

## Management Control Transformation: Perspectives from the Information Economy

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## ABSTRACT

The changing and dynamic environment influenced by the organisational and competitive patterns of the information economy is increasing the need of transforming the existing management control systems towards increasing visibility, and transparency of new competitive and organisational phenomena.

Our analysis is based on Simons' model of management control [1995], whereby business strategy gets implemented by means of the interactions among four levers of control, that is to say: beliefs systems, boundary systems, diagnostic control systems, and interactive control systems. The purpose of the paper is to identify the drivers and to a lesser extent the processes of transformation of management control within the context of the information economy, e.g. a context within which some fundamental rules of business and organisation are altered.

The literature so far has identified some drivers of transformation of management control systems and namely the technological level, the structured level, the judgement level, and the programmatic level [Almqvist and Skoog, 2001]. Very little it has been said about the process of transformation [Burns and Scapens, 2000].

The paper tests the theoretical aspects (drivers and processes) of the management control transformation in the context of the information economy. The study is exploratory.

### Key words

Management control system; Information economy; Change management

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## 1- Research context

In the recent years important changes have been taking places: globalisation and digitalisation are most likely the two phenomena that have been featuring the economy and the way to conduct business.

The worldwide social and political new equilibrium has meant a progressive transformation of economic systems and globalisation of markets of goods, labour and financial resources as well as new ways for organisations to compete and innovate. Further, the progresses in science and technology, the extensive use of Internet and web-technologies, gave rise to business models based on the organisation ability to manage information, intrinsically different from what known thus far.

The context of the present research is defined along two subject matters: the information economy, and management control and its transformation.

The information economy is about two complementary goods that are information and the associated technology [Shapiro and Varian, 1999]. Information is anything that can be digitalized, e.g. encoded as a stream of bits. Technology is the infrastructure that allows information to be used.

Impacts of information economy are massive on markets, organisation and society. Nonetheless, the scope of our research is bounded to relevant research streams such as those which studied the consequences of information economy on strategy [Shapiro and Varian, 1999; Porter, 2001], and on management of information [Evans and Wurster, 1999].

Both issues, strategy and management of information, tie closely into management control, the former, because management control is about achieving goals and objectives, and the latter because the subject matter is information based. As change carries its load of conflicts, costs and misfortune the evidence is that in order to survive any business concern necessitates of managerial tools and processes coherent with the contingency situation. Management control systems, and namely "the formal information based routines and procedures managers use to maintain or alter patterns in organisational activities" [Simons, 1995: 5], incorporate part of those managerial tools and processes.

## 2- Research Objectives

In a context of rapid change, such as that of the information economy, we investigate the management control transformation in terms of drivers of change and processes of change. Which are the drivers of management control transformation and which are the processes of management control transformation are the two fundamental questions which we investigate by providing a literature review highlighting the current state of the art.

Secondly, the research is intended to give theoretical evidence to the patterns of management control transformation. The environment of the information economy provides an excellent context to observe the transformation of management control systems. Particularly, we identify drivers of management control transformation that are deeply and specifically rooted in the information economy, we specify the logical impacts of those drivers onto the management control, as defined by Simons [1995], and finally we classify those drivers in the general drivers of change highlighted in the literature of management control transformation. In so doing, we would like to address another set of fundamental questions, and namely which are the specific drivers of management control transformation in the context of the information economy, which are the impacts of specific drivers of transformation onto the management control, and how are the specific drivers of transformation related to the general drivers of transformation.

We could not come to general conclusions on whether the processes of management control transformation can be specified in the context of the information economy.

### 3. The evolution of the concept of management control

During the recent years an awakening of interest about management control, its definition, role and function has been occurring (Table 1).

The so-called "new economy" played a role in such direction. The "new economy" in fact recalled new markets rules, new business models, new business environment and new management systems. According to a well established general theory of systems, many academics and practitioners started investigating which novelties the new economy would imply onto management control in terms of its new definition, role and function. In our opinion, little has been accomplished over the last few years. The slogan "new economy" created a general expectation of a "major revolution" in all subject matters -management control being just one of them. The revolution did not happen. In the field of management control the disappointment, partly, stemmed out of too many *dot.coms* which did not survive enough to show how their management control systems evolved; partly, because the "survivors" are still in their start-up phase and, therefore, as theorized by Simons [1995: 128], their control requirements are minimal, down to the protection of assets. Protection of assets is carried out by simple means of internal controls, hence, the e-metrics, by itself, is still no evidence of a new model of management control system. Lastly, most of *bricks and mortars* integrated the information technology in their existing technologies, business and management models replicating themselves notwithstanding the new technology.

The "failure" of the new economy seems, however, to mitigate the extent of change and to better direct the scope of management evolutionary studies. The current discussion about the management control transformation happens in such context.

#### 3.1 The early stage of management control

As Anthony [1965:13] defines it, management control is the process by which managers assure that resources are obtained and used effectively and efficiently in the accomplishment of the organisation objectives.

This first definition, which has become as known as critiqued, assumes:

- a) a cybernetic approach to control;
- b) an underlying economic environment, which is proper of Taylorism;
- c) a dominance of accounting in control.

None of these three assumptions, however, are true any longer, and as one by one they lost their relevance, management control changed its emphasis, as argued in the following.

In the late seventies, Hofstede [1978] discussed the poverty of management control: he observed that management control is essentially the field of application of Cybernetics. According to Cybernetics, systems are based on *feedback* or *feed forward* control mechanisms. These control mechanisms imply that: one chooses the objectives, determines to what extent objectives have been achieved, compares objectives with results, and activates a communication flow to evidence unfavourable variances and to start corrective actions (*feed back*) or execute programmed ex-ante corrective actions as known function of environmental disturbances (*feed forward*). All cybernetic systems assume: a) a standard of efficient or effective achievement of objectives, b) measurability of results, c) ability of the system to use the information obtained in confronting a) with b) to start corrective actions. In many organisational situations one or more of the three above assumptions will not occur.

Further, cybernetic control is useless in a situation of complete predictability of phenomena, cybernetic control helps in cases of moderately stochastic phenomena, but certainly cybernetic control is meaningless in the presence of completely undetermined phenomena. The application of cybernetic philosophy to organisational processes which are not cybernetic is, to say the least, inappropriate. The essential elements of non cybernetic phenomena lay intrinsically in their *political* character. In those situations, decisions are based on negotiation and judgement. Politics, as known, is not composed of rational elements: its main ingredients are values, and shared norms.

As for the second assumption, more recently Lorino [1992: 29] describes how the fundamental principles of traditional Taylor's model of control are known just as an illusion. According to Taylor:

- a) performance mechanisms are known and stable over time;
- b) managers have perfect information of the performance mechanisms;
- c) productive performance is itemised as minimization of costs;
- d) total cost is a linear function of the dominant productive factor, typically direct labour.

In the information economy these assumptions do not hold, but neither they have been doing so in last three decades yet in the presence of a lesser degree of information and pace of technological innovation. On the one hand, in fact, the acceleration of the rhythm of innovation [Shapiro and Varian, 1999] and globalisation are factors that leave little room to the hope of stable mechanisms of performance. On the other hand, managers are currently confronted with more and more complex technologies, qualified personnel, extreme degree of specialisation and exponential increase of the information processed and memorised, which is not conducive to perfect information of the performance mechanisms. Further, the supply driven market of last century has become a demand driven market, hence, competition is based less and less on pricing and more on differentiation and innovation. In the current context, therefore, management of financial results cannot be identified only with pure cost management. Lastly, in the information economy the marginal cost is nil and the total cost depends on a number of production factors, as one factor is not longer the dominant one.

Relatively to third assumption brought forward by Anthony [1965], accounting systems constitute the building block of formal management control even though social psychology, rather than economics, forms the basic source discipline on which management control rests. In fact, Lowe and Puxty [1989: 11] argue that little of social psychology is seen in Anthony [1965], and in addition Otley [1989: 35] states that management control in Anthony [1965] is management accounting.

A lively debate has been going on in the eighties, building on previous studies about the political dimension of decision making processes [Cyert and March, 1963; March and Olsen, 1976]. Robson and Cooper [1989: 79-99] well take and further develop the essential recognition of Hofstede [1978], when he argues that the essential elements of non cybernetic phenomena lay intrinsically in their political character, and decisions are based on negotiation and judgement. According to Robson and Cooper [1989], who discuss the relationship between power and management control, the traditional literature on management control ignores the issues of power and conflict and treats organisations as unitary entities with well defined and essentially agreed purposes. For example, influential management control texts such as Anthony *et al.* [1983], and Maciariello [1984] rarely even mention terms such as power or conflicts.

Robson and Cooper [1989] analyse the influence on management control of four paradigms on power: the first one, "*the subjectivist approach*," looking for the subject of power by asking "who has power"; the second one, "*the integration approach*," looking for the power to command things and focusing on social integration by asking the question "power to do what"; the third one, "*the historical materialism approach*," looking at the production of systems of power, and asking "what are the sources and effects of power"; the fourth one, referred to as "*the analytics of relations of power*", focusing on the specific technologies by which power is exercised through its intersection with knowledge. Those studies that identify power as a significant element in management control practices are to be appreciated for various reasons, and namely for:

- a) recognising organisations as contested terrains both between managers, and between managers and the workforce in the subjectivist approach;
- b) emphasising legitimate authority and the deterministic nature of managerial activity (e.g. superior and subordinate relationships, forms of managerial structures in the organisation or the organisational chart) in the integration approach;
- c) questioning the organisational goals and the role of management in achieving such goals in the historical materialist approach;
- d) emphasising the role of power as providing the medium for the reproduction of modes of domination in society be they economic, nation-state, ethnic, or whatever in the analytics of relations of power.

### 3.2 The contingency approach to management control

The lively debate of the late seventies carried on during the eighties and early nineties originated the "contingency approach" of management control. According to the contingency approach, the most appropriate control system for an organisation depends upon certain contingent variables, that is the system must be matched with circumstances [Otley, 1987: 8-9]. Many advocates of the contingency approach contributed to identify the contingent variables [Scapens and Arnold, 1986; Hopwood 1989, 1988, 1972; Bromwich and Hopwood, 1994, 1986, 1981], whereas other academics added on discussing many various aspects [Ashton, Hopper, and Scapens, 1991]. The major contingent variables that have been suggested to date are (Table 2):

- a) the demands of key stakeholders [Maciariello and Kirby, 1994; Merchant 1998; Groot and Lukka, 2000];
- b) the nature (predictability) of the environment in which the organisation is set, the types of task it undertakes and the technology it utilises [Amigoni 1977; Otley, 1987; Maciariello and Kirby, 1994; Anthony, Reece and Hertenstein, 1995; Merchant 1998; Simons, 2000; Groot and Lukka, 2000]
- c) the competitiveness of markets and the availability or access to scarce resources [Maciariello and Kirby, 1994; Merchant 1998; Groot and Lukka, 2000]
- d) the culture in which the organisation operates, both in terms of national characteristics and the internal organisational culture [Amigoni 1977; Otley, 1987; Anthony, Reece and Hertenstein, 1995; Merchant 1998; Simons 2000; Groot and Lukka, 2000];
- e) the strategy the organisation is attempting to pursue [Amigoni 1977; Otley, 1987; Maciariello and Kirby, 1994; Merchant 1998];
- f) the organisation structure adopted [Amigoni 1977; Otley, 1987; Anthony, Reece and Hertenstein, 1995; Merchant 1998];
- g) the use of information [Simons, 2000];
- h) the choice of what to control based on technical feasibility of monitoring [Simons, 2000].

According to Bernardi [1987: 18], the contributions of the contingency theory compete against its limitations. According to the author the quality of the contingency theory lies in the methodology applied, the highly descriptive power of the theory, the normative usefulness of some theoretical results, the recognition of academics and practitioners. Nonetheless, the theory has some limitations as it has not been validated with robust empirical evidence. Particularly, some critics argue that, notwithstanding the particularistic approach, the contingency theory is based on universal rules and presumably the descriptive/diagnostic dimension of the theory coincides with the normative one. In other words, the theory assumes that there is no difference between "what it is" and "what it should be". In this aspect, the contingency approach does not evolve from the previous early stage models of management control inasmuch it fails to consider the relationships between control and exercise of power. As an example, the process of organisational design is seen by the contingency theory as a rational and deterministic process of organisational optimisation. However, a conception of such a kind does not consider as crucial the dimension of organisational change, which is intrinsically tied to the exercise of power.

A recent systematic study has considered the performance management systems in over 70 large UK companies, in order to relate those systems to the planning and control systems [Cooper *et al.*, 2001: 109-119]. For the purpose of the study, the sample of companies has been clustered into three distinct groups: companies which adopted the Value Based Management philosophy (VBM companies), companies oriented towards meeting the stakeholders' expectations, and traditional companies, e.g. the residual companies. The evidence shows that the three approaches are different in emphasis and in the measurement, control, and reward systems used. It equally shows, however, that even within each category, there is a great deal of diversity within the planning and control systems between one organisation and another. This diversity, hence, cannot be explained by the philosophy adopted, e.g. VBM, stakeholders' expectations, traditional. On the contrary, the variations observed in this study would seem to provide support for the contingency theory, as the researchers argue that the emphasis of any particular organisation depends upon a combination of its culture, objectives, and operating environment. Indeed, certain group of companies appear to have a propensity toward one type of planning and control system rather than another. This is only true, however, for some companies, as the choice of system adopted is not always apparent from this general theory. According to the research of Cooper *et al.* [2001] there are circumstances

that inhibit or alter the prescriptions of contingency theory and, as such, they are also motivating factors for change. These circumstances are a) "the me too factor", e.g. emulative behaviour in the adoption of particular management control design or tool; b) the product championship, e.g. the familiarity or personal preference of most senior managers towards a particular design, or technique; c) the organisation performance, e.g. because inadequacies of its current techniques for evaluating decisions are realised or because of the disastrous overall performance [Cooper *et al.*, 2001: 109-119].

**Table 1:** Management control: definition and elements

Author [year]	Definition	Elements
Anthony [1965: 13]	<i>Management control is the process by which managers assures that resources are obtained and used effectively and efficiently in the accomplishment of the organisation objectives.</i>	The overall planning and control function is formed of three independent though interrelated areas: Strategic Planning, Management Control, and Operational Control.
Amigoni [1977: 39 ]	<p><i>Management control systems:</i></p> <ul style="list-style-type: none"> <li><i>a) signal relevant information</i></li> <li><i>b) activate actions in response to the signals</i></li> <li><i>c) evaluate the results of actions and feed-back</i></li> </ul>	An ad-hoc mix of control tools such as financial accounting, simulation, budgeting, forecasting, reporting, cost accounting, responsibility accounting, capital budgeting, planning and strategic planning allows to create a management control systems, whose features are in line with the ideal system ( <b>Table 2</b> ).
Lebas and Weigenstien [1986: 25]	<b>Management control</b> is the process by which an organisation ensures that its subunits act in a coordinated and cooperative fashion, so that resources will be obtained and optimally allocated in order to achieve the organisation's goals.	Not available
Otley [1987: 14]	<b>Management control system</b> can be seen as a set of control mechanisms designed to help organisation regulate themselves.	Not available
Maciariello and Kirby [1994: 1-10]	<p>A <b>management control systems</b> is a set of interrelated communication structures that facilitates the processing of information for the purpose of assisting managers in coordinating the parts and attaining the purposes of an organisation on a continuous basis.</p> <p>The <b>purpose of management control system</b> is to assist management in the coordination of the parts of an organisation and the steering of those parts towards the achievement of its overall purposes, goals and objectives.</p>	<p>The <i>formal structure</i> is the relatively permanent part of a control system. It consists of the following sub-systems:</p> <ul style="list-style-type: none"> <li>- management style and culture of organisation</li> <li>- infrastructure</li> <li>- rewards</li> <li>- coordination and integration</li> <li>- control process</li> </ul> <p>A companion set of systems to the formal are the <i>informal systems</i>. Informal systems complements the formal systems in a manner similar to the way informal organisation complements the formal organisation.</p>



Author [year]	Definition	Elements
Anthony, Reece, and Hertenstein [1995: 757]	<p><b>Management control</b> is the process by which managers influence members of the organisation to implement the organisation's strategies efficiently and effectively.</p> <p>Much of the <b>management control process</b> involves informal communication and interactions. Although these informal activities are of great importance, they defy a systematic description. Besides these informal activities, most organisations also have a formal management control system consisting of: strategic planning, budgeting, measuring and reporting, evaluation.</p>	Same as Anthony 1965
Anthony and Govindarajan [1995: 15]	<p><b>Management control</b> relates to broad type of activities, and manager decides what is to be done within the general constraints of strategies.</p>	Same as Anthony 1965
Simons [1995: 5]	<p><b>Management control systems</b> are the formal, information based routines and procedures managers use to maintain or alter patterns in organisational activities.</p>	Levers of control: <ol style="list-style-type: none"> <li>1. Beliefs systems</li> <li>2. Boundary systems</li> <li>3. Interactive control systems</li> <li>4. Diagnostic control systems</li> </ol>

Author [year]	Definition	Elements
Merchant [1998: 4-5; 13]	<i>In the broadest sense, control systems can be viewed as having two basic functions: strategic control and management control. Strategic control involves managers addressing the question: Is our strategy still valid in the changing environment? Management control involves addressing the general question: Are our employees likely to behave appropriately?</i>	<i>The collection of control mechanisms (action control, results control, and personnel/cultural control) that are used to control problems that cannot be avoided is generally referred to as <b>control system</b>.</i>
Groot and Lukka [2000: 1]	<i><b>Management accounting</b> is the business function that aims at providing information to assist managers in their planning and control activity (*).</i>	The scope of management accounting therefore extends beyond the traditional transaction-based financial information provided by the book-keeping system to include also non-financial and prospective information about current and future capacities and performance.

(\*) Even though mention is made to management accounting, the empirical study of Groot and Lukka often refers to management control. Further, its mention is justified by its innovativeness and its representativeness of the case studies included in the book.

**Table 2:** Factors affecting management control design

Author [year]	Factors
Anthony [1965: 13]	Factors affecting the accounting system design.
Amigoni [1977: 38-53]	Management control systems are influenced by: a) organisational complexity or 1) the number of area of results and their interactions, and 2) the number of responsibility centres and their interactions b) degree of environmental discontinuity e.g. rapidity and predictability of change
Lebas and Weigenstien [1986]	Not available.
Otley [1987]	Not available.
Maciariello and Kirby [1994: 78-79]	The importance of identifying these relatively few variables that are crucial to the attainment of strategy, goals, and objectives is ultimately derived from the limited information-processing ability of the manager. We call these crucial variables “key variables” or “key success factors”. Key success variables are those variables in the external environment to which the goals objectives and strategy of managers are most sensitive. Key variables come from five sources: <ul style="list-style-type: none"> <li>- industry characteristics</li> <li>- competitive strategy</li> <li>- environmental forces (economy and political climate)</li> <li>- significant problems with key stakeholders</li> <li>- functional issues (for example, interest rates for the treasurer).</li> </ul> It is important that control system designers establish critical success factors that help managers achieve their subunit goals while also minimizing the sub-optimisation to overall corporate goals.
Anthony, Reece, and Hertenstein [1995: 761]	The environment – namely its uncertainty - in which organisation operates affects the nature of its management control system. An organisation that operates in a relatively uncertain environment relies more on the informal judgement than on its formal management control system. Four facets of the management control <b>environment</b> are as follows: <ul style="list-style-type: none"> <li>- the nature of the organisations</li> <li>- the rules, guidelines, and procedures that govern the actions of the organisation’s members</li> <li>- the organisation’s culture</li> <li>- the external environment</li> </ul>
Anthony and Govindarajan [1995]	Not available



Author [year]	Factors
Merchant [1998: 729]	<p>Situational factors relevant in some management control systems situations:</p> <p><b>a) organisation and people factors</b>  organisational form  ownership structure  organisation structure  degree of diversification  organisational interdependence  industry  assets specificity / decision reversibility  organisational performance  debt covenants  information asymmetry between superiors and subordinates  corporate culture  organisational resources (stress)</p> <p><b>b) mission and strategy factors</b>  diversification (corporate) strategy  strategic mission  business (competitive) strategy  critical factor of success</p> <p><b>c) environmental and technological factors</b>  national culture and infrastructure  regional culture  environmental uncertainty  environmental stability  environmental complexity  intensity of competition  government regulatory environment  task programmability  length of production cycle  length of sale cycle  decision reversibility  stability of product line  production technologies  production routineness  production interdependencies  pace of technological change  research and development intensity  business risk</p> <p>Three situational factors are of the utmost importance on management control system design:</p> <p>a) uncertainty (difficulty or impossibility to predict the future) /lack of programmability (lack of understanding of the means-end relationships)  b) corporate (diversification) strategy (the setting of corporate strategy determines what business a company wants to be in, and how resources should be allocated between those businesses activities)  c) business strategy it encompasses two related concepts: strategic mission, and competitive strategy)</p>

Author [year]	Factors
Groot and Lukka [2000: 1]	Business environment stability and predictability influenced by: <ul style="list-style-type: none"> <li>a) demands from shareholders, customers, employees, and the public at large</li> <li>b) competitiveness of markets</li> <li>c) pace of technological innovation</li> </ul>
Simons [2000: 59-74]	Performance measurement and control information can be understood only by reference to: <ul style="list-style-type: none"> <li>a) some model of underlying organisational processes</li> <li>b) the choice of what to control based on technical feasibility of monitoring or measurement, on understanding of cause effect, on cost, on desired level of innovation</li> <li>c) uses of information (decision making, control, signalling, education and learning, external communication)</li> </ul>

### 3.3 Alternative approaches to management control

According to Bernardi [1987: 19] the surpass of the contingency theory has followed two streams: a) the paradigm internal evolution; b) a new paradigm.

The academics which opted for the first solution focused on the attempt to merge the normative and diagnostic dimension of the model by hyper-rationalising the approach. They came up with interminable check-list of variables that ignores the interdependencies among variables, such as it is visible in Merchant [1998: 729] (**Table 1**).

Other academics, suggesting a new paradigm, meant to define a paradigm according to which change is a process intrinsically richer in factors and determinants than what postulated by the rational model underlying the contingency theory. The general theory of systems cannot account for many aspects: the social psychology elements, the multiplicity and the indeterminateness of goals and objectives, the informal matrix of organisational power, the constant redefinition of the organisational structure [Bernardi, 1987: 20]. The attempt of Maciariello and Kirby [1994: 1-23] (**Table 1**) to define the management control as formal and informal management control systems, which are mutually supportive, is a very good example of the surpass of the contingency theory.

On a more practical ground, however, we cannot say that a new paradigm is there yet: trends and new directions are set for. Lorino [1992: 30-40] effectively summarises those trends and directions, when he suggests that management control systems should:

- a) focus on value management, as the shareholders play a prominent role among stakeholders;
- b) manage change on a continuous basis, the system is, hence, adaptive;
- c) diagnose permanently or else the system is information based;
- d) assume limited rationality and therefore accept judgement as opposed to economic rationality in decision making;
- e) manage information asymmetries between superiors and subordinates, e.g. accept the existence of the informal side of the organisation, recognise the role of power of politics in the organisational environment.

Simons [1994: 5] (**Table 3**), in his attempt to systematise those trends, suggests that the tension between old models and new models reflects a deeper tension between basic philosophies of control and management. He observes that: old top down strategy are confronted with new customer/market driven strategy; standardisation has been overcome by customisation; management according to plan is substituted by the continuous improvement philosophy; the "keeping things on track" idea is contrasted with the "meeting customer needs policy"; control has shifted from "no surprise" to empowerment. Hence, Simons poses questions about how organisations, that desire continuous innovation and market driven strategies, could balance the use of management controls that are designed to ensure "no surprises"; further about how empowerment and customisation could be reconciled with management controls that seek to standardise and ensure that outcomes are according to plan. From a descriptive viewpoint, Simons' model of four levers of control is convincing. The model suggests that managers control strategy using four basic levers: beliefs systems, boundary systems, diagnostic control systems, and interactive control systems. The solution to balancing the above tensions lies not only on the technical design of these systems but, more important, in an understanding of how effective managers use these systems.

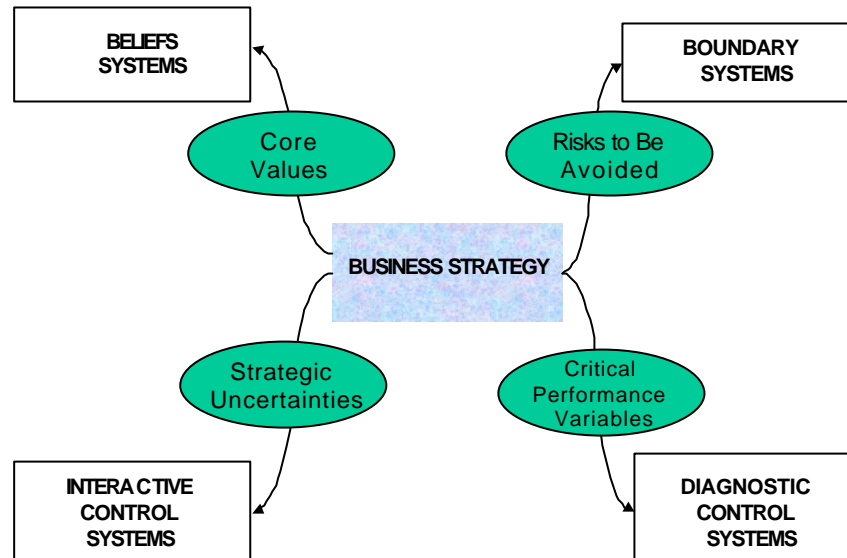
The levers are:

- a) belief system, used to inspire and direct the search for new opportunities, is the explicit set or organisational definitions that senior managers communicate formally and reinforce systematically to provide basic values, purpose, and direction from the organisation;
- b) boundary system, used to set limits -based on defined business risks- to opportunity seeking behaviour, delineates the acceptable domain of activity for organisational participants;
- c) diagnostic control systems, used to motivate, monitor and reward achievement of specified goals, are the feedback systems, which are the backbone of traditional management control. They are designed to ensure predictable goal achievement;

- d) interactive control systems, used to simulate organisational learning and the emergence of new ideas and strategies, are formal information systems manager use to involve themselves regularly and personally in the decision making of subordinates.

The four levers create the opposing forces of effective strategy implementation and further formulation.

**Table 3:** Levers of control as opposite to management control system



Source: Simon R., 1995, *Levers of Control*, HBSP, Boston (MA), p. 7

#### 4. Management control transformation

The frame suggested by Simons has some distinctive features and some limitations.

Firstly, Simons, by introducing a process model of relationships between management control systems and strategy, calls for a closer relationship between strategy and management control, implying that management control is also an input in the process of strategy formulation. Almqvist and Skoog [2000: 8] share our opinion. That management control systems have traditionally been conceptualised in terms of implementing an organisation's strategy is certainly a misconception [Simons, 1990] and that perspective has a weakness in that it fails to recognise the power of management control systems in the strategy formulation process.

Secondly, Simons distinguishes between management control and management control system. Management control is a process attained by the combined and simultaneous balancing of various levers of control. Hence, the role of management control systems, i.e. the formal, information based routines used by managers to maintain or alter patterns in organisational activities, is certainly bounded for achieving management control. This distinction, made clear in the model, accommodates for the longstanding criticism towards the Harvard school of thought, which has frequently been accused of being accounting-based and hype-rationalistic.

Thirdly, the model underlies some degree of informality. Informality cannot be attributed to the management control system per se, nor it can be referred to the four levers of control (diagnostic, interactive, boundaries and beliefs systems). The formal/informal side of management control has to do with the activation of levers of control, which may be formal, codified, programmed or informal, non codified, non programmed. Simons [1995: 37] commenting the usefulness of beliefs system states: "For managers who are engineering organisational change, formal beliefs systems are vital. A new vision can help to attract and unite followers (...). Still many of the benefits of



creating formal beliefs systems flow from the discussion necessary to communicate and understand these beliefs rather than from credos or statement themselves."

Lastly, the model enables for change (diagnostic and interactive) and assume a dynamic balancing of levers of control.

The model is also limited. Its main limitation lies in the failure to delineate the concepts and the processes of organisational change underlying management control transformation. Ignoring the transformation dimension, one will not be able to describe management control within an organisation and the main question "how and why organisation management control becomes what it is over time" remains unresolved.

Some authors [Bromwich and Bhimani, 1989, 1994; Macintosh and Scapens, 1991; Burns and Scapens, 2000] begun to throw some light on it in a more rigorous way than what has been done in the past so to recognise the transforming, dynamic, nature of management control.

The issue is certainly not easy to handle as it adds complexity to the picture. Nonetheless, the direction is set, and it needs to be investigated in the light of the early critique that has been reported in this paragraph.

The critique of application of Cybernetics to management control suggests some insights into transformation of management control.

In the early stage of definition of management control, cybernetic control adequately supported the need for organisation control. The organisational model underlying control was Talyor's one [Lorino, 1992: 29], and, namely, the model reasonably assumed a managers' full command of means-end relationship, stable over time. The organisational process was hypothesised as a summation of moderately stochastic phenomena, and Hofstede [1979] suggested that these phenomena were effectively controlled by means of feed-back and feed-forward mechanisms.

The reaction to a mechanistic application of Cybernetics, even in the presence of situation far from what hypothesised, meant that the lessons from Cybernetics were harshly criticised (see paragraphs: 3.1 and 3.3). Homeostasis and organisational chaos was the reaction.

After about twenty years is clear that lessons from both Cybernetics and Homeostasis are important, and one discipline does not exclude the other one: both are essential to describe the existing status of management control. However, in what are they essential? Management control adapts constantly to what need to be controlled, and, therefore, mixes different types of control, swinging in emphasis from cybernetic control (see after structured level) to homeostatic control (see after judgement level). At a given point in time, management control results as the outcome of the transformation process which is undergoing.

The additional point that we need to investigate is the role of situational factors in management control transformation. Suggestions on management control and its transformation can be taken from the contingency theory.

The contingency theory has been criticised because of its normative character. The explicative power of the theory is high [Bernardi, 1987:18], nonetheless the theory has not been validated with complete empirical evidence. We believe this is an obvious result, if we assume management control as a process and not as an outcome. From the process perspective, situational factors could be better seen as drivers of change (paragraph 4.1.)

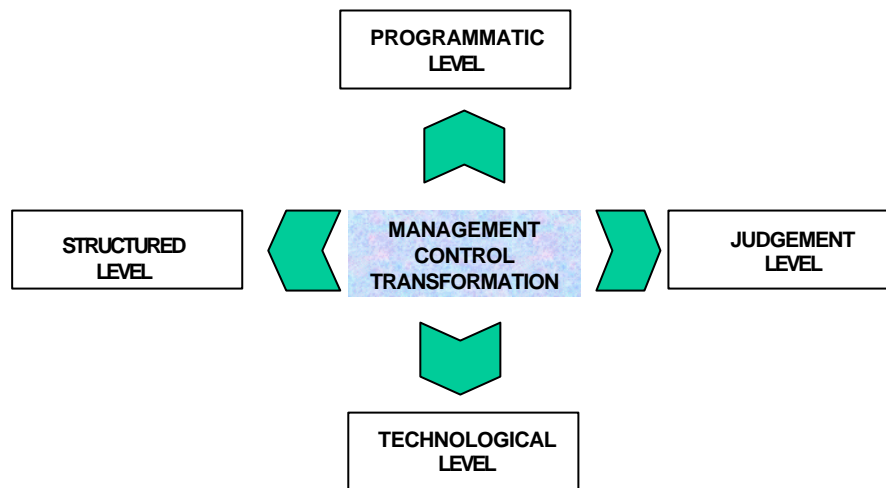
#### **4.1 Processes of change**

Drivers of change are just one dimension of management control transformation. The process of change is the other side of management control transformation. However, little research attention has been given to understand the process through which new management control systems have emerged through time. According to Almqvist and Skoog [2001] much of the existing research focuses on management control transformation as an outcome, while rather less research has

investigated how and why organisation management control becomes what it is over time, e.g. management control transformation as a process.

Almqvist and Skoog [2001] suggest that fruitful perspectives, that could be used to observe management control transformation in organisations, are the programmatic-technological dimension and the judgement-structured dimension (Table 4).

**Table 4:** Processes of management control transformation



Source: Almqvist & Skoog, 2001, *Management Control Transformation*, working paper, p. 13, EAA, Athens.

As per the first dimension – programmatic-technological dimension - the authors observe that, on the one hand, is the conceptual level of transformation, and on the other hand is the practical level. Often transformations in the organisation or in the management control are initiated through programmes of certain concepts and ideas of how the organisation should be managed and structured. In general, programmes are related to normative concepts and ideas, which often promote a transformation within a specific practice. Sometimes ideas and practice (which respectively belong to programmatic and technological levels) harmonise, sometimes they do not. Therefore, to understand management control transformation in organisations it is important to distinguish the idea or concept of management control transformation from its phenomenon or practice. The programmatic level of management control is programmatic, because of its effort to transform practice and routines in the organisation and because it is characterized by the hopeful aspect that the organisation could be managed better. The common characteristics of the concepts mentioned above are that they call for more and expanded management through increasing visibility, transparency and measurability. This has promoted a technological construction of more variables and performance measures transforming existing management technologies and systems towards an extended amount of controllable objects within the organisation.

Secondarily, management control transformation comes along the lines of a judgement-structured dimension. According to Almqvist and Skoog [2001: 9] it is fruitful to relate the structured –based and judgement-based levels to programmed and non programmed activities. Programmed activities occur when a good predictive model of process being controlled is available. Hofstede [1979] would refer to that situation as moderately stochastic phenomena. In other words, for these activities to be successful, a great deal of stability in both the external environment and the internal behaviour is assumed. Non-programmed activities are more explicitly directed towards uncertainty – uncertainty in the sense that contingency factors at some point in time render

management decision making task more or less programmed. All kind of decisions and activities will require a degree of intuition, judgement and discretion [Hofstede, 1979; Maciariello and Kirby, 1994].

One principal difference between the levels within this dimension is that by transforming the information constructed from face-to-face interactions through codifying, classifying, and systemising processes into structured forms, the information is to become more tangible and manageable, and hence more deployable across the organisation [Simons, 1995: 185; Evans and Wurster, 1999]. The other major differences are related to transferability and continuity of the information.

#### 4.2 Drivers of change

Drivers of change are actions, developments, actors and (changes in) circumstances that cause, provoke or facilitate changes processes that take place [Groot and Lukka, 2000: 6]. According to Innes and Mitchell [1990] drivers of change can be distinguished into three categories: facilitators, motivators and catalysts. *Facilitators* comprise a set of factors conducive to change: they are necessary, but in themselves not sufficient for change to occur. *Motivators* are factors that influence change processes in a general manner: they provide decision makers the reasons and the grounds to initiate and permit change. *Catalysts* contain factors directly related to timing of change: they are occurrences which lead directly to the initiation of change. They provide the opportunity for change to take place. Facilitators, motivators and catalysts need not to be related to each other as they occur. *Obstructors*, as opposite to facilitators, work in as sense contrary to facilitators: they contain set of condition blocking, hindering or delaying change processes. Examples are complex decision processes and forces of structural inertia [Hannan and Freeman, 1984].

As per what argued in the present paragraph, we believe that situational factors (paragraph 3:2) identified in the contingency theory well define the types of drivers of change as of today. All those drivers of change facilitate or accelerate the transformation of the management control.

#### 5. Drivers of change: perspectives from the information economy

In our analysis the characteristics of the information economy, observable on the information side and the technology side, are analysed in what they play a role in the management control transformation. We argue, in fact, that basic phenomena of the information economy are drivers of management control transformation, as they stimulate a process of change within the elements of management control. To develop this idea, we assume as a reference the Simons' model of levers of control [Simons, 1995], and we analyse the potential impact of each information economy characteristic onto the levers of control. Particularly, our analysis argues that the information economy characteristics are likely to be controlled by means of a specific balancing of the levers of control. Hence, the information economy characteristics, having an impact on the balancing of the levers of control, are considered as drivers of change.

The results of this theoretical analysis are quite interesting. The results evidence that the information economy characteristics originating from the technology side are more likely to impact onto the beliefs systems and the boundary systems, than onto the diagnostic control systems and the interactive control systems. On the opposite, the information economy characteristics originating from the information side behave in an opposite way.

Finally, other more general drivers (namely ambiguity of decision making, compensation plans, initial public offering, and mergers and acquisitions) can be associated to the organisations of the information economy, even though they can be also referred to more traditional organisations. Nonetheless, we report them as relevant to our research context. Our analysis shows the impacts of these more general drivers onto the four levers of control.

The results of our analysis are briefly summarized in **Table 5**.

**Table 5:** Fundamental impacts of the information economy characteristics on the levers of control

	Information economy characteristics	Levers of control			
		Beliefs systems	Boundary systems	Interactive control systems	Diagnostic control systems
Technology side	Co-opetition	X	X		
	Lock-in and switching costs	X	X		
	Network effects	X	X		
	MCSs' technology			X	X
Information side	Cost of producing information	X	X	X	X
	Versioning and price differentiation			X	X
	Intellectual property	X	X		
	Information as experience goods			X	X
	Attention economy			X	X
	Interdependence			X	X
Other	Ambiguity of decision making	X	X	X	X
	Compensation plans			X	X
	IPO	X	X	X	X
	Mergers and acquisitions	X	X	X	X

### 5.1 The technology side

#### Co-opetition

Co-opetition allows organisations to simultaneously compete and co-operate respectively against and with each others [Brandenburger and Nalebuff, 1986]. The phenomenon of co-opetition is certainly not new, however, is very extraordinarily important nowadays. One evident example is given by portals, whose unique value proposition is the convenience they offer users by aggregating and organizing a vast array of contents, commerce, and applications developed by others [Eisenmann and Pothen, 2000]. To reach this purpose, portals develop frequent partnership agreements with retailers, aiming at sharing the revenues originated by e-commerce. Portals often partner also with Internet Service Providers to provide their subscribers with a start page. This is done by pre-programming the portal's home page to launch whenever a subscriber installs the Internet service provider's software. Consequently, the portal and the Internet service provider may split the ad and e-commerce revenues generated through the home page.

Hence, in the information economy, the players of the competitive system are complementors as well as competitors, suppliers, customers. According to Brandenburger and Nalebuff [1996] a complementor is when "customers value your product more when they have the other player's product than when they have your product alone" or when "it's more attractive for a supplier to provide resources to you when it's also supplying the other player than when it's supplying you alone".

As complementors become more and more relevant, "forming alliances, cultivating partners, and ensuring compatibility (or lack of compatibility!) are critical business decisions" [Shapiro and Varian, 1999]. This is to say that strategy formulation must focus not only on the firm competitors but also on its complementors. This kind of decisions contribute to frame the strategic domain of the organisation, and impact on its opportunity-seeking behaviour, hence, it is important to devote the right attention to the development of an articulated relationship management, addressed to both competitors and complementors. In terms of levers of control, co-opetition impacts both on the beliefs systems and on the boundary systems.

## **Lock-in and switching cost**

Lock-in arises whenever users invest in multiple complementary and durable assets specific to a particular information technology system [Shapiro and Varian, 1999]. Switching costs are the costs involved with a change in the information technology system; costs associated to new hardware, software, and wetware (the knowledge that, once it is reached, enables to use the hardware and the software).

Lock-in and switching costs are recurring in the information economy. A typical example of lock-in concerns operating systems running specialized software and requiring specific hardware: the substitution of this information technology system may arise huge switching costs, as both the hardware and the related operating system have to be changed. This kind of lock-in occurs on two different levels: customers are locked into the specific information system, and vendors are locked to their software suppliers too. The market for on-line services provides an example of "small" switching costs, and of their large market impact. In fact, changing from an Internet service provider to another one requires changing one's email address. If the incumbent Internet service provider refuses to forward mail sent to an old address, these switching costs are not irrelevant.

Managing the lock-in is a very critical issues as it requires to recognize lock-in, protect the organisation from its adverse effects, and use it to advantage the organisation [Shapiro and Varian, 1999]. Indeed, lock-in can be a source of both success, and failure. To manage this phenomenon, it is fundamental to fully anticipate future switching costs: in fact, these costs are difficult to measure, but they are predictable as present investments determine future switching costs. It is, therefore, important to think strategically, and successfully trading off organisation's future options and information technology system to be used, or in other words profitable opportunities and risks to be avoided. Hence, levers through which organisations control lock-in and switching costs are embedded in the beliefs systems and in the boundary systems.

## **Network effects**

The concept of network effect is related to the phenomenon according to which the value of a product or service to one user depends on the number of other users [Shapiro and Varian, 1999]. This kind of effect is certainly typical for all communication technologies. For example, portals are subject to network effects with those services that are based on connectivity (e.g. chat, instant messaging, auctions) [Eisenmann and Pothén, 2000]. In addition, there are also powerful network effects in "virtual" networks, such as the network of users of Macintosh computers. The maximum expression of a successful network effects is the development of a standard system.

The consequence of this kind of effects is that technology selection represents a relevant strategic issue, for both users and producers. From an user viewpoint, technology selection ties up future compatibility decisions and related possible partnerships. From a producer viewpoint, introducing a technology means competing to become the standard, or at least to achieve a critical mass of users. However, having a superior technology is not a sufficient condition to impose standard systems. There are other critical factors of success in competing for standard setting [Shapiro and Varian, 1999]: attracting partnerships with well-established complementary products (eg. Microsoft and Intel), managing consumer expectations (e.g. through competitive pre-announcements of a product appearance on the market), and choosing the timing of strategic moves (eg. being a leader or a follower). In fact, these critical factors of success are widely related to the organisation's opportunity-seeking process, because their definition requires a deep understanding of the strategic domain and a clear positioning within it. As a result, network effects impact on the beliefs systems and the boundary systems.

## **Technology to support management control systems**

Improvements in information technology have had and will continue to have profound effects upon the efficiency and effectiveness of management control systems. By technology to support management control systems it is meant any technology (software, hardware, and wetware) which supports the information processed within management control systems. Particularly, some related attributes of information, depending on technology, are codification and diffusion [Simons,

1995]. Information codification concerns structuring information by categorizing and compressing data into aggregated formats, while information diffusion concerns the degree of information sharing within an organisation. A typical example of technology, supporting highly codified and diffused controlling information, is the ERP technology [Amigoni and Beretta, 1998]. Information codification and diffusion, in turn, affect other information attributes, namely the information availability, stability, transferability, and continuity [Almqvist and Skoog, 2001].

In terms of levers of control, the question is whether and how the new technology supporting management control systems influence the four levers of control, as it affects the above information attributes. Our analysis shows that, unlike the other technological characteristics analysed before, technology supporting management control systems mainly influences the diagnostic and the interactive control systems.

Diagnostic control systems, aiming at measuring and monitoring the progress of critical performance variables against plans, need highly codified and diffused information. This is true, particularly, as long as both the environmental ambiguity and the organisational complexity increase. In these situations, improvements in information technology facilitate to “bring unity out of diversity” [Maciariello and Kirby, 1994: 54]. This is to say that improvements in IT permit a broader span of managerial control, thus permitting the elimination of many layers of the organisation and reducing the filtering of information that occurs as information passes from one level of the organisation to another.

With respect to the interactive control systems, improvements in information technology affect the availability of information for supporting operational and strategic decision making. The rapid decrease in the cost of information processing is very apparent as the automatic performance measurement systems are being designed into production equipment and into service operations [Maciariello and Kirby, 1994: 54]. Consequently, this can increase the access to real time data about market dynamics and profitability trends, improving the interactive control actions.

## **5.2 The information side**

### **The cost of producing information**

The cost structure of an information supplier is characterized by high fixed costs and low marginal costs, that is to say information is costly to produce but cheap to reproduce [Shapiro and Varian, 1999]. Consequently, it is firstly important to define the right size of production capacity, as investment costs are sunk costs, e.g. costs that are not recoverable whatever future operating actions will happen. Decision making focused on production capacity sizing is very much related to some technological elements that have been previously discussed (e.g. lock-in and network effects), with a consequent main impact on beliefs systems and boundary systems.

Once the production capacity sizing has been defined, the main issue concerns production capacity exploitation, and absorbing the initial investment by increasing volume through reuse and resale becomes the critical success factor. In terms of levers of control, the key problem is controlling the actual production capacity utilisation through specific measures developed by the diagnostic control systems (e.g. volume variances). Secondly, interactive control systems focus on monitoring potential alternative future exploitation with respect to the emerging strategic uncertainties.

### **Differential pricing and versioning**

One of the fundamental implication of the production cost structure of information goods concerns pricing strategy [Shapiro and Varian, 1999]. Indeed, cost-based pricing doesn't work for information goods. On the contrary, pricing of information goods is based on consumer value, that is to say that differential pricing will be used. Differential pricing allows the organisation to exploit the production capacity over different market segments that will pay different prices for different versions of the same information goods. Consequently, profitability can be increased by means of two levers: firstly, by maximising the total contribution margin of a product by exploiting differential pricing,

and secondly by reducing average cost by means of an increased volume through reuse and resale.

One of the fundamental pre-requisite of this pricing strategy is based on a deep customer profiling. Customer profiling can be obtained in two main ways: registration and billing, allowing to collect personal profiles; observation, aiming at arguing virtual consumer behaviour by analysing customer search queries and "clickstream" [Shapiro and Varian, 1999]. This information represents a basic metric developed within either the diagnostic control systems, and the interactive control systems, respectively for diagnosing the economics of the policy of differential pricing and versioning, and for monitoring future strategic uncertainties.

### **The relevance of intellectual property**

As the marginal cost of reproducing an information is very low, a typical characteristic of the information economy is the defensibility of intellectual property. With the advent of Internet, this topic has become much more relevant, as a current dramatic reduction in costs of copying and distribution may offer a relevant opportunity for owners of intellectual contents, mainly in terms of creative use of informational free samples, limited in scope, convenience, quality and/or quantity. Indeed, the intellectual property is a fundamental issue in the information economy, as it mainly concerns striking the right balance between the value returned to innovators and the innovation diffusion by means of information technologies [Poynder, 2001]. From the creator point of view, the problem is managing the "appropriation system", eg. the terms and conditions influencing how to distribute the profitability generated by an innovation [Grant, 1998]. If the appropriation system is "strong", then the innovator is able to retain a substantial profitability share. On the contrary, if the appropriation system is "low", then profitability is shared among different actors beside the innovator, such as suppliers, users, and imitators.

The appropriation degree of the profitability generated by an innovation depends at least on four factors, that are: intellectual property rights; complementary resources; innovation complexity and transferability; lead time [Grant, 1998]. Managing the intellectual property means managing the above four factors in order to maximise the intellectual property value, besides its protection through proper intellectual property rights [Shapiro and Varian, 1999]. For instance, the availability of resources required to distribute the innovation over different segment markets is a fundamental example of complementary resources. In terms of levers of control, an organisation needs to define its strategic domain with respect to the above four factors (namely, intellectual property rights, complementary resources, innovation complexity and transferability, and lead time), by acting on both its core values and beliefs (beliefs systems) and risks to be avoided (boundary systems).

### **Information as "experience goods"**

Information goods are experience goods, as customers must experience them to value them, and this characteristic is present every time information goods are consumed [Shapiro and Varian, 1999]. Consequently, managing reputation, creating customer loyalty, and reinforcing brands become strategic imperatives for organisations belonging to the information economy.

From a management control perspective, organisations are likely to implement a "customer-based accounting system" [Valdani, 2000], focused on monitoring the quality and the number of the relationships between the organisation and its customers. Some basic indicators of a customer-based accounting system are: life time value; customer retention rate; customer equity; customer portfolio value; brand value; and so on. In terms of levers of control, both the diagnostic and the interactive control systems will be activated because the above indicators partly become critical performance variables, and partly support the identification of marketing strategic uncertainties.

### **The attention economy**

The information technology development has heavily overcome the problem of the information availability, and nowadays the problem is not information access but information overload [Evans and Wurster, 1999; Shapiro and Varian, 1999]. Consequently, the value of an information provider

lies on locating, filtering, and communicating what is useful to the consumer, in other words the problem is maximizing the attention of customers.

The most important implication of the attention economy phenomenon is the development of one-to-one marketing, that is to say marketing initiatives tailored on a single user. A one-to-one marketing evidence is clearly provided by portals, whose marketing strategy is developed into the following steps [Eisenmann and Pothen, 2000]:

- firstly, a portal requires, prior to the supply of many of its services, a user registration, i.e. users are asked to provide, at minimum, an e-mail address, and often additional personal information. This allows for customer profiling;
- secondly, customer profiling is used to push offers specifically customized to the single user;
- thirdly, acquiring additional personal information by means of registration helps selecting targeted advertisements, for which portal quotes higher rates.

The management control implication of the above phenomena is again related to introduction of a "customer-based accounting system" [Valdani, 2000], aiming at monitoring the customer profitability as a basis to support future marketing decisions. In terms of levers of control, this mainly impacts on beliefs control systems and interactive control systems, as argued in the previous paragraph.

### **Interdependence**

Interdependences both among different actors in the marketplace, and among different business contents offered by the organisation is a typical characteristic of the information economy.

As it concerns the first form of interdependence, all Internet market structures (portals, market makers, and product/service providers) are strongly characterized by a high level of reciprocal interdependence [Mahadevan, 2000]. Players in the information economy get the same incentive to co-operate, as they provide complementary goods. An example of this is given by portals and product/service providers, as:

- product/service providers succeed in marketing their products and services through their web sites as long as those players catch the attention of prospective customers. To catch the attention, product/service providers could partner with portals;
- at the same time, as the revenue stream of a portal depends largely on its relationships with product/service providers, portals get the same incentive to co-operate with product/service providers.

In the meantime, this interdependence is emphasized by the availability of a huge amount of information related to customers, suppliers, competitors, which are beneficial for both portals and product/service providers.

The second form of interdependence is very clear in the case of portals. They are a complex example of Internet business, providing five interdependent core elements [Eisenmann and Pothen, 2000]:

- search services (e.g. search engines, directories, Yellow Pages services);
- contents (e.g. news headlines, stock quotes, sports scores, weather forecasts, maps, entertainment options);
- community building services (chat rooms, message boards, cards, instant messaging services);
- commerce offerings (auctions, shopping malls aggregating small online retailers' websites, link to external shopping sites);
- personal productivity applications (web-based e-mail, address books, calendars, file storage).

These five elements are strongly interdependent, as portals provide a global service aiming at attracting, retaining, and monetising user traffic by aggregating and organizing a vast array of content, commerce, and applications. For instance, external shopping sites (belonging to the commerce element) are often nested within relevant content categories (belonging to the content element).

These forms of interdependence are very complex to control. Organisations have already developed specific e-metrics and increased the number of controllable objects within their performance evaluation systems. These metrics are used firstly as business information system, in



what they aim at monitoring the interactivity among various players in the marketplace (e.g. the relationships with customers and the capacity of attracting banners). In the meantime, the same metrics are also used as strategic/management control information system, as they are used to control the economics of contents provided by Internet business. Indeed, e-metrics are quite flexible and they allow to report indicators by multidimensional controllable objects. To sum up, the above forms of interdependence strongly impact onto the diagnostic and the interactive control systems.

### **5.3 Other drivers of change**

#### **Ambiguity of decision making**

The ambiguity of decision making is a general characteristic of the information economy (Sawhney and Parikh, 2001), even though it also refers to more traditional organisations. Ambiguity embodies different forms within organisations of the information economy, such as:

- the speed of e-business, that leaves little time to decide and rationalize alternatives;
- the imperfect knowledge of the causal relationship decisions-actions-results;
- the highly competitive market structures combined to a high operating risk.

The ambiguity of decision making impacts heavily onto the four levers of controls. On the one hand, the ambiguity requires continuous intuition, judgment, and discussion concerning future business modelling. In turn, this requires a more holistic concept of management control in which beliefs systems and boundary systems play a fundamental role. On the other hand, the same ambiguity is compensated by enhanced diagnostic and interactive control systems, whereby one can acquire more detailed information about different controllable objects.

#### **Compensation plan**

The issue of compensation plans is an important topic for organisations belonging to the information economy. In particular, this issue is even more relevant for those organisations of a high-tech nature. Strong evidences about stock-option plans are reported in the Internet high-technology start-ups both in the USA and in Europe. Those stock-option plans have involved involving not only CEOs and other high-level executives, but also employees below the vice-president level [Barone K.J., Applegate L.M., 1999]. One possible explanation of this evidence is that high tech firms need to attract and maintain talented knowledge workers, and stock-options are a powerful link between employee self-interest and that of the organisation and its shareholders.

In terms of levers of control, the main implication of the development of stock-option plans concerns the performance evaluation of these knowledge workers, whose contributions is supposed to be so important for the attainment of business goals. Moreover, it is fundamental to objectively evaluate the managerial performances related to rewards. Consequently, it is important to develop both the diagnostic and the interactive control systems.

#### **IPO**

Going public is a third relevant issue for organisations belonging to the information economy, even though it also concerns other more traditional organisations. The relationship between the information economy and the need of going public lies on the organisational financing requirements. Indeed, as these organisations are characterized by substantial initial investments, choices concerning their financial structure are relevant. Attracting new shareholders interested in sharing the business risk, especially during the start-up stage, and later liquidating venture capitalists are very common reasons that lead these organisations to go public.

The impact of going public on management control concerns both the strategic domain framing, and the business strategy implementation [Cifalinò, 2000]. Indeed, managing an initial public offering, firstly, impacts on the stakeholder relationship management. Stakeholders' commitment towards the organisation's future plans has to be gained and, ultimately, new shareholders need to be attracted and retained over time. This stakeholder relationship management is certainly

supported by the levers of beliefs systems and boundary systems. Indeed, selecting future alternatives and creating a shared vision of the organisation are critical imperatives.

Moreover, going public also impacts on the operating side of management control, as the stakeholder relationship management has to be supported by up-to-date reporting systems and contingency plans. As a consequence, both the diagnostic control systems and the interactive control systems are heavily affected by going public.

### **Mergers and acquisitions**

A last general characteristic of the organisations belonging to the information economy is the frequency of mergers and acquisitions. In particular, the rise of Internet has been associated to the resurgence of mergers and acquisitions as critical growth strategy [Carey, 2000]. There are different possible explanations of this trend, as it follows: external growth is much faster than internal growth, and speed is an absolute must of the information economy, acquiring is a way to timely reach network effects, and network effects are a critical success factor in the information economy.

From a managerial viewpoint, mergers and acquisition require deep thinking both prior to the closing, aiming at evaluating opportunities and risks associated with those operations, and then after the closing, in order to manage the integration issues. These evaluations, even though generally relevant, are particularly important for the organisations of the information economy, as they are very risky. Indeed, managing successful mergers and acquisitions in the information economy requires a powerful balancing of the all four levers of control.

### **6. Conclusions**

In the conclusion of our work, we support the idea that management control studies are progressing toward a definite recognition of a process view of management control. This is witnessed by the interest of academics and called for the less and less cybernetic phenomena organisations need to control. The status of management control systems per se is certainly not explicative of the organisation management control at a given point in time. The management control transformation is an ongoing process and management control is hence a process, rather than an outcome. Contingency factors, derived from the contingency theory, act as drivers of change.

The information economy provides an excellent context to observe the transformation of management control. The specific drivers of management control transformation in the context of the information economy have been listed and clustered in three classes: technology side, information side, and others. Particularly, drivers of management control transformation deeply and specifically rooted in the information economy, as well as drivers present in the information economy even though not featuring it, have logical impacts onto the management control, as defined by Simons [1995].

The information economy characteristics originating from the technology side are more likely to impact onto the beliefs systems and the boundary systems than onto the diagnostic control systems and the interactive control systems. On the contrary, the information economy characteristics originating from the information side are likely to behave in the opposite way.

We have related the specific drivers of change to the general drivers of change based on the affinity between the two classes. Specific drivers of transformation can be related to the general drivers of transformation (**Table 6**), *i.e.* factors of contingency, and as such are likely to activate processes of transformation. What is the meaning of that?

**Table 6:** Specific as opposite to general drivers of change

		Specific drivers of the information economy	General drivers							
			A	B	C	D	E	F	G	H
Technology side	Co-opetion	X		X		X				
	Lock-in and switching costs		X							
	Network effects	X		X						
	MCSs' technology							X	X	
Information side	Cost of producing information			X				X	X	
	Versioning and price differentiation		X	X		X				
	Intellectual property	X	X							
	Information as experience goods		X	X						
	Attention economy							X	X	
	Interdependence		X		X	X	X			
Other	Ambiguity of decision making		X	X	X					
	Compensation plans			X	X	X	X			
	IPO	X		X					X	
	Mergers and acquisitions			X	X	X	X			

The information economy brings little innovation. We do not expect any difference between the specific drivers and the general ones with respect to how they activate management control transformation. However, we could not come to general conclusions on whether the processes of management control transformation can be specified in the context of the information economy. We believe, nonetheless this is the direction of future research.

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