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A Generic Framework

for Information Management

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ABSTRACT: A generic framework for investigating and interrelating the different components of information management is proposed; developed as a re-interpretation of and an extension to the widely propagated model for strategic alignment by Henderson and Venkatraman, it deals with (the interrelationship of) business, information/communication and technology at the strategic, (infra)structural and operations level.

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1. Introduction

Over the past decade, the discipline of information management emerged both in academic research and in practice. It deals with the management of information as a business resource and, by the ubiquitous nature of information and communication technology (I/C T), with the business - I/C T relationship. It is fair to say that:

(1) the discipline is still struggling with its identity (a good survey of the manifest confusion is given by Lewis, Snyder and Rainer, 1995)

(2) the importance of technological aspects has been overemphasized to the detriment of infological aspects (information management was and still is to a high degree constrained to "information *technology* management") (see, e.g., Davenport, 1994)

(3) the importance of "communication" has only recently been widely recognized; it is illustrative that the term "information/communication technology" is more and more replacing the well-established term "information technology".

As a consequence, no commonly accepted, precise notion of information management exists and hence no accurate empirical testing of the contribution of information management to the success of organizations could be done (Lewis, Snyder and Rainer, 1995). Information management greatly lacks scientific rigor although we amply agree with Peter Keen on the prevalence of practical relevance over scientific rigor: "*Until relevance is established, rigor is irrelevant*" (Keen, 1991).

Checkland and Holwell (1998) have persuasively denoted that scientific rigor in Information Systems cannot be achieved independently of the social context, e.g. by simply importing the methods of natural sciences. They argue in favor of action research (Argyris, Putnam and McLain-Smith, 1982), while stressing the importance of 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*" (ibid., p. 22). The subsequent research "*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).

The purpose of this article is to develop a generic framework for information management; it elaborates on an earlier article (Abcouwer, Maes and Truijens, 1997). Furthermore, the framework is the subject of an ongoing Ph.D. project "*Empirical definition and validation of the concept of 'information management'*" (which might, in the line of reasoning of Checkland and Holwell, lead to its modification but hopefully not to its abandonment). It is our belief that the existence of such a framework is essential for a better understanding of the nature and significance of information management both in theory and in practice. We further use the term "framework" in the restricted sense of *"an outline structure that defines a set of cells and their relationships"*, as proposed by Evernden (1996).

In order to conceive the framework, we start from the strategic alignment model as proposed by Henderson and Venkatraman (1993, 1995). This model intends to support the integration of I/C T 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 of strategy) and functional integration (between the business domain and the I/C T domain).
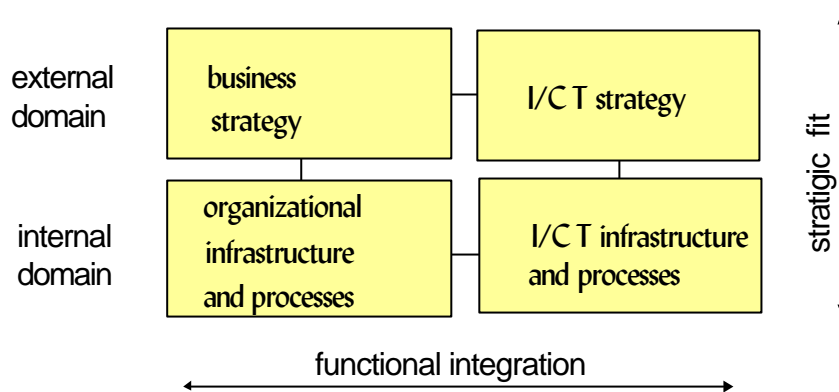

Figure 1: the strategic alignment model

Actually, the 'strategic alignment' body of thought is a leading principle both for research programs (see, e.g., Chan et. al., 1997) and for practical methods (Luftman, 1996 and Luftman, Papp and Brier, 1999) in information management. 'Alignment' is in itself a broad and widely used management instrument: Labovitz and Rosansky (1997), e.g., consider the alignment of strategy, customers, people, and processes essential for growth and profit of any company. However, even fervent adherents of strategic alignment in the context of the business – I/C T relationship (Thomas and Dewitt, 1996) admit that the concept is not at all unequivocal, that measuring its various dimensions has not yet taken place and hence that it is questionable whether strategic alignment makes a difference in an organization's performance over time.

Not surprisingly, severe critique has recently been given on this popular yet theoretically barely founded model (Keen, 1996, Ciborra, 1998 and Ciborra and Hanseth, 1998). The heart of the critique deals with the fact that business - I/C T alignment is highly illusory: business developments depend on many more factors than merely I/C T, I/C T developments have a greatly autonomous character and I/C T infrastructures are in themselves primarily dependent on the rigid installed I/C T base (they act, by their falling back on industry standards, as self-reinforcing mechanisms in the sense of Arthur, 1988 and 1994). In addition, the implicit dominance of a structured strategy process is questionable in an era where uncertainty and flexibility are predominant and hence the articulation of the strategic intent troublesome if not impossible. What's more, a lack of balance (and hence the existence of non-alignment) is under these conditions quite often a source of innovation and success: strategic alignment is not only illusory, but even inexpedient!

Accordingly, we distance ourselves from the compelling underlying idea of strategic alignment but maintain the basic building blocks (the four domains) of Henderson and Venkatraman's model as starting point for the generic framework. In what follows, these domains will be reinterpreted and completed. In the second paragraph, we extend the vertical dimension of the strategic alignment model; this enables us to present a survey of the successive stages in information management. In paragraph 3, we add to the horizontal dimension of the model by introducing a connecting column. The latter addition completes the framework. Experiences with and a further elaboration of the framework are given in paragraph 4, while additional interpretations are the subject of paragraph 5. We reconsider the concepts of "information management" and "alignment" in the context of the framework in paragraph 6. Suggestions for further research are given in paragraph 7.

2. Extending the vertical dimension

The internal domain of Henderson and Venkatraman's model deals with choices regarding organizational and I/C technological *infrastructure* and *processes*. This designation and the further specification of the internal domain (Henderson, Venkatraman and Oldach, 1996) are rather half-hearted; they tend to focus this domain on (infra)structural issues to the detriment of operational considerations. Recent insights, on the contrary, stress the importance of operations as a valuable area for strategic attention and even as a basis for strategy (see, e.g., Hayes and Upton, 1998). Consequently, a first extension of the framework becomes rather self-evident: a structural level and an operational level should replace the single internal domain. The former level plays a pivotal role in the tuning of long-term strategic vision and short-term operational transformation and is accordingly retained as the middle level.

This extension enables us to outline the evolution of information management practices in the last quarter of a century, as is demonstrated in figure 2 (a and b).

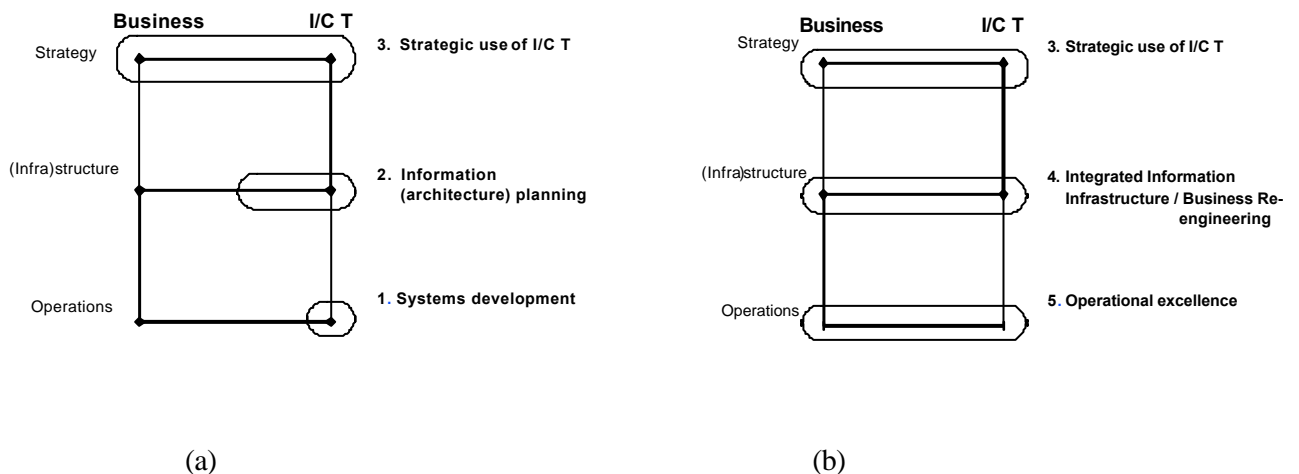(a)   (b)

Figure 2: stages in information management

In stage 1 (reference publication: Turner et. al., 1970), information management was constrained to the management of systems development processes and to the subsequent management of installed systems and computer configurations. Information systems were prioritized, developed and maintained on an ad-hoc basis (a single system was considered to be a solution for a single, mainly administrative problem) and without any serious reference to business considerations. In stage 2 (reference publication: IBM Corporation, 1981) and due to the perceived common use of data by separate information systems, full attention was given to information (architecture) planning. This introduction of infrastructural (i.e. on a multi-system level) considerations also marked the first endeavor to take business reasons into consideration. The attempt was very tentative, as "IS managers (…) used the language of IT and added a business flavor to it" (Keen, 1996, p. 141). In stage 3 (reference publication: Porter and Millar, 1985), the strategic impact of information systems and hence the full spectrum of the business – information technology link were recognized. This stage also marked the advent of "information management" as a more appropriate term for the extension of what was first called "data processing management" (Nolan, 1979).

The initial euphoria of the late eighties about the strategic impact of information systems was only partially translated into effective business- I/C T strategies. This was mainly due to the accidental nature and, therefore, irreproducibility of the (predominantly American) success stories (Galliers, 1993). As a consequence, renewed attention was paid to the (infra)structural level, with business re-engineering (reference publication: Hammer, 1990) and the integration of the organization and information infrastructures (Truijens et. al., 1990) as the most remarkable exponents of this fourth stage (see figure 2b). The attention paid to operational excellence through the introduction of ERP-solutions makes clear that during the last years, we were facing the transition between the more structure-oriented stage 4 and stage 5, where impeccable and flexible operations and 'operations based strategy' (Hayes and Upton, 1998) are dominant. A common characteristic of the stages of figure 2b is the intrinsic and self-evident intertwining of business and I/C T issues: information management has become a major component of integral management!

Exploration of the next shift of focus for information management is dependent on a reconsideration of the horizontal dimension of the emerging framework.

3. Extending the horizontal dimension

The business – I/C T relationship (the horizontal dimension in figure 2) has many characteristics of a LAT (*Living Apart Together*) relationship (Abcouwer, Maes and Truijens, 1997): they have a mature relationship though both have their own dynamics and therefore they try to meet each other under optimal conditions and without imposing too many mutual constraints. Ward and Peppard (1996) use a similar metaphor ("a troubled marriage") to describe this relationship in distress. Its overall study has been

governed by relatively simple models (for example Porter and Millar, 1985 and Earl, 1989); these models invariably depart from the predominance of the strategic level and from the *direct* mutual influence of business and technology. This one-sided reasoning is open to many objections:

- The strategic component may be leading, but it is in many cases opposed to lengthy and painstaking strategies: "The key to the business/technology dialogue is at the imperatives stage", where imperatives are concrete targets for action ("*Regardless how we do it, it is absolutely vital that we...*") (Keen, 1996).

- In present-day organizations, the crux of the business – I/C T relationship is at the structural (Weill and Broadbent, 1998) and even operational (Hayes and Upton, 1998) level.

- The business – I/C T relationship cannot be described without a thorough exploration of the cultural gap between the I/C T organization and the rest of the business (Ward and Peppard, 1996).

- Successful integration of the business and I/C T strategy is dependent on the information itself rather than on technology as the real carrier of value and source of competitive advantage (Glazer, 1993).

- In order to bring organizational structures and information infrastructures into line with one another, one has to pay full attention to information use and information sharing (Lee and Leifer, 1992).

It is appropriate to state that the *use* and the internal and external *sharing* of information and not its *provision* are of strategic nature. Consequently, we introduce a middle column in the framework of figure 2, representing the internal and external information and communication aspects of the organization under study. The resulting (and final) framework is represented in figure 3:
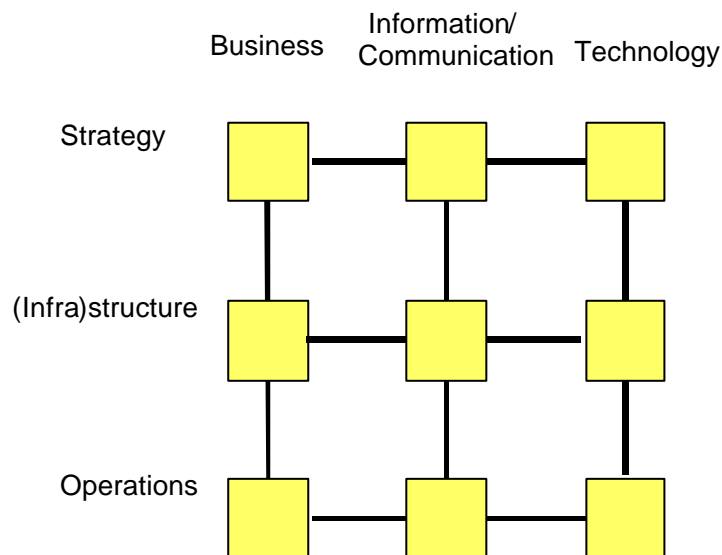

Figure 3: the generic framework

From right to left, the horizontal axis of figure 3 schematically represents the *providing* technology, systems and databases (right column), the *interpreting* information, communication and knowledge

(sharing) processes (middle column) and the *application* as business expertise (left column) of the information processing spectrum.

Referring to the stage model of the former paragraph, we conclude that the next stage will concentrate on a further exploration of the middle column. Evidence for this allegation can be found in the increasing attention of the business world for knowledge management and knowledge sharing. It is questionable whether the traditional yet never clearly agreed upon classification along the axis data – information – knowledge – expertise – wisdom will stand up to the scrutiny of this exploration.

Empirical evidence and further interpretations of the generic framework of figure 3 will be given in the next two paragraphs. Here, we confine ourselves to the following observations:

- The vast majority of all information and communication processes in organizations are I/C T-independent (Davenport and Prusak, 1997).

- Relatively little attention has been paid to the importance and modeling of information and communication processes in organizations (Van Reijswoud, 1996); this observation is particularly true for the informal processes.

- The middle column is intrinsically human-centered (Davenport, 1994) and requires political (Davenport, Eccles and Prusak, 1992 and Homburg, 1999), cultural (Ward and Peppard, 1996) and even ecological (Davenport and Prusak, 1997 and Nardi and O'Day, 1999) analysis.

- The interpretative middle column has primarily to do with the quality of information and communication processes as opposed to the quantitative bias of the I/C T column; quantitative emphasis leads to information overload and hence qualitative degradation (Simpson and Prusak, 1995 and Earl, 1996).

- The importance of information and knowledge sharing for network organizations has recently been underpinned by Hansen (1998b). The use of I/C T is helpful in exchanging explicit knowledge, but impedes the transfer of more complex, tacit knowledge (Hansen, 1998a).

4. The generic framework: elaboration and experiences

The generic framework deals with the business - I/C - technology relationship at three distinct levels: strategy, structure and operations. In the next paragraph, the vertical relationships between these three levels are further worked out. Here, we successively elaborate on the major issues dominating these levels and consequently on the components of the generic framework. Basically, each component (each of the nine building blocks) considers its own area of concern, taking into account its connections with the adjacent components. In what follows, we restrain ourselves from a discussion in full detail of each of the components; instead, we present a point by point survey of the main decision areas and for each of these one or two examples. One fundamental restriction has to be made at this instant: the intertwining of the

components might heavily restrict the degrees of freedom within a single block; information management then becomes the management of the network of relationships between the components. This topic is the subject of paragraph 6.

The importance of information as a strategic resource has been widely recognized. Sampler (1998) extends this recognition by redefining the nature of industry structure based on the strategic characteristics of information, while Teece (1998) and many other authors extend the very notion of information to intangible assets in the form of intellectual capital. Therefore, the strategic level of the generic framework recognizes the need of modern organizations to address information and communication processes and the underlying technology in relation to their overall business strategy. The present position of many CIO's at the Board level is reflecting this interest.

The three building blocks involved primarily regard scope, core competencies and governance decisions (Henderson, Venkatraman and Oldach, 1996):

Business strategy

- business scope
- to determine the organization's products and services
- to position the organization in the market place
- to choose the appropriate level of scope or diversity
- business core competency
- to determine the differentiating strategic competencies (see paragraph 5)
- business governance
- to decide on mergers, partnerships and strategic alliances

I/C strategy

- I/C scope
- to determine the organization's external and internal I/C strategy
- to position the organization by its generic I/C strategy (comparable with the generic knowledge strategies of Bierly and Chakrabarti, 1996)
- I/C core competency
- to determine the differentiating competencies for using and sharing information and knowledge
- I/C governance
- to decide on strategic partnerships for information procurement (the importance of which has been underlined by Powell, 1998)

Technology strategy

- technology scope
- to determine the organization's I/C T strategy
- to assess emerging technologies
- technology core competency
- to determine the organization's differentiating I/C T competencies
- technology governance
- to decide on strategic partnerships with key technology providers
- to decide on strategic buy/make and I/C T standard choices

The importance of the <u>structural level</u> has dramatically increased due to the emergence of resource based (Wernerfelt, 1984 and Collis and Montgomery, 1995) and more specifically core competence (Prahalad and Hamel, 1990) thinking. The importance of I/C T as a core resource is acknowledged (Powell and Dent-Micallef, 1997) and translated into an adjusted, infrastructural management approach (Truijens et. al., 1990 and Weill and Broadbent, 1998).

The main decision areas at the structure level concern the architecture of the infrastructure and the establishment of competencies. The latter ones are derived (in essence: generalized) from work practices at the operations level and can eventually be transformed into core competencies, as will be explained in paragraph 5; competencies (or capabilities) are the substantiated capacity of the organization to realize its goals. The structure level of the generic framework emphasizes the significance of tuning the organizational, informational/communicational and technological architectures and competencies.

Business structure

- business architecture
- to develop the organization's business model
- to determine and (re)design the critical business processes
- business competency
- to select and develop promising business competencies
- to develop the organization's "strategic architecture" (Kiernan, 1993)

I/C structure

- I/C architecture
- to develop the organization's information, communication and knowledge architecture/model
- to determine and (re)design the critical information and communication processes
- I/C competency
- to select and develop promising information and communication competencies
- to develop an I/C learning infrastructure

Technology structure
- technology architecture
- to develop the organization's technology (data, systems, configuration and the supporting I/C T organization) architecture
- to determine and (re)design the critical I/C T processes
- to decide on legacy systems
- technology competency
- to select and develop promising technology competencies
- to develop an I/C T learning infrastructure

For a long period, strategists have distanced themselves from operations on the shop floor: "operational effectiveness is not a strategy" (Michael Porter). The strategic importance of excellent operations has rather recently been (re)discovered in the context of customer-oriented thinking; it goes together with a reorientation of core capabilities (Hayes, Pisano and Upton, 1996) and with the breakthrough of ERP software packages. In some industries (manufacturing, retail,…), this may lead to an "operations-based strategy" (Hayes and Upton, 1998) as has been put forward in paragraph 2.

The contribution of accurate information and communication processes and technology to operational excellence is addressed at the <u>operations level</u> of the generic framework. This level primarily deals with work processes and skills.

Business operations
- business processes
- to (re)design, perform and monitor business processes (balanced score card)
- to implement and monitor changes in business processes (balanced change card, Koster & Bouman, 1998)
- business skills
- acquisition, training and development of the skills of business professionals

I/C operations
- I/C processes
- to (re)design, perform and monitor I/C processes
- information/communication modeling
- I/C skills
- acquisition, training and development of the skills of I/C professionals

Technology operations
- technology processes
- to (re)design, perform and monitor I/C T processes (development, maintenance, …)

- operational I/C T management (ITIL)
- technology skills
- acquisition, training and development of the skills of I/C T professionals

This generic framework for information management has been developed and subsequently tested in executive teaching, in the formulation of a research program and in consulting. Companies and governmental agencies in the Benelux have adopted it as their frame of reference for positioning and interrelating their information management issues and for clarifying the business - I/C T dialogue. It has become the overall frame of reference and program outline of a successful joint Executive Master in Information Management program of the Universiteit van Amsterdam and the Vrije Universiteit (Maes and Abcouwer, 1999).

The actual use of any conceptual construct can be described in terms of description, explanation and prediction, both at the concept development and at the concept testing level (Snow and Thomas, 1993). Applied to the generic framework, this categorizing results in the following observations:

- Description: this article is the (tentative) end result of an evolving framework that was empirically investigated during the last four years; a previous version appeared as Abcouwer, Maes and Truijens, 1997.
- Explanation: the framework was extensively tested in real-life and executive classroom situations, as was explained above. Empirical explanations were gained regarding the basic assumptions of the framework and, vice versa, manifold real-life cases were elucidated by arranging them in the framework.
- Prediction: relatively few situations occurred where the predictive power of the framework could be tested. One interesting exception was the study of emerging I/C roles in information intensive organizations (Maes, Jägers and Dedene, 1999).
- No concept testing, involving larger sample sizes, was undertaken. Concept testing is a major research objective of an ongoing Ph.D. project.

5. Interpretations of the generic framework

The generic framework has proven to be a valuable tool for positioning and interrelating information management issues. Here, we further explore it by a linguistic interpretation of its horizontal dimension, by confronting its vertical dimension with concepts taken from organizational learning and by looking at its externalities.

The business – I/C T relationship (the <u>horizontal</u> dimension of the framework) can be defined as a dialogue in search of a "lingua franca", a common language (paraphrasing Keen, 1996). The ever-growing impact of I/C T on organizations can in fact be interpreted as the introduction of a new *syntax* in the internal and external information/communication of an organization. This linguistic interpretation leads to the conclusion that the left-hand business column of figure 3 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 – I/C T dialogue (see e.g. Mingers, 1995, for a full discussion of these terms). "The field of information management focuses on managing the transformations between the three levels. We are concerned with the problems business firms have in their capability to disseminate relevant data, to establish a shared frame of reference for making meaningful interpretations, and to put that information into a meaningful business context" (Lundeberg et. al., 1995).

A simple, yet illustrative example is the introduction of e-mail in an organization (Van den Hooff, 1997). This new syntax for intra- and inter-organizational communication is easy to learn, allows efficient communication and is independent of organizational hierarchies. What's more, it is (almost) control-free (it forms a " free speech area") and it is consequently razing the wall between organizational and private communication. E-mail is attractive, if not addictive. Its booming, however, raises many questions of pragmatic and semantic nature:

- What is the efficiency in business terms of the dominant, unquestioned position of e-mail vis-à-vis other communication channels? Is it so attractive to see hundreds of professionals trying to print the same attached document while evading the immanent virus threat?

- What is the personal efficiency of the daily dozens of e-messages, a high number of which are irrelevant, not urgent at all or both? (the mobile telephone would be an even nicer example of this phenomenon)

- Is there any clear, commonly accepted understanding of the status of e-messages?

- Which time frames are involved in the communication through e-mail? How many different perceptions and expectations can be found in (the heads of the senders of) the messages of one and the same inbox? Do you feel obliged/pushed/ free to answer e-messages within 1 minute/1 hour/1 day?

What we are in essence missing to answer these and similar questions, is a commonly accepted frame of reference to attach *meaning* to the messages uttered using this new e-syntax (semantics, I/C column, see e.g. Ngwenyama and Lee, 1997).

It becomes, more generally speaking, clear that the central information/communication column plays a vital role in the sense making of I/C T in organizations. Its continuous disregard is at the very basis of the poor business – I/C T 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 <u>vertical</u> dimension of the framework is in line with modern, resource-based visions on organizations, as was fairly explained in paragraph 4. Andreu and Ciborra (1996) distinguish three learning loops:

- The first loop deals with mastering the use of standard resources and hence leads to efficient work practices. This basic loop is at the skills level; Andreu and Ciborra call it the "routinization learning loop".

- The second loop combines work practices and organizational routines to form and continuously improve the organization's capabilities, i.e. its "capacity to effect a desired effect by performing its processes and deploying its resources" (Amit and Schoemaker, 1993). Andreu and Ciborra call this the "capability learning loop".

- The third loop gives meaning to capabilities in the context of the organization's competitive environment and business mission, thus identifying "core capabilities" (capabilities that differentiate an organization strategically). This third loop is called the "strategic learning loop".

These three learning loops can easily be projected on the generic framework, as can be seen in figure 4. The contribution of information/communication and of I/C T is different in each of these loops:

- In the routinization loop, I/C T serves as a standard resource in itself or in support of other resources. New technologies may induce new working practices. The information and communication processes of the individuals and groups involved have to do with the sharing of best work practices and with understanding of the overall organizational context (the middle level in the framework). E-mail, discussion bases and groupware in general are typical technologies for this loop.

- I/C T gets an infrastructural character in the capability loop; integration with the organizational infrastructure becomes a direct management and design concern. The information and communication processes among the participants in this loop imply sharing not only of the direct infrastructural information (e.g. the information architectures), but also of the overall strategic direction of the infrastructure development process. I/C T facilitating experimentation and knowledge based systems are particularly useful at this level.

- The identification and definition of core capabilities is key in the strategic learning loop. This involves the continuous scanning of the different environments and the relentless inquiring of the strategic position of the organization. Information and communication processes are external or have to do with the shaping and sharing of the business vision. Group decision rooms, video conferencing, environmental scanning and filtering systems and decision support systems are illustrative for this loop.
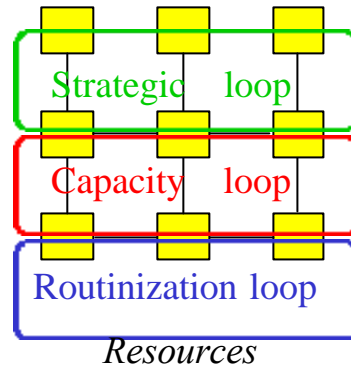
Figure 4: learning loops in the generic framework

Through the three learning loops, I/C T transforms itself from a standardized resource (a commodity) into a strategic asset (a core capability). However, in order to become of sustainable strategic value, I/C T should preferably be embedded in or linked to other core capabilities (Powell and Dent-Micallef, 1997).

Projecting the learning loops on the framework makes clear that information management is built upon organization-owned resources (of which I/C T is one). Two other externalities can accordingly be added to the framework:

(1) On top of the framework, the business, information/communication and I/C T environment can be drawn. One of the functions of the strategic level consists exactly of making organization-specific choices in these environments (the I/C T strategy, for example, involves choices among new technologies to be included in the organization's I/C T infrastructure).

(2) The framework is conceived at the level of an individual *business unit*. All other organizational levels (company, department, team, individual, …) or even external levels of consideration (society, industry, …) can eventually be added along a third axis.
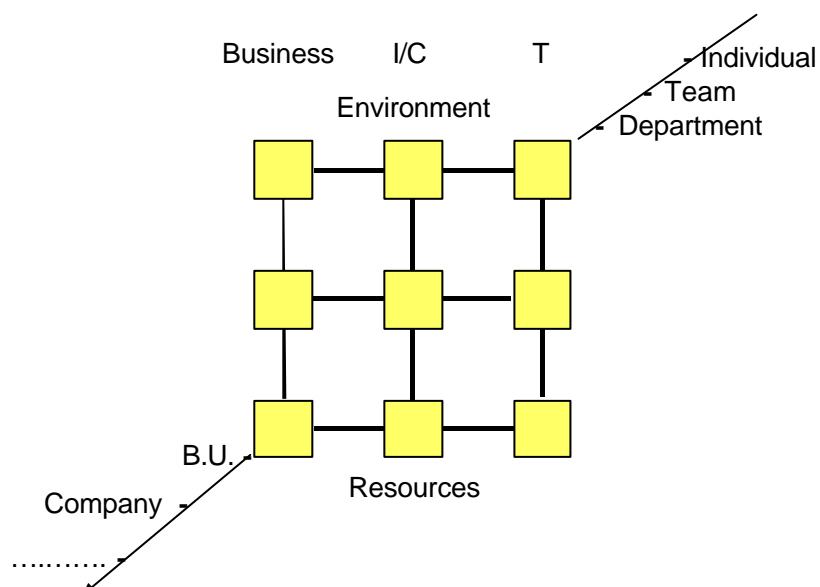
An overview of these externalities is given in figure 5.

Figure 5: the externalities of the generic framework

6. Reconsidering information management

Numerous and hence no commonly accepted definitions exist for "information (resource) management"; they range from technological over info/datalogical to organizational perspectives (Lewis, Snyder and Rainer, 1995). We postulate that information management is the management sub-discipline dealing with (the interactions of) the building blocks of the generic framework. Depending on the actual purposes and circumstances, one can interpret this postulate in a more or less comprehensive sense: (1) the framework including the externalities of the preceding paragraph, (2) the framework as such at the business unit level and (3) the heart of the framework, comprising the middle row and column. The presuppositions behind the latter interpretation are that (1) the structure variables of the middle row are critical and consequently that architectural considerations are key to information management and (2) external and internal information and communication patterns are governing variables and therefore cannot simply be deduced from matching business and technological arguments.

Alignment is at large considered as the instrument par excellence for information management. We explained in the first paragraph that the straightforward application of vertical and horizontal alignment in the generic framework is at least a controversial issue. Our main argument against alignment as a management tool is its deep-rooted control and command nature: it presumes 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).

Accordingly, we opt for the vision that an (information) manager and even a management team can only partially influence the situation: the subject of the generic framework is in essence a socio-technical system, where different actors (both social and technological) interfere at the same level. In some cases, technological actors (e.g. the installed information infrastructure) may be even more influential and powerful than human actors. As a result, information management requires a combined action of different agents instead of a solo alignment action of the almighty management. The role of the (information) manager is more comparable with that of a movie director, a sports coach or even a negotiator than with that of a military commander. Information management is a modest yet creative discipline!

We infer that the generic framework is valuable in discerning the different actors. The middle row, e.g., stands for the intertwined organizational, informational/communicational and technological infrastructure. All these actors are not stand-alone, yet operate as elements of heterogeneous networks. In this sense, information management is primarily network management.

7. Conclusions and suggestions for further research

The generic framework for information management, as presented in this article, is a "framework of ideas" in the sense of Checkland and Holwell (1998): a framework that can serve as a frame of reference for positioning previous and interpreting further research in the field and that, due to that future research, can itself be adjusted. In this article, we used the framework to redefine information management and to interrelate its different components. The framework is at the same time offering useful guidance for practitioners in their quest for insight in the business – I/C T relationship; much of their confusion stems from making insufficient differentiation between the building blocks of the framework, especially between the information/communication and technology columns.

The framework has been built and tested in empirical settings. Further investigation, particularly in predictive situations, and large scale testing in the sense of Snow and Thomas (1993) are needed in order to give the framework firm validity. Special attention should be paid to the interdisciplinary study and empirical underpinning of the central information/communication column; this sense making column is supposed to be crucial for the future of the business – I/C T relationship.

The managerial implications of the framework cannot be nailed down to strategic alignment: successful information management consists of carefully directing the combined action of the components of the framework. This activity requires empathy (Ward and Peppard, 1996), "bricolage" (Ciborra, 1994) and negotiating skills more than systematic and methodical thinking. As a consequence, transforming the 'what' of the framework in the 'how' of everyday information management is a major challenge both for action oriented researchers and for practitioners.

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