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## ***Redefining business – IT alignment through a unified framework***

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# **Redefining business – IT alignment through a unified framework**

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**ABSTRACT:** Even fervent adherents of business – IT alignment admit that the concept is not at all unambiguous, that no serious attempts have been made to make the concept more tangible and hence that it is questionable whether alignment in its actual meaning is viable or even makes a difference in an organisation's performance over time. This papers redefines the concept by positioning it in a unified framework. This framework is derived form the generic framework for information management and the integrated architecture framework. This paper aims at providing for the foundation for further research into the concept of alignment as a real tool for management and design.

**KEY WORDS AND PHRASES:** strategic alignment, architecture, information management

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## 1. Introduction

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‘Alignment’ is a leading principle both for research programs and for practical methods dealing with the business – IT relationship. Time after time, alignment is designated as the management instrument par excellence for business managers and information managers alike:

*“The company's 11th Annual Critical Issues of Information Systems Management Study revealed that 72 percent of the 594 information technology executives polled ranked "Aligning I/T and Corporate Goals" as their top concern. This urgent message was underscored by the fact that this is the fourth consecutive year the alignment of corporations' business strategies and I/T priorities was rated as the top challenge.”* (Computer Sciences Corporation, [http://www.csc.com/about/news\\_stories/19981118\\_b.html](http://www.csc.com/about/news_stories/19981118_b.html))

However, even fervent adherents of business – IT alignment admit that the concept is not at all unambiguous, that no serious attempts have been made to make the concept more tangible and hence that it is questionable whether alignment in its actual meaning is viable or even makes a difference in an organisation’s performance over time.

The overall purpose of this paper is to re-assess business – IT alignment (in short: alignment) by repositioning it in a unified framework. We strongly believe that this re-assessment is vital for any further elaboration of alignment as a useful and implementable tool for 21st century organisations.

We will give a short overview and a critique of alignment respectively in the paragraphs 2 and 3. The *overall approach* taken, explained in paragraph 4, is that we redefine alignment as a combined management and design issue; therefore, we look for a unified framework for the business – IT relationship. This involves presenting two frameworks, the generic framework for information management in paragraph 5 and the integrated architecture framework (IAF) in paragraph 6. By comparing these two frameworks, we are able to derive the contour of the unified framework in paragraph 7. Subsequently, in paragraph 8, we define alignment as a combined management/design concept. The *overall intention* of this paper is to deliver the foundations for further research in the elaboration of the alignment concept as a real tool for management and design. This endeavour is discussed in paragraph 9.

## 2. Business – IT alignment

Already seven years ago, Henderson and Venkatraman (1993) proposed a seminal model for business – IT alignment; it was intended to support the integration of information technology (IT) into business strategy by advocating alignment between and within four domains (see fig. 1). The inter-domain alignment is pursued along two dimensions: *strategic fit* (between the external and internal domain) and *functional integration* (between the business domain and the IT domain). The objective of this model was to provide a way to align information technology with business objectives in order to realise value from IT investments. The authors argued that the potential strategic impact of information technology requires both “*an understanding of the critical components of IT strategy and its role in supporting and shaping business strategy decisions*” and “*a process of continuous adaptation and change*”. Hence, they presented a model “*that defines the range of strategic choices facing managers*” (Henderson and Venkatraman, 1993, p.5).

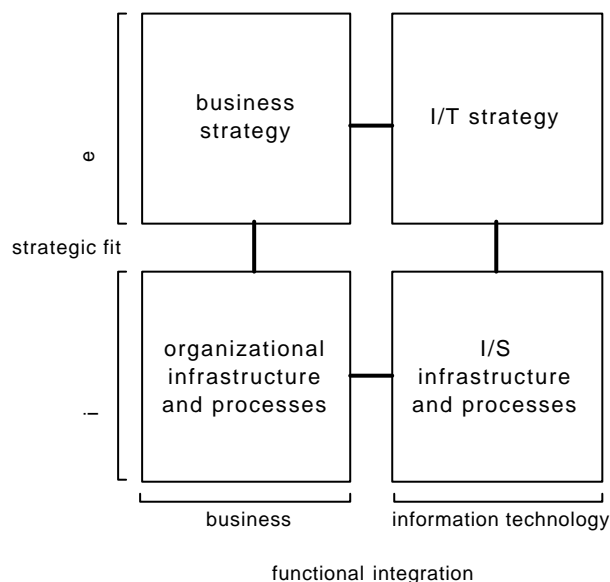


Figure 1 The overall alignment model

Almost all later models and consulting practices in alignment start from this original model. Two elaborations are of interest, given the attention paid to them in the literature (see, e.g., Luftman 1996).

Luftman et al. (1996) refined the model by elaborating on the critical management issues inside the domains.

The authors argue that the external strategy dimension is dealing with:

1. *scope*, defining the choice for (a) certain market segment(s),
2. *core-competencies* that contribute to the chosen strategy,

3. *governance*, the selection and use of inter-organisational relationships to obtain certain competencies;

the internal dimension is concerned with issues regarding:

1. *work processes* needed for operations,
2. the acquisition, training and development of *skills* required to manage and operate the processes,
3. an “administrative” business *infrastructure* / *IT architecture*.

Luftman (1993) aimed at transforming the model into a management tool by introducing four governing alignment perspectives. These perspectives are visualised by means of triangles drawn up by the anchor, pivot and impacted domain (see fig. 2); they induce approaches that are most appropriate to transform an enterprise in a given situation. In each of these approaches, different methods, different roles for business and IT management and different performance criteria exist.

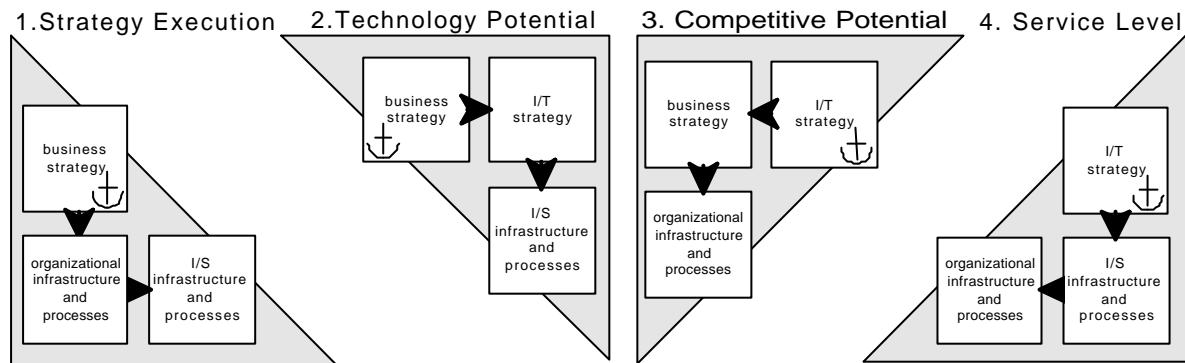


Figure 2 Four alignment perspectives

The overall conclusion is that the original Henderson & Venkatraman model, extended by both elaborations of Luftman, is still the unchallenged model for business – IT alignment. Most current research is focussing on the underpinning of the positive impact of alignment on overall business performance.

### 3. A short critique on the current interpretations of alignment

Various alternative terms exist to refer to the phenomenon of alignment:

- *balance* (Henderson and Venkatraman, 1993),
- *coordination* (Lederer and Mendelow, 1986),
- *fit* (Venkatraman, 1989),
- *linkage* (Reich and Benbasat, 1993),
- *harmony* (Woolfe, 1993).

These terms all assume to refer to one and the same phenomenon, though their actual use does not contribute to its clarification. What's more, they are a clear indication of the confusion and even misunderstanding that exist regarding the very concept of alignment and its goal. Here, we confine ourselves to a summary of the main critiques on alignment; a full account can be found in Maes, Dirksen & Truijens (2000).

### **Equivocal or tautological definitions**

In general, alignment is defined in an indefinite and vague way, if at all! Many publications simply avoid any pinning down of the concept, or fall back to tautological definitions. Luftman et al., e.g., define alignment as “the extent to which the IS strategy supports, and is supported by, the business strategy” (Luftman, et al., 1993, p.204). This indefiniteness is continuously repeated with only slight alterations. Two examples: alignment is defined as “the alignment of information systems strategy with business strategy” (Tallon and Kraemer, 1998, p.2) and as “the degree to which the information technology mission, objectives and plans support and are supported by the business mission, objectives and plans” (Reich and Benbasat, 1998, p.4).

### **Contradictory interpretations**

Apart from (or, due to) its vague definition, alignment is quite often interpreted in contradictory ways. A striking example is whether it should be interpreted as a (final or temporary) outcome, or as a process leading to this outcome. Broadbent and Weill (1993) and Barclay (1997), e.g., argue in favour of the first interpretation, where Burn (1997) views alignment as a process, underlining the fact that “alignment is not a one time activity but a constant balancing act between a lead or lag strategy” (Burn, 1997, p.85). The first category of authors are by far in the majority, as a result of which the need to maintain alignment dynamically is only sporadically acknowledged (Coakley, et al., 1996, Gunn, 1997).

Similar contradictions can be found regarding the focus of alignment. Henderson and Thomas (1992), e.g., acknowledge that “... alignment means much more than the linking of information technology and business strategy (...) Fitting the technology, structures, processes, and skills to match this integration is also critical for success” (Henderson and Thomas, 1992, p.72). This interpretation is in line with the original alignment model. Many other authors, however, explicitly perceive alignment as the business – IT fit at the strategy level only (see, e.g., Barclay et al., 1997).

### **Theoretical concept without sufficient practical elucidation**

All publications are rather vague in terms of 'how to practice alignment', apart from some simple rules of thumb (Luftman, 1996). Besides, many authors (e.g. Coakley, et al., 1996 and Ciborra, 1997) question the measurability of the degree of alignment: if we are not able to measure alignment, then what conclusions can be drawn regarding its effectiveness?

The greater part of the alignment discipline further disregards the notion of context dependency. Real-life organisations, however, with differing organisational structures and business processes and operating in differing environments, are most likely to require different approaches to alignment. There is not 'one design fits all contexts' in alignment. (Brown and Magill, 1998 and Ciborra, 1997).

The role of human actors in alignment is not sufficiently acknowledged. This lack of attention for the social dimension (as elucidated by Reich and Benbasat, 1998) too often results in the interpretation of alignment as merely developing IT strategy and designing infrastructures, meanwhile totally ignoring 'organisational learning' (Ciborra). Moreover, adherents of alignment too easily assume that the management is in full control of the situation and that, e.g., the information infrastructure can deliberately be aligned with emerging management insights (Ciborra and Hanseth, 1998).

### **Conclusions**

The critique on the alignment concept is serious and basically of a twofold nature: alignment is not clearly defined and offers no handles for (management) practice. The foregoing tour d'horizon, further elaborated in Maes, Dirksen and Truijens (2000), makes clear that the actual state-of-the-art of alignment requires further refinement and adjustment. Any further attempt to enhance (in fact: to install) alignment as a practical tool should at least take the following into consideration:

- It should start from an unequivocal definition of alignment
- It should consider alignment as a dynamic process
- It should consider alignment at different levels, ranging from strategy to implementation
- It should attempt at measurability
- It should take the relevant business and technological contexts into account
- It should pay clear attention to the human factors
- It should be well balanced, taking the practical restrictions of management seriously; no component, not even strategy, is by definition leading.

#### 4. The need for a unified framework

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Alignment is a concept aiming at the effective exploitation of IT in an organisation, at the effective enabling (and not disabling) of the organisation by IT. According to Checkland and Holwell (1998), transforming a concept into a practical method implies a declared-in-advance framework of ideas, “a framework in terms of which what constitutes ‘knowledge’ about the situation researched will be defined and expressed” (figure taken from Checkland and Holwell, 1998, p. 22).

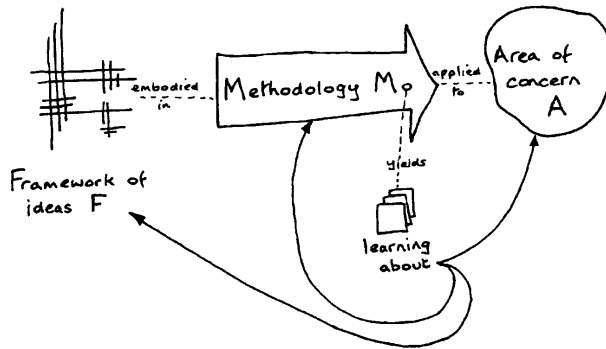


Figure 3 Framework - method - area of concern

The subsequent research, directed at the development of a practical method, “might lead to the framework being modified, or, in an extreme case, abandoned; but without a declared-in-advance epistemological framework it is sometimes difficult to distinguish researching from novel writing” (ibid., p. 23).

Exploitation of IT in an organisation implies both strategic positioning and operational implementation. Any attempt at transforming the concept of alignment into a practical method will therefore need a reference framework incorporating strategic and implementational perspectives. As far as we know, no such framework exists. In order to develop an overall framework, we start from an existing framework for information management (Maes, 1999) and from the Integrated Architecture Framework (Goedvolk, 1999). These frameworks are different in scope, but complementary in nature. In what follows, we shortly present both frameworks and then dwell upon the elaboration of a unified framework for the positioning of alignment.

#### 5. The generic framework for information management

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The generic framework for information management (Maes, 1999) is in itself an elaboration of the alignment model as proposed by Henderson and Venkatraman (1993) (see fig. 1). This generic framework is used to define the concept of information management and to position its different

components. However, the business – IT relationship is key to information management in any modern organisation; the generic framework is consequently supposed to deal with the quintessence of the business – IT relationship as well.

### **Deriving the framework**

The internal domain of Henderson and Venkatraman's model deals with choices regarding organisational and technological *infrastructure* and *processes*. This designation is rather half-hearted. Hence, a first extension of the model is that the single internal domain can be split up in a structural level and an operational level. We state that the business – IT relationship is not only a question of *strategic*, but equally well of *structural* and *operational* correspondences. The resulting middle row plays a central role in managing and designing modern organisations: it represents the structural components/variables, in particular the deeply rooted competencies and infrastructures of the organisation. Designing and managing this organisational structure is above all an architectural issue: the combined contribution of business, information and technology architects is key to the long term health of present-day organisations, where the external disturbances and the resulting operational adjustments are increasingly governed by short term requirements.

The horizontal dimension in Henderson and Venkatraman's model states that there is a *direct* mutual influence of business and IT. They further assume that the strategic level is predominant and gives direction to the overall relationship. However, the business – IT relationship appears to be much more complex than could be derived from this model; it involves, a.o. others, cultural, political, financial and semantic aspects, as has been put forward in Maes (1999). It is appropriate to state that the *use* and the internal and external *sharing* of information and not its *provision* are of strategic nature. The crossroad of the newly introduced column and row, i.e. the architecture of the information/communication/knowledge infrastructure is at the heart of any modern organisation. Consequently, we introduce a middle column in the model of Henderson and Venkatraman, representing the internal and external information and communication aspects.

The resulting (and final) model for the business – IT relationship is represented in figure 3:

Redefining business – IT alignment through a unified framework

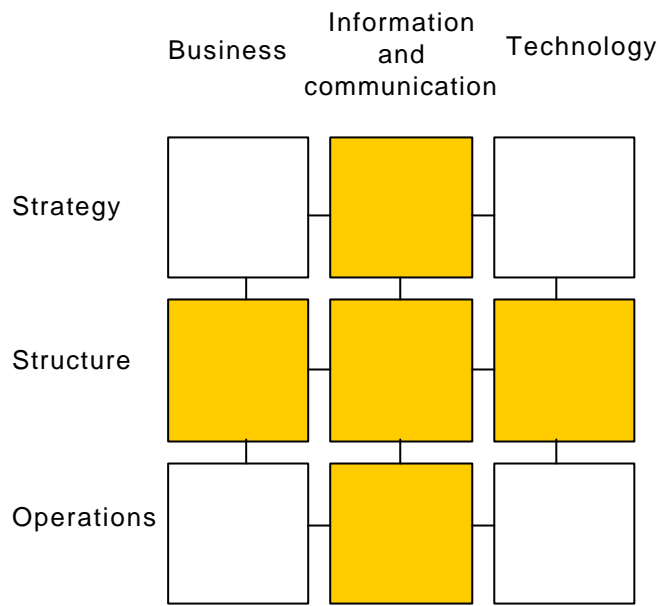


Figure 4 A generic framework for the business - IT relationship

## **Interpretations**

From right to left, the horizontal axis of this figure schematically represents the *providing* technology, systems and databases (right column), the *interpreting* information, communication and knowledge (sharing) processes (middle column) and the *utilisation* as business expertise (left column) of the information processing spectrum.

The introduction of IT can be interpreted as the introduction of a new *syntax* in the internal and external information/communication of an organisation. This linguistic interpretation leads to the conclusion that the left-hand business column of the foregoing figure represents the *pragmatic* application aspect and hence that the middle column can be interpreted as the *semantic* component, dealing with the meaning of the business – IT dialogue.

It becomes clear, in our opinion, that the central information/communication column plays a vital role in making sense of IT in organisations. Its continuous disregard is at the very basis of the poor business – IT dialogue: the new language needs a semantic underpinning, as can evidently be ascertained in the common discussions between business people and their information systems department's counterparts.

The generic framework gives a clear indication of the *issues* to be considered at the different levels. In Maes (1999), it is argued that the strategy level deals with decisions regarding scope, core capabilities and governance. The structure level is basically concerned with architecture and capabilities, the operational level with processes and skills. It also becomes clear that at each level and for each column, different *roles* can be derived. A very central overall role has to do with the middle row, where business architects, information/communication architects and technology/implementation architects deal with the structural, permanent components of the organisation.

Further interpretations and extensions of this generic model for the business – IT relationship are given in Maes (1999). Its value as a reference model for *managing* and *designing* this relationship is the subject of an ongoing Ph.D. project.

## **Illustration of the framework**

The actual value of the generic framework for positioning business – IT issues can be illustrated as follows.

A large Dutch governmental agency started some five years ago a strategic repositioning process. The outcome (to be situated in the business/strategy component of the framework) was that the agency had

to define and treat its (business) relationships as customers, fully supporting their competitiveness and inviting them to deliberately comply with the requirements of the government. At the same time and purely coincidentally, a thorough reconsideration of their existing information platforms and systems (to be situated in the technology/operations component) was undertaken.

The outcome of the strategic re-orientation was that the organisational structure (formerly based on geographical grounds and internally organised according to professional expertise) had to be changed; this relates to the business/structure component in the enneahedron of Figure 4. The resulting multi-professional teams introduced new account management, working principles etc. (business/operations component). The basic decision taken in the IS-project was that the tremendous amount of paper work had to be included in any new approach (to be situated in the technology/strategy component). A new technological architecture (technology/structure component) emerged, enabling the integrated treatment of data formerly entered via paper documents.

What gradually became clear, was that both projects were heavily interrelated and that the central issue of this interrelationship had to do with the integrated customer profile (situated in the central information-communication/structure component of the framework). What became clear, in fact, was that the information/communication column of the framework was completely omitted from both projects and hence that the information-communication strategy was key to any further successful endeavour. Considering this from the very beginning would have brought both projects organically together; considering the information/knowledge/communication architecture as *the pivot* of the transformation process would have omitted many of the pitfalls the organisation is still suffering from today. This very architecture is not a dependent variable, yet a leading component in any substantial transformation of present-day organisations. The framework is a valuable instrument to interrelate the different parts of such an all-encompassing transformation.

## **Conclusion**

The generic framework has proven to be a valuable frame of reference for the business – IT relationship. The middle column and, to a less extent, the middle row have suffered from a lack of interest; in fact, they have been considered (and are still considered by many) as dependent variables, to be derived from the combination of the adjacent columns or rows. We strongly believe that the intermediate “structure” row and “information/knowledge/communication” column are key to a successful alignment of business and IT and hence that they should be considered as independent variables in their own right. Their calibration is an architectural issue, not a managerial one.

## 6. The Integrated Architecture Framework

The Integrated Architecture Framework (IAF) of Cap Gemini is aimed to support the integrated architectural design of business and IT. Architectural design plays a key role in the alignment of business and IT. Figure 5 depicts the role of Architectural Design and IAF in the transformation of business and IT. The transformation starts with the development of a business vision and IT vision of the new IT enabled enterprise. These visions are aligned through an integrated architectural design of the business and IT system based on IAF. Subsequently, the architectural design is input for the business and IT transformation that results in a new IT enabled enterprise.

The alignment of the business and IT vision through the architectural design goes further than only a simple supporting role for IT in the existing business processes. IT is also used in an innovative way as enabler for renewed or even totally new business. This new IT enabled enterprise will show new forms of organisation, new business processes, new products, new services and new channels and relationships to the customer, which are only possible by designing the business and the supporting IT systems as one co-operating whole.

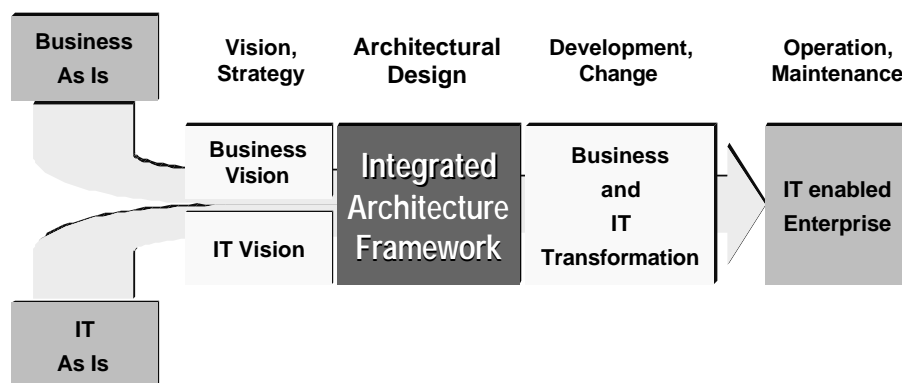


Figure 5 The Role of the Integrated Architecture Framework

### Introducing the framework

The Integrated Architecture Framework supports the creation of a complete integrated architectural description of the IT enabled Enterprise. Therefore, the IAF has three dimensions that relate to the systems of which an IT-enabled Enterprise is comprised and the products and views of the architectural description.

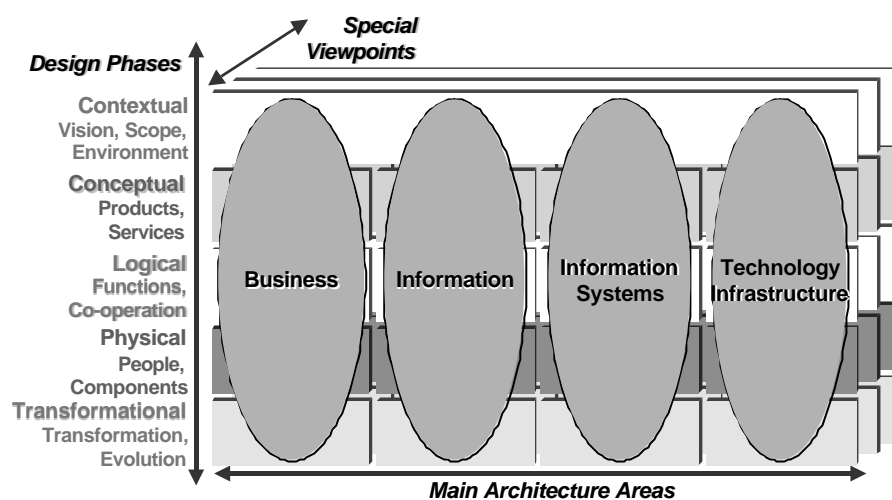


Figure 6 The Integrated Architecture Framework (IAF)

The horizontal dimension concerns the four *main architecture areas*: *Business Processes*, *Information provision system* (including knowledge), (automated) *Information Systems* and the *Technology Infrastructure*

The vertical dimension concerns the five *design phases* that are supported by the architectural description. Each design phase contains a part of the architectural description of the systems in the four architecture areas.

The third dimension is comprised of *specific architectural viewpoints* that need a holistic approach concerning all main architecture areas. An example is the security viewpoint.

### Main architecture areas

The *Business processes* consist of communicating and collaborating people in the role of employee, and of organisational units such as teams or departments. The business processes are organised as one or more supply chains of individuals, organisational units and companies working together in delivering products or services to the customers. The environment of a company is seen as network connecting the company with customers, suppliers and third parties.

Information and knowledge are vital enablers of the business. The people in the business processes are supported by an *Information provision system* formed by people and organisational units in specific information and knowledge oriented roles such as information provider, information user and information manager. The same people and units that already have a business role in the business processes may perform these information roles. The information provision enables the business by supporting the creation, processing, exchange, storage and use of information and knowledge. The Information provision in fact acts as the collective memory and frame of reference of the organisation.

Business Processes and Information Provision System form together the *Business System* of the enterprise.

The *information systems* encompass a network of communicating and co-operating software components that deliver IS (automated) services to the people that have a business role and/or information role in the business system. These automated services enable the communication and control in the business processes, and the creation, processing, exchange, storage and use of information and knowledge in the information provision. The technology infrastructure is seen as a network of communicating and co-operating hardware devices and system software and middleware. The Technology Infrastructure (TI) delivers processing, communication and storage capabilities to the information systems and human/computer interfaces to the people in the business system.

The information systems and the technology infrastructure form together the *IT System* of the enterprise

### **The design phases**

The *contextual* phase describes the mission and strategy of the enterprise, the role of the enterprise in the environment and the scope of the transformation of the business. This information is also used to determine the role of the information and infrastructure and the scope of the transformation of these systems.

The *conceptual* phase designs for the four architecture areas respectively:

- the products and services that the business processes within the scope deliver.
- the information services that the information provision delivers in support of the business processes.
- the automated IS services that the information systems deliver in support of the business processes and the information provision.
- the infrastructure services that the technology infrastructure delivers to the information systems.

The *logical* phase designs the operation and structure of the business processes, the information provision, the information systems and the technology infrastructure. This is the most creative phase, because here the business system is designed as a collaboration of roles and the IT system as a co-operation of functions. The interaction of the systems with other systems in their environment is also designed.

The *physical* phase answers the question who (type of person) performs the roles in the designed business system or what (type of software or hardware) performs the functions in the designed information system and technology infrastructure.

The *transformational* phase designs the stages in transformation of the business system and the migration of the IT systems.

## 7. Towards a unified framework for business – IT alignment

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The correspondence between the two frameworks presented is striking; in many ways, they are complementary. The main difference is determined by the overall purpose of both frameworks: the generic framework for information management is above all a tool for *management*, enabling to position and interrelate the different aspects of information management and hence of the business – IT relationship. The Integrated Architecture Framework, on the contrary, is a *design* tool, aiming at the development of mutually aligned business and IT systems through a unified architecture.

This general deliberation leads to the following more detailed points of comparison:

- The differences between the columns of both frameworks are twofold, yet of minor importance:
  - the technology column of the generic framework is split up in an information systems column, representing the more volatile software components, and a technology infrastructure, representing the more stable hardware and system software annex middleware
  - the differences between the information/communication column of the generic framework and the information column of the IAF can be brought back to slightly diverging interpretations and wordings: both represent the *information handling* capabilities of the organisation.
- The differences between the rows of both frameworks are more substantial, but mainly due to their divergent purposes:
  - the rows of the generic framework represent different levels of management attention; those of the IAF, on the contrary, represent phases of the design process. However, these “phases” basically depict various levels of description of the combined business – IT system-to-be, similar to the levels of abstraction of Zachman’s Information System’s Architecture (Zachman, 1987)

## Redefining business – IT alignment through a unified framework

- the contextual phase of the IAF coincides with the strategy level of the generic framework; the subsequent phases, however, all deal with phases and levels of description having to do with the design and (re)configuration of the business and IT system of an organisation. The latter can be considered as elaborations of the structure level of the generic framework, with the exception of the transformational phase, which describes the prescriptions for the development, implementation and operations of the information system and hence can be considered as the transition between the structure level and the operations level of the information management framework. The operational level of the generic framework itself is not tackled by the IAF approach.

The conclusions of this short yet elucidating comparison are substantial:

1. Any unified framework for modelling the business – IT relationship should include both management and design components: *aligning business and IT is a matter of management and of design.*
2. The generic framework for information management and the Integrated Architecture Framework in combination can be the basis for such a unified framework. The IAF framework offers in a certain way the third, design-related dimension of the information management framework.
3. The IAF framework offers more specifically an authoritative design substantiation for the structure level of the generic information management framework. The ultimate, yet to be defined, unified framework will need similar design interpretations for the strategic and operational levels.

The combination of both frameworks is represented in figure 7.

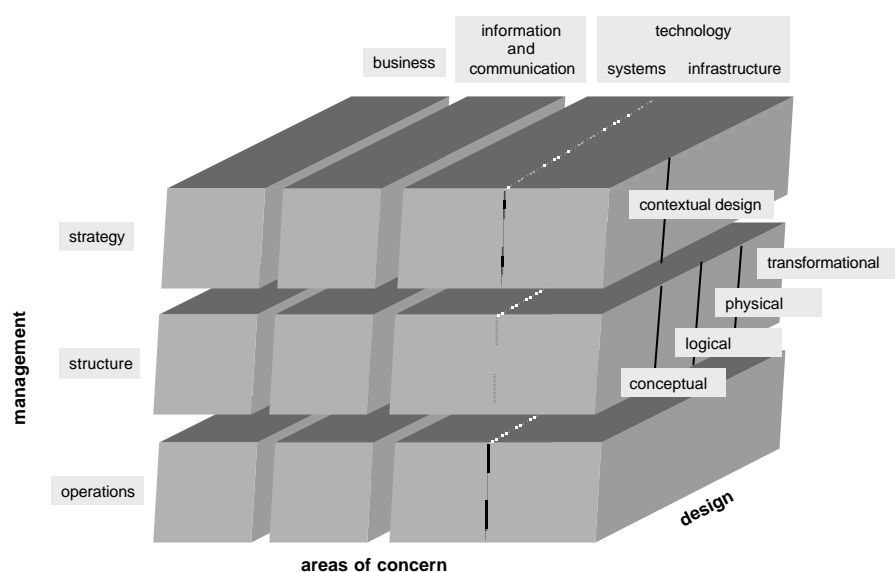


Figure 7 The outline of a unified framework for alignment

## 8. A new definition of alignment

The foregoing discussion leads to the fundamental statement that the alignment between business and IT cannot be demarcated as a management concern only: establishing this alignment is a design concern as well. The information sharing and architectural issues that are central in both the generic framework for information management and in the Integrated Architecture Framework play a pivotal role in this alignment.

We define alignment as *the continuous process, involving management and design sub-processes, of consciously and coherently interrelating all components of the business – IT relationship* in order to contribute to the organisation's performance over time.

This definition diverges from previous definitions in a number of ways:

- We clearly opt for alignment as a dynamic process, involving continuous adjustment, and not as a static situation
- We take all the components of the business - IT relationship into account: we don't confine alignment to the strategic level and we include intermediate information sharing components at all levels

- We don't restrict alignment to managerial processes, but include design processes as well; by this, we simultaneously distance ourselves from the vision in which the management is able to determine every single aspect of the business - IT relationship
- We don't strive "by definition" for harmony or balance between the different elements of the business - IT relationship, as we assume that consciously introduced and/or sustained lack of balance is the motor of many organisational innovations

This definition can further be elucidated by mapping it on the unified framework of figure 7.

The main objective of this framework is to indicate the relationships between the main areas of concern and between the different levels, including the implied management and design processes, and not to visualise the areas or levels as such.

At the strategy level, “strategic” alignment basically concerns decisions concerning variables like mission, scope (boundaries and granularity), governance and core capabilities. The following alignment aspects have to be considered:

- Alignment of these variables over the different areas (horizontal)
- Alignment of these variables with the policies regarding the structural level (vertical)

This level requires substantial further elaboration: existing strategic management approaches are either limited to simple, overall models (like Porter’s competitive forces model) or to relatively outdated, one-directional techniques mainly based on Critical Success Factor analysis. The existence of only one design phase (the contextual one) in the IAF framework further underlines the relatively poor underpinning of this level from a design point of view.

**At the structure level, “structural” alignment basically concerns decisions concerning variables like architectures and capabilities. The following alignment aspects have to be considered:**

- Alignment of these variables over the different areas (horizontal)
- Alignment of these variables with the variables from the strategy level and from the operations level (vertical)

This level appears to be crucial in modern organisations: it represents the relatively stable infrastructural components linking the lively strategic options governed by the organisation’s environment and the volatile operational activities. A major effort seems particularly to be needed to align the variables of the different areas (e.g. to link concepts from organisational theory to concepts taken from the technology area). A promising design approach is taken by IAF (see figure 8).

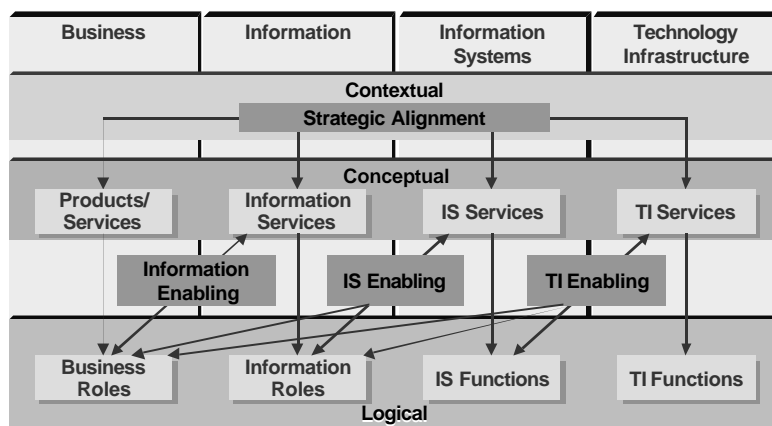


Figure 8 Alignment between Main Architecture Areas

The structural alignment in the conceptual and logical design of IAF is based on the enabling relations between the areas. The idea is that the systems at the right-hand side i.e. information provision, information systems and technology infrastructure deliver services to the systems at the left-hand side. These services enable the roles and functions of these systems. The enabling services are designed in the conceptual design of a system and the roles and functions enabled by these services are designed in the logical design.

The following enabling relation are designed:

- The information provision enables with its information services the execution of the business roles in the business area
- The information systems enable with their automated services the execution of business roles in the business area and the information roles in the information area.
- The technology infrastructure enables people executing roles in the business area and information area with physical interfaces and enables with processing, storage and transmission capabilities the execution of functions of the information systems.

**At the operations level, “operational” alignment basically concerns decisions concerning variables like processes and skills. These variables have to be horizontally and vertically (relationship with the structure level) aligned. The elaboration of this alignment is subject to further research.**

## **9. Conclusions and further research: towards a workable method for alignment**

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The main conclusions of this paper are threefold:

1. Alignment is a combined management/design concern
2. The unified framework, the outline of which is derived in this paper, is a valid starting point for any further elaboration of the alignment concept
3. The central issues of this unified framework, dealing with architectural and information sharing issues, are key to the success of this elaboration

Transforming alignment from the ill-defined concept it was, into a workable method, requires more than what could be accomplished during the preparation of this paper. Therefore, a combined research project, aiming at this elucidation, is envisaged. The main directions and steps of this research can be derived from this paper:

1. The design dimension of the unified framework has to be elaborated for the remaining levels (strategy and operations)
2. The managerial transition from one level to the other has to be worked out
3. The management and design dimensions of the unified framework have to be transformed into a single unified approach to alignment
4. The measurability of alignment, ultimately proving the contribution of alignment to the overall organisational performance, has to be worked out.

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