

Aligning information systems with business strategy

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It is generally accepted that one of the key factors for successful IS planning and implementation is the close linkage of the IS strategy with business strategy. However in practice this linkage is not yet well established. It is the conventional wisdom that this linkage problem is solved by analysing the corporate strategy and integrating IS issues and solutions in this. This paper develops an alternative approach to IS and business strategy alignment, based on the observation that corporate strategy is either unknown or unadaptable once it is fixed. It argues, therefore, that *ex post* IS alignment will seldom be a success. The proposed approach is based on the current theoretical concepts in information management, links them in a framework, and integrates the process of corporate strategy definition with the process of IS strategy definition. However, it should be added that the resultant general alignment map will be different for different industry sectors.

Keywords: IS strategy, corporate strategy, IS planning process, strategic alignment, organizational structure, technology management

From a reading of the general management literature, one might conclude that the concept of business strategy is far from clear and different definitions prevail^{1,2}. Despite this ambiguity, the following working definition is proposed: 'Corporate Strategy is a proposed action or sequence of actions intended to have far-reaching effects on the company's ability to achieve its business objectives'. As such, it fits between policy and tactics.

Strategic information systems planning (SISP) also has a number of different definitions³⁻⁶. Leaving aside the information management dimension to SISP, the following definition is adapted for the purpose of this paper: 'Strategic information systems planning is the process of deciding the objectives for organizational computing which the organization should implement'³.

These definitions allow the alignment of both activities. However, since information and knowledge is central to decision making, and since decision making is central to both, an additional level needs to be added, i.e. that of creating information and knowledge⁷.

Recent research³⁻⁶ confirms that despite the growing number of theoretical frameworks for SISP, practice still struggles with, and needs the integration of, SISP in the business strategy. In addition, severe problems exist in the execution of a SISP. The findings of Lederer and Sethi³ for example, seriously challenge the utility of the planning methodologies which are in common use.

Major conclusions of this research include that organizations with less sophistication in business planning have more severe problems than those with more sophistication. Organizations with less participation by the IS department in business planning have more severe problems than organizations with greater participation. These findings lead to the conclusion that an investigation into the integration of business planning and SISP is called for. Integration of IT and business strategy does pay off⁴.

A number of problems make this integration difficult, however. These include organizational structural deficiencies, communication problems between management and data processing people, strategic management model deficiencies and the highly contingent nature of strategy⁸. Galliers⁹ mentions, in addition, the lack of management commitment to planning, particularly that associated with IS/IT, the lack of IS planning experience and credibility, and the inadequacy of business plans and direction. Some practical issues associated with these problems in finance and telecommunications are discussed in Baets^{10,11}. In general, it seems that companies are struggling with problems associated with decision making based on incomplete formal information^{1,12}, the necessity to deal with less-routine and less-formal management information¹³ and technology push in the area of information and knowledge management¹⁴⁻¹⁶.

Gaining competitive advantage via IT depends on the interaction between industry conditions and internal capability to identify and exploit opportunities⁴,

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which again stresses the need for integration between business and IS strategy. Efforts to deploy IT for competitive advantage which are best known¹⁷⁻²¹, mostly concentrate on 'niche' applications within the industry concerned. They sometimes neglect the core business, which in practice still makes an important profit margin, employs most resources and leads to most problems.

Despite the existence of some good IS alignment models^{22,23}, a recent research project amongst North American and European IS managers²⁴ shows for both groups the alignment of IS strategy and corporate strategy as the top priority for the future.

Solving the problem of why so much money is spent on IS/IT without the expected benefits, would appear to require the integration of corporate business processes and information management, based on adequate information systems and technology management. The only valid measurement of success for IT is that concerned with evaluation via common business performance indicators.

The approach developed in this paper attempts to solve the problems of alignment with a view to improving the effectiveness of IT. Given the inadequacies of business strategy, the approach concentrates almost as much on it as it does on IS strategy *per se*. Aspects of the approach are: information strategy (what); information management strategy, IT strategy and change management strategy (how); and human resources strategy associated with IS/IT (who)^{6,25}. The approach attempts to align both strategies throughout the process in different industrial sectors. While it has been applied within the banking industry, further research is required to assess its adaptability in other sectors.

Overview of strengths and weaknesses of existing methodologies

A number of methodologies and frameworks exist in the field of IS strategy definition and even more specifically in the field of IS strategy alignment. Some of these will be discussed briefly as a precursor to the introduction of an extended model for the strategic alignment process.

Earl's 'New IS Pyramid'²⁵ gives a first impression of how different types of applications developed over recent years can be categorized. It is a first attempt at integration. However, it fails to integrate issues associated with hardware, architecture and database with the information and application aspects. For this reason an extension of this concept, which does integrate these aspects, and which will be described later as the 'Information Pyramid' will be used in this paper. Both concepts are static (historical) and hence not appropriate to describe and guide the process of alignment.

The stages of growth model (e.g. Galliers and Sutherland^{26,27}) is a well known dynamic representation of the IS planning process within a company. As a first step this approach should be applied to each aspect of the business, thus providing a 'linear' representation of the growth processes. It does not, however, concentrate on the feed-back mechanisms which are very valuable in the process of IS strategy alignment.

The stages of growth model is therefore more of a thought provoking framework for SISP, than a guideline approach to alignment.

An interesting extension on such 'strategic frameworks' is that provided by Ward, Griffiths and Whitmore²⁸. They position the activity of IS strategy definition in the context of a company within a broader economic environment. They stress the necessity to consider the economic environment as broadly as possible, before focusing on markets and corporate values. Though this is not an alignment process in itself, it provides an economic framework in which such an alignment process should take place. A criticism of existing alignment processes is that they suppose that the necessary information is known and managed accordingly. This, as we have argued, is not always the case. Therefore, incorporation of an improved understanding of necessary information will be an important step in successful IS strategy alignment.

At the other end of the alignment process, IS strategy should be translated in an applications development strategy. Amongst others, Earl²⁵ proposes a 'multiple methodology' to enable this translation process. Once an aligned strategy exists, Earl's approach can be used to develop an aligned applications strategy.

Two IS strategy alignment models that are complementary to each other are the 'Strategic Alignment Process' of MacDonald²³ and the 'Enterprise-wide Information Model' of Parker, Benson and Trainor²². The two approaches are combined in Figure 1.

MacDonald's 'Strategic Alignment Process' considers four activities and its interactions: business strategy; organizational infrastructure and process; IS infrastructure and process; IT strategy. In a broader context it also considers: competition; organizational change and human resource issues; IS implementation processes and tools; global IT platform. This alignment process presupposes the participants' awareness of the economic environment and its relevant information. Furthermore it assumes that all participants know the corporate strategy and, of course, it pre-supposes this corporate strategy is clear and agreed by all. However, preliminary research undertaken by the author in a well ranked European bank showed quite clearly that many of its middle managers, charged with carrying out the corporate strategy on behalf of the bank, were unable to define the corporate strategy. They were unable to undertake a reasonable strengths, weaknesses, opportunities and threats (SWOT) analysis and they had no clear view of the future of IT as a platform on which aspects of business strategy could be based. Given this preliminary research, MacDonald's Alignment Process seems difficult to apply in such circumstances.

Though Parker, Benson and Trainor²² develop what they call processes of economic justification of IS investments, the 'Enterprise-wide Information Model' actually describes a similar process of IS alignment as MacDonald's model. This methodology stresses a little more the economic validation of the process, but does not deal with the weaknesses mentioned above.

In conclusion, a conventional paradigm (like the ones of MacDonald and Parker, Benson and Trainor) would start from the corporate strategy and attempt to integrate the IS strategy within it. Given the difficulties

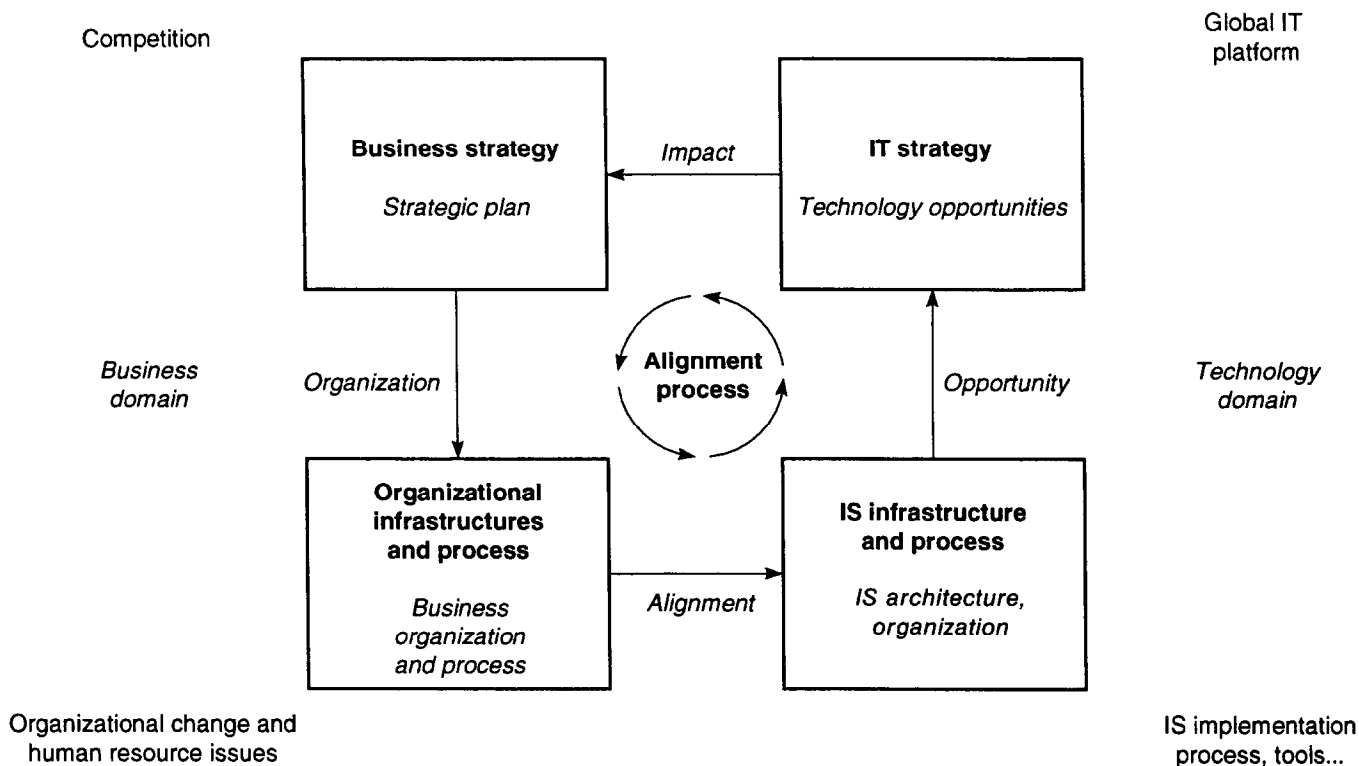


Figure 1. Strategic alignment process

identified above, it is argued that we should extend the existing alignment models, put them in a broader framework of information needs analysis (before even attempting the process of alignment) and not just attempt to align IS strategy into corporate strategy, but define them in parallel.

This paper attempts to describe an approach that has been developed to perform this and goes on to describe briefly its application in the banking sector. A more detailed account of the banking sector application is given in Baets^{29, 30}.

Extended framework

Figure 2 is an extension of the model shown in Figure 1, based on the arguments of the preceding section. In extending this model, it is necessary to identify a number of 'necessary and sufficient' conditions for success. These include:

1. The alignment process itself needs to be effectuated based on a map, specific to each industrial sector with a view to positioning the case of a particular company in relation to industry conditions. This map can be considered as a tool to serve the strategic alignment process. The basis of such a map will be the stages of growth model, mentioned earlier. An example of such a map for the banking sector is described later in this paper.
2. Since we cannot presume the existence of sufficient knowledge relating to the industrial sector and the specific company, we need to add this additional dimension to the map. Although this dimension will be adapted during the process, a first detailed description is needed, focusing on the process of alignment itself. The Strategic Framework of Ward, Griffiths and

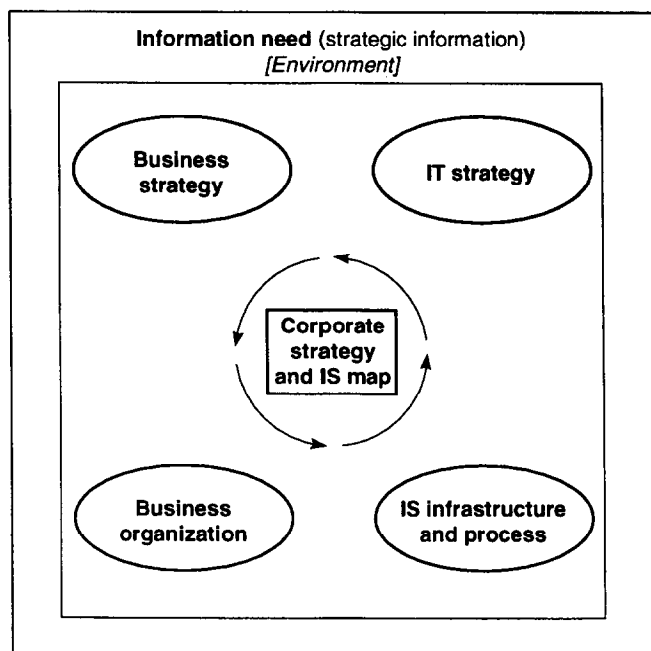


Figure 2. Extended strategic alignment model

Whitmore²⁸, described above, will be used to assist in this regard.

Figure 2 is extended from Figure 1 in the sense that it includes these two 'conditions for success'. The alignment process, indicated in Figure 1 as happening in abstraction between the business strategy, the business organization, the IS infrastructure and process and the IT strategy, takes place in Figure 2 on the basis of a 'Corporate Strategy and IS Map'. Operating the

Strategic Alignment Process on a concrete corporate map, will overcome some of the shortcomings described earlier, and fulfils condition 1. Detail is given later how such a map is created.

A second extension to Figure 1 is the explicitation of the Information Needs Analysis. As argued before, and summarized in condition 2, sufficient knowledge of the economic, industrial and environmental aspects is an integral part of the alignment process. Environment in the context of Figure 2 has to be understood as all economic conditions in the business world which could be of importance to a particular company.

Before summarizing the implementation of the proposed approach, it is important to stress that while a central figure in this process of alignment will be the Information Manager, the driver will need to be top management.

Summary of the implementation of the approach

To apply the extended strategic alignment model in practice, the dynamics of the process need to be described. This section of the paper provides, in summary, the steps to take in applying the model, an illustration of which is provided as Figure 3. Whereas Figure 2 describes the concept of the alignment process, Figure 3 describes the dynamics of the implementation. Both steps 1 and 2 of Figure 3 happen in the sphere called 'environment' in Figure 2. As such they proceed and prepare for the alignment process itself. These stages provide information and knowledge which allows in step 3 the creation of the corporate map, necessary to be used in the strategic alignment process itself. Step 3 of Figure 3 includes both the creation of the corporate map, as well as the strategic alignment process.

Step 4 completes the process, in order to define the IS (IT) strategy which is the outcome of the alignment process and which by definition fits the corporate strategy. Step 5 translates this IS/IT strategy into an IS applications strategy. Both steps 4 and 5 are not discussed in detail in this paper, since frameworks exist to implement them. Some brief references will be given, however. Steps 4 and 5 take place in the 'environment' of Figure 2.

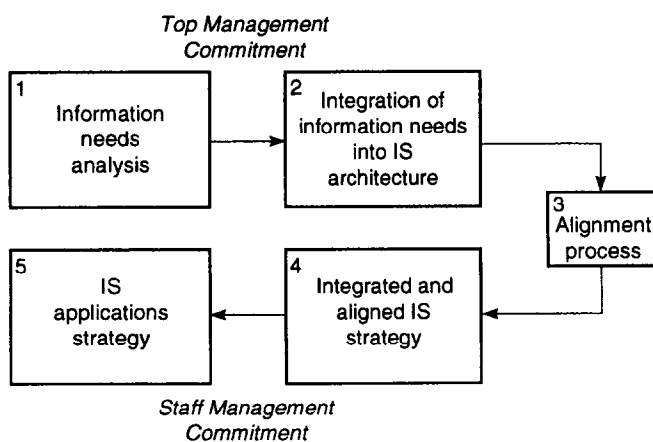


Figure 3. Process of aligning information systems with corporate strategy

The different steps of Figure 3 attempt to highlight:

1. The information needed for decision making has to be analysed based on the concepts of economic environment, market, competition, market share, corporate operations.
2. The use of the Information Pyramid allows the integration of step 1 into the IS architecture, still being in the 'environment' of Figure 2. It describes in a way the 'current state of affairs' of information management within its technological context.
3. Knowledge modelling and strategic alignment is the process which allows iteration on shared values, competitive advantage, organization, etc. A useful technique that can be employed here is that of a business game together with spin-off discussions on the basis of a company's own, industry-related map. This process converges on an overall corporate strategy, after a number of iterations. As much as this step concentrates on knowledge building and application of this knowledge in the strategic alignment process, a by-product of this step is the adaptation or establishment of a corporate strategy, as argued earlier in this paper. The company's own map is based on the stages of growth model.
4. An IS strategy, integrated into the overall corporate strategy, can now be defined. This step has all to do with the definition of the IS strategy, the IS architecture, the data models and structures, etc.
5. A multiple approach may be the most appropriate to translate this into an IS applications strategy.

It is important in each step to consider the commitment needed by either top management or staff management. For example, the step concerned with information needs analysis will need extensive top management involvement in order to prevent the creation of an IS strategy which is unable to answer to management questions. Finally, some issues are more descriptive, others have to do with integration within the context of the business as a whole, and some are rather analytical. Different types of issues need different people to deal with them.

Information needs

In any management decision, the quality of the decision is limited by the quality of the information on which it is based. Furthermore, information has become the life-blood of the company and has been shown to be the central point of focus in the overall corporate strategy⁷. But if information is central and is considered as the life-blood of the company, it has to be managed accordingly. User involvement is of paramount importance^{31, 32}. Different approaches exist to improve this involvement^{33, 34}.

In order to structure the information need, one should start from the concept of the company in its environment²⁸. First of all one needs to consider aspects of general economic climate, such as inflation, interest rate levels, political climate, etc. In a second stage, this broad environment can be focused a little more on the economic environment in which the company operates. Only then, can one consider the market place, on which supply and demand meet in order to fix the level of economic activity. The latter stage has everything to do with competition. This market place

decides the market share for each competitor, on which a company only has an indirect influence (e.g. by price, promotion, etc.). Finally, the company can concentrate on its internal policy: its values, objectives, organizational structure and performance evaluation.

In this way a company can successfully integrate its strategy into the real economic world (external environment, pressure groups, stake-holders), it can relate these external aspects to the internal corporate decisions (such as value system, objectives, monitoring and control).

A simplified schematic form of this concept is shown as Figure 4. Figure 4 can be used as a tool to focus on the information necessary for decision making, helping managers to define the information needed, following the steps mentioned. The use of facilitators in this process may help¹⁶, since not all managers are able to define clearly, concisely and easily the information needed for decision making.

Current state of affairs of the IS architecture

In the previous stage, we attempted to define the business environment in broad terms (including information internal to the company, but which is in a way out of the direct control of the company). A next step is to integrate the information needed within the existing IS architecture and system. This allows evaluation of the actual process of information gathering for decision making.

This stage integrates the more technological and systems considerations with those of a general management perspective and decision making, still working in the 'environment' of Figure 2. At this stage, it remains a 'current state of affairs', building a coherent picture of information needs, decision support capabilities and actual IS architecture and applications.

Some frameworks exist^{25, 35, 36} describing the integration of aspects of information needs analysis and decision support capabilities into the more techno-

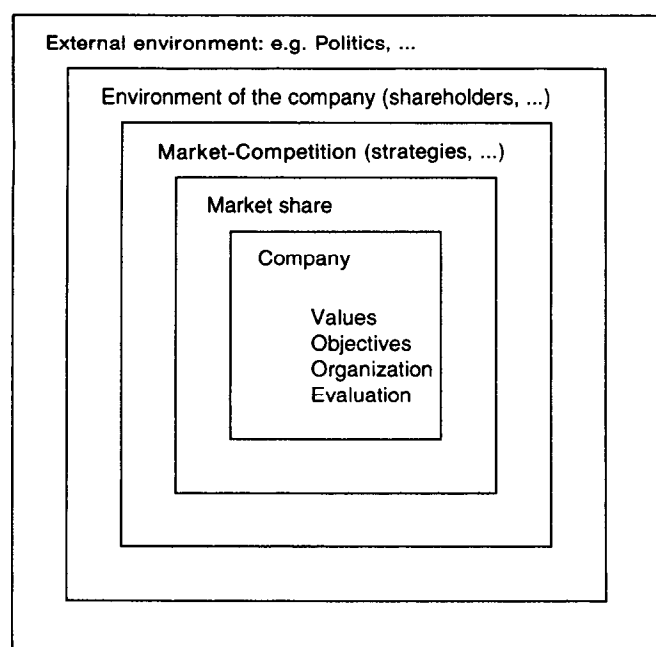


Figure 4. Structure for corporate information

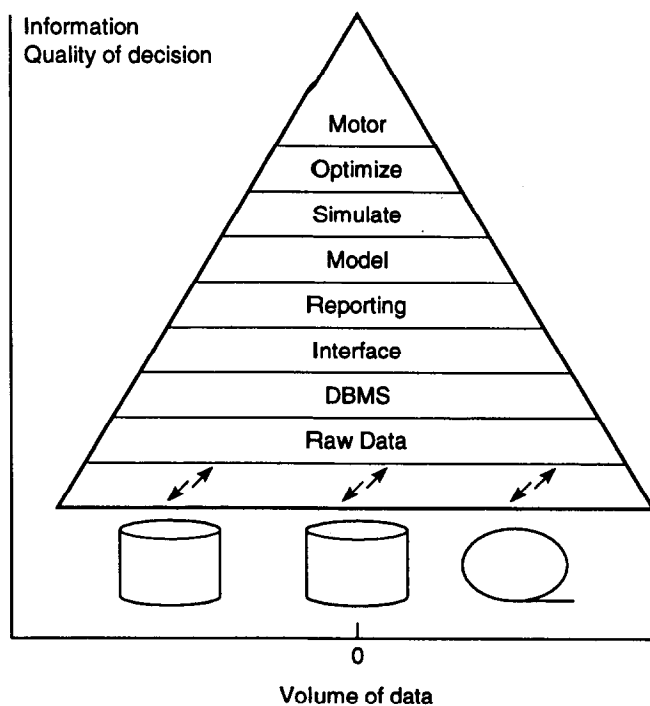


Figure 5. The Information Pyramid³⁶

logical considerations of architecture and systems. This integration is illustrated in Figure 5. On the X-axis the volume of data is dealt with (centred around 0), and the Y-axis deals with the increase in the quality of required information and hence an increase in the quality of decisions. Decision support aims to limit the volume of data, in order to increase the quality of information and hence improve the decision. Decision support should be structured as follows.

Starting with external data (external to the decision making process), an entry point is created which gathers raw data. The next step is to organize this data into a database management system. One can then create user-friendly access to this, overcoming SQL-type problems for occasional IS users (such as semantic databases, interfaces and so on).

One can include in this DBMS approach a 'library-type system' containing informal information, enabling searching for text strings. The more one deals with informal and non-routine information, the more this kind of information will be stored in text strings. However, the problem is far more complex than that. Integrating informal information into a structured information model, changes by definition the nature of the information. 'Knowledge management' is a key element here¹⁶. The mis-use of the 20-80 rule in management³⁷ is just one dramatic example of the difficulties. Since only 20 per cent of the effort produces 80 per cent of the result, a lack of correct 'knowledge' may result in concentrating on only 20 per cent of the business. Since the 20-80 rule is a general rule to which all systems tend to comply, cutting away the 80 per cent 'unproductive' activities will imply the collapse of the company in the longer term.

At this level in the Information Pyramid the quality of decision making is improving since there is some accessibility to data, but there is still hardly any integration. Marketing data and production data are

alongside one another. In the best of cases they can be considered simultaneously.

What management needs is integrated information and knowledge. How do production data influence marketing data? And hence how does an IS strategy influence the overall corporate strategy and its profitability? A way to find out about these interrelations is to create a model to describe them. In this step, one can create a lot of information, and raise the quality of decision making dramatically, as opposed to the use of considerable quantities of (useless) data.

Models can be used to simulate thinking, which then allows what-if simulations on the overall activity of the company. One can even optimize management decisions, but too much detail on these topics would bring us into the domain of management science. However it should be clear that decision support, which aims to improve the quality of decision, has to have the structure shown in Figure 5. On top of such a pyramid, one can successfully place an executive information system, for example, which allows easy access to the different levels of the pyramid (motor).

The use of the Information Pyramid is again a support concept and tool, facilitating in this case the process of the definition of accessibility of information needed and more specifically its accessibility in the actual IS architecture. It concentrates not on the information need as such (what the first step did), but it concentrates on the quality of decision support, delivered by the actual IS.

Once steps 1 and 2 of Figure 3 are dealt with, all background information is available to proceed with the building of the corporate map and the execution of the strategic alignment process itself.

Alignment process

The design of the corporate map and its use in the strategic alignment process has much to do with management of uncertainties. It is argued that an instrumental treatment of uncertainty seems appropriate in this context³⁸. This suggests an action research approach. Recent literature³⁹ suggests four possibilities: operational research, soft systems methodology, socio-technical systems design, viable systems diagnosis.

In this stage, an attempt is made to create a corporate map, describing the different aspects of corporate strategy and IS strategy. As argued before, these issues of corporate strategy and IS strategy are not always clearly perceived by the management. Depending on the situation in a particular company, soft systems methodology⁴⁰ can help to prepare the work of problem definition. This methodology, however, is limited in its ability to deliver a map, readily usable for simulation.

Operations research techniques are well known within the business community, and hence will be the more easily accepted. It is generally accepted that most operations research techniques are not very well suited to model the softer aspects of management. As a compromise between the soft systems methodology and the 'harder' operations research techniques, the use of neural networks seems promising therefore^{41,42}.

The corporate map aims at being the best possible description of the company, integrating all different aspects of its activities, interactions, market and

environmental influences, etc. Even if the latter is difficult to translate into a symbolic language, the strength of the model will be the integration of these soft, organizational aspects. This stage needs a lot of expert input. Knowledge management is the key to the success of this stage.

In order to begin developing this corporate map, an econometric company model can be designed. Later this model will be enhanced with organizational aspects⁴³. The model will focus the debate on concrete shared beliefs, or at least knowledge should consensus not be forthcoming. It helps to clarify risk and uncertainty.

A practical way of using the developed map is through the use of a business game. The model on which the game is based can be a generic model for the sector. Advantages of the use of business games are discussed in Elgood⁴⁴. A practical example of such a game for the banking sector can be found in Baets⁴⁵.

The business game should help to clarify the different points of view within different strata of the company as well as those of different departments. These inputs are gathered by questioning and will highlight structural disagreements, different concepts of the company, its goals and future directions and different information needs to improve the decision making process.

Since this process contains mostly soft information and involves many strategic considerations, convergence may well be difficult to achieve. Indeed, it can be argued whether convergence on these topics is possible or even desirable at all. The point is that obtaining shared understanding (or possibly observing disagreement) can help considerably in focusing on strategy.

Armed with the experience and the actual outcome of this step, we can concentrate more on the IS side of the equation. In order to integrate explicitly aspects of IS and IT in it, the particular model of the industrial sector will be built around the stages of growth model^{26,27}. This form of the model attempts to take into account the company's culture, shared values, staff and skills, as well as its strategy, systems and structure. In Galliers' terminology⁶ this concentrates on the relations between business strategy and IS strategy.

The use of Galliers' stages of growth model enables the company not only to be positioned relative to the stage of growth in its use and management of IT but also helps to clarify the issues that need to be considered for future growth. This framework is obviously important in defining the next steps to take, taking into account the information needs identified previously, as well as the current stage of growth.

Later in this paper an example of the final map obtained from this process for the banking sector will be given. In any particular case this map may be used as reference, but is likely to require adaptation to take into account local considerations and circumstances.

Defining an integrated and aligned IS strategy

Having gone through the process of IS strategy alignment in the previous step, we are now able to return to the definition of the IS strategy itself.

Starting from the overall corporate strategy, one can re-use the concept of the information pyramid, in order to detail the IS strategy, the desired IS architecture, the

technology used and available, data structure and database design, and so on. Dealing with the IS strategy only in this stage, guarantees that the corporate strategy will lead to the definition of the IS strategy, and hence that corporate strategy will benefit fully from the designed IS strategy. This, as well as the next step, are a little outside the scope of this paper, but are included in outline for the sake of completeness.

IS applications strategy

As a result of the previous work, the definition of the most adequate IS applications strategy can be considered, for example, by using Earl's 'Multiple Methodology'²⁵. All three aspects of IS applications strategy formulation (top-down, bottom-up, inside-out) can be considered, being part of a global information strategy, based itself on the overall corporate strategy.

This stage concentrates on the translation of the IS strategy into the specific IS applications. Though this stage is an important one in terms of effort and output, it should be clear that it follows from the earlier conceptual works. However, if we accept that strategy is to do with doing the right things, tactics are to do with doing things right, we need to bear in mind that only a combination of both amounts to good management. Defining the IS applications strategy is more to do with doing things right, and is hence an extremely important component of the overall requirement.

The banking case

For each industry sector this general approach of alignment can be applied, but there will clearly be differences in different industrial sectors. The approach has already been applied successfully in the banking world^{29,30}. A brief indication only of the results will be given here as a more detailed discussion is provided elsewhere^{29,30}.

Through research within the industrial sector, both desk research and field research, the information need analysis is undertaken for the sector, both concentrating on general banking problems as well as on the relationship between these problems and IT. In this particular case some elements of organizational theory and individual managerial decision style (such as business unit management, entrepreneurship, leaderships style, creative problem solving style, etc.) were included, since they are important to the banking sector.

This research also enabled building a picture of the general market conditions (macro economic level) and the buyer behaviour criteria (micro level) in the sector, which, together with a completed stages of growth model²⁶, helped to form a second layer of information. The third layer comprises the bank's corporate strategy, an economic model of the company and the economic justification of it.

Combining these three layers, through the dynamics of the alignment process described above, enabled a 'map' of strategic information systems planning in banking to be drawn up (see Figure 6). After empirical validation of this map, it will be applied more generally in the banking sector, in order to observe, compare, understand and improve IS management in any particular bank. The empirical validation is being

undertaken using neural network techniques, based on information gathered amongst 150 managers from seven European banks. The map shown in Figure 6 is an example of a map which is used in the third step of the process, shown in Figure 3, and which is the central tool in the extended model, shown in Figure 2. Based on this map, the alignment process will take place.

Conclusions

In this article, an attempt has been made to develop an approach for successful IS alignment with corporate strategy, which is both theoretically sound and practical.

This approach takes into account the need for:

- linkage between IS strategy and overall corporate strategy;
- commitment to and involvement in IS strategy and planning on behalf of senior and middle management;
- assessment of the economic value (rather than just the financial value) of IS implementation and planning;
- the lack of a clear understanding of corporate strategy amongst (middle) managers;
- the lack of a clear picture of the information needed for decision support and decision taking.

IS strategy is becoming an on-going management activity and is an integral part of the dynamic process of defining and monitoring corporate strategy.

A number of spin-off advantages could be as important as the approach itself:

- the overall corporate strategy can be defined, adapted and improved if currently inadequate or even non-existing;
- communication can be improved between different functions and between different hierarchical layers;
- a number of company-cultural values, based on shared understanding and vision of the company are likely to be developed. This will facilitate the management of changes, necessary to implement the strategy;
- an inventory of knowledge will result and additional knowledge will have been created about the company.

Some limitations and weaknesses remain:

- the integration of behavioural aspects in a map (model) implies serious uncertainties, which have to do with the limitations of estimation techniques in general;
- though classical quantitative techniques are not adequate to validate such a map, neural network techniques are still experimental;
- the process of alignment is lengthy and needs important involvement on the part of different layers of management;
- the banking sector is but one sector in which to apply this process. The services sector has comparable characteristics and is likely to present few problems. However, industry may prove to be so different in nature that the general process described here may be inadequate in this context. Since the emphasis in industry is less on people but more

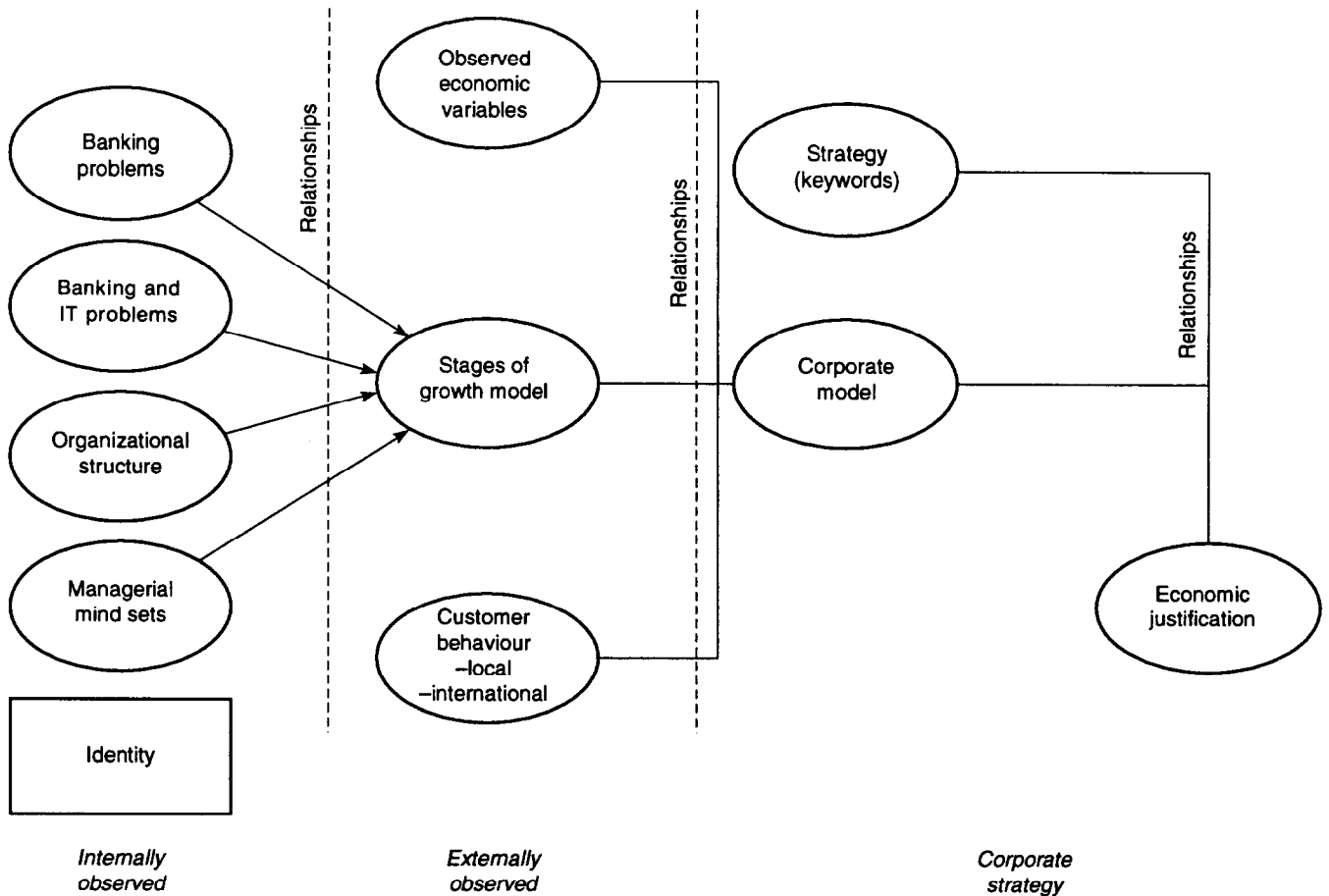


Figure 6. Mapping of strategic IS in banking

on producing processes, less on organizational structure but more on hierarchical decision making and less on technology based products but more on technology support, some of the bases of this approach may prove to be inadequate in this context;

- more empirical evidence is necessary on the practicality of the method, and its economic value, for these different industrial sectors. While this approach has been applied to the banking sector and promising results have been obtained, further testing is clearly necessary.

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