integration**

The policy of BIRB is make every process as paperless as possible (Grand Strategy) and as a consequence to make every process web-based (Resources Strategy). The Free Food Distribution (FFD) has been chosen to be the pilot project to implement the e-Government policy of the BIRB, because it is quite independent from other processes but has the greatest amount of clients.

The first interdisciplinary forum session had as result that to change the manual FFD processes into an “e-Government process” (as paperless and web-based as possible), a Business Process Re-engineering (BPR) (Hammer et al. 1993) had to be performed. A list of possible solutions was presented to the Director-general, who decided on the scenario to be implemented.

Since the process should be almost paperless and web-based, a further business analysis is being performed together with the ICT department and using CAF, before the next interdisciplinary forum session. The chosen solution is based on Service-Oriented Architecture (SOA) and Business Process Execution Language for Web Services (BPEL or BPEL4WS). In what follows, the used evaluation technique is discussed.

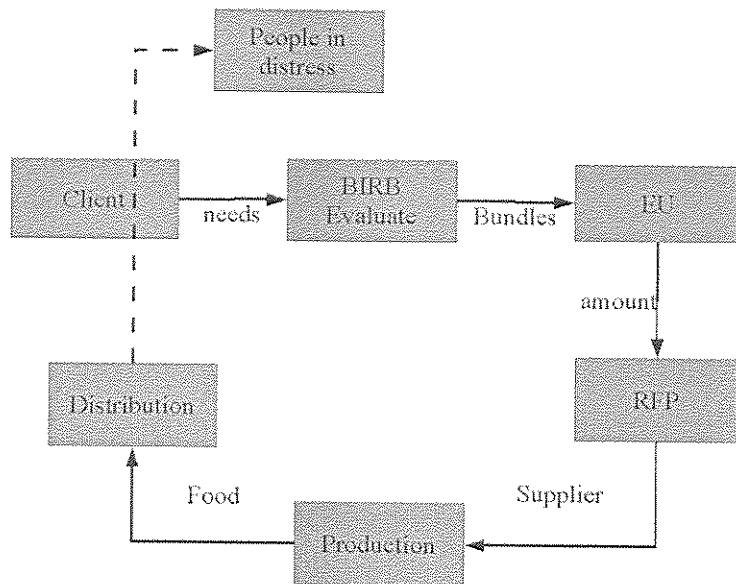
### ***Cross Border Business Integration***

Cross Border Business Integration (XBI) is an extension of an Enterprise Application Integration (EAI) evaluation framework as is discussed in detail in Rabaey et al. (2005a).

The integration of processes may also affect other processes. All the processes are catalogued in the Process-Process Matrix (PP-matrix in Figure 12) where the relationships between the processes are described (supporting, collaborative, etc.). Most of the processes are supported by ICT-applications (noted in Process-Application Matrix (PA-Matrix). The



interconnection of applications is mapped in the Application-Application



**Figure 13: Process Flow Free Food Distribution**

Matrix (AA-Matrix: file transfer, web services, API, and so on). The PP, PA and AA matrices are an implementation of the city map as discussed in the paragraph on Enterprise Architecture's role.

When the consequences of the business integration or EAI are known, three evaluations take place. The first two evaluations are a CTC-Eval (Cost-Technical-Coverage Evaluation) and a BR-Eval (Business-Resources Evaluation: detection of Core Business Processes and/or Resources processes). The result of both evaluations indicates which actions should be undertaken. Possible actions are the replacement or upgrade of an application, the integration of one or more applications, the deployment of new applications or no action has to be undertaken. During the third evaluation (CTCR-Eval: Cost-Technical-Coverage-Risk Evaluation) all possible solutions are discussed. The Interdisciplinary Forum in turn evaluates these alternatives in a broader context.

In the case of the BIRB, the introduction of SOA to enable a BPEL implementation of the Free Food Distribution had a lot of impact on the existing architecture and on the culture at BIRB. Since the investment decision making process is characterised by uncertainty and incomplete knowledge, the real options approach was used.

The need for EAI rises from the technical side or from the business side of the organisation, which is also the case for Cross Border Business Integration. Until now we have discussed the business approach to EAI. The business needs find their origin in a change in the business or grand strategy, in business integration or in business process reengineering (BPR).

Resource-strategy driven EAI/XBI may be due to a change in the resources or grand strategy, efficiency issues (better use of resources), systems that may be technically obsolete or the introduction of new technology. In many cases, ICT is at the base of resource-strategy driven EAI/XBI.

In the latter approach, the evaluation will start with the Application-Application matrix. Via the Process-Application matrix the involved processes are detected. Then the influence on other processes is determined through the Process-Process matrix. It may occur that the business strategy has to be reviewed because of new, possible business opportunities due to the new technology or due to another use of technology.

Once approved by the people responsible for the business (or even grand) strategy, the evaluation of EAI/XBI will follow the same path as the business-driven EAI/XBI. With both approaches a Business/Resources evaluation is guaranteed. The case of FFD was a business-driven XBI. The kind of integration is mentioned between brackets. Figure 13 **Error! Reference source not found.** shows a summary of the phases in the FFD process.

The clients (social aid organisations) express their needs via the portal (operational). These needs are evaluated and bundled in a global demand of Belgium to the European Commission. The official amount of exchange is sent back to FFD. An external party handles (operative) the requests for proposal (RFP). As a result, the list of the suppliers with their respective orders is returned.

In the production phase, FFD collaborates with the suppliers, controllers (operative) and silo-managers (operational). The produced food is delivered to depots of Defence (Strategic), where the clients get the food (operational) and distribute it to the people in distress. So, all types of integration were present and were evaluated with the XBI-method.

### ***Steering plan ICT***

In the proposal of Rabaey et al. (2004) the aggregation of all ICT-SLAs formed the steering plan. However by performing the IF with the Free Food Distribution, the impact of Service Oriented Architecture (SOA) on ICT-infrastructure could not be evaluated. Therefore two more plans were added: SLA-plan and RAA-plan. The optimization of the use of ICT-resources in the additional plans enabled the creation of business cases for ICT-infrastructure or global ICT-services.

### ***Other issues***

Before the Business process re-engineering (BPR), only the activities inside BIRB were automated. Due to its interdisciplinary nature, the Interdisciplinary Forum proposed that all processes of FFD should be assessed and supported from the beginning the process (the expression of the needs) until the end (satisfaction of the needs) and not only the own BIRB-activities.

The result of this statement was that each actor in the process was consulted and that his or her environment (social and cultural) was taken into account. In this way, no hostile intrusion in the way of working (integration) of the external partners or actors was felt.

Originally three directors were concerned with FFD. After the BPR, one process-owner was dedicated to manage the processes of FFD (horizontally). The concerned directors give input from their domain (vertically) to the process-owner. Before the BPR, the introduction of a matrix-organisation was never accepted. Due to the Interdisciplinary Forum, every problem of FFD was discussed in a transparent way, which brought the "common sense" at the surface.

## SUMMARY

In this chapter a holistic approach for business integration has been introduced with a strong emphasis on the alignment of ICT capabilities with the required business integration. The impact of business integration on Enterprise architecture was discussed along various integration scenarios. An extended and adapted version of the Balanced Scorecard for non-commercial organisations was introduced to define a general integration framework. The set up of the Interdisciplinary Forum, key to successful business integration, has been thoroughly tested in a real life case within the Belgian Intervention and Restitution Bureau (BIRB) a case which has led to improvements in our original view of the working of the Interdisciplinary Forum.

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