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**Sense making in Corporate Governance:  
A multilayered model for information asymmetries between  
investors and executives**

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### **Abstract**

In studies of corporate governance by default information asymmetry is assumed, based on the principle-agent theory, between investors and executives, and also by default it is assumed that executives have superior information over investors. In this paper I apply the more rich theory of information from cybernetics, compared to the mathematical theory to this assumed information asymmetry in combination with the theory of decision making, especially with respect to producing eidetic information. The quality of eidetic information turns out to be more critical as is the management or pragmatic information, with respect to the longer-term success of a firm and subsequently its value over the longer term. Due to e.g. psychological phenomena like dominant logic or belief conservation, executives not always produce good quality eidetic information and subsequently decide poor strategies. More in general it can be concluded that the assumption of information asymmetry needs to be understood per type of information and per each phase in decision-making. The resulting model provides a more precise insight in what value investors and non-executives may contribute to improve the quality of the information in a system of corporate governance and thus its effectiveness.

## Introduction

Executives first are responsible to the corporation they serve and second to the general meeting of shareholders (Cadbury, 1995). In a response to the perverse effects induced by the stakeholder concept in the USA in the seventies of the twentieth century on the conduct of executives (Donaldson, 1994; Jensen, 1993) the stakeholder concept became replaced by the concept of shareholder value. Phrased succinctly by Milton Friedman (Friedman, 1970), the social responsibility of business is to increase profits, implying that the task of the executives is to maximize shareholder value. Although it now becomes understood that the objective to maximize shareholder value also, like stakeholder value, may induce perverse behavior, especially in the case of stock options rewards (Jensen, 2001), the concept of shareholder value plays a central role in corporate governance codes and therefore in the exchange of information between executives and shareholders.

This exchange of information between investors and executives is, at least partially, structured on a number of (accounting) concepts (e.g. EBITDA), concepts from investment theory and corporate governance and concepts from the field of strategic management in order to have an intelligible communication between the parties involved in this communication. Investors through their formal or professional training in fields like e.g. management accounting, management control and corporate finance are familiar with a number of concepts which are used to judge the potential and the performance of firms. Alike executives have been trained in the same concepts. Business schools, in which such fields of management accounting, management control and corporate finance are being taught, are attended both by future managers and future investors or their analysts, and thus most likely there will be a certain commonality with respect to the parameters, concepts and definitions being used in the exchange of information between executives and investors.

In addition to accounting information investors will be interested in non-accounting information with respect to the operations, the strategy and the markets of the firm. This especially is relevant for the design of managerial compensation system. This design requires obtaining information beyond accounting information (Tirole, 2006, p.

339). Especially information is needed with respect to what (innovative) initiatives an executive can and should undertake to maximize shareholder value over multiple periods.

In interpreting (or formally sensemaking or producing eidetic information) this accounting information and information with respect to strategy (opportunities), competitive position and efficiency, both executives and investors explicit or implicit use effect-information (Beniger, 1986), that is information with respect to cause-and-effect relations, to identify executive actions to improve the efficiency and the performance of the firm. E.g. investors may believe that executives can and thus should improve efficiency by concentrating on core competencies through either de-verticalization or outsourcing, or a combination of such actions. Outsourcing basically is the restructuring of the balance sheet to increase the ratio of economic profit to required investments, which is to improve the return on invested capital.

A question to be asked is whether the set of insights and conventions with respect to the choice of performance information concepts, strategic information and effect-information as used by executives and used by investors are congruent (by choice, use, weight, interpretation) or are incongruent. These sets being congruent or incongruent may have either a positive or a negative impact on the value of the firm as these sets may cause the interpretation of the capabilities of the firm (possible production functions) to be different.

Due to changes in business models and the underlying micro-economics, e.g. the changing nature of assets, moving from tangible to intangible assets, the parameters which are critical to measure and to judge the performance (potential) of a firm may change over time, and may diverge between firms as firms differentiate in a complex economy. Therefore the choice of performance parameters, respectively parameters used in accountability, reporting and judgment, may be critical for the value creation of the firm in the long term, apart from the fact that different parameters induce different biases in executive decisions, which may impair the value of the firm (Copeland, Weston, & Shastri, 2005).

In the period since 1990 the shift from tangible assets to intangible assets have induced a change in the choice of performance parameters. The first is the change from

judging the value of the firm based on accounting profit to economic profit. In the latter the value of the firm is based on future cash flows rather than the value of the assets. As the accounting rules IASB-38 do not allow for capitalizing investments in e.g. human capital, information capital and organization capital on the balance sheet, whereas these types of capital are acknowledged to play a larger role in the value creation and the value of the firm as do tangible assets critical for the performance of the firm. By valuing the firm on basis of future cash flows, as opposed to accounting value, the contributions of these intangible assets automatically is included in the valuation of the firm. Although a precise micro-economic theory describing in detail how intangible assets contribute is wanting. The shift towards economic profit does not solve the problem of the firm as a black box. But this shift does force executives to change the methods by which strategies are executed. Specifically executives need to abandon the still widely used budget-driven method (aka Bower's bottom-up resource allocation process (Bower, 1986)) and need to adopt methods for strategy execution based on cause-and-effect relations (Kaplan & Norton, 2008). The latter implies that management information as much is about non-financial leading parameters as it is about financial, lagging parameters in. This in itself is not new in view of the writings of Henry Fayol, dating back to 1918, but the increasing role of the capital markets induced in the eighties a narrowing of systems for performance management to financial performance parameters. In the USA this narrowing was corrected back to a more balanced system for performance management, but not so in Europe.

Some authors suggest that a high monitoring intensity may discourage the executive-entrepreneur from coming up with new ideas (Tirole, 2006, p. 360). Others suggest that especially in innovation-intensive firms there is often a high degree of information asymmetry with regard to what is a most efficient way to create value from a firm's resources and that a substantial managerial discretion is needed to be innovative (He & Wang, 2009). From the perspective of the agency theory such a greater latitude in decision making also gives executives a greater latitude to pursue their own interests and their own agenda's (Jensen & Meckling, 1976). He & Wang develop the argument that incentives are often more suitable governance mechanisms in an innovative environment and an over reliance on monitoring may hinder the innovation process. However, absence of monitoring or low monitoring intensity is no guarantee that the

management of firms will be innovative. In corporate governance the issue is as much the lack of innovation or inefficient organization of innovation in less innovation intensive firms, especially when executives and other in the firm make themselves an easy living from running existing products and existing markets, and fail to provide for the future of the firm entrusted to them.

In the field of strategy the standard textbooks on corporate finance (e.g. Grinblatt & Titman, 2002) assume the firm to be a portfolio of investment projects (based on product-market combinations), in its turn based on the concept of the multi-divisional organization in which each division is self-contained organized (Drucker, 1946; Sloan, 1962/1986)(Ansoff, 1965). It is assumed that these divisions either are unrelated in terms of value creation, or if there is a relation (in terms of synergies) a division still can be divested without impairing the value and value creation of other divisions. Investors have a preference for this unit-concept of the organization as it allows them to judge the efficiency of the executive board by calculating the break-up value (corporate discount) of the firm. Certain managers also may have a preference for this unit-concept, although, through the deployment of corporate account management and shared service centers (platforms), the self-contained organized unit has become a rarity in business. More in general the once successful M-form has lost its relevance due to declining costs of information, declining costs of communication, the shift towards intangible assets and markets that are more difficult to segment. But the concept of the M-form still plays a dominant role in accounting, management control and corporate finance and thus in the relation between investors and executives.

Due to the increasing role of intangible assets, which have different micro-economic characteristics compared to tangible assets, their exploitation requires different organization forms compared to the unit-organization to achieve maximum return on investment in those intangible assets. Especially the exploitation of a number of synergies cross divisions is required, implying organization forms, which compared to the unit organization, may be judged by investors to be less transparent.

The case of IBM suggests by its performance that such more complicated organization forms (that is, more complicated from a perspective of the M-form) can be efficient in terms of shareholder value. IBM operates an integrated firm, which reports

its performance over multiple dimensions (product, industry, applications, geography), consequently IBM no longer can be considered as a portfolio of self-contained investment projects (Palmisano, 2006).

At the same time some investors require the performance of the firm to be reported on multiple dimensions in order to be able to identify the weak parts of the firm (IBM only after having introduced such a multiple dimension reporting could produce the numbers proving that its PC-operations, organized in multiple regions, was loss making). But due to path dependency of firms, e.g. through ERP-systems designed mainly for financial reporting and based on the unit-concept, firms may have difficulty to answer the new information requirements of some investors.

Information requirements of investors both may stimulate executives with respect to innovation in organization forms and administrative processes, as well may hamper such innovation. In general investors will want to reduce the information asymmetry between the executives and themselves, to reduce agency costs. Executives may perceive this attempt to reduce information asymmetry as an infringement on their autonomy as an executive. Also disclosure of information with respect to the firm may affect the interests of the corporation vis-à-vis competitors. The Dutch Corporate Governance Code requires firms to disclose their risks as well the uncertainties they face in the market. It goes without saying that executives need to know and to understand these risks and uncertainties and need to prepare for these, but in general a full disclosure of such risks and uncertainties may harm a firm in view of its competitors. Whereas it may be in the interests of investors to understand the uncertainties and risks a firm faces, a full or even partial disclosure of these will harm the firm vis-à-vis competitors.

Due to different utility curves of executives and investors, and due to the role of sense-making of available data, either party is expected to impose on the other models of interpretation or framing the other (Arnoud W.A. Boot & Macey, 2004). Useem observed with respect to the period of the eighties of the twentieth century that large shareholders rebelled [against the policies of executives], pressing companies to build organizational forms suited to their purposes as shareholders [not those of the company]. Especially shareholders pressed for devolvement of authority lower in the



organization, measures of success were altered, and headquarter's managerial and professional staffs were scaled back as administrative control [within the firm] yielded to financial oversight (Useem, 1993, pp. 7, 14). "In practice, management does care about the capital market's opinion, and tries to some extent to keep its shareholders happy. Such an internalization of the opinion and welfare of others is, however, endogenous. *Management cares only about its own well-being*, and it is only to the extent that its incentive scheme makes it sensitive to the welfare of others that such concerns may arise" (Tirole, 2006, p. 240). With that Tirole suggests that managers tend to anticipate preferences of investors in terms of their own interest, even when this is not serving the interests of the firm.

### A model of information

In studies of corporate governance by default information asymmetry is assumed, based on the principle-agent theory, between investors and executives, and also by default it is assumed that executives have superior information over investors. E.g. Lev claims that in the case of earnings guidance managers were more accurate 70% of the time, the analysts only 26% and 4% ties (Lev, 2011). But this 70% may be explained that managers consciously may underreport earnings (for reasons of a risk free bonus) and have the option to manage the firm towards published earnings, apart from using accounting rules to make their guidance to be accurate. As far as information is specified this is usually limited to the distinction between accounting information and non-accounting information (Bushman, Chen, Engel, & Smith, 2004; Richardson & Tinaikar, 2004). This categorization of information, as we will see, is too simple, as is the economic information theory.

The information theory as implied by the academic field of cybernetics provides a typology of information, which in combination with decision making theory and methods for valuating businesses, produces a more precise model on what types of information is being used for what purposes and how information is generated. As a consequence it is to be questioned whether executives always have superior information compared to investors to make decisions to maximize the value of the firm.

Therefore in next section we will formulate a model for typology and use of information in systems of corporate governance.

### The corporate governance structure

Investors (in which we discern different types of investors, institutional investors, active shareholders, analysts, private equity, investment banks) have an interest in reducing the asymmetry with respect to the information between the executives they monitor and the information economically available to the investors.

The general argument to reduce this information asymmetry is formulated in the agency theory (T. E. Copeland, Weston, & Shastri, 2005, p. 18; Jensen & Meckling, 1976; Pratt & Zeckhauser, 1991). This theory assumes that agents (executives to be monitored) not necessarily will take initiatives nor make decisions to maximize the interests of the principals (shareholders), because of satisfying behavior, having different motives and having a different risk appreciation compared to principals.

Especially the interest of investors, taking risks and risk appetites into account, is to know what the maximum potential performance of a firm can be. Different definitions of the performance of the firm exist, including forms of non-financial performance, e.g. ESG-information and corporate social responsibility. Here we assume that the performance of a firm is the shareholder value or market value over a longer period. We assume that the objective of investors, assuming a specific risk appetite, is to maximize this market value and are willing to accept ESG- and CSR-aspects as constraints to maximizing the financial performance of the firm. To be more specific we assume that the shareholders hold shares over a longer period and the shareholders wealth is to be the discounted value of the streams of dividends ( $Div_t$ ) (T. E. Copeland et al., 2005, p. 20):

$$S_0 = \sum_{t=1}^{\infty} \frac{Div_t}{(1+k_s)^t} \quad (1)$$

Where  $S_0$  is the present value of shareholders' wealth and  $k_s$  is the market determined required rate of return on equity capital. Ignoring taxable differences between dividends

and capital gains Eq. (1) incorporates all cash payments, both dividends and capital gains (T. E. Copeland et al., 2005, p. 21).

The maximization of shareholder value is supposed to be achieved within a structure of decision rights and monitoring rights. Fama & Jensen (Fama & Jensen, 1998 (org. 1983)): “When decision managers are not residual claimants and therefore do not bear a major share of the wealth effects of their decisions, a system for decision control is needed in which control rights are separated from rights over decisions.” This can be expressed as in Figure 1.

Management Rights	Control Rights
1. <b>Initiation</b> – generation of proposals for resource utilization and structuring of contracts, entrance in and exit from activities	
	2. <b>Ratification</b> – veto power over implementation of decision initiatives; test of proposed decision against mission, risk profile, set targets (ROI, NPV), assumptions made
3. <b>Implementation</b> – execution of ratified decisions	
	4. <b>Monitoring</b> – overseeing the execution, performance measurement & evaluation, issuing corrective actions and implementation of rewards
CEO, (Executive or Management) Board	General Meeting of Shareholders Supervisory Board / Non-executive members

Figure 1. The basic structure of corporate governance (Jensen & Meckling, 1976).

### Information structure

Within the basic structure of corporate governance a distinction is to be made between formal authority (the right to decide) and real authority (the effective control over decisions) (Aghion & Tirole, 1997). Aghion and Tirole suggest that real authority is determined by the structure of information and that the structure of information (information asymmetry) depends on the allocation of formal authority. Whether the structure of information depends on formal authority is to be questioned.

Contrary to what is assumed in the Weberian bureaucratic internal organization of the firm, and contrary to what is assumed in the basic structure of corporate governance as defined by Jensen & Meckling, the information structure is not defined by formal authority (of the principal over the agent). As will be elaborated in this paper, information structure depends on the costs of information and communication, on the nature of information, whether it is about data or effect-information (information on

cause-and-effect relations), the nature of knowledge, whether it is codified knowledge or uncodified personal knowledge and on the object of information, whether the information is about e.g. market attractiveness or whether the information is about the efficiency of the firm. In addition to these factors the information structure may depend on psychological factors, this especially applies to the production of eidetic information (to be explained below).

Arrow introduced a distinction between *information structure* and *decision structure* in the firm (Arrow, 1985). Arrow suggests information structure to be the choice of and assignment of signals to the agent by the principal. A signal being defined as an element of information as defined in statistical decision theory, which implies that the role of the agent is to map the signal [by the principal] to an action as a choice of available actions for the agent. The mapping of signals onto action is based on decision rules. A decision rule in general will be an objective function to maximize a specific parameter, e.g. shareholder value, under constraints.

Arrow's concept of information structure may apply to the internal organization of the firm, the executives being the actors making a choice of signals and assignment of signals to lower level management (agent). This indeed is assumed in the older concepts of performance management, in which the top-level objectives of the firm are translated into lower level objectives. In the modern concept of the firm performance management is assumed to be information-based, that is that there is no signaling process as suggested by Arrow, but a guiding system through which lower level managers propose initiatives needed to achieve top-level objectives (Simons, 2000).

It is to be questioned whether Arrow's concept of information structure applies to the basis structure of corporate governance. Applying Arrow's model of information structure the agent (executive) is assumed to have access to all available signals (superior information), the agent (executive) is assumed to observe the entire state of the world (thus defining all possible options). By implication it are not the shareholders who define the information structure of the executive. Shareholders may try to attempt to define the information structure to influence the executives towards their interests or to correct the executives and alike with the decision structure. The basic structure of corporate governance as defined by Jensen & Meckling implies that agents (executives) have an interest in imposing on the principals both an information structure and a

decision structure as preferred by the agents (executives) and they have the means to do so by deciding which decisions to present for ratification to the principals and which not, which is also implied by the Agenda Theory (Arrow, 1974).

Arrow assumes a concept of information as defined in statistical decision theory or communication theory. This most likely is a too restricted definition of information.

### What is information?<sup>1</sup>

It appears that the term 'information' is used in a wide variety of meanings, dependent of the science it is being used for, physics, computer science, statistics, cybernetics, communication theory, linguistics, psychology, economics (Birchler & Bütler, 2007, p. 12). Many refer to the definition of information as given in the communication theory defined by Shannon in 1947. In Shannon's definition information is a signal exchanged between two machines each with a finite and well-structured set of states or messages. In this engineering or mathematical definition information has value if it reduces uncertainty (Keeney & Raiffa, 1976). Economic theory uses elements of the engineering definition in e.g. structured decision support (decision trees, real option theory, game theory). In the context of mathematical models for decision-making it is possible to determine a value for (mathematical) information.

De Kuijper (2001, p. 39) defines information as: "A useful input into decision making, especially decision making about commercial transactions. A piece of information, or input, is useful if it causes a difference in a commercial decision." This definition is based on the theory of decision-making, in which decision-making is selecting the most valuable alternative of a number of available alternative courses. But entrepreneurship and thus competition is not about selecting a most valuable alternative from available courses, but to create new, innovative alternatives and destroying existing practices. The essence of entrepreneurship and competition is not induction nor is it deduction, it is abduction. Entrepreneurs are constantly looking for information that helps them to create new options. So the finite structure assumed in the mathematical information theory does not apply to entrepreneurial situations of decision making.

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<sup>1</sup> The following section is taken from: Strikwerda, J. 2011. Competing on Information: An Exploration of Concepts. *SSRN eLibrary*.

In the world of executive's economics the semantic aspects of information play a more important role (Birchler & Büttler, 2007, p. 15). This semantic definition of 'information' has itself a wide variety of meanings; varying from facts, hypothetical knowledge, accepted knowledge, fundamental knowledge, heuristics, algorithms, codes, stories, values, interpretations, rumors, gossip, intelligence and communication. Lash (2002, section 3.2) discerns within semantic information discursive information and disinformation.

Especially the semantic definition of information, because it includes such a diversity of meanings, needs a further understanding. Lash (2002, p. chapter 11) defines two types of information. The first type of information is about discursive or analytic knowledge. This type of knowledge is based on abstraction, on selection, on simplification, on complexity reduction. To deal with such type of information requires formal training in science, technology and or economy. This type of information is about codified knowledge that is easy transferable between individuals and groups. It assumes a Cartesian rationality, be it in manufacturing, computer programming, marketing, and sales or in finance. The production of such type of information and thus knowledge marginalizes manual labor according to the law from cybernetics that the information intensive system always masters any system that is not information intensive, even if more intensive by matter or energy. This also explains that whereas in the industrial economy capitalization (market value) was based on physical assets, in the informational economy capitalization is based on intangible assets, *human capital*, *information capital* and *organization capital*, being a mix of complementary, co-specialized intangible resources, routines, skills and processes, not easily to be codified and difficult to imitate or to transfer.

In the industrial era firms exerted control over these intangible assets by ownership of physical assets, buildings, equipment, proprietary standards, and based on the fact that exploitation of these intangible assets was through embedding of knowledge in discrete physical goods (e.g. an incandescent lamp, a car). Especially the latter implies that such exploitation of knowledge remains subject to the law of diminishing returns. Due to the digital technology and the emergence of information goods, knowledge increasingly can be exploited without being embedded in physical goods, opening up the possibility for increasing returns, e.g. in the case of Microsoft's

Windows. Discursive knowledge and thus discursive information is universal, it is valid over large stretches of time and space. It has both use-value and exchange value.

Lash's second type of information is labeled *disinformation*. Disinformation is about the content in newspapers, on the Internet, in YouTube-movies. Disinformation is temporal, it is ephemeral, it is immediate, it has no past, nor future, it has no space for reflection or reasoned argument; it is about *fait divers*. Disinformation is about lifestyles, design, about branded goods and about the mediation of goods and services (Lash & Lury, 2007). This second type of information is about the information culture. This second type of information is about information overload, for which individuals and groups need frames (e.g. brands like Oprah Winfrey, software like iTunes) to find their way in this information overload. Whereas the first type of information is supposed in decision making, also by consumers, to maximize their utility, it is the second type of information that molds the perception of consumers, shapes their identities, orders their preferences, defines their social life; living by this disinformation is their consumption. This second type of information is being exploited by the media industry since the end of the nineteenth century. This information was initially carried by the newspaper, the cheap printed novel, movies, radio, and today it is being carried by television and by the (mobile) Internet. The digital technology has removed forcefully the limitation of channels, of media, of media capacity. It has removed, through the social media, the distinction between the journalist and the reader. The consumer of news also is the producer of news: the prosumer. Broadcasting now exists alongside narrow casting and point-to-point casting, all bidirectional. Whereas in the past broadcasting was monopolized by state owned institutions (e.g. the BBC) or private enterprises (USA), now individuals have the means for broadcasting as well.

Firms are wrestling with social media, which deny firms the control over consumers as exerted by traditional marketing and advertising. In the traditional sales process the sales clerk had information superiority over the customer. Today, due to the Internet usually consumers are better informed on alternative products, product quality, prices, etc. as is sales staff. Social media comprises phenomena like Wikipedia, YouTube, Facebook, Second Life, Twitter, and LinkedIn. These media differ in social presence/media richness and in self-presentation and self-disclosure from the traditional broadcast media. Dependent on these factors firms may engage in collaborative projects, blogs, content communities, social networking sites, virtual game

worlds, and virtual social worlds (A. M. Kaplan & Haenlein, 2010). This is done both to understand consumers and to use their ideas, as well to control the image or reputation creation with respect to the firm by the public through these social media.

Disinformation is of value to understand markets in terms of customer preferences and it is of value to create new information goods.

Therefore it is understandable that Wikipedia defines the information society as a society in which the creation, distribution, use, integration and manipulation of information as a significant economic, political, and cultural activity. The idea of an information society or information economy is not uncontested. Frank Webster (2006) rightfully argues that there may be something like an information society, but the various attempts to define the information society or even to prove that we live in an information society or information economy are questionable. Nevertheless the idea of an information society is useful as it serves to ask questions what today is different from the era of the second industrial revolution ( $\pm 1875$  -  $\pm 1975$ ). “The concept has helped scholars to focus attention on, and to collect together, a wide-ranging and diverse number of phenomena, from occupational shifts, to new media, to digitalization, to developments in higher education” (Webster, 2006, p. 263). The media perspective on information certainly is helpful to gain a better understanding of the role of information, not in the least because the media industry (movies, games, newspapers, magazines, etc.) is of material importance to the economy.

To understand the role of information in the economy an even broader or deeper perspective is needed. Companies like Google and Yahoo depend on algorithms as the core of their business models, providing a search engine and selling advertisements. Such an algorithm, which is used to process information inputted by their customers, is itself information. So in the case of Google and Yahoo these firms not only process information, it appears that their business model itself consists of information. This should be placed in the perspective that originally the resource based view (RBV) dominated the debate on the nature of the firm (Penrose, 2009). The phenomenon of outsourcing has made clear that the nature of the resources of the firm increasingly is knowledge, less it is physical resources, hence the knowledge based view of the firm (KBV). As Arrow (1996) has pointed out, increasingly the resources of the firm are not physical resources, but are explicit and implicit knowledge and routines, whose codification, in whatever form and carrier (machine code, work instructions, tacit



knowledge) can be viewed as information. It is this type of information what makes a firm unique and difficult to imitate. The phenomenon of tacit knowledge is not new in itself. But from a second order effect in the industrial economy it has become a first order effect in the information economy.

The idea of the firm as codified information leads us to the field of cybernetics because cybernetics offers a deeper insight in different types of information to be codified. Also a cybernetic view on the organization of the firm can be related to Herbert Simon's concept of complex systems (Simon, 1962, 1973). Those organizations that are complex systems have the capability to reprogram themselves in order to adapt to changes in their environment, whilst maintaining their identity. Firms with such a type of organization have the capability of absorbing uncertainty. Such firms therefore are expected to create more value over a longer period.

### Cybernetic information theory

Cybernetics explains how living systems, biological, the individual, social systems, different from inorganic physical systems, are *organized*. The function of this organization is to generate, acquire, store, process and to communicate information: to control the flows of matter (input-output economics) and energy (ecology) in order that the living system remains alive and whenever necessary adapts itself to changes in its environment to survive (Beniger, 1986, p. 40). In the cybernetics five types (levels) of information are defined:

1. *Goal-information* (usually codified in the mission of the firm, or formulated as the identity of the firm. E.g. in the Dutch jurisdiction a decision of the Executive Board which may imply a change in the identity of the firm, by law is subject to ex ante approval of the general meeting of shareholders);
2. *Motivation- or axiological information* (usually codified in the firm's hierarchy of values and or code of conduct, including the endorsement by the corporation of multiparty codes of conducts or ethical rules as e.g. published by the ILO or other NGO's );
3. External information:
  - a. *Material information* (objective facts about the external situation);

- b. *Eidetic information* (the interpretation (sense making) of the material information in terms of actions and choices to be made due to the material information, this should be feeding the strategy of the firm.) The eidetic information will be codified in the strategy of the firm expressed choices;
- 4. *Instruction- or effect information*. This is the description of the economic model or business model of the firm, how profit is being made. This type of information usually in an implicit way is codified in a large variety of ways, including in tacit knowledge, culture, processes, structures, etc. (Increasingly instruction- or effect information is being expressed in an explicit business model (R. S. Kaplan & Norton, 2004; Osterwalder, 2004; Slywotzky & Morrison, 1997). From the foregoing it follows that this effect information needs to include the working of the competitive and institutional environment as described in the field of the modern industrial organization);
- 5. *Pragmatic information*, also known as choice or management information. This is the type of information assumed in mathematical decision theory (Keeney & Raiffa, 1976), in management accounting information systems (AIS), management control (Anthony & Govindarajan, 1995; Merchant & Van der Stede, 2003), performance measurement and management systems (Simons, 2000), and in the issue of information asymmetry as discussed in the field of corporate finance and corporate governance.

The cybernetic types of information will help to understand that a firm, according to Arrow (1996) is codified information and that this code it self is part of the firm's information base. A firm can treat this information base as an asset, even if not as well defined as a piece of land. This corresponds with the observation that the market value of a firm as a *going concern* often considerably exceeds the book value of its physical assets (Arrow, 1996).

The codification of the firm's information, especially the axiological information and the effect information, is not straightforward, complete, univocal, explicit nor easily to be detected. Much of the codified information is implicit, sometimes even unconscious, in the minds of executives, managers and workers.

In the economy of the second industrial revolution institutions in society, formal and informal, reduced much of the uncertainty and complexity. It might be argued

therefore that a part of the information base of the firm was codified in the institutional environment of the firm (labor law, work ethos, pre-organizational socialization, trade rules). Part of the codified information is in the firm's culture, which is according to Margaret Mead 'the collective programming of the mind'. With that a part of the codified information is in the communication routines of the firm, work routines, implicit decision making rules, which is consistent with e.g. Nelson & Winter's view on the firm as a set of routines, including its path dependent development (Nelson & Winter, 1982). Due to the application of enterprise systems (ERP-systems), there is a tendency to codify the firm's implicit information-as-an-asset in the software of computer systems. It has been tried to extend this codification by use of technology to the tacit knowledge of individual workers (Nonaka & Takeuchi, 1995), but to no avail (Wilhelm & Downing, 2001). Codification of tacit knowledge of workers is not only an issue of codification; it is as much about an attempt to transfer the ownership of specific knowledge from workers to the corporation. Workers may volunteer to share tacit knowledge through interaction with colleagues because that will increase the economic value of that tacit knowledge to them, but in general will oppose the appropriation of the ownership of that knowledge by the corporation as that will decrease their bargaining power.

Although considerable improvements in productivity have been achieved by the application of ICT in the various processes of the firm (Brynjolfsson & Hitt, 2003), these applications are not without problems as has been spelled out by Davenport (1998). The application of enterprise resource planning (ERP) systems in the early nineties of the twentieth century were successful because the *best practices* these systems were based on for many firms implied a considerable improvement in the efficiency of processes, and in that period the business models of firms existed in a limited variety. Due to the capital deepening of ICT, the Internet, digital technology and the emergence of information goods, the variety of business models or profit models has increased since 2000 and with that the basis of competition, as a result of which the best practice based ERP in the second wave of ERP implications at the end of the nineties experienced problems because the standard software failed to observe the specifics of individual business models and strategies of firms.

Especially is an issue that information goods in general have weak property rights inducing the issue of how firms can appropriate created value from the market

(Teece, 2010). In the information economy competition is shifting to include the innovation of business models itself. This explains why firms now need to make their (new) business models explicit in their organization (R. S. Kaplan & Norton, 2004; Osterwalder, Pigneur, & Tucci, 2005), and why business models, that is effect information, no longer can be transferred implicit through socialization and thus through culture on new members of the organization. The practice of making business models explicit basically is opening up the black-box input-output production function of neo-classical economics of the firm, be it not in terms of a micro-economic model or financial models, but in terms of cause-and-effect relations. The differentiation and innovation of business models also reflect that entrepreneurs in today's economy have an increasing number of options (alternative projects) to turn investments into returns.

In terms of Arrow's signals a hypothesis might be that investors with a low preference for risk, will prefer to invest in business models with which they are familiar and will decline to invest in (new) business models which with they are not familiar, irrespective of the probability of a positive return on an investment in a business models with which they are not familiar. It may be the other way around as well; in the period of the dot.com crisis (around 2000) apparently quite some investors put a strong confidence in the then new business models, and lost heavily. Also it might be hypothesized that managers have a better knowledge of available or possible (new) business models compared to investors, including the probability of a positive return of an investment in such a business model. Further, it may be that managers have *perceptions* of business models preferred by investors to which they anticipate in making decisions for the firm, irrespective whether more efficient options exist, both for the firm and for the investors.

According to March it is impossible to define a firm's economic working in a perfect, complete and accurate way: "The systems being modeled and analyzed are substantially more complex than can be comprehended either by the analytical tools or the understandings of analysts. As a result, important variables and interactions among them are invariably overlooked or incorrectly specified" (March, 2006). This is consistent with Simon's observation that the programming (tasks, objectives, corporate policies, incentives, budgets, etc.) between higher level departments and lower level departments better should be loosely coupled, allowing for adaptive behavior at lower

levels in the organization in response to changes in the firm's environment in order that a firm is in-control, that is will be able to survive in a changing environment (Simon, 1962).

As Simons (2005) has demonstrated, it is precisely *tight control* that causes a firm to be *out-of-control* because tight control destroys the capacity of adaptation of the organization to changes in the market. Axelrod & Cohen: "Adaptive interactions are, in fact a major, *raison d'être* of the Information Revolution. Improvements in processing, storage, transmission, and sensing make it possible for us to know the state of a system with far greater speed and precision." (Axelrod & Cohen, 1999, p. 27)

Information can be used to constantly improve the efficiency of the firm. This started with Taylor analyzing movements in physical labor and eliminating unnecessary steps to increase labor productivity. Gilbreth and others conducted around 1900 detailed time studies (time motion studies), using chronographs and direct observation, to analyze and improve physical labor, processes, tools, and later on as well office procedures. This developed later into process engineering, and the movement of Total Quality Management made processes more in detail measurable and thus subject to improvement. This was to be followed up by process re-design in the nineties, related to computer programs to execute operational processes. More recently, due to the increasing databases within firms, after the initial failure of business intelligence, efficiency improvement by using information is boosted, also because better software is available to analyze data using sophisticated techniques: competing on analytics (Davenport & Harris, 2007).

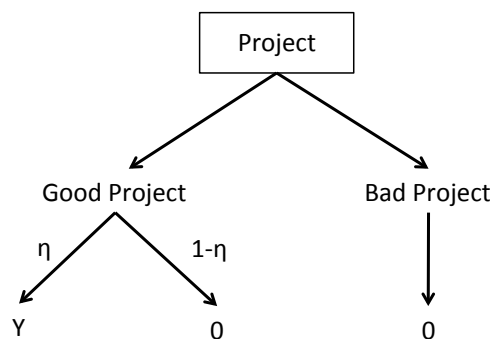
The information-processing concept of cybernetics needs an addition in order it to be useful to understand the information economy. This cybernetic control model suggests a firm to be passive with respect to its environment by only adapting to changes in that environment. It is precisely through persuasive marketing and advertising, through mergers and acquisitions, standards strategies (Shapiro & Varian, 1999), but often also through public relations and other influencing activities to the political environment, and not in the least simply by offering (innovative) products and services, that a firm influences and sometimes even changes its (competitive) environment including in a number of cases its industry (Evans, Hagiu, & Schmalensee, 2006; Evans & Schmalensee, 2007). With that the boundaries of the system of the firm as assumed in the effect

information (business model) are not always straightforward to be decided, these may extend into the market, and in general will be dynamic. Apple is an example of a firm whose strategy it is to change the market's demand for functionality by its offering of hardware in combination with iTunes. Whereby iTunes not only is part of the revenue model of the business model of Apple, but a frame (Lash, 2002) to help Apple's customers to cope with the overload of information (offering of information goods) on the Internet (Evans et al., 2006). Therefore the investments by Apple in their hardware products, iPhone, iPad, iPod, and Apple's investments in iTune cannot be considered as separate, unrelated investment projects.

## A model for processing information: the process of decision making

### A Basic Model

Boot and Thakor (1997) present a basic model for decision making by investors in de capital market (Figure 2).



**Figure 2.** The basic model by Boot & Thakor for the types of projects and contractible returns for the financial system architecture (A. Boot & Thakor, 1997).

In this model it is assumed that the economy consists of firms, each with a[n investment] project that needs a \$1 dollar investment, which once committed cannot be invested alternatively. The model assumes that each firm has a stochastic investment opportunity set that contains two projects good and bad. A good project has the probability  $\eta$  ( $0 \leq \eta \leq 1$ ) of producing a value  $Y$  and subsequently a probability  $1-\eta$  of resulting in a value of zero. In their 2011 paper Boot & Thakor modify this model by including the dimension of time in it (Arnoud W. A. Boot & Thakor, 2011).

The model (Figure 2) is to be questioned for two reasons. The first is that in firms projects no longer are one off decisions without alternatives during the period of implementation and the exploitation of the project. To see [investment] projects as one off decisions at the start of the project, including the decision to commit the full investment budget to the project, denies that there may be alternative choices how to execute the project, including commitments of investment budgets, during the course of the project. Applying the net present value valuation method (NVP) to such one off projects systematically undervalues such projects as an investment, as the probability of such projects to be managed into successful projects necessarily will be lower compared to the case of projects which have alternatives during implementation, because in the latter case information that becomes available in latter periods of the implementation of the project can be used to reduce uncertainty.

Therefore the practice in business, by using the technology of modularity (Baldwin & Clark, 2000, 2004) to the design of projects, amongst others to accommodate future uncertainty, is to increase the value of the investment of the project at the outset of a project by basing the valuation of the project not on NVP but on basis of real option theory. Therefore the general pattern of investments in a project will be like the example is depicted in Figure 3.

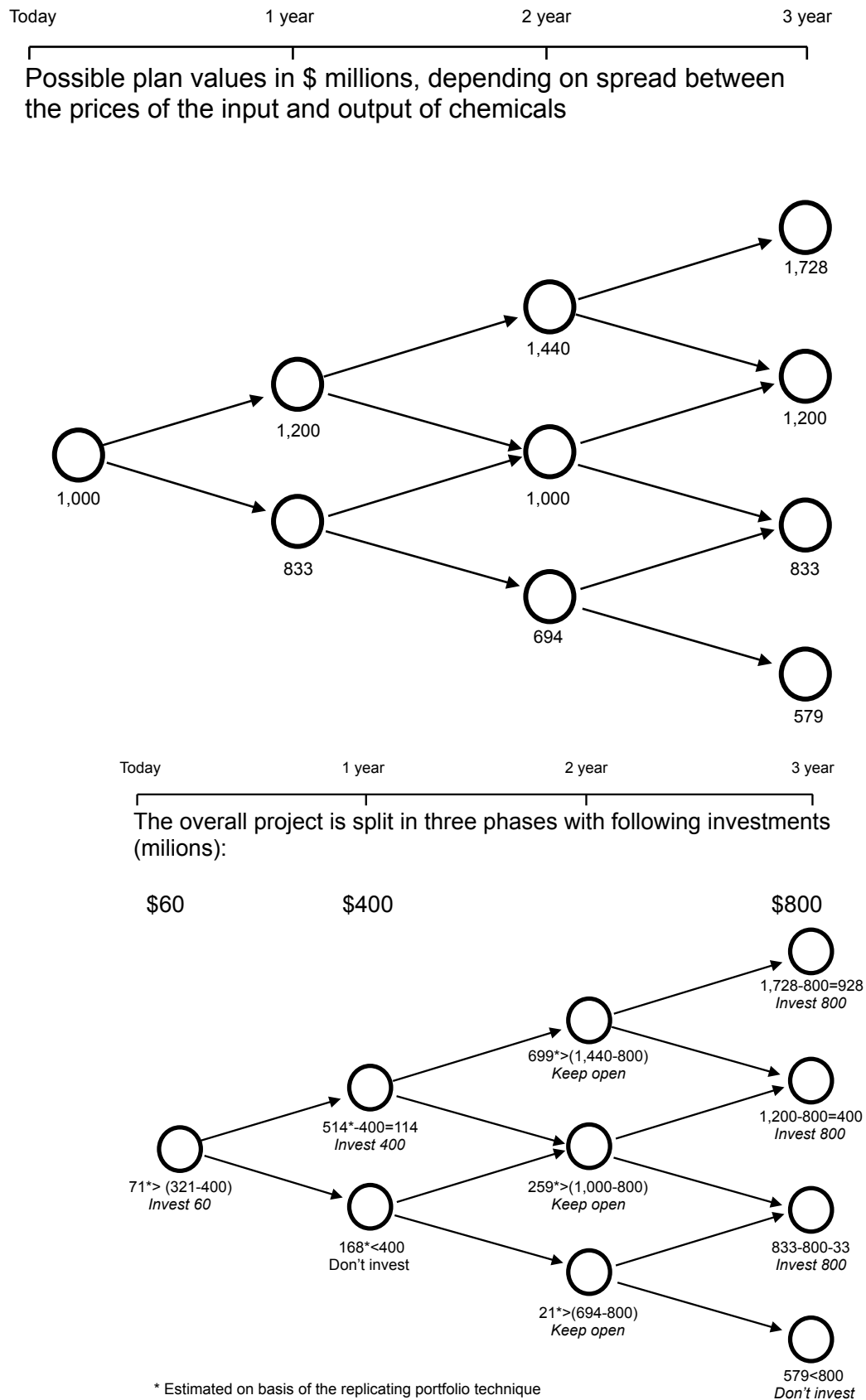


Figure 3. Example of an investment project structured on basis of the real option theory (T. Copeland & Tufano, 2004).



In general it may be assumed that the management of a firm has better information with respect to the flexibility in the implementation of a project in terms of alternative options, compared to the investor. Therefore investors may tend to value a project on basis of NPV and thus underestimate the value of a project compared to the valuation by management, especially in the case of high-risk projects (Grinblatt & Titman, 2002, p. 454).

The second issue with the basic model in Figure 2 is that the model assumes the firm to be one investment project at a specific moment in time. The combination of projects structured on basis of the real option theory and the multi-business firm (which applies to most public firms) defines the firm not as one project, but as a continuous stream of [investment] projects. Within corporate finance there is a tendency, in addition to conceptualize the firm as a[n investment] projects, as a portfolio of (unrelated) investment projects. The latter is reflected in the concept of the break-up value or corporate discount, by which investors calculate whether the liquidation value of the firm as a going concern is higher compared to breaking up the firm in its constituent divisions or lines of business and selling these off. Due to the increasing role of intangible assets and the lowering of coordination costs in the organization of the firm, increasingly firms exploit a number of types of synergy, market synergies, product synergies, knowledge synergies, changing the nature of the firm from a port-folio of unrelated businesses (investments) into an integrated firm.

Within the concept of the integrated firm, in an existing firm, there will be a continuous flow of investment initiatives for new products, expansion of capacity, entry or development of new markets, investments for new technology, to develop new knowledge, etc. Each of such projects will start at different periods and will have different number of periods in which these will produce a return. At each period the firm has existing assets in place (AIP) that consist of tangible assets (disclosed through audited accounting information) and intangible assets (not disclosed through audited accounting information), which produce outputs over multiple periods.

So at any period  $n$  a firm will have a set of [investment] projects, consisting of two subsets, a subset of assets-in-place ( $\sum_{j=1}^{j=x} p_{j,n}^A$ ) and a subset of initial investment projects ( $\sum_{j=1}^{j=y} p_{j,n}^I$ ). The value of an investment project  $p_{j,n}^I$  will depend on:

- The synergies between project  $p_{j,n}^I$  with projects invested in in previous periods, not being assets-in-place;
- The synergies between project  $p_{j,n}^I$  with projects being the assets in place  $p_{j,n}^A$ ;
- The synergies between project  $p_{j,n}^I$  and projects to be invested in following periods  $\sum_{n+1}^{\infty} \sum_{j=1}^{j=y} p_{j,n}^I$ , including the projects which are acquired at the open market;

A firm at a given period will have a strategy formulated by its management. This strategy will have a public part (strategy as a public truth) and a private part (strategy as a private truth). Strategy as private truth is about creating and maintaining market power, including creating entry barriers, setting standards which fit the own firm and hinder competitors, influencing law makers and policy makers, manipulating through mergers and alliances the industry structure, containing competitors etc., plans which usually will not be published for reason of regulation and tactics, neither to outsiders, nor inside the organization of the firm.

The public part of the strategy of the firm has a sequence of events, which we for this paper will simplify to three parts.

The first sequential part of the public strategy is informed by an explicit or implicit (direct or indirect) interaction between the management and investors, in which investors aim for signaling what they expect in terms of performance, management explores what might be acceptable in terms of performance by investors. This interaction is complicated by the existence of different types of investors, each with different utility curves. We define three types of investors: The first is the investor which decides to invest or not to invest in a firm on basis of the reputation of the firm, as this is based on past performance, its management, and other firm specific characteristics (the reputation investor). The second type of investor is the speculative investor that mainly is driven by profits to be made in trading in shares, less in the firm itself. The third type of investor is the informed investor; this is the type of investor that has informed himself on opportunities relevant to the firm, be these improvements in efficiency and or market opportunities. Each of these types of investors has different utility curves and managers will have a specific preference for types of investors, depended on their own utility curve. This will inform the first sequential part of the public strategy, whether the

management will emphasize continuation of an existing strategy (low risks, moderate returns), a strategy focused on raising pledgeable income for the investors in the short term, or pursuing new opportunities (jumping from the existing curve of diminishing returns to a new one), be it with higher risks. This first sequential part of the public strategy will be consolidated in a planning letter issued by the management (with or without ratification of the supervisory board) to the organization of the firm with the assignment to propose budgets for investments and operations with which to execute the strategy formulated in that planning letter (Bower, 1986). In such a planning letter a general ceiling for available investment capital will be specified. To this available investment capital the dynamic capital structure theory applies, that is neither the overall funds of available investment capital is fixed, nor the capital structure of the firm. The pecking order of financing choices hypothesis stipulates that management prefers to finance investments from the free cash flow (depreciation plus retained earnings, the latter influence by the dividend policy) over straight debt, over convertible bonds, over issuing equity. Managers will prefer to finance its strategy with at least as necessary issuing of information with respect to the strategy. However the pecking order hypothesis is denied by empirical research, suggesting that firms prefer issuing equity, especially when stock prices are high (Arnoud W. A. Boot & Thakor, 2011). Also, a relation exists between the capital structure of a firm and the nature of the strategy. A firm pursuing an alliance strategy (e.g. the Dutch chemical firm DSM) will need to avoid financial distress and therefore will pursue a conservative type of finance. A firm with a debt overhang in general will be limited in the strategic options for the firm and may be vulnerable to pricing tactics of conservatively financed competitors.

The issuing of the planning letter creates the second sequence in the public strategy of the firm, the creation of investment opportunities bottom-up in the organization, to be matched with available investment funds, with the objective that there will result a most efficient allocation of available funds over available investment projects, this is the working of the internal capital market of the firm. Dependent on the nature (utility curve) of management, the internal organization, including e.g. committed resources, path dependency, quality of the management, the reward system, in general the outcome of the matching of proposed investment projects and available investment funds may imply a different strategy compared to that intended in the planning letter. The process of matching investment projects with available investments funds is riddled

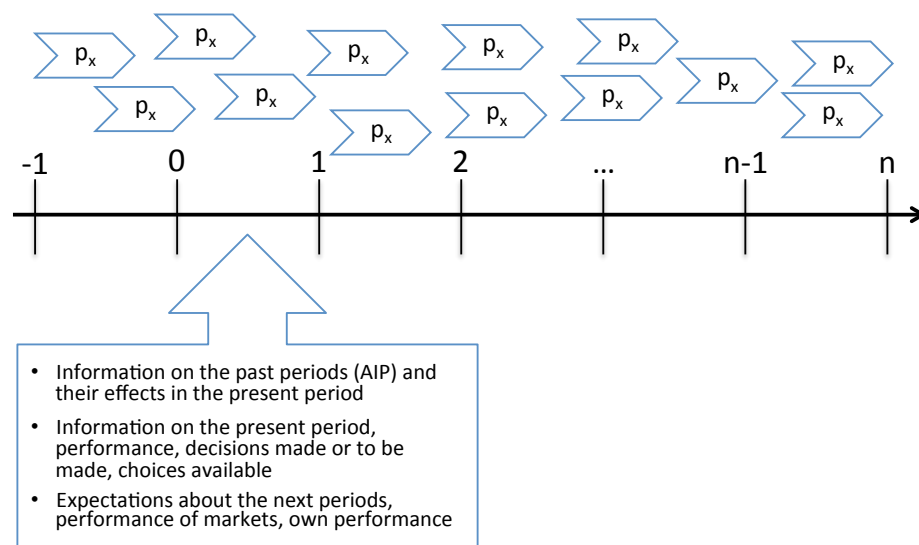
by information asymmetry between lower level management and the management of the firm. Other causes of the difference between intended strategy and emerging strategy may be that managers are risk avoidant and prefer to use the available free cash flow to extend existing lines of business, in spite of these having a lower return compared to attainable new lines of business (the cash flow trap). Another cause of this difference is that lower level management define investment proposals from a different utility curve compared to the management of the firm, e.g. through the mechanism of escalating commitments, that is unit-managers prefer to invest in their line of business as it is, instead of investing in a new, more profitable line of business. Lower level managers also will try to frame the management of the firm in their decisions, by making (unconsciously) use of Kahneman-Tversky's Prospect Theory. Returns on investments often seriously are impaired by the role of step-wise unit performance based rewards, making lower level management to negotiate lower targeted returns in order to be more certain to earn an ex ante set bonus (Jensen, 2001b).

In general the available resources in this second sequence of the public strategy of the firm consists of the sum of available capital at the discretion of management (initial capital plus depreciation plus free cash flow) and the capital management perceives it can arrange at the capital market in time to finance the intended strategy.

The second sequence of the public strategy results in a decision by the management of allocated capital and thus ratified investment budgets and operational budgets, including targets of divisions, lines of business etc. This starts of the third sequence in the public strategy, the specification of the budgets of divisions, business units, lines of business etc. This is a fine-tuning process, especially to match market opportunities with available resources in the firm. The result is the combination of the budget and the strategy as to be ratified by the supervisory board. In general this ratified strategy only partially will be financed and will need additional financing from the capital market. The ratified budget plus strategy in general will be different from the intended strategy at the outset from the strategy process. Subsequently management needs to sell the strategy, as this has resulted of internal processes, to investors; the management being itself uncertain with respect to the returns of the ratified investments. Investors are aware of the information asymmetry within the firm and the management being uncertain about the returns on the ratified investments, which still at least for a part need financing. In addition to the financing needed for the public

strategy, financing is needed for the private strategy, usually existing of take-overs, entering alliances and such, in which the internal organization is not or less involved as in developing the public strategy. The objectives with respect to the private strategy, due to lack of involvement of the internal organization, tend to reflect stronger the personal objectives of the CEO, and thus tend to bias towards immoderation, less to satisficing behavior.

With respect to the basic model in Figure 2 we therefore propose that a firm should not be considered as one project at a specific time, in which an investment in period  $t = n$  will produce a payoff and a return in a number of periods  $[t = n, t = n+m]$ . The basic model proposed for this paper is the firm as a flow of projects, which in the time may be related as real options of a larger project, and also may have synergies parallel in time between individual projects and streams of related projects. It is also assumed that investments in projects consist of investments in intangible capital (human capital, information capital and organization capital) which cannot be liquidated as separate items of capital as the value being produced by these types of intangible capital, follows from these being complementary and co-specialized organized. Whereas investments in tangible assets, including intangible assets like patents, increases the ownership title of the shareholders in terms of liquidation value, investments in human capital in general will not (a high percentage of new start ups is by employees leaving public firms taking ideas developed during the employment with those firms). The firm as a flow of projects implies that in any period investment decision have to be made, by the firm, by the investor, and at any period new information becomes available revaluing existing options for project alternatives and creating new options. This new information is about market developments and industry developments, including general economic conditions, about internal developments in the firm, efficiencies, new patents, new products, etc. and because managers respond to new situations by making decisions (or not) information is revealed about the motives of managers themselves. So that at any period  $n$  there is information about the past, investments, returns, markets, etc., information about the present state and present decisions, and new forecasts or expectations about next periods. With that the information asymmetry between the management of a firm and its investors can be conceptualized as a problem of information asymmetry between two dynamic sets of real options.



**Figure 4.** The firm as a flow of investment projects, in which in each period new information is revealed.

Projects initiated by the firm either produce a value for the firm in a certain period by producing revenue or because the project (e.g. in the form of a product or patent, or even a line of business) is alienated to a third party. A new project either may be initiated by the firm or be an acquisition, e.g. of a start up. Through this application of the concept of open innovation the firm reduces the risks that an investment project produces no return for the firm, respectively the probability that a positive return results from a project is increased. Also by being open to acquire projects in the market the probability of a positive return is being increased (H. Chesbrough, Vanhaverbeke, & West, 2006; H. W. Chesbrough, 2006). Alike by making use of suppliers, outsourcing and entering alliances, the firm is creating an open business model allowing the firm to shift risks into its operational network, be it that this needs to be balanced against this issue of the appropriation of the created value (H. Chesbrough & Rosenbloom, 2002). Therefore the firm can be conceptualized as an *open* flow of investment projects.

The firm as an *open* flow of investments projects in a way places the firm and investors in competition. An investor either may invest in the firm, or investments in start ups, e.g. in the biochemists industry, the software industry, that may be acquired by the firm or the investor may invest in spin offs of the firm, or a combination of these. This will depend on the nature of the investor. Some make combinations by structuring their own funds, e.g. some pension funds place a part of their capital to be invested in a venture funds.

In any period it is to be expected that there will be information asymmetries between the management of a firm and investors. There will be multiple information asymmetries with respect to performances, (new) capabilities, new options, value of options, risks, market developments, etc. The real option theory implies that an investor not just may digest all this information and decide to invest or not in a firm as a one off project, the investor may decide e.g. for a smaller investment and postpone further investment decisions to next periods, depending in the information he or she can lay hands on. The informed investor may, dependent on the corporate governance structure, try to influence the valuation of options as available to the firm in a period, respectively propose additional investment options, knowing that the generation of options by the firm itself is not a perfect model.

#### A valuation model

Investors and analysts use multiple frameworks to estimate respectively judge future and actual cash flows of firms. Two types of monitoring exist, exit and voice, passive and active monitoring (Grinblatt & Titman, 2002, p. 454). In active monitoring the investor will look for value-enhancing information, whereas in passive monitoring the investor will look for retrospective or speculative information. In active monitoring the investors, especially private equity investors (Tirole, 2006, p. 331) may try to influence plans, strategies and decisions to be made by executives to create shareholder value.

Judgment and valuation of investment proposals assumes a model, or cause-and-effect relation to interpret raw facts. McTaggart et al. (1994:85) suggests that most managers lack an economic framework that explicitly links the forces of competition and a business unit's competitive position directly to value creation. Multiple frameworks exist that suggest such links, e.g. Porter five forces model, or the growth-share matrix. Neither of such models is perfect nor has it ever lasting validity or universal validity, because competition for a part is inventing such new relations. If managers lack an economic framework linking the characteristics of an industry, its competitive forces and their firm's competitive position to value creation, does this imply that others, e.g. investors have such models? One strategy to develop such models is through statistical analysis of databases with respect to investments and performance of firms. Apart from

the question whether insights resulting from such studies are applicable to an individual specific firm, such insights reflects mechanisms that have worked in the past, and due to the double hermeneutics of business models and the innovation of business models not necessarily have a predictive value.

Investors will judge the potential shareholder wealth to be created by a firm by analyzing (A.W.A. Boot & Cools, 2007; Arnoud W. A. Boot & Thakor, 2011):

1. The attractiveness of the industry, respectively the markets a firm is in or which it intends to enter;
2. The competitive position (market power) the firm has in its industry or its market or may achieve in an industry or market to be entered;
3. The efficiency of operations the firms with which the firm performs, respectively it can or should be able to achieve. This includes the qualities of the executives of a firm. The efficiency of the firm includes the assets in place, tangible and intangible, routines, path dependencies, and capabilities as defined in the dynamic capabilities view of the firm (Teece, 2007);
4. The corporate governance system of the firm;
5. The capital structure of the firm;
6. The nature of the motivation of the executives and their personal values and objectives;
7. Accounting data as disclosed through audited financial statements.

A market may be attractive, but if a firm has a poor competitive position and or a poor efficiency, it will not turn the potential of a market into shareholder wealth. Vice versa, examples exist of firms, which, e.g. through path dependency, are in a less attractive market, but by a superior market position and or efficiency are attractive to investors in terms of shareholder wealth.

Shareholder wealth is measured over multiple periods, usually a number of years. Within this time horizon there will be dynamics in markets, competition, technology, consumer preferences etc. Therefore to create shareholder wealth over a multi period time horizon, in general a firm will need to make adaptations, changes and innovations with respect to products, distribution, markets, technology, knowledge, etc. to produce a multi period shareholder wealth.



### The decision making process

Before analyzing the nature of information asymmetry between investors and management, another theory is needed to understand how information is being used (Processed) or is supposed to being used.

A general view of management is that management is making decisions, especially to select the most valuable alternative form available options. A closer view on the process of decision making reveals that making decisions is a more complicated process, in which nine steps must be identified, each carrying specific problems with respect to making decisions to maximize the value of the firm (adapted from McTaggart, Kontes, & Mankins, 1994, p. 85).

The first step in decision-making is the *intelligence activity*: identifying (sensing) occasions calling for a decision. In general it is assumed that managers in their entrepreneurial role will sense opportunities and act upon these. Due to the internal structure of the firm however, it may happen that for the firm relevant opportunities are not or too late observed, as explained in the Agenda Theory (Bazerman & Moore, 2009; Jensen & Meckling, 1999; Simon, 1945/1997) and by psychological factors like search biases or group think (a too strong culture in the firm)(Arrow, 1974). A management inadvertently may suffer a surveillance filter on its environment and therefore fail to observe relevant changes in its environment (Bazerman & Moore, 2009). In the case of adverse market developments, a new competitor, a new technology, a frequent response by management is to deny or play down such signals, either through the mechanism of the fight-or-flight syndrome (Ansoff, 1984) or the mechanism of belief conservatism (Jensen, 1998).

Investors may have their shortcomings and biases in observing changes or events that require for a decision to be made, but in general these will be of a different nature as those suffered by management. Therefore it cannot be assumed that either investors or manager are superior over the other in the intelligence activity in decision-making.

A second step in decision-making is *defining the problem*. Is a new technology simply a more efficient replacement of an existing technology, or will it open up new opportunities, change the rules of the game in an industry, etc. The emergence of the digital computer initially by many firms was interpreted as a technology to make

existing processes in existing businesses more efficient and scalable with lower investments. This was expressed in the Business-IT-Alignment paradigm (March, 1994), whereas it turned out that the digital computer, in combination with changes in the communication technology would fundamentally transform industries, products, consumer preferences, firm's micro-economics, etc. To define a problem depends on the capability of conceptualizing new developments and therefore depends on the capability of managers to see the limits of existing dominant logics and business models. Within the firm the process of defining the problem is being influenced by structure, the resource allocation process, the existing reward system, which may impair the capability of the organization to define a problem to continue the value creation of the firm (Henderson & Venkatraman, 1993). It may be that managers in general have superior capabilities to define a problem to increase value, compared to investors, there is ample evidence that managers often err in defining a problem (strategic decision, investment decision) to maximize the value of the firm.

The monitoring by investors is not limited to ratified decisions as suggested in Figure 1, a specific form of monitoring is advising (Burgelman, 1983; Christensen, 1997; Hammond, 1994). This advising is in the case of the Dutch corporate law institutionalized as a task of the supervisory board. But the supervisory board is supposed to provide advice to the executives in the interests of the corporation, not in the interests of the investors only. Investors themselves may advise through signaling, e.g. by asking questions. In the case of active shareholders it is to be expected that explicit suggestions will be presented to executives. The question is whether members of supervisory boards, non-executive members or investors, explicitly will advise with respect to the intelligence step and the step of problem definition. From the objective of maximizing the value of the firm this is to be expected. From the theory of framing in administrative behavior (Tirole, 2006, p. 364), it is to be expected that executives will defend themselves, especially in how to define a problem, by them trying to frame investors.

A third step in decision making is deciding the *process* of decision making, who should make the decision, respectively be involved in the decision making process. In corporate governance theory it is usually assumed that the management of the firm makes

decisions as required to maximize the value of the firm. In reality decision-making is a process, involving lower level managers and staff departments. In this process information asymmetries play a role, decisions are being framed by lower level management, e.g. through escalating commitments or governance overhang in the cases of a linking pin between divisions and executive board and in the end the management of the firm may be framed by its own organization, as explained in the agenda theory (Tversky & Kahneman, 1981). The role of the design of the process of decision-making raises the question whether investors should be part of that process, other than in ex-post judgment (Figure 1).

With respect to the process of decision making the issue is whether, in the basic structure as proposed by Fama & Jensen, investors let themselves frame by management with respect to proposals presented for ratification or whether investors have information to identify and correct framing by managers of proposals that are suboptimal in maximizing the value of the firm. Decision structure is the choice of decision rules.

A fourth step in decision-making is applying an objective function or preference criterion, which is to apply a utility curve. This specifies how the decision maker will value the alternative options to be identified to solve the decision problem. In general the utility curve of decision managers will be different from that of investors.

A fifth step in decision-making is identifying *decision variables*, those items under direct control of the decision maker. Managers and investors may differ in their knowledge or opinions (preferences), which variables are under control of management and which not, which may influence the number and the values of options. Investors expect managers to be rational, to make decisions on basis of the logic of consequences (Arrow, 1974; Hammond, 1994). In this mode of decision making growth and development result from visionary, futurological thinking, breaking with and through existing boundaries and rules to maximize the value of the firm. The costs may be that there is too much experimentation, too many undeveloped ideas, but in view of a dynamic market, some level of explorative, rule breaking rational decision making is needed for value maximization in the long term (March, 1994). In this rational decision making managers will try to increase the decision variables under their direct control. However,

managers often do not pursue rational decision-making but follow the logic of appropriateness or rule following decision-making. In this mode of decision making managers, in case they are faced with the situation to make a decision, first will ask themselves the question what (social) situation they are expected to maintain, what role their environment expects them to play or not (March, 1991). In this mode of decision making the choice of decision variables is limited to what the executive perceives to be acceptable by his environment, or by role attribution he is willing to let himself be constrained to in deciding which are and which are not decision variables. In this mode of decision making the emphasis is on exploitation as opposed to exploration, but the risk is that the executive finds himself trapped in suboptimal stable equilibriums (March, 1994). Because investors are not part of the social system of a firm they will have a different, less tolerant, appreciation for rule following decision making, even if justified by management by the role of social capital. In terms of information asymmetry it is tempting to state that management has better information on what are and what are not decision variables, but both March's dilemma of exploitation versus exploration, and the psychological aspects which may play a role in defining decision variables suggest that investors have reason to question the choice of managers with respect to what are and what are not decision variables.

A sixth step in decision making is the *design activity*: inventing, designing, and identifying possible courses of action in the form of investment decisions to maximize the value of the firm and to achieve strategic and tactical objectives. As explained below it is certainly in large corporation not the management itself that generates alternative investment options, in most cases this is done by division management, business unit management, managers of lines of business and managers of departments. Jensen observed that in the seventies management did not choose for e.g. radical new products as implied by the law of diminishing returns, but chose for product life cycle extension instead, apparently playing safe in terms of risks, but in the end wasting billions of dollars (March, 1991, pp. 71-87; 1994, p. 81). Sull and Bower & Gilbert have explained that the nature of the resource allocation process that is deployed by firms often results in investment proposals which reflect more the phenomenon of escalating commitments and budget gaming but not the content of a new strategy (Jensen, 1993). The assumption made by some authors that the management has superior information

compared to investors is not necessarily true in all situations. The discussion on identifying decision variables in the fifth step of decision-making also applies to the generation of investment options. Another issue in generating alternative courses of action or investment opportunities is the role of theory, that is the causal relation between activities, investments and results. In business, different from mechanical engineering or physics, a double hermeneutic relation (or reflexivity) exists between the realities on which a theory (or business model) is based, including past experiences, actions based on such a theory and the effects of those actions. That is, precisely a successful business model or management theory because it acts upon the assumptions of the theory it is based on, changes, in different degrees and times frames these assumptions. That is, in business no success formula exists that is valid over a long period. Sooner or later a successful business model loses its validity and thus its success. Management books are rife with claimed success models, but as the example of Peters & Waterman's *In Search of Excellence* demonstrates against the claims of its authors, no everlasting or universal theories or business models exist (Bower & Gilbert, 2005; Sull, 2005). This implies that generating investment proposals that are likely to produce a return requires inventing new business models. This is a first responsibility of the managers of the firm in their role of entrepreneur. And many do so, as in the case of Branson or Steve Jobs. But more managers fail to do so or fail to keep up their initial capability to innovate their business model. As explained below, managers may suffer e.g. a dominant logic and thus a capability to see what should be done in a different way. But also investors have a repertoire of cause-and-effect relations in judging strategies and investment plans. Investors accepted re-engineering because in the early nineties this reduced costs and thus increased shareholder value, other parameters of the business remaining unchanged. But re-engineering does not create new products or new markets. The unit organization tends still to be a kind of theory for investors (and alike for controllers and accountants) because it allows investors to calculate the break up value. Due to the declining costs of information and communication, the increasing role of intangible assets and standardization of supporting processes, the unit organization is for most firms no longer a most efficient internal organization.

A seventh step in decision making is identifying constraints which apply to the decision to be made, that is the selection of possible alternative investments projects. Apart from

objective constraints, e.g. number of hours in day, subjective constraints may exist, whether or not to introduce shift work to increase the numbers of hours to work in a day. Identifying constraints basically is part of the design process in step six, but e.g. to cut costs management may decide to offshore specific activities, e.g. a back office for finance services, which most likely will be opposed by the lower level management and employees. An overall constraint is the availability of funds for investments. Managers may define the free cash flow in a restrictive way, arguing that the cash flow is needed for maintenance of the existing business, or less restrictive, giving priority in investing in new business. Available investments funds also may depend on the way the firm is or could be financed, less conservative or more conservative. With respect to the latter the preferences may differ between management and investors. To suggest that management has superior information on the constraints to be applied to alternative investments options is ignoring that a number of constraints may be determined by the utility curves of managers and investors.

The eighth step in making decisions is the choice activity, that is both the process and the choice of the evaluation method (DCF, real options) to choose those investment options that will create the highest value. In the process of selecting alternative options the management of the firm may be framed by lower level management by the way investment proposals are presented, due to asymmetry in risk aversion versus risk taking (Peters & Waterman, 1982). The choice of the evaluation methods, because any evaluation method has some bias, depends on the utility curve of managers. In getting support for a strategy, and thus an investment proposal, managers usually do not present alternatives to investors, but simply their choice. Whereas investors might be interested to understand from what alternatives managers have made a selection. A selected alternative will be presented as in the best interests of the shareholders, but in reality, due to the process of selection may reflect more the interests of the insiders of the firm.

The ninth step in decision-making is making the decision happening. Decisions are never perfect, they need to be actively managed towards the objectives set, in a flexible way, requiring active monitoring of activities, initiatives, and their intermediary effects, and taking corrective actions where necessary. Especially as to be explained in more detail below, the execution of new strategies is an issue. The traditional budget-drive

method no longer is effective. As has been documented by Christensen, firms often have difficulty to manage the <10% of their budget allocated to innovation and new strategies (Christensen, 1997; R. S. Kaplan & Norton, 2006). New management and organization methods exist to solve this problem, and investors should be interested whether management is familiar with those new methods and whether these are applied effectively. The monitoring of the execution of a ratified decision is not only with respect to the resulting performance, the information asymmetry with respect to the execution of a decision is also about the methods deployed by management to execute a decision. A review of methods allows for an ex-ante judgment with respect to how ratified decisions are executed.

Applying the model of decision-making reveals that the issue of information asymmetry between investors and management includes information with respect to cause-and-effect business models, constraints and management methods to execute ratified decisions. Because especially business models and management methods are time sensitive there is also a time factor in the information asymmetry between investors and managers.

### Information asymmetry with respect to market attractiveness

Investors can acquire information with respect to the attractiveness of an industry or a market independent of the firm. Information with respect to the size of an industry or a market, its growth, number of suppliers, number of customers, price elasticity, regulation, entry and exit barriers is, be it at a cost, available in the market. However, the judgment of the attractiveness of a market is not straightforward. New markets, e.g. through a combination of technological innovation and a change in consumer preferences, are difficult to analyze for lack of information (Christensen, 1997). To see new, possible attractive markets, requires foresight (Christensen, 1997; Hamel & Prahalad, 1994). Industry boundaries, and boundaries between markets may change due to technological innovation, making interpretation of available data not straightforward (Hamel & Prahalad, 1994).

An asymmetry in information between investors and executives with respect to market attractiveness, 'picking the right horse', is not so much about available data, but about

the interpretation of this data (Tellis, 2006). The system of capitalism assumes that the entrepreneur foresees new opportunities, new attractive markets, precisely before these can be proven based on existing data. Many examples of thus successful entrepreneurs exist, but many executives and managers failed to see market opportunities, and due to a number of psychological mechanisms precisely once successful entrepreneurs or executives failed to see new opportunities as relevant for their firm (Sutcliffe & Weber, 2003). Other reasons why firms may fail to enter into new attractive markets are to be found in the phenomenon of path dependency (Ansoff, 1984; Bazerman & Moore, 2009; March, 1994; C.K. Prahalad & Bettis, 1996; C. K. Prahalad & Krishnan, 2008). But path-dependency also depends on 'the skill of the jockey'. An element in path dependency may be that available data is interpreted by either party on basis of strategic archetypes developed in the twentieth century and, e.g. through the emergence of information products, changing technologies, possibly are inadequate to understand 21<sup>st</sup> century phenomena (Nelson & Winter, 1982; Schreyögg, Sydow, & Holtmann, 2011; Sydow & Schreyögg, 2009).

A possible strategy by investors to reduce the information asymmetry with respect to the interpretation of data about the industry or market attractiveness is to have the strategy for the firm, as formulated by the executives, to be disclosed. This is no guarantee that investors will get an insight in the way executives interpret data with respect to the attractiveness of industries and data, executives may be reluctant to disclose their ambiguities and uncertainties, apart from the fact that choices made in the strategy reflect an political process within the firm and as such is a reflections of the internal interests of the members of the organization, not of the interests of the firm and its shareholders. On the other hand, the requirement to have meta-control or strategic control (Adler, 2011) and to understand uncertainties and to manage (strategic risks) implies that executives should record in writing the assumptions made in interpreting the data with respect to the industry and market attractiveness. Investors may want to have such assumptions disclosed to check these against their own data and understanding. With respect to certain types of assumptions, e.g. currencies, interests rates, macro-economic growth, prices of some commodities, this will not pose a problem, as these are not sensitive in terms of competition. Other assumptions, e.g. new products, distribution tactics, which competitors either will be contained or pushed



from the market, influencing law makers, occupying strategic nodes in a network industry are more sensitive. These latter categories of assumptions and strategic moves are labeled strategy as private truth, whilst strategies formulated in terms of choice of product market combination are labeled as public truth. The first type of strategy is sensitive with respect to the interests of the firm, to be kept secret from competitors, or even regulators. The Dutch Corporate Governance Code requires the Executive Board to disclose uncertainties and risks of its strategy to the Supervisory Board, but not the assumptions made. The High Court of the Netherlands has ruled in the case of shareholders against the Executive Board of ASMI (LJN: BM0976, Hoge Raad (09-07-2010), 09/04465 en 09/04512) that an Executive Board cannot be required to discuss the strategy of the firm with the shareholders. Only a limited number of specific strategic decisions, e.g. change of identity, need prior approval of the general shareholder meeting (but the executive board is ex-post accountable to the general meeting for a pursued strategy). In the case of active shareholders, especially those with a controlling share, the Executive Board, irrespective of the law, will be forced to disclose its strategy to be scrutinized by these active shareholders or by experts hired by those active shareholders.

A second type of information asymmetry with respect to market attractiveness is with respect to the capabilities of a firm to enter an identified new attractive market. Access to and entry in a new attractive market is not obvious. In the fifties of the twentieth century General Electric was a main supplier of radio vacuum tubes. This technology was replaced by the semiconductor technology (diodes, transistors, integrated circuits), but like three other suppliers, GE failed to enter the semiconductor industry. Only Philips Electronics succeeded to make this switch, but marginally, taking a tenth position in the market of semiconductors. Kodak failed to switch to digital photography, whereas Canon and Nikon did so successfully. The capability of a firm to enter new attractive markets depends on a number of factors, including the quality of the executives of the firm. Executives may have a personal interest in denying the importance of new markets or new technology, as these new market or technologies may erode their power based in the organization, especially if their power position is based on in depth experience with existing markets and technologies. This creates a twofold problem for investors. Executives, to protect their existing power base may

therefore underestimate new market opportunities, but if they acknowledge new attractive markets, may overestimate both their personal capabilities and those of the firm to enter new attractive markets successfully (e.g. Sony entering the film industry, whereas Philips Electronics aborted the same effort through Polygram, for reasons of the oligopolistic nature of the film industry).

Those investors that opt for active monitoring will seek value-enhancing information, to assist executives to avoid or overcome the well known psychological barriers in seeing new attractive markets. Seeing new opportunities not only depends on available data with respect to markets, consumer preferences, new technologies, etc., but as much depends on the capability and willingness for foresight and abductive thinking (Abell, 1993).

Investors and executives each use a different set of business models in making a judgment about the attractiveness of a market, and the capability of a specific firm to turn that attractiveness through investments into a return on these investments. These sets may be different between individual investors and may be different between investors and executives, which may result in different valuations of market attractiveness by different players in the case of the same market. Investors will add value to a firm when they suggest business models which are viable for the market and the specific firm, but with which the management is not familiar. Management may have knowledge about, or have belief in (the principle of probabilism) a business model that makes a (new) market attractive for them and or the firm, but with this business model either investors are not familiar or is not preferred by investors to the effect that investors will not invest in the firm. In such a case the question is what management will do, will the management invest in the investors to educate these with respect to the new business model and thus will invest in the firm, will management back down and decided for a business model which is accepted or preferred by investors, even if this produces a sub-standard performance, or will management present their preferred business model in a way that investors are lured in perceiving it a familiar business model?

An example of a wrongly perceived business model by investors is the case of Dell. The business model of Dell often is expressed to exist of disintermediation of

delivery of personal computers and peripheral equipment to business and to consumers (although the business model of Dell later on included sales through third party channels as well). In reality the business model of Dell was based on mix-match flexibility, that is creating value by combining specific requests of consumers with the modular architecture of personal computers, as a result of which some extra value can be created for a specific customer without additional costs for assembly, on basis of which the customer is willing to pay a small premium. However, the model of mix-match flexibility is sensitive to the overall price level of a product, in this case the personal computer. When after the dot.com bubble the overall prices of computers fell, consumers were willing to accept over dimensioned computers as e.g. sold through channels like the German retailers Aldi and Lidl, paying a lower price even. This resulted in poor financial performance of Dell, to which investors responded by suggesting that Dell would use its business model-as-disintermediate-sales for consumer electronic items like TV's, DVD-players etc. That didn't work because these items have no modular architecture and therefore do not fit into the mix-match-flexibility model (so Dell could not created added value), apart from competitors stepping in direct sales through the Internet and thus reducing prices. The reason why Dell did not explain its real business model probably is that Dell has a policy to patent business processes (Howkins, 2001, p. 40) and or wants to keep business processes secret from competitors.

### Information asymmetry with respect to the competitive position of the firm

With respect to the competitive position of a firm investors can acquire information on that independent from the firm: market share, position in the distribution, brand reputation, control over tactical positions in the market (e.g. real estate for retail chains), relations with suppliers, etc. The judgment of the competitive position is more straightforward compared to that of the market attractiveness. Therefore it is to be expected that with respect to the competitive position of the firm information asymmetry be less an issue as it is with market attractiveness. Because the competitive position is more directly linked to operational results, (market share, revenues, income), an issue might be the balance between attention for and investments in competitive position versus attention for and investments in new attractive markets. One of the

observations of Jensen is that in the seventies many executives too much focused on defending the existing competitive positions, e.g. through product life cycle extension, and paid insufficient time, effort and money in new markets and new products (the cash flow trap), an observation in a more explanatory mode corroborated by Christensen (Hamel & Prahalad, 1994; Martin, 2007).

Also, financial evaluation tools like e.g. the DCF-method, which is biased against innovations producing performance on a longer time horizon, tends to bias decision making in favor of investments in the existing competitive position (Christensen, 1997; Jensen, 1993). The resource allocation processes deployed within firms, especially Bower's bottom-up resource allocation process (Christensen, Kaufman, & Shih, 2008), tends to favor the continuation of the existing strategy of a firm, e.g. through the mechanism of escalating commitments, the concept of the unit organization, and reward systems based on unit-performance, denying the firm to make moves to more attractive markets (Bower, 1986). Therefore the information asymmetry between investors and executives with respect to the competitive position of the firm is more about the trade-off, or marginal rate of substitution, between returns on investments today and returns on investments tomorrow. The Fisher Separation Theorem implies that this trade off between short term investments and long term investments can be delegated to the executives of a firm (Bower, 2003; Burgelman, 2002; Christensen, 1997; C. K. Prahalad & Krishnan, 2008; Sull, 2005). This theorem appears to overlook a number of the administrative and behavioral mechanisms present within the organization of a firm, which deny maximizing shareholder value. Focusing too strong on the existing competitive position of a firm and paying insufficient time, effort and money to new markets and products, even may deny a firm access to future markets as needed for its continuity.

The Fisher Separation Theorem assumes that the free cash flow of the firm "belongs" to the insiders, that are the executives, and that these have and can have discretion how to invest this free cash flow. The corporate governance revolution of the 1980s, in response to phenomena like the cash flow trap, reduced this discretion, claiming the free cash flow belongs to the shareholders (T. E. Copeland et al., 2005, p. 11). Even more, in the past investors trusted executives to invest the free cash flow, e.g. in R&D, to create new products, etc. because this secured them property rights on new growth

opportunities. The new knowledge thus created remained within the firm due to a non-mobile labor market and an inefficient capital market. With the labor market for scientist having become mobile and the availability of seed capital and growth capital for start-ups, many firms experienced that ideas they invested in were taken outside the firm, by employees starting small firms for themselves, e.g. in biology and software (Rajan & Zingales, 2001). That is, the property rights shareholders invested in through the free cash flow, for a part is being denied to them. This issue has been solved through the phenomenon of corporate venturing and open innovation (Bhidé, 2000; H. Chesbrough et al., 2006). This way of organizing and financing of innovation fits the real option valuation model of investment opportunities and basically increases the ex-ante value of investment projects.

The investor, dependent on his preferences, may either invest in a firm pursuing innovation and thus in future wealth creation through open innovation, or invest in the (small) firms in the open innovation ecology of the same firm, or in a combination of these two. This implies a different situation with respect to the information asymmetry between the executives and investors, especially those also investing in small firms operating in the open information ecology of the firm.

### **Information asymmetry with respect to the efficiency of the operations of the firm**

We assume that the operations of the firm include the internal governance of the firm, this is the set of administrative relations between the executive board, the management of divisions, shared service centers and staff departments, the management control of the firm, including the resource allocation process and the internal capital market, and the operational processes producing services and goods (H. Chesbrough et al., 2006).

Investors will try to judge the actual efficiency of a firm by analyzing published accounting data against industry benchmarks, e.g. labor productivity, investments in various categories, number of employees in specific functions, costs of functions, e.g. costs of capital, costs of finance, costs of ICT, etc.

Identifying opportunities for improving the efficiency of the operations of a firm in general is impaired by an information asymmetry between executives and lower level managers. Depended on the reward system, lower level managers may be motivated to

shirk in disclosing opportunities to improve efficiency. They may fear to lose their job or perceive improving efficiency as a loss of autonomy.

In the nineties of the twentieth century the information asymmetry between executives and lower level managers increased as a result of the growth of specific knowledge in the production process (Acharya, Myers, & Rajan, 2009; Strikwerda, 2000; Teece, 1985; Williamson, 1985) and because executives as a result of the focus on shareholder value changed the internal reporting of divisions and business units to financial reporting only, to align that reporting with the reporting of the executives to investors (Jensen, 1998). In relation to this latter movement the ERP-systems implemented in firm in many cases were designed for financial reporting only, especially to generate accounting data for the annual report.

Under influence of insights from the field of corporate finance investors switched from valuing firms based on accounting data or accounting profit, to valuing firms on basis of economic profit, more precisely on basis of the net present value of projected cash flows. This change towards economic profit reflects the acknowledgement that if the ratio of the market value of the firm to the replacement costs of the capital (Tobin's  $Q > 1$ ) this results from the intangible assets of the firm. According to the accounting rules of the IASB (IAS 38) only investments in patents as intangible assets are allowed to be capitalized and certain expenditures on development. Investments in human capital, organization capital and information capital (except hardware and software) are to be expensed. In the USA investments by firms in intangible assets exceed the investments in tangible assets since 1990 (OECD, 2008; Useem, 1993). Although these investments in intangible assets, because these are expensed subtract from the profit in the short term, obviously shareholders accept this. This raises the question whether the claim is valid that shareholders have an interest in short term profits only. Apparently shareholders have an understanding that investments in intangible assets will produce additional future dividends.

Within the field of management, management accounting, decision theory, etc. no clear model can be identified that links investments in intangible assets to cash flows or return on such investments. Such models may exist at macro-level, they do not exist at

the level of business models (B. van Ark, Hao, & Hulten, 2009; Bart van Ark & Jäger, 2010; van Rooijen-Horsten, van den Bergen, de Haan, Klinkers, & Tanriseven, 2008). Kaplan & Norton provide an operational method to define required investments in human capital, organization capital and information capital, but their method does not include an accounting type numerical calculation model to predict future returns on such investments.

Brynjolfsson et al. (2004) suggest, based on a database analysis, that investors value firms disproportionately higher for disclosed high investments in information technology. Even more when, based on information e.g. through visits, that investments in information technology are combined with investments in organization capital. It can be argued that this valuation is based on a perception with respect to the relation between inputs (investments in information technology) and output (future cash flows) based on the firm as the neo-classical black-box. This perception may have been based on the observation documented by Bresnahan et al. (1999, 2002) that certain organizational practices, when combined with investments in information technology, were associated with significant increases in productivity in the late 1980 and early 1990s.

It is assumed that a strong or effective corporate governance system produces better operating efficiency of firms (Brynjolfsson, Hitt, & Yang, 2002). To identify the maximum attainable efficiency of a specific firm is not straightforward. The efficiency or inefficiency of a choice of operating mode of a firm, including its internal governance system is always relative to some specific set of individuals whose interests are being taken into account and also to some specific set of available options (Dybvig & Warachka, 2010). Available options may change as a result of e.g. technological innovations or changes in the law. Milgrom and Roberts: "..., in applying the concept of efficiency it is necessary to be clear about whose interests are counted and what alternatives are considered to be feasible." Following Milgrom and Roberts we state that a firm has an efficient mode of operation if there is no available alternative that is universally preferred in terms of the goals and preferences of the people involved. Milgrom and Roberts: "More precisely, if individuals are sometimes indifferent about some of the available options, then a choice is efficient if there is no other available option that everyone in the relevant groups likes at least as much and at least one person strictly prefers. Turning the definition around, a choice is *inefficient* when there

is an alternative possible choice that would help one person without harming any other.”

With respect to the efficiency of the operations of the firm the information asymmetry between investors and executives is about this alternative possible choice of mode of operations, which would make the investors better off without harming others involved by the firm. The traditional method to achieve maximum operating efficiency was through time and motion studies, as practiced by Taylor and Gilbreth around 1900, and has become the bread and butter of the field of industrial engineering. Through direct observation of activities and systematic analyzing movements of workers and eliminating redundant action and movements, alternative options with a higher efficiency were being identified. The analysis of the organization of (physical) work soon extended to the organization of the firm itself, e.g. by introducing the unit-organization, as well to behavioral aspects of the organization, as elaborated in the fields of industrial psychology and organizational behavior. The development of new accounting methods, including cost accounting and related statistics, in combination with the development of the function of management control, provided management with information on options to improve efficiency. The movement of Total Quality Management provided a range of statistical and analytical tools to eliminate waste (of time, materials, energy, equipment) and reduce faulty products, thus improving efficiency (Milgrom & Roberts, 1992, p. 22). With the application of TQM-methods however, increased the amount of specific knowledge in the organization whereas management control techniques assume generic knowledge (Jensen, 1998, p. Ch. 11). The emergence of the movement of Total Quality Management more or less coincided with the emergence of financial control in the eighties and nineties, reducing the reported information from divisions to headquarters to financial information only, whereas before non-financial information was reported as well which provided the headquarters of a firm insights with respect to efficiency (Wruck & Jensen, 1994).

Executives countered this increased information asymmetry between them and the management of division mainly by two methods.

The first method was benchmarking the costs of specific functions or processes against those of other firms, irrespective of industry. This helped a number of executives to set efficiency targets to their managers, also because a number of these benchmarks were



published and were thus available to investors (Useem, 1993). Benchmarking as a method to identify opportunities to improve efficiency is flawed because this method suffers definition problems, is limited to isolated specific business functions, e.g. finance or HR, and it does not identify options for efficiency improvements as the application of the methods of industrial engineering is capable to do independent of benchmarks.

The second method deployed by executives to reduce the effects of information asymmetry was to change the performance based pay of managers of divisions from a tiny sensitivity in the relation between pay and performance into a strong sensitivity. This however turned out to be not without problems. The definition of performance turned out to be not unambiguous, especially the one-dimensional target setting opened up all kind of opportunities for perverse behavior and number management. Jensen (Krische, 2005) may have argued that multiple targets is no target, and that the variable to be maximized must be single dimensional, but between effort parameters, e.g. raise market share, no monotonous increasing relation exist with profit, but often is a concave relationship, at least for traditional products. To reward a manager on return on invested capital (ROIC) encourages harvesting behavior. A target expressed in terms of discounted cash flow (DCF) undervalues investment projects because DCF fails to value flexibility or options in projects (Jensen & Meckling, 1999).

Because the performance of a manager always contains subjective elements, e.g. should a manager be held accountable for the effects of events outside his control on his performance, and because in the process of judging performance a large number of psychological and institutional elements play a role between rater and ratee (T. E. Copeland et al., 2005, p. 472) the effectiveness of performance based pay to reduce the effects of information asymmetry is to be questioned (Baker, Jensen, & Murphy, 1988; Levy & Williams, 2004). Jensen's description of LBO's moving the debt from headquarters of a multi-business corporation to the divisional level and thus increasing the debt to equity ration at that level and related creating a high pay to performance sensitivity seems to be limited in its application (see also: Bebchuk & Fried, 2005; Holmstrom, 2004).

A more recent development is that, due to the decreasing costs of information and communication, it is technically possible to reduce information asymmetry within the internal organization of the firm, at least with respect to pragmatic or management

information. Examples of firms having done so are IBM, Microsoft, Nestlé, Heineken. The wide spread applied unit organization form, the multidivisional organization or business unit organization (Jensen, 2007) was pioneered by DuPont and elaborated by Alfred Sloan at General Motors, to have maximum information processing capability and speed whilst maintaining effective control by the headquarters of the decentralized businesses. The design constraints present in the first quarter of the nineteenth century to achieve this were the high costs of information, the high costs of communication, the limited capacity and the limited speed of communication (Drucker, 1946; Fligstein, 1985; Sloan, 1962/1986). Since these constraints have been lifted due to the declining costs of information (Stinchcombe, 1990), the declining costs communication, the virtual unlimited capacity of communication and the real time speed of communication, new options for organization forms are available for firms. Because techniques, concepts, decision rules etc. for management accounting, management control, IT-governance, functional design of enterprise resource systems and management itself are based on the unit-organization, there is a material inertia in acknowledging and deploying available new concepts for the organization of the firm.

Herbert Simon observed that the design of the internal organization of the firm no longer is about structure, but about the organization of information and the factoring of decision making (Simon, 1945/1997). In the unit organization information was organized within the structure of the M-form, its divisions and business units, thus creating information asymmetry. Companies like IBM have organized information disembedded from the internal structure and by decree of the CEO all employees and managers are granted access to the same information, apart from some security issues. IBM has done so for multiple reasons, to be able to implement a new strategy, to improve negotiating power, to have a better use of its human capital and to be able to see market opportunities which most likely would not have been seen with the old organization. In this IBM has followed the call of Michael Porter to organize information and knowledge disembedded from the internal structure in order to have a better use of information and knowledge and thus a better return on its investments (Porter & Wayland, 1992). Also, IBM reports its performance on multiple dimensions, product, customer/industry, region and distribution, weekly to all members of the organization, and aggregated in its annual report. This provides investors with a more in depth view of IBM.

The elimination of information asymmetry with respect to pragmatic or management information does not imply a complete reduction of information asymmetry. Information asymmetry with respect to opportunities, (dynamic) capabilities will remain to exist, also because this is for a part tacit knowledge. To an extent applying a two level rolling forecast is reducing this type of information asymmetry. At the first level decentralized managers are required to produce every month a 18 month or 24 month period forecast of market demand. At the second level managers are required to provide each month an 18 month or 24 month period forecast of the performance of the line of business they are responsible for. Whether executives are willing or should disclose such information to investors is to be discussed, because this forecast information is no accounting information, executives do not need to disclose such information.

The use of rolling forecasts within the system of management control in the firm illustrates a shift from an emphasis, induced by financial management, on lagging, financial parameters, to an emphasis on leading, non-financial parameters. Within the multi-business firm, or multidivisional firm the method for strategy execution due to the management-by-objective method introduced by Drucker in the early fifties did develop into what is labeled, the budget-driven method of strategy execution. This method is related to both the unit-concept of the organization and the portfolio investment theory of corporate finance. The concern for the executives became to have opportunities for investment created by lower level management and to allocate available investments funds most efficient to those investment opportunities. As explained before, due to the information asymmetry between lower level managers, the tendency of lower level manager for escalating commitments to their existing activities, satisfying behavior, this process of allocation investment funds became inefficient. Even more, because of performance based pay based on unit performance and the unit-based accounting methods, this method also failed to identify and to exploit the various synergies between the divisions or business units. The method, according to Bower, also failed because executives, partly due to the changing regulatory environment, failed to adapt the systemic context of the internal organization to new strategies (Drucker). As predicted by the Interactionist Perspective Model (Bower & Gilbert, 2005) most managers let themselves more influence by the elements of the systemic context to define initiatives

to negotiate for available investment funds in view of their personal objectives, as they let themselves influence by the content of the new strategy.

The budget-driven method for strategy execution is being replaced by a method based on cause-and-effect relations. The budget-driven method basically is the same as the firm as a black-box input-output system in neo-classical economics. Within a firm, because it is possible to eliminate information asymmetry with respect to pragmatic or management information, and because the growing data basis within firms allow for verifying claimed relationships between input and output, there will exist increasing cases in which ex-ante investment proposal can be scrutinized on plausibility, based on available data. This change in method of resource allocation is implicit reflected in the idea of business models. That is that another type of information within the organization is subjected to reduction of information asymmetry: effect information. This movement from budget-driven resource allocation to allocation based on verified cause-and-effect relations has its restrictions as well. Due to cognitive limitations it will be impossible to describe cause-and-effect relations completely and accurately (Greenberg, p. 70). Second, the nature of entrepreneurship is abductive thinking, not inductive thinking or deductive thinking, but to think: 'what else might be possible.' This abductive thinking not only applies to new products and new markets, but as well to operational processes and work methods.

Where does leave us with respect to the information asymmetry between investors and executives with regard to the efficiency of the operations?

Information asymmetry may exist with respect to the reported level of efficiency (either explicit disclosed or contained in the disclosed accounting data) and the actual level of efficiency. Such a discrepancy will be considered fraudulent and creates a risk for executives to be punished for it by investors. Investors will be more interested in the maximum attainable level of efficiency and whether executives are both motivated and have the quality to overcome the usual resistances to achieve this maximum level of efficiency. Private equity is well known to take over the management of the firm and by force cut costs to create financial rewards, but this is not necessarily the same as creating an efficient firm.

### Information asymmetry related to the corporate governance structure of the firm

The governance system of a jurisdiction, respectively of a specific firm aims to define rights on information, especially for shareholders and supervisory boards, to be disclosed by the management of a firm. The aim of this disclosed information is to ratify specific decisions to be taken by management ex ante, according to the scheme in Figure 1. The aim of a system of corporate governance is not to have full information disclosure as this might harm the interests of the firm vis-à-vis competitors. Governance system may vary with respect to the degree information needs to be disclosed by the management. In the Dutch jurisdiction, as explained before, the executive board has no obligation to discuss the intended or actual strategy of the firm with the general meeting of shareholders, although public firms must have their strategy approved by the supervisory board. In the case of majority shareholders and closely held firms shareholders by the sheer force of voting power define themselves the right to influence and to approve or not the strategy of the firm. Especially an informed investor, which may have value enhancing information with respect to the firm, will be interested in what the de facto, not what the de jure system of corporate governance is of the firm under consideration. To have information which may be value enhancing for the firm, but which cannot be made input to the decisions of the management, has no value and investors will not be willing to invest in information.

### Information asymmetry with respect to the nature of the motivation and the values of executives

In corporate governance theory and its related agency theory it is assumed that executives have motives, interests and purposes that diverge from those of the shareholders, to the effect that the interests of the shareholder are not fully served. It was attempted to align the motives, interests and purposes of the executives with those of the shareholders by making executives shareholders as well, to no avail (March, 2006). In general executives and shareholders will have congruent motives: to increase their wealth. But the executives of a firm have means to achieve their objectives in a rather risk free way (e.g. through stock options, playing with accounting rules, postponing necessary investments) that may be suboptimal for shareholders and the corporation, and may be perceived as unfair by other stakeholders. To this is to be

added the issue of the agency costs resulting from the utility curve of the executives (including non-pecuniary benefits and perquisites) being different from the utility curve of the investors (Jensen, 2001a).

In corporate governance in general the principal-agent theory is assumed. The alternative to the principal agent theory is the stewardship theory. The stewardship theory assumes that the executive is motivated by an intrinsic sense of responsibility, abiding by his moral commitments and a sense of external accountability (to society or the community), directed to due stewardship on entrusted assets. The stewardship theory assumes that the executive is focused on the going-concern value of the firm. The stewardship theory is assumed in e.g. the Dutch corporate law. The question is to be raised whether the stewardship theory invokes the same perverse behavior, as did the stakeholder society in the USA in the period 1940-1970. Or whether executives use the stewardship relation to avoid accountability to the shareholders meeting and use the stewardship theory as a cloak for their narrow self-interest. This suspicion does not deny that executives exist, e.g. Peter Elverding the former CEO of the Dutch multinational chemical company DSM, an executive who satisfies Jensen's description of the perfect agent in the perspective of the enlightened stakeholder theory (Jensen & Meckling, 1976).

A perfect agent is an individual which is resourceful, evaluative and maximizes an objective function other than her or his own, but that of a community; a perfect agent is altruistic. This reminds of the question Berle & Means (Jensen, 2001c; Jensen & Meckling, 1998) asked: toward what end the powers of the CEO be directed? Berle & Means identified three alternatives: 1. CEOs function as something like trustees for stockholders, regarding the interests of shareholders as primary; 2. CEOs might take the opportunity to plunder the resources of the firm, utilizing the corporate form to exploit other constituencies (*managerial entrenchment*); 3. CEOs could choose to use their discretion, not narrowly for their own or for stockholder's interests, but for the interest of society as a whole (*managerial professionalism*). The debate existing between about 1870 and 1930 in the USA to use the latter, *managerial professionalism*, lost ground to the first as a basic philosophy and objective for MBA-courses in the USA (Berle & Means, 1932/1991; Khurana, 2007). The tide seems to have turned somewhat, as in the Principles of Corporate Governance published by the New York Stock Exchange it is stated: "The Commission also recognized that in addition to these three groups, other

corporate stakeholders have critical interests in the long-term success of the corporation, including, for example, the corporation's employees who rely on the corporation to provide jobs and wages, the corporation's customers and vendors, as well as the communities in which the corporation operates and society at large, which look to the corporation to help address society's challenges, to innovate and to promote durable and sustainable economic growth" (New York Stock Exchange Commission on Corporate Governance, 2010)

In selecting a new CEO, supervisory boards may have a tendency to look for perfect agents. Executive search firms know this and know how to train their candidates to present themselves as perfect agents (altruistic-political man). As a result boards instead may end up with a CEO that turns out to be a manipulative-political person, using his new power for personal purposes.

CEOs, like any individual, not only maximize or satisfy their personal utility, they also will pursue morality. An individual obtains a sense of affirmation when a person abides by his or her moral commitments. Utility and morality are qualitatively different, dependent on the situation and individuals, and cannot be traded off or substituted (Etzioni, 1988). Investors will try to understand the vector of a CEO with respect to the degree in which utility is pursued respectively morality, and which of these two will be the first constraint on the other. This, as suggested by Etzioni not only depends on the individual, but as well on the context within which CEOs make decisions. This context consists not only of shareholders, but as well stakeholders, the regulatory environment, and the formal and informal institutions of society. CEOs therefore seem to be sensitive for moral issues, e.g. sustainability. In the case of AKZO and SHELL management can earn bonuses based on the sustainability index scored by their firms. This violates Etzioni's opinion that utility and morality cannot be substituted (Etzioni, 1988, pp. 63-64). That the maximization of utility, e.g. shareholder value, should be constrained is also implied by Cadbury's description of the social responsibility of the firm, not doing harm to the physical nor the institutional environment of the firm (Cadbury). Because utility, e.g. shareholder value, and morality, e.g. corporate social responsibility cannot be substituted, but morality can be used as a cloak for satisfying behavior, it may be difficult for investors to understand the motivation and the values of the individual CEO.

## Information asymmetry with respect to accounting data

By definition, as stipulated in the law, no information asymmetry is supposed to exist between investors and management with respect to published, audited accounting data. The system of law and chartered accountants is designed that published annual reports are reliable. In the Netherlands in approximately 30% of audited and certified published annual reports turned out to contain material errors. Numerous cases exist that audited and certified annual reports either contain material errors or fail to report risks, fraud or other facts which should have been reported in the opinion of shareholders.

## Closing

By applying the cybernetic information theory to the relations between investors and executives in combination with a model for executive decision making based on the field of administrative behavior a richer space of dimensions can be developed with respect to the issue of the information asymmetry as assumed in theories for corporate finance. Due to a number of psychological mechanisms in e.g. interpreting material information, respectively producing eidetic information but also in decision making, the default assumption in corporate finance that executives always have better information available to them with respect to the (actual and potential) performance of the firm. Even more, by understanding the various types of information and by understanding how data is being processed into information, and subsequently into strategic investment decisions, it can be understood in which cases and how investors but also non-executives can make a contribution to improving the quality of especially the eidetic information and thus the strategic decisions of the executives. Due to the declining costs of information and communication the information asymmetry with respect to pragmatic information (including accounting information) and material information (facts about the environment of the firm) are expected to be reduced further. The competitiveness and the performance of a firm therefore increasingly will be determined by the capability of the corporate governance system of a firm to process various types of information, especially with respect to producing high quality eidetic information. Which is an intellectual challenge for both executives and investors.



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