Merger Dynamics – A System Dynamics Analysis of Post-Merger Integration Processes

Switbert F.L. Miczka and Andreas Größler

Mannheim University
Industrieseminar, Schloss
D-68131 Mannheim, Germany
Tel.: +49 621 181-1583
Fax: +49 621 181-1579

E-Mail: smiczka@is.bwl.uni-mannheim.de
agroe@is.bwl.uni-mannheim.de

Abstract

Mergers and acquisitions (M&As) have drawn the attention of researchers for several decades now. Manifold viewpoints have been taken and numerous factors apparently influencing the success of an M&A project have been identified, leading to an extensive, yet extremely fragmented body of knowledge. Although the logical strive for integration has been expressed by several authors, in most cases a focus on small sections of M&As persists.

The aim of this study is to offer a different way of synthesis that allows testing well-established theories of post-merger integration processes. With the help of a literature-based system dynamics model and by analysing the simulation runs it produces we are able to open up a new perspective on the organisational processes which are dominant during post-merger integration. Particular emphasis is put on the investigation of capability transfer, the change of corporate culture and the employees' perception of the integration process.

Key words: mergers & acquisitions; post-merger integration; literature-based modelling; capability transfer.

For the last 40 years mergers and acquisitions (M&A) have drawn the attention of researchers mainly for two reasons: Firstly, the regular occurrence of this particular strategic move has inspired detailed analyses. At the peak of the current M&A wave in 2000 the value of the worldwide M&A transactions amounted to about $ 3.5 trillion (Grant, 2002), which is about 1.7 times the gross national product of Germany in the same year (von Baratta, 2003). Even after a substantial decline due to the economic

downturn during the last three years the worldwide M&A activity remains at an impressive level with transactions worth $ 1.38 trillion in 2003 (Stewart, 2004), which is still more than in every single year before 1996 and approximately the value of all deals closed during the 1980s (Grant, 2002). Several reports indicate that a revival of the M&A market is approaching (Stewart, 2004; money.cnn.com, 2004; Kestel, 2003).

Secondly, the effects of externally achieved corporate growth seem to be worth a closer look since M&As affect economies, industries, organizations, as well as individuals substantially. On the one hand M&As alter markets, industries or even whole economies: Those which get caught by a substantial M&A wave regularly end up in a completely new configuration. The power relations between the competitive forces inside the industry shift due to the higher level of concentration (Porter, 2001). On the other hand M&A deals often trigger dramatic change in individual firms, affecting organizational structures, individual job environments and life circumstances. Mergers and acquisitions stand for thrills and threats, for corporate chances and individual changes, gambling, growth and getting fired. Where managers assume their ultimate challenge, lower-level employees often imagine their personal ruin, and therefore research reveals not only growth and prosperity, but numerous pitfalls and risks emerging from the combination of two formerly independent organizations. The weak corporate performance of many companies after a merger or acquisition supports scepticism towards the justification of such a risky strategic move (King et al., 2004), and employee-oriented voices emphasize negative examples causing high individual uncertainty and traumatic effects to organizational and personal identity (Cartwright & Cooper, 1996).

Mergers and acquisitions appear to be “an important, if not dominant, strategy for twenty-first century organizations” (Hitt, Harrison & Ireland, 2001, 4) since they apparently offer opportunities of fast access to new resources, markets, and new knowledge, and present a possibility of investing disposable financial resources in promising industries and companies (Bower, 2001). The expected outcomes of M&A deals seem to justify the apparently high risk, but which dynamics evolve from the combination of two organizations and apparently lead to only little chances for a successful combination several studies have reported? (Cartwright & Cooper, 1996)

The different backgrounds of researchers approaching M&A topics have opened up various and sometimes contradicting perspectives (Haspeslagh and Jemison, 1991). Manifold criteria for evaluation have been created and numerous factors apparently influencing the success of an M&A project have been identified, leading to an extensive body of knowledge which covers descriptions of practices, best policies, and of theories on how these factors interact with each other. In combination with the researchers’ diverse backgrounds this has led to the obvious fragmentation of the M&A knowledge base (Cooper, 2001). The more detailed research becomes, the less straightforward and manageable becomes the body of knowledge, without any integrative efforts (Schoemaker, 2001). Yet the endeavours have not been brought together and addressed straightforwardly in a comprehensible and methodologically coherent research design.

The present study aims as a first step at a comprehensible integrative formulation of people-oriented, cultural, and knowledge-focused issues of the post-merger integration phase. Firm-external effects and a detailed financial analysis of the post-merger phase will not be part of this analysis. Their omission is grounded in the assumption that those

elements are either not to be influenced extensively by the management team (in case of the market), or are not the core elements of value creation in mergers and acquisitions: Haspeslagh and Jemison (1991) argue that two classes of M&A exist, the "strategic" ones that aim at the "creation of value" through the combination of two organizations, and others that only "capture value" and consider M&A merely as an investment without any ambition to coordinate operationally or strategically. Since the latter consequently do not involve any significant management efforts after merging, they will not be covered explicitly by this study.

The differentiation between the terms mergers and acquisitions is not made with the widely applied reference to the legal characteristics of the deal (Gerpott, 1993). Rather, the two terms are used to describe differences in the distribution of power between the two formerly independent organizational entities A and B which are to be combined: *Merger* shall describe a situation in which both partners are more or less equal in power, whereas *acquisition* depicts a condition characterized by one dominant and one subordinated unit.

Methodological approach

The present study tries to overcome at least some of the difficulties of the fragmentation by integrating the current body of knowledge on post-merger integration offered in the corresponding literature into a system dynamics (SD) model. Most SD modelling guidelines, e.g. Sterman (2000), explain the building process of such models as the explication of individual implicit models through interactive discussion in workshops or through comparable techniques. The idea behind the literature-based approach of the present study therefore shall be laid out briefly.

In general the aim of any research is the creation of a consistent and complete knowledge base on a particular subject, interpreting Schoemaker (2001). The longing for consistency finds expression, for example, in the referential system of quotations scientific publications use to link specific ideas to each other (Stichweh, 1987), as well as in the formulation of integrative efforts which attempt to build a framework interconnecting the individual research results (Luhmann, 1994). The respective building blocks of such a knowledge base are supposed to be retrieved with a certain level of precision, which the methods of empirical research provide to an extent that has been generally accepted as sufficient. Completeness is a formal aim, but basically unattainable since the complexity of any research object that is of social nature unavoidably leads to a fragmentation of the knowledge base. As already mentioned the research on mergers and acquisitions is a formidable example.

The formulation of frameworks or meta-studies is frequently conducted in order to check both consistency and completeness and to integrate several fragments. Unfortunately many of these frameworks are oriented on the design of empirical studies and thus simply formulate hypotheses about linkages on a meta level without conducting own empirical testing or other ways to crosscheck findings methodologically, for which Das and Teng (2000) give a formidable example. Albeit many empirical studies include observations of variables over time, the condensation into frameworks often results only in correlative hypothesis of the kind "A is positively related to B". The time dimension is excluded systematically, even though maybe

unconsciously. System dynamics yet aims at the formulation of a different class of hypotheses, namely dynamic hypotheses which describe the researcher's assumption about a system's behaviour *over time* caused by the interference with other elements (Sterman, 2000, 94–102). The explicit formulation of perceived or previously proved interrelations between variables in a formal model rather than in an alternative verbal description leads to higher precision and may hint at uncertainties about the directness of connections or reveal inconsistencies in theoretical constructions. Approaching systems structure by modelling causal relationships instead of correlative ones increases the meaningfulness of such models, since it forces the decent investigation in the nature of and reason for the correlations revealed previously. Qualitatively researched knowledge may be of great use in this regard (Sterman, 2000, 853–855; Milling, 1984).

Even though SD models are rarely accurate in the exact numerical values they project, the precise mathematical formulation of causal relations supports the clarification of the actual structure of the examined problem. A clear picture of the problem's structure improves the understanding of the observed phenomena (Forrester, 1987; Größler, 2000). In this regard, a numerically exact representation is only the second step. As a first step, however, a conclusive causal structure must be identified which represents the reality of the problem domain. In other words, structural validity is assumed to be more important as behavioural validity (Barlas, 1996).

Besides the effect from the mere formulation of a literature-based system dynamics model, the possibility of simulating the model may allow further insights, mainly regarding the refinement of the dynamic hypotheses and the identification of lacks and inconsistencies in the current knowledge base. The dynamic hypothesis of a system dynamics model can be checked at least for internal consistency with the assumed interrelations between the model's elements. In addition, simulating the model's behaviour might also reveal shortcomings in the underlying model structure. As a consequence either the model structure has to be improved and adapted to the knowledge base or a lack of insight in the body of knowledge has been detected.

Such a detected lack of knowledge may be got over, for instance, by borrowing from closely related fields, in the present case especially from research on strategic alliances, joint ventures or change management. The numerous similarities between post-merger integration and other kinds of organizational change have already led to a high degree of adoption of theoretical concepts, tools, and insights from such studies into the M&A literature and practice (Galpin & Herndon, 2000). But for M&A "the complexities that would accompany any other kind of change effort are all due, in this case, to the merger of two companies, and the resulting organizational dynamics are intensified because they have to be addressed not just in one organization but in two." (Galpin & Herndon, 2000, 54) This high complexity increases the difficulty to obtain a complete and consistent picture, not relieving that such a period of change is a difficult object to analyze anyway. The usual comparatively static research methods focus on a specific point in time or on discrete events analyzed sequentially and stringed to form a time series (van den Bosch, 2001). Even though this repeated investigation offers hints at the dynamics of the system, researchers frequently acknowledge that grasping dynamics with conventional methods has been a problem in their studies (Bourantas & Nicandrou, 1998; Lane, Salk & Lyles, 2001). System dynamics thus offers a valuable method for testing and maybe even increasing the consistency as well as the completeness of the

body of scientific knowledge on dynamic social phenomena. For this purpose the exclusive recourse to literature is not only appropriate, but the logical basis.

The different purpose of the literature-based approach presented in this study compared to the 'managerial approach' that SD guidelines frequently describe should be obvious from these considerations: 'Managerially built models'—i.e. those aiming at the explication of implicit models—are supposed to support solving problems in the specific situation of a particular company. The basis for these models is the subjective expert knowledge of the interviewees. A rather explorative approach to a dynamic problem is chosen. Insights from research are used as supplements, either directly or because they actually form some of the perceptions the managers report on, new knowledge is generated through an inductive approach. In contrast, the literature-based model aims at the integration and testing of the already existing knowledge base. This may lead to its further acceptance through the application of a different method of investigation, or it may uncover shortcomings in the actual picture research draws on a specific phenomenon. Additionally it can result in the deduction of new insights on the causal relations in and the behaviour of the system under investigation.

Up to now the dynamics related to mergers and acquisitions have not been researched extensively with system dynamics models. In fact, only three contributions directly addressing the whole field could be identified in the last 15 years, namely Lino's (1988) model of the unsuccessful acquisition of the Zayre retail network by Ames Department Stores Inc, Korten's piece on the development of corporate value in connection with mergers and acquisitions (Korten, 2000), and finally Kunc's (2001) study of the influence of M&A activity on an industry's long-term performance. Besides the small number of studies the mentioned also address only peripheral or very specific questions of the M&A process. The basic questions which the enormous number of non-SD-studies on M&A address have obviously never raised interest of the system dynamics community despite the numerous hints on the importance of a dynamic investigation of the several processes which are mainly of social nature—usually a classical system dynamics domain.

The dynamics of post-merger integration

The model developed in the present study basically depicts the combination of two organizations, A and B. Most phenomena influencing the post-merger processes take place in both organizations, even though their intensity may differ. To depict situations of an unequal distribution of power some variables are included that allow A to be superior to B. For example, A can decide to what extent B gets the opportunity of remaining autonomous and thus of protecting its own culture (Haspeslagh & Jemison, 1991). As a result both mergers and acquisitions in the terms of this study can be simulated.

The model boundary follows the study's focus on people- and knowledge-oriented internal aspects of the post-merger phase as described further above. The model does not contain variables that are relevant only at the pre-merger level or during the phase of the closing of a deal. Furthermore, the focus on *integration* leads to the exclusion of all variables that do not directly influence the company-internal processes in the post-merger stage, e.g. political disputes, anti-trust examinations, competitor's reactions, the

creation of monopolistic positions etc. Neither does it cover consequences of the additional burden on the course of the daily business. The level of aggregation will be kept comparably high, mainly as a consequence of the study's limited space. Nevertheless the relevant peculiarities of the post-merger phase depicted in literature can be portrayed since the model building process reveals some overlaps and analogies in the up to now discussed constructs and the apparently identified predictors of M&A success. It turns out that the model's dynamic behaviour is still endogenously generated, what hints at the usefulness of the defined model boundary (Forrester, 1971).

Of particular importance for the understanding of the model is the organizational level at which it is applied: For actual day-to-day integration matters—especially when it comes to culture and the like—the examination has to be well-focused on the truly merging organizational entities, which are mostly localized on the level of business units or departments. The appropriate level of application to use the present model thus has to be found by identifying the organizational level at which different populations of a more or less homogeneous social structure can be found, if a detailed analysis is the aim. Therefore the model is parameterized in a way that describes the situation in such a sub-unit instead of those describing, for example, a whole multinational company. Haspeslagh & Jemison (1991, 176) incorporate this idea in their distinction between "acquirers", i.e. the whole acquiring corporation, and "hosts", the corporation's subunit that has to deal with the new partner (also Birkinshaw, Bresman & Haakanson, 2001). This idea is valid for the acquisition of small organizations by large ones as well as for the actually occurring integration tasks after a 'mega-merger'. For the application of a model representing the post-merger processes in an organisation this implies that it can either show the processes only in a quite generalized way for large M&A deals, or it has to be applied to every distinct organizational subunit that is combined with a counterpart separately. Thus, a deal like the formation of DaimlerChrysler would result in a model that includes the one designed and explained in this study many times if a detailed and differentiated insight into the post-merger dynamics is desired. Otherwise, i.e. if the whole deal is simulated in one model, only a general analysis can be achieved.

The complete model can be divided into four interweaved sub-models, each addressing a particular aspect of the dynamics of post-merger integration: On the one hand the transfer of capabilities from A to B and vice versa and the cultural dynamics arising from an initial cultural difference are described, on the other hand the employees' perception of the way the integration is handled as well as the actual style and impact of the M&A management team are addressed. For better understanding, the sub-models are described separately one after the other and are considered in combination in the end. Due to the limitations of this paper only the capability transfer and the cultural dynamics can be explained in detail to point out the study's approach, whereas the other structures will only be touched on, even though they have been developed with the same effort and rigour.

Capability Transfer

Haspeslagh and Jemison (1991; also Bresman, Birkinshaw & Nobel, 1999) conclude from their studies that capability transfer is the value-creating characteristic of an M&A: "Acquisitions create value when the competitive advantage of one firm is improved through the transfer of strategic capabilities." (Haspeslagh & Jemison, 1991, 28)

Furthermore they argue that this value creation takes place only in the post-merger phase: “Yet no matter how attractive the opportunity, value is not created until after the acquisition, when capabilities are transferred and people from both organizations collaborate to create the expected benefits or to discover others.” (Haspeslagh & Jemison, 1991, 11) This argumentation is supported by the basic assumptions of the resource-based view (Wernerfelt, 1984; Penrose, 1959). It is argued that a company can obtain a competitive advantage by accessing a set of resources or capabilities which are valuable because they fulfil four criteria: They have to be rare, imperfectly imitable, without strategically equivalent substitutes, and valuable when they are applied to the market (Barney, 1991).[i] The aspect of imperfect imitability now is of particular importance: Resources and capabilities can be inimitable because they are “dependent upon unique historical conditions”, their link to the “sustained competitive advantage is causally ambiguous”, or because they are “socially complex” (Barney, 1991, 101). Inimitability causes a certain degree of imperfectness of the strategic factor markets on which resources and capabilities are dealt (Dierickx & Cool, 1989): Causal ambiguity prevents a clear identification of the desired resources or capabilities a company wants to obtain, social complexity can make it impossible to transfer a particular resource or capability from one company to another without destroying its vital embeddedness into the current owner organization (Reed & DeFillippi, 1990; Barney, 1991; Kogut and Zander 1992) If a desired capability or resource is even dependent on unique historical conditions it is not tradable at all since it has to be built up over time like, for example, customer relations (Dierickx & Cool, 1989). The logical result is that resources and capabilities exist which either have to be developed internally, or can be bought not exclusively but only as a part of the whole bundle of resources and capabilities which includes the specifically desired ones. This is a merger or an acquisition.

The apparently different grounding of the argumentations to either resources or capabilities, respectively, can be resolved by a clear definition of both terms: Resources in this respect can be seen “stocks of available factors that are owned or controlled by the firm. *Resources* are converted into final products or services by using a wide range of other firm assets and bonding mechanisms […], [*and consist*] of knowhow that can be traded […], financial or physical assets […], human capital, etc. […] *Capabilities*, in contrast, refer to a firm’s capacity to deploy *Resources*, usually in combination, using organizational processes, to effect a desired end. They are information-based, tangible or intangible processes that are firm-specific and are developed over time through complex interactions among the firm’s resources.” (Amit & Schoemaker, 1993, 35) Therefore only the term ‘capability transfer’ is used in the further course of this study, constituting the more comprehensive construct, since it includes the transfer of the resources underlying the capability, but ‘resource transfer’ does not include the transfer of capabilities.

Figure 1 shows the structure which represents the main elements of this process. The structure is implemented twice in the model since two ways of capability transfer are possible, from A to B as well as from B to A (Haspeslagh & Jemison, 1991). The explanations always refer to the structure of the transfer from B to A, even though all statements equally apply to the respective structure ‘A to B’. The icon in the lower right indicates where the structure is situated in the entire model, the upper blue part is the one covered by Figure 1, the lower is the corresponding structure of the transfer ‘A to B’.

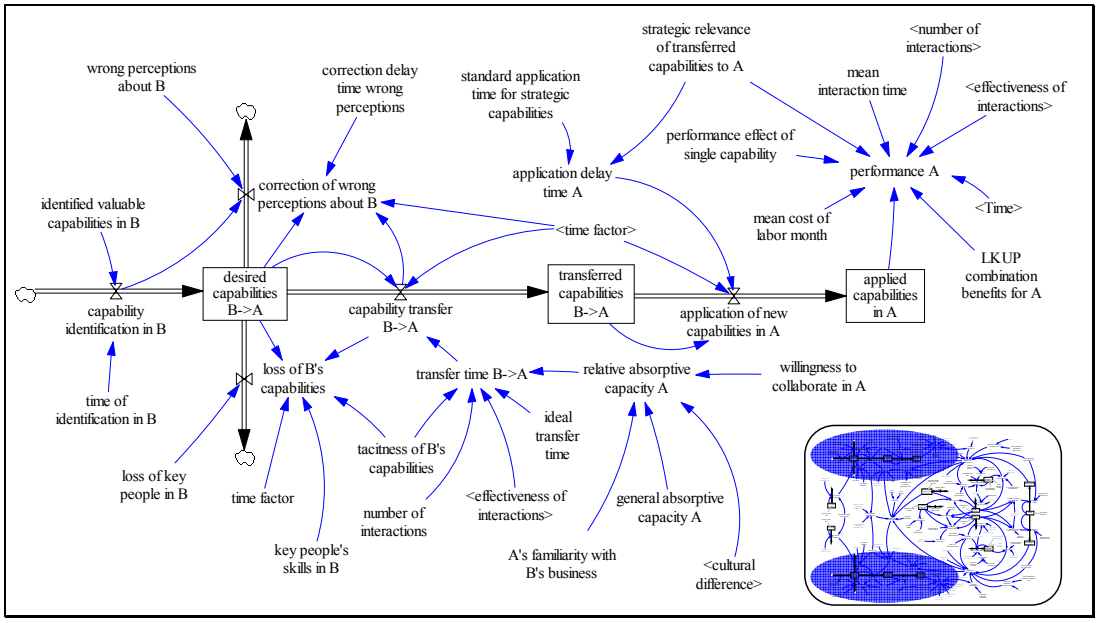

Figure 1: The sub-model structure of the post-merger capability transfer

The input to the whole transfer process is the *identified, apparently valuable capabilities*. A basic problem in this regard is the quantification of capabilities, as no manageable, quantifiable definition could be identified in literature. Since an exact prognosis of future numerical values is not the primary aim of SD, a quantification has to be reasonable, but even a rough construct that allows to trace the variable's behaviour in connection to reality can be sufficient for a first model like the one presented here in a particular research field (Milling, 1979). Therefore, as a first solution in the present study we simply ask the question, "what do we want to learn to do from B?" The answer to this question has to be broken down as far as possible to identify a single, countable capability. For example, if the "capability of producing time-efficiently" is supposed to be transferred, it can be broken down into the "capability of the effective transportation of input factors", an improved "management of order releases" leading to smaller lot sizes, the "training of employees in new manufacturing techniques", and so forth. That means to learn time-efficient manufacturing implies to transfer at least three distinct capabilities in this abbreviated illustration.

Only the identified capabilities can enter the transfer process and accumulate as those *desired capabilities* to be transferred from B to A. The identification of capabilities is considered to be a task completed in the pre-merger phase in this model and thus an exogenous aspect. This stock is reduced through the *transfer of capabilities* from B to A, influenced by the *transfer time* it takes and the so-called *time factor*. The idea behind the latter is simple but of general importance to the model as it will also be applied in other sub-models: In some cases the outflows from a particular stock are related to the stock in the way "$rate = stock / time\ factor$" with the *time factor* being equal to one month. This formulation describes that theoretically the whole content of the stock can flow out at once. It therefore represents a generally applicable abbreviation of the term "*rate = stock*average outflow rate*" with "*average outflow rate = |amount in stock|*". Since most of the affected flows also contain a DELAY or a

similar function, only the specifications of these elements determine the actual speed of the outflow, if no limitation is set by a different parameterisation of the *time factor*.

The second variable influencing the *capability transfer* is the necessary *transfer time*. Grant (1996) defines organisational capabilities as accumulated individual knowledge. Following Szulanski (2000) the transfer of knowledge does not happen immediately but takes a considerable period of time. The phenomenon of a *capability transfer* itself has not been defined clearly in literature, even though the basic idea has been treated intensively. In what sense *capability transfer* is used actually is the basic question for a thorough definition of the *transfer time*. For the present study *capability transfer* shall be defined as the implementation of a capability formerly only available in B into A's value chain. This may happen by a transfer of capabilities in workshops or through the exchange of documents, but also simply through an effective organizational integration of, for example, B's manufacturing units and their capabilities into A's value chain. The period of time that is necessary to do so is the *transfer time*, which mainly depends on three factors: First of all the *tacitness of B's capabilities* has an influence, determining the difficulty of the transfer (Polanyi, 1966; Reed & DeFillippi, 1990): A thoroughly codified procedure with clear routines and exactly defined resources to deploy can be transferred basically by taking this procedural description to A. The more tacit the capability is, the longer it takes to transfer it. Secondly, the transfer time depends on how often A's and B's members *interact* with each other *effectively* (Bresman, Birkinshaw & Nobel, 1999). And thirdly, A's *relative absorptive capacity* (Lane, Salk & Lyles, 2001) is essential. The latter describes how good A is in receiving capabilities from B. In its original form the term absorptive capacity has been defined as, "the ability of a firm to recognize the value of new, external information, assimilate it and apply it to commercial ends" (Cohen & Levinthal, 1990, 128). Lane, Salk and Lyles (2001) sharpened the concept in the context of international joint ventures—which is transferable to the case of post-merger capability transfer—and offered the idea of a *relative absorptive capacity* that includes only the first two aspects of the original definition: "Our results suggest that the first two components, the ability to understand external knowledge and the ability to assimilate it, are interdependent yet distinct from the third component, the ability to apply the knowledge." (Lane, Salk & Lyles, 2001, 1156)[ii] In addition, it is defined as a case specific (i.e., relative) rather than generally valid variable that denotes that the two organizations "must have sufficiently similar knowledge bases and norms in order for the 'student' […] to understand the 'teacher'"(Lane, Salk & Lyles, 2001, 1140). The concept is incorporated into our model as follows: A previously built up *general absorptive capacity* constitutes the basis. The specific *relative absorptive capacity* concerning B's knowledge then depends on the *cultural difference* between both entities—taking up Lane et al.'s "similarity in norms"– and *A's familiarity with B's business*, measuring Lane et al.'s "similarity of the knowledge base" (also Cohen & Levinthal, 1990, 129n).[iii] Haspeslagh and Jemison (1991, 111) explain this also directly in combination with the importance of the *tacitness of B's resources*: "If a firm's strategic capabilities are embedded in the context of its organization and culture, then transferring and applying them successfully require an appreciation for the contexts from which they come and to which they will be transferred." Furthermore *A's willingness to collaborate* takes effect: Even though all other aspects may induce a high *relative absorptive capacity* it may effectively be quite low if the recipients of the new capabilities do not want to obtain them. A low *willingness* results in less engagement to understand B's capabilities, thus the *relative*

capacity to absorb those decreases (Minbaeva et al., 2002). All of these factors can reduce the *transfer time* only up to certain point, since a reduction to zero seems not reasonable. This generally necessary period of time is called the *ideal transfer time* and is assumed to be three months, taking into account the definition of the *transfer time* given above.

Besides the *transfer* of the *desired capabilities* two alternative outflows are possible. On the one hand a *correction of wrong perceptions* may be necessary if some of the desired capabilities turn out to be mirages which are expected to exist in B, but a closer analysis of the insider information accessible after the deal reveals that they do not exist in reality. This phenomenon is a direct result of bad due diligence in the pre-merger phase. Furthermore, *capabilities can get lost* if *key people* leave the organization. The more *tacit* the desired capabilities are, and the more dependent on some *employee's skills* the organization is, i.e. the more tacit capabilities are located in a single person (Reed & DeFillippi, 1990), the more dangerous is the exodus of those key people: "The best capabilities are useless if they walk away from the purchase." (Chaudhuri & Tabrizi, 1999, 127)

After capabilities have been transferred, it again takes some time until they can fully be deployed and can cause an increase in *A's performance*. The *application delay time* until the new capability shows some economical consequence depends on how *strategic* the particular capability is: It is assumed that strategic capabilities generally come to effect after 36 months, the period it takes, for example, to exploit a transferred patent or to establish a new strategic market position based on the *transferred capabilities*. The *strategic relevance of the transferred capabilities* to the transfer target determines how long the *application delay* is in the particular case, considering how large the fraction of strategic versus short-term effective capabilities is.[iv] The capabilities' (average) *strategic relevance* also influences the *performance* effect generated through the *capability application*: Highly strategic capabilities offer a better leverage and thus cause a stronger economical effect. The absolute economical impact for A depends on a *single capability's performance effect* leveraged by its *strategic relevance* and on the negative effect of ineffective *interactions* between A and B in the course of the transfer process. These variables have been roughly estimated to obtain an insight into the model's behaviour. In addition, *combination benefits* that "do not involve formal capability transfer" (Haspeslagh & Jemison, 1991, 29) like increased market power can be fed into the model exogenously as a table function.

Cultural dynamics

The second major process which gets a lot of attention in literature is the issue of cultural changes in the post-merger phase. At day zero suddenly two organizations have to collaborate that have each developed an identity and an unique culture; i.e. "a complex set of values, beliefs, assumptions, and symbols that define the way in which a firm conducts business" (Barney, 1986, 657), over many years. How the differences between the two cultures can influence other integration processes, how diversity can be overcome and what actually happens when two cultures are confronted with each other has been described from many perspectives, not only for M&As but also for other types of inter-organizational relationships. The structure modelling the cultural dynamics is shown in Figure 2.

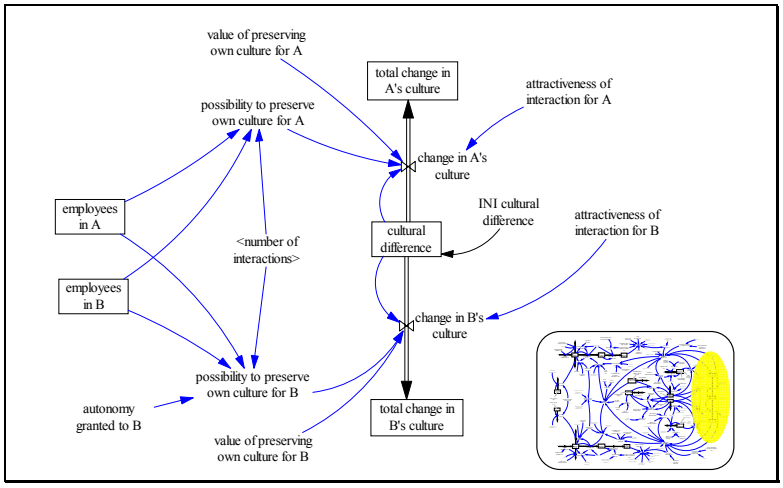

Figure 2: The sub-model describing the cultural dynamics

Again, a major difficulty in this regard is the quantitative capturing of the qualitative variables describing corporate culture. For the present study an adjusted version of the continuum of organizational cultures developed by Cartwright and Cooper represents the underlying construct (Cartwright & Cooper, 1996). The continuum is changed in that regard that it is interpreted as an interval scale, assigning each of the cultural archetypes defined a value between 1 and 6 (compare Figure 3). The assumption that an ordinal scale can be used as an interval scale is made aware of and despite the problems it may bring along concerning empirical validity. For the present investigation it offers a first tool for assessment which can be communicated easily and may serve as a starting point for practical investigation if the model is supposed to be applied to a real life case. Cartwright and Cooper mention that "it is not so much the distance between the two parties that [is] important, but the direction in which the other culture has to move." (Cartwright & Cooper, 1996, 81n) They ground this statement in the existence of two underlying factors which evaluate the cultural change as good or bad, namely the *attractiveness of the partner's culture* and the *value of preserving the own culture*. Since these two factors are modelled separately the mere numerical value of the *cultural distance* is at first used as an input in this context. The two evaluating elements will be explained in detail further below in this section.

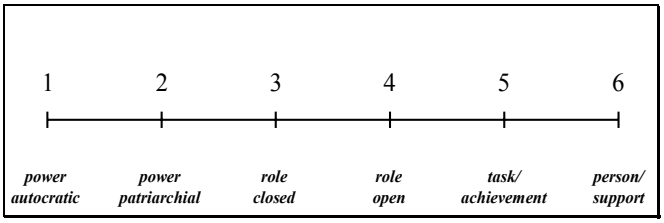

Figure 3: Adapted interval scale for the assessment of cultural differences

Thus the *initial cultural difference* between two organizations can range from 0 to 5. A decrease in *cultural difference* can only happen if at least one of the two cultures undergoes a *change* process and an acculturation takes place.

Acculturation in turn takes place only if there is *interaction* between both entities. Through *interaction* the employees get to know new ways of doing things and maybe prefer those. As a result the organizations' values, opinions and procedures adapt to each other. From the relative size of the two partners and the *number of interactions* the

impact of the *interactions* on the *cultural change* can be calculated: The larger the other partner, the lower the *possibility to preserve one's own culture* at a given level of *interaction*. The current specification assumes that for a *change* of one point on the cultural differences scale 200,000 *interactions* are necessary if both companies are of equal size, and if A does not make use of its dominance: If a situation with an uneven distribution of power is examined, the stronger partner A can choose to what extent it exerts pressure on B to change its culture. Haspeslagh and Jemison (1991) describe this as the *autonomy the acquirer A grants the acquired B,* motivated by the insight that there may be the (true or illusionary) need to preserve B's culture to secure its valuable, i.e. tacit, capabilities. In a similar argumentation Nahavandi and Malekzadeh (1988) argue that A might value cultural diversity in the combined organization and thus does not enforce the adaptation of its culture through B. Both rationales are covered in the model by the exogenous variable *autonomy granted to B*, portraying A's cultural policy during the integration phase. The terminology implies that the *autonomy granted to B* should be connected to the *possibility to preserve own culture for B* instead of directly relating it to the *change in B's culture*.

In addition to the *autonomy granted to B* Nahavandi and Malekzadeh (1988) conceptualize acculturation as depending on three further aspects: The *attractiveness of interaction*, the *value of the own culture* and the *relatedness* of A's and B's businesses. The influence of the former two is comprehensible: To what extent the interaction with the counterpart appears to be *attractive*, i.e. how eager the employees are to interact with the new partner and as a result, how open they are for new 'ways to do things' influences the pace of *cultural change* obviously. Opposing this factor the *value of preserving one's own culture* can slow down the acculturation. Nahavandi and Malekzadeh (1988) see these two factors only as influencing the acculturation of an acquired organization to its acquirer. Apparently they assume that the acquirer is culturally stable and immune against any cultural influences, which is analogue to Berry's (1983) original description of different types of acculturation. Obviously this is not compatible with the basic conception of the present study. As a consequence the variables will not only be included for B, but also for A to allow cultural change in both entities. In the model both variables are fed in as relative values ranging from 0 (no attractiveness or no value of own culture, respectively) to 1 (high attractiveness or high value of own culture).

The fourth factor which is supposed to have an influence on the acculturation following Nahavandi and Malekzadeh (1988), the relatedness of the two organizations, is not considered explicitly in the model. The authors state that, "if the merger is with a firm in a related business, the acquirer is more likely to impose some of its culture and practices in an attempt to achieve operating synergies" (Nahavandi & Malekzadeh, 1988, 84). This statement seems to point at a connection between *A's familiarity with B's business* and the *change in B's culture*, but it is problematic for two reasons: Firstly, from the formulation it is apparent that this idea implies a quite low value A assigns to cultural diversity, which has already been considered in the *autonomy granted to B*. "Is more likely" secondly implies that acquirers have a choice which cultural policy to impose on B. Therefore it seems reasonable to omit a fixed connection between *familiarity* and the *autonomy granted to B* and to consider this idea to be regarded sufficiently in A's (exogenous) specification which *degree of autonomy* to grant to B.

It may be raised the objection that the structure of this sub-model allows only acculturation, but not an increase in cultural difference. Referring to the model's boundary this limitation can be explained easily: How shall cultural difference increase if the only alternative given is the culture of the counterpart, but there is no external point of reference? A cultural crisis may lead to a hardening of the two positions opposing each other; Berry names this phenomenon "rejection" (Berry, 1983, p. 69; also Nahavandi & Malekzadeh, 1988, 83). But an increase in cultural difference seems not logically justifiable inside the model boundary.

Employees and their perception of the integration process

After two major areas of change have been discussed in detail, the following two sections briefly cover the two remaining parts of the merger dynamics model, namely the employees' perception of the deal and the pursued approach to managing the integration boundary between A and B. Several groups of people participating in the post-merger integration processes have to be distinguished and put into relation to each other briefly. *Employees in A* and in *B*, respectively, describe the total workforce of the two organizations. *Key people* are part of each of these two groups, but are those employees that own a considerably high amount of valuable *skills*. In contrast to the *key people* the rest of the *employees* are considered replaceable easily. The top management and the M&A team (denoted as the *M&A management capacity*) are people who are not influenced by the post-merger dynamics, but have already only a combined organization 'A+B' in mind. This makes their internal structure and perception of the post-merger action exogenous to the model. As agents of the dominant organization A they define the policies influencing the dynamics of the model like time and amount of layoffs and the like. Figure 4 exhibits the relationships between the different groups.

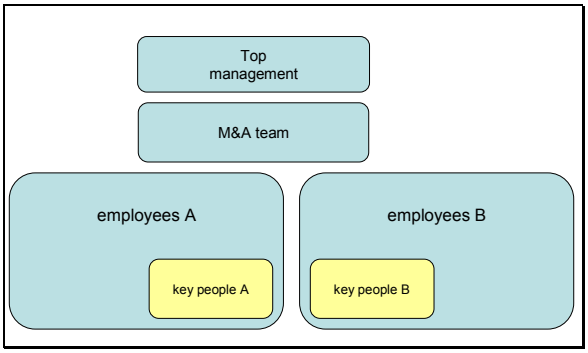

Figure 4: Participants in the post-merger process

Comparable to the structure of the capability transfer also this sub-model is included twice in the complete model. The explanation given here for the situation of A's employees similarly apply to the conditions in B. Figure 5 gives an overview.

The key variable in this part of the model and maybe most obvious consequence an M&A results in for the employees is the sudden *uncertainty* the announcement of the deal raises. "Acquisitions threaten, reduce, or destroy important elements of economical or psychic value such as job security, promotion, career opportunities, status and pride of association." (Haspeslagh & Jemison, 1991, 132) Cartwright and Cooper explain this by "the termination of the existing psychological contract between the individual and his or her organization [and consider it] the beginning of a period of self-appraisal and critical risk analysis." (Cartwright & Cooper, 1996, 116) Thus after the announcement of the deal the employees in both organizations try to anticipate how many people actually might get fired—the level of *anticipated layoffs*—taking into account the

operational overlap of A and B as well as *A's reputation* for being radical in rationalisation following an M&A. The *operational overlap* is defined as the total number of positions which exist twice after the deal. *A's reputation for M&A handling* describes the assumed or from previous M&As estimated percentage of overlap that will be cut by A. This source of *uncertainty* can be reduced by management through statements about its actual policy concerning the overlap problem: It can either issue *job guarantees* or *announce* explicitly which persons will be fired (Schweiger and DeNisi, 1991) Only if the sum of the *announced layoffs* and the *job guarantees* is equal to the number of *employees* the job situation exerts no further influence on the overall *uncertainty*. In addition the effect on *top-down communication* on the employees' *uncertainty* is taken into account addressing not job perspectives but every other issue of the deal, its motivation, its current progress and success, visions, market reactions, and so forth (Schweiger & DeNisi, 1991). Exceeding the *expectations* leads in general to a positive perception of the M&A and its integration process as a consequence of the perceived sincerity, care, and fairness.

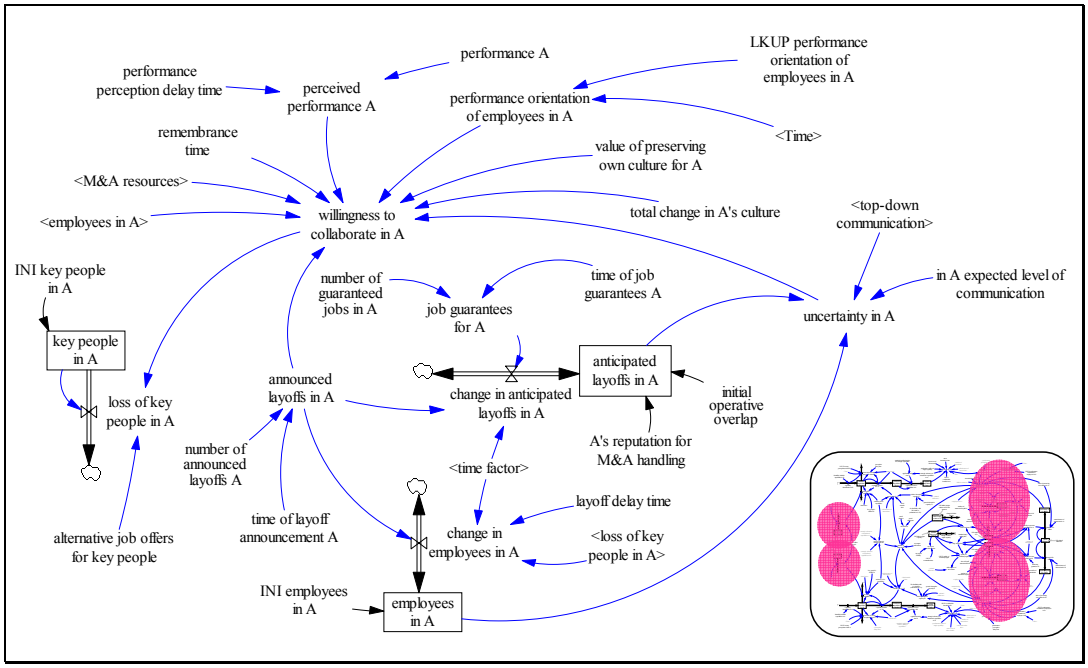

Figure 5: Sub-model of the employees' perception of the post-merger dynamics

The resulting degree of *uncertainty* influences the employees' *willingness to collaborate* with their new colleagues and to support the M&A project actively (Cartwright & Cooper, 1996). Several other variables affect the enthusiasm as well: First of all the *total change* the own organizational culture has undergone, assessed with the *value of preserving it*. Large changes in a strongly favoured corporate culture will reduce the *willingness to collaborate* significantly, since the deal is perceived as destructive and hence unfavourable (Haspeslagh & Jemison, 1991). Furthermore the *number of announced layoffs* in the own organization in relation to the *number of employees* decreases the motivation for collaborative behaviour (Marks & Mirvis, 1992) Besides these 'soft' factors also the motivation resulting from monetary incentives is incorporated (Frey, 2000; Haspeslagh & Jemison, 1991). In addition a large M&A team and an impressive budget for integration-related expenses arouse the employees'

perception to participate in something important, Haspeslagh and Jemison call this "creating the right atmosphere" (Haspeslagh & Jemison, 1991, Kay & Shelton, 2000).

Managing the boundary between A and B

The fourth and last sub-model (see Figure 6) covers the boundary between A and B, i.e. the elements which actually interconnect the two organizations and where therefore exchange and confrontation can occur and take effect. The concept of a "boundary" or "interface" between the two organizations which has to be managed is based on Haspeslagh's and Jemison's (1991) work. They suggest that one of the major tasks of the integration managers is to guarantee that each substantial interaction a member of the one organization initiates has to target the right person in the other organization. An active management of the boundary thus reduces the amount of inefficient, time-consuming and therefore expensive interactions. In addition the further characteristics of the managerial approach to post-merger integration are covered.

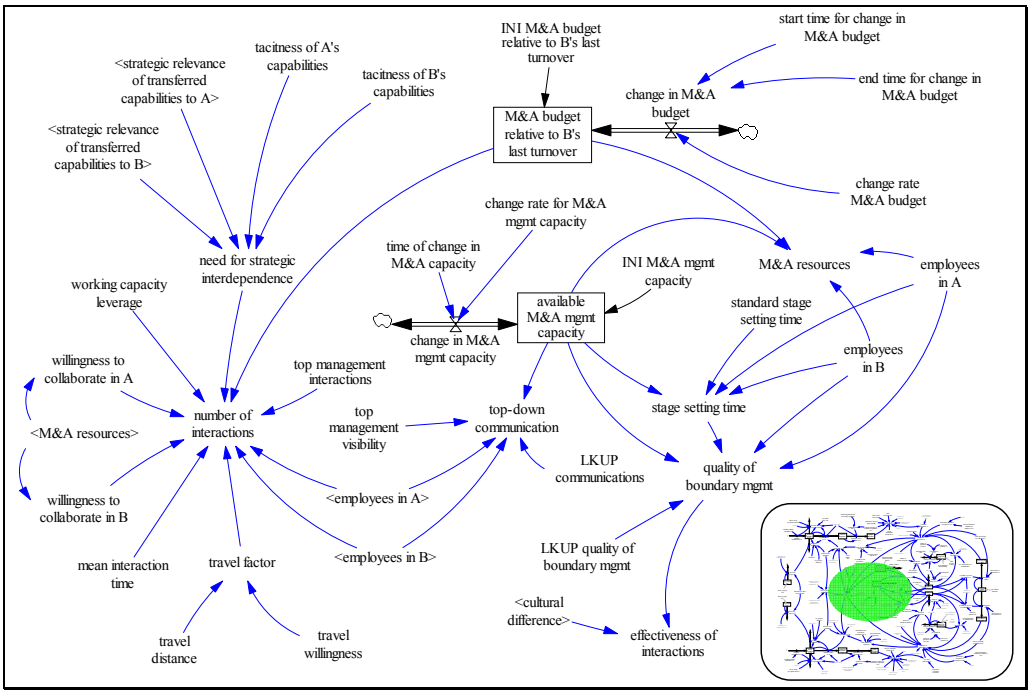

Figure 6: Sub-model of the boundary between A and B

A key variable the previous explanations have already involved frequently is the *number of interactions*, a factor influencing several aspects of the integration process and important in all sub-models. In fact, Haspeslagh and Jemison (1991, 121) say that "interactions between the two firms are at the heart of the integration process." *Interactions* are acts of exchanging knowledge between employees in A and B during the actual integration process. They can take place via telephone, e-mail, fax, in meeting or by other means of impersonal or personal interaction.

From A's perspective as the organization in control the integration task has to be assessed in terms of the size of B. There the *M&A budget* is measured in relation to B's last turnover and is set exogenously by the top management in advance. In contrast to a comparison of the number of employees this conceptualisation bears the basic economic

distinction between capital-intensive and labour-intensive production in mind: A relation to the number of employees would understate the task to integrate a capital-intensive business, whereas the turnover as reference value allows an evaluation of the integration task regardless of this criterion. To integrate a capital-intensive company with few employees that generates the same turnover as a compared labour-intensive firm is thus assumed to be comparable regarding the costs of integration due to the higher costs associated with the employees' standard of living and working, the technical integration, and so forth.

The *M&A budget* constitutes in combination with the *available M&A management capacity*, i.e. the size of the M&A team, the overall *M&A resources* that have been dedicated to the integration task. This conceptualizes the idea of 'organizational slack resources' as "that cushion of actual or potential resources which allows an organization to adapt successfully to internal pressures for adjustment or to external pressures for change in policy, as well as to initiate changes in strategy with respect to the external environment." (Bourgeois, 1981, 30; also Cyert & March, 1963) The motivational as well as the process-related importance of the availability of slack resources for successful post-merger integration has been acknowledged by several authors (Sharfman et al., 1988; Haspeslagh & Jemison, 1991) Both the *M&A budget* and the *M&A management capacity* can be adjusted exogenously through the corresponding *change rates* as a reflection of the 'slack policy' over time.

The *available M&A management capacity* furthermore influences the *quality of the boundary management* and the time it takes to set up a working interface structure, the so-called *stage setting time* (Haspeslagh & Jemison, 1991). In the present model it is assumed that an ideal and at least necessary *stage setting time* of three months can be achieved with a management team with a size representing 5% of A's and B's combined workforce. A higher ratio of *M&A team size* to workforce results in an even faster establishment of the boundary management. As a result the *effectiveness of interaction* is positively influenced by an *efficient boundary management*. Unfortunately even a perfectly managed boundary cannot prevent ineffective interactions since also the *cultural difference* between A and B takes effect on the *effectiveness of interactions*.

The merger dynamics model

After all four sub-models and their deduction from the existing knowledge base have been explained, these structures are to be combined to form the integrative model of the post-merger dynamics that is the aim of the study. Due to its size the structure is only shown as a rough sketch in Figure 7, illustrating how the sub-models are arranged.

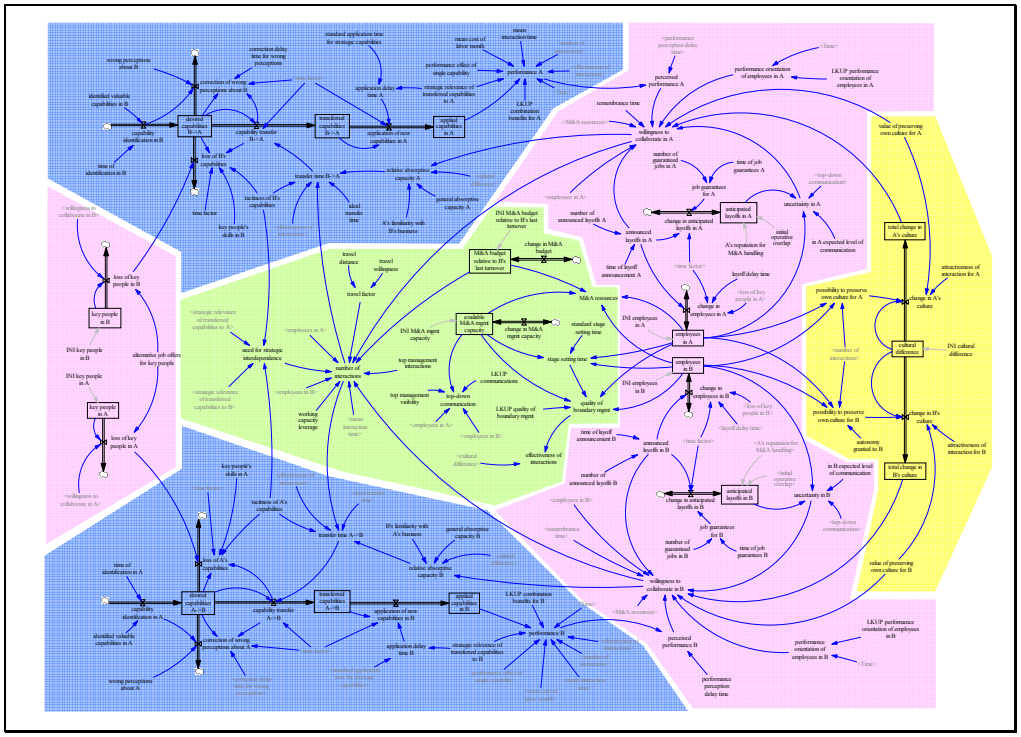

Figure 7: The structure of the merger dynamics model, combining all four sub-models

From these graphics the importance and key position of the *number of interactions* and *the willingness to collaborate in A* as well as *in B* become apparent. Each of these elements directly combines effects from three sub-models and influences the same structures in turn. The integrated model illustrates what is meant by the statement that some of the relations proposed in literature are modelled as direct influences of one element on another, whereas other relations are incorporated only as indirect ones. For example, Szulanski (2000) only suggests that both, the source's as well as the recipient's motivation is important for a successful transfer of knowledge. The comparison with other studies reveals that the causal structure that underlies the transfer obviously is more complicated: Szulanski (2000) only proposes that the respective *willingness to collaborate* of both groups affects to what extent they *interact* with each other and thus generate a possibility to *transfer capabilities*. Minbaeva et al. (2002) additionally assume that the recipient's *willingness to collaborate* exerts an influence on his *ability to absorb* new capabilities. The necessity to define causal relationships in a formal model therefore has induced a more precise formulation of the antecedents of the capability transfer: both ability and opportunity are necessary, but each of them depends at least to some extent on the same motivational basis.

Two major feedback loops across the sub-models' boundaries can be identified from complete model structure: Firstly, the "motivated by success"-loop (Figure 8), describing that positive results from the integration-driven capability transfer motivate the employees and thus foster further collaboration. During the post-merger integration process this effect can mainly be enforced by reducing the cultural difference, but with respect to the second important feedback loop this should be aimed at only after thorough consideration.

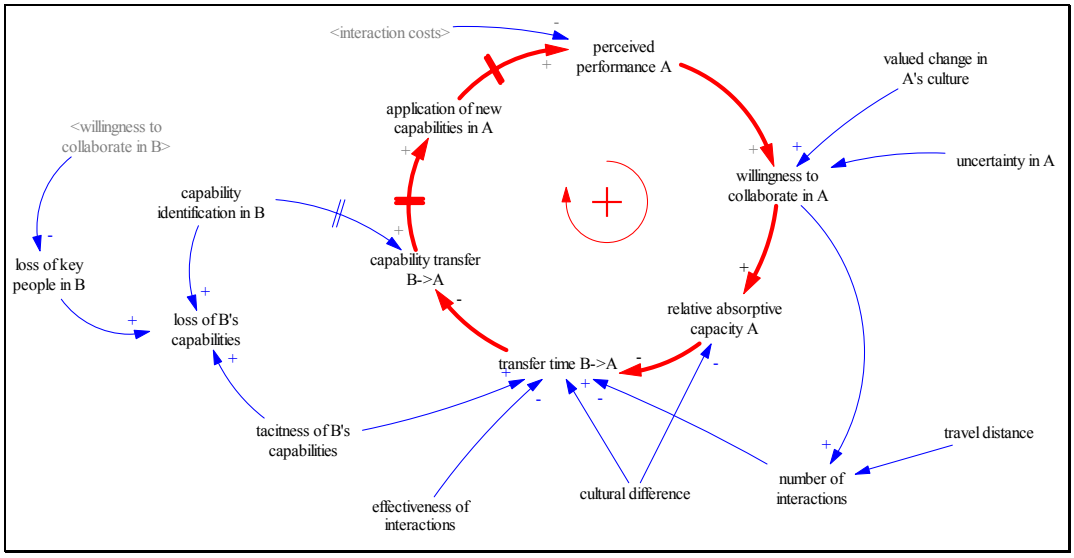

Figure 8: The "motivated by success"-loop

This second loop shown in Figure 9 is the "change culture only if change is favoured" loop, describing that cultural change can become an important motivator, but can also slow down the integration and the value-creating capability transfer if it is enforced, but not favoured by the employees.

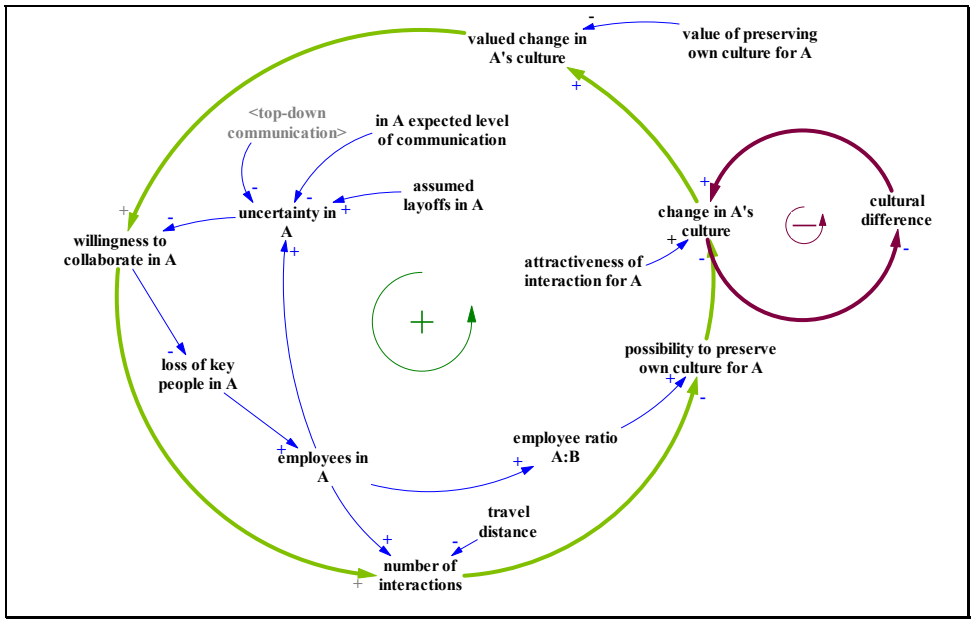

Figure 9: The "change culture only if change is favoured"-loop

The influence of the *cultural difference* on the capability transfer process now becomes apparent: On the one hand its negative effect on the *relative absorptive capacity* of the recipient and on the *transfer time* lets management favour a fast cultural integration (cf. Birkinshaw et al., 2001). On the other hand the employees' negative evaluation of cultural change might lead to an even worse situation for quick and successful capability transfer. This shows how important an assessment of the cultural differences in the pre-merger phase is and to that it should be a major basis for the development of a post-merger integration strategy.

Due to the constraints of this study it is refrained from a detailed analysis of all implications from the combination of the sub-models, with the exception of two noteworthy details: The first concerns the announcement of layoffs: From the connection of the capability transfer structure and the employees' perception an important implication for the number of the announce layoffs has to be noticed: The loss of key people directly results in the loss of capabilities—that is the reason to denote them as 'key people'. Yet they are still a part of the stock of employees of the respective organization. Thus if the number of announced layoffs exceeds the difference of employees minus key people, management actively reduces the stock of desired capabilities and also the basis for value creation. In contrast this is not the case if the people are fired after all capabilities have been transferred. Therefore the layout policy has to be thought through decently: A "suck them out and fire them" policy might be a good approach to mergers and acquisitions, saving the high salaries of valuable employees after the original targets regarding capability transfer have been achieved. But, of course, thorough reflection leads to the insight that the innovation potential of these employees might be valuable as well—later on, beyond the boundary of this model, i.e. after the integration has been completed.

Secondly the modelling of the financial aspects has to be regarded in detail: Between the *M&A budget* and the *performance* figures for A and B no connection has been modelled even though it may be argued that the money spent to facilitate the post-merger processes has a significant impact on the *performance* as success criterion of the deal. This omission is intended for two reasons: First of all the *performance* is used as the calculation basis for the effect of performance related incentive structures. Yet the corresponding literature postulates that the basis for such incentives has to be closely tied only to the achievement of particular targets set for integration phase (Frey, 2000). Since the *M&A budget* is fixed externally it is therefore not supposed to influence the motivation of the employees. Furthermore, the chosen specification allows a more detailed analysis of the value the post-merger phase produces: It is (theoretically) possible to calculate the net present value of an M&A deal in dependence on the chosen integration approach. This simply requires to offset the time series of the payoffs generated from the *transfer* and *application* of new capabilities against the time series of the *M&A budget* and discount the results to TIME = 0. The only additional information needed is B's last absolute turnover before the deal. As the present value analysis can be conducted in greater detail if both time series are available separately an incorporation of the *M&A budget* into the *performance* figure is not preferable from this point of view either.

After these observations on the effect of the combination have been explained theoretically, the actual behaviour of the complete "merger dynamics" model shall be analysed. The parameterisation is comparable to the sub-models. As a brief storyline the scenario represented in the baserun can be described as the integration of the organization B with 100 employees into the ten times larger A. A is modelled as an organization that sticks to its traditions. Towards B it is not particularly interested in terms of culture but wants to obtain 750 comparatively tacit capabilities which are to be exploited. In turn B shall get 2000 mostly codified capabilities injected to increase its operational efficiency. B is interested in these capabilities but also attracted by its new partner's culture since the own traditions are disliked in the company. The combination with A is considered a chance for cultural change. As a consequence of its particular

interest in an efficient capability transfer A provides sufficient resources to foster the integration process. The comprehensible behaviour of the sub-models shown above is partly based on the fact that each model was kept isolated from the dynamics other parts generate. Consequently the behaviour of the integrated model is supposed to be a bit more difficult to grasp and harder to trace to its roots.

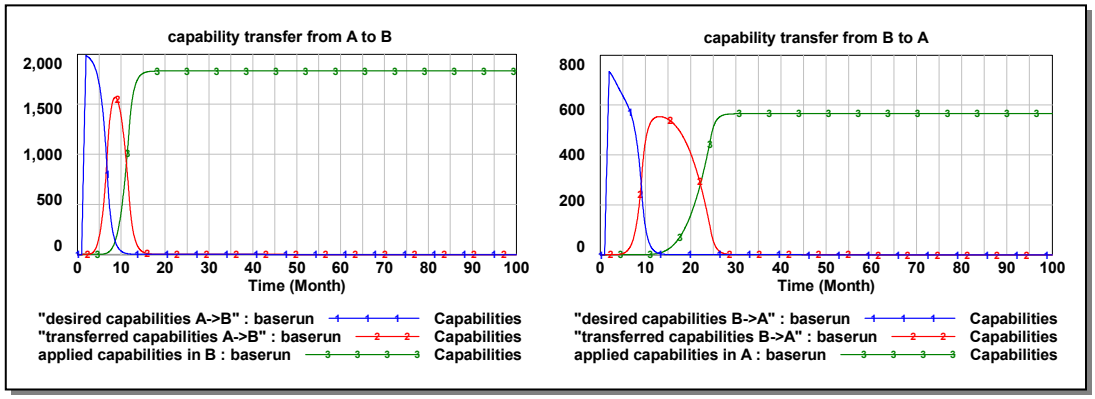

Figure 10: Capability transfer between A and B in the complete model

Figure 10 shows how the stocks of the two capability transfer processes change over time. This is quite similar to the behaviour of the respective sub-model. Interesting is the fact that the *transfer* and the *application* of almost 2,000 capabilities from A to B is achieved in about half the time it takes to complete the opposite process for only about 600 capabilities. Clearly one reason is the higher *tacitness* of the capabilities to be transferred from B to A (0.7 versus only 0.2 for A's valuable capabilities).

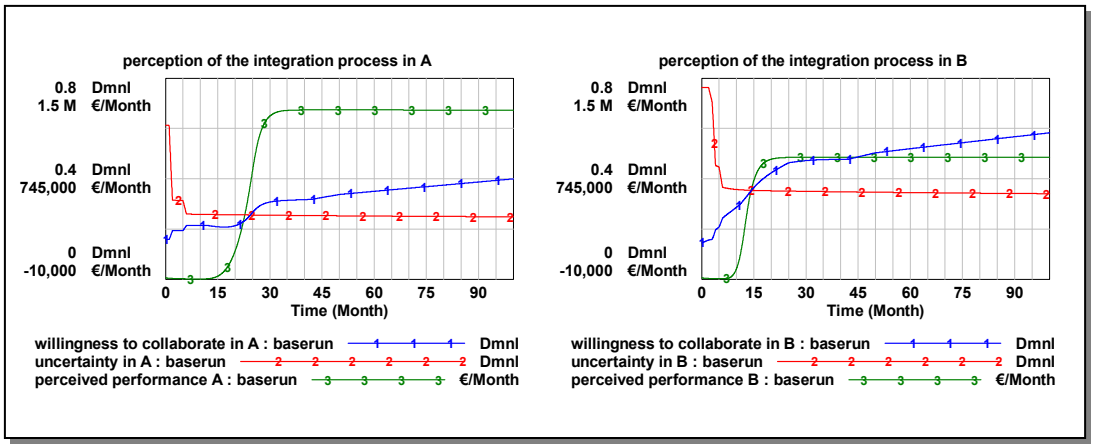

Figure 11: Perception of the integration phase in A and B

In addition *A's relative absorptive capacity* is smaller than B's from TIME = 3.96875 onwards, with the gap growing, grounded in the significantly lower degree of the *willingness to collaborate in A*, what is connected to the employees' perception of the deal and the post-merger integration process, portrayed in Figure 11. Note the different scale for the *total change in A's culture* (0 to 0.006) and in *B's culture* (0 to 4). The scale from 0 to 0.8 refers to the *willingness to collaborate* in each graph.

Noteworthy are in this regard the transmission of the steps in the *uncertainty* graphs into the behaviour of the *willingness* variables. The large step in the beginning is caused by the publication of the pursued employment policy, i.e. the *announcement of layoffs* and the *issue job guarantees*. The second step in period 5 is due to an enlargement of the *M&A team* from 5 to 20 people, leading to a consecutive increase in *top-down communication*. In the following periods the development of *the willingness to collaborate* in both organizations is dominated by a different factor, namely the *performance orientation* of the workforces: A policy of increasing monetary motivation of the employees is equally implemented in the two table functions *LKUP performance orientation* for *A* and *B*.

In the early phase of the post-merger integration the *performance* generated by the transferred and *applied capabilities* takes no effect on the employees' *willingness to collaborate*. But from period 7 onwards the management relates wages increasingly to the performance. The effect is different in both organizations: In B the induced *performance orientation* directly results in an increase in motivation (compare Figure 11b), whereas A's employees become slightly demotivated in the beginning, i.e. until period 20. The reason is apparent from Figure 10: The *transfer of the capabilities from B to A* and their *application* takes more time, and A is until period 12 in a 'worse-before-better dip' of the performance figure, which is caused by the primarily very *ineffective interactions* that directly cause transfer related costs. In addition to that the reduction of the *M&A budget* from period 12 onwards slows down the increase in *willingness to collaborate* in A, both illustrated in Figure 11a. The importance of the right timing of a performance oriented motivation strategy becomes clear from this example.

The remaining dynamics of this exemplary case are to a large extent similar to those already described for the sub-models. The cultural change processes are almost identical, again only B undergoes a significant change, the *total change in A's culture* sums up to only 0.0041 points (compare Figure 12b). The major difference of the isolated baserun_culture portrayed in Figure 12b is the speed of acculturation, caused by the *number of interactions* which heavily increases to a maximum of 1,240 interactions per months in this simulation of the complete model. In combination with the reduction of *B's workforce* these *interactions* lead to an about four times smaller *possibility for B to preserve its previous culture*, whereas *A's possibility to do so* is between 2.5 and four times higher. The post-merger literature assumes that cultural integration processes take about three to five years (Birkinshaw, Bresman & Haakanson, 2001; Cartwright & Cooper, 1996). In the simulation the *cultural difference* decreases from the initial 3 points to 0.0605 in the first 36 months and to 0.0016 until month 60, thus it is obviously able to generate the cultural dynamics with a reasonable time horizon.

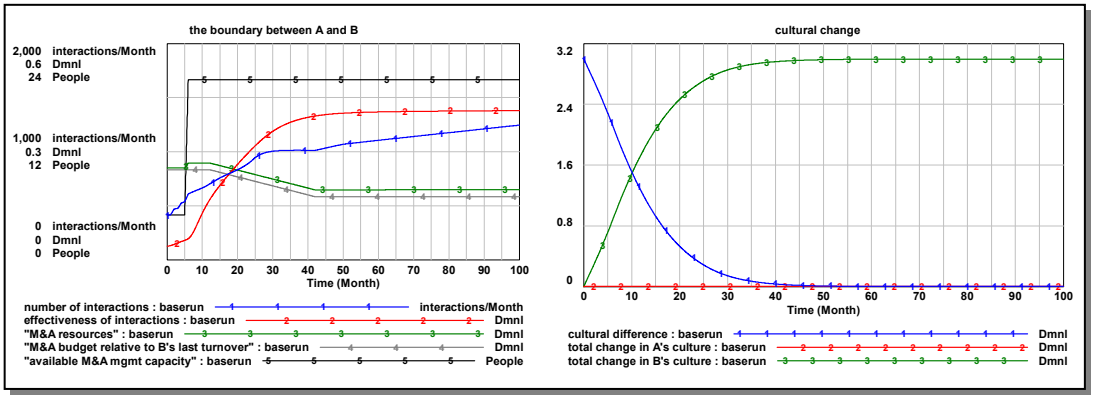

Figure 12: Behaviour of the elements of the boundary between A and B and cultural dynamics in the complete merger dynamics model

As Figure 13 shows also the changes in the workforce are almost predictable and comparable to the picture the sub-model offers. The in general comparatively low *willingness to collaborate* in both organisations leads to a steady outflow of *key people*, reinforced by the constant amount of *alternative job offers*. In addition B is affected by some *layoffs*. The only noteworthy difference is the slight slowdown of the key people's voluntary fluctuation due to the increase in both entities' *willingness to collaborate*.

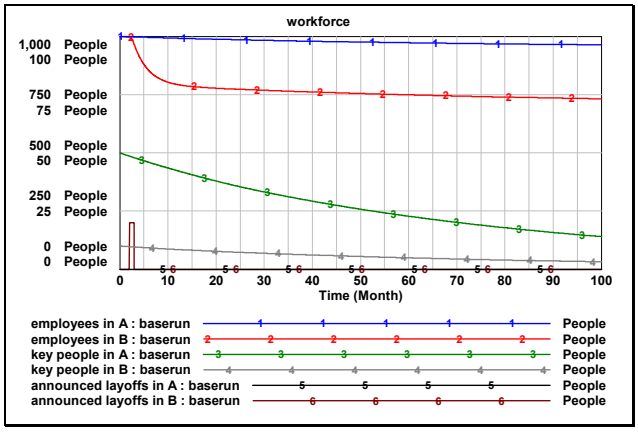

Figure 13: Changes in the workforce in A and B

The results of the baserun show that the model can somehow offer a consistent multidimensional picture of the dynamics of post-merger integration processes. Since the quality of these results and therefore the model's ability to project an M&A's trajectory in a reliable manner is not obvious from this single run, several tests of the model structure and its behaviour are carried out in the following.

Structural tests of the merger dynamics model

The baserun presented in the previous chapter describes an example of a possible post-merger scenario, the chosen parameters represent a consistent storyline, yet the model's ability to generate an appealing output says only little about its overall quality. A validation or verification of models is generally impossible as Sterman (2000, 846–850) explains. Since all models are only simplified representations of real systems their omissions make them refutable and argumentatively vulnerable, and thus each model can be proven wrong, or falsified in Popper's sense. Nonetheless it is possible to build confidence in a model by explaining to what extent and with which limitations it can generate valuable insights with some correspondence to reality. Several procedures are explained in the SD literature to evaluate the structure and behaviour of system dynamics models through thorough and multifaceted testing. Due to the limited scope of this study only the structural assessment can be conducted formally.

Forrester and Senge (1980) name five ways to test the structure of a system dynamics model, namely the assessment of the structure and the parameters, tests of the model's dimensional consistency, of its reaction to extreme conditions, and of the adequacy of its boundary. The assessment of the model structure and of its boundary's adequacy can hardly be accomplished in this study in greater detail: On the one hand the iterative modelling process which underlies the presented structure has lead to an alignment with the current literature on the covered phenomena from the authors' point of view. Therefore the subjective evaluation of structure and boundary will lead to no further valuable evaluation. The second possibility of an assessment of structure and boundary, a confrontation with experts in the field of post-merger integration, is an interesting and valuable possibility to build confidence in the model, but it clearly goes beyond the scope of this study. Therefore from the present point of view the model can

only be regarded as sufficiently precisely related to reality. One remark appears to be necessary anyway: The model does not include elements named ‘prior acquisition experience’ or ‘prior experience with the other company’, even though these factor’s influences on M&A success are a regularly discussed issue in the corresponding literature (Haspeslagh & Jemison, 1991; Beckman & Haunschild, 2002; also Gammelgaard, 2002). A decent analysis of an organization’s M&A experience reveals that this construct merely is an aggregation of several aspects the model actually takes into account: Experience with M&A in general or with a single organization in particular, no matter if it has been good or bad, influences the organization’s willingness to accept or even strive for the confrontation with a different culture (Carr, 1999). It may increase the ability to identify desirable capabilities in the pre-merger phase and thus reduce the *correction of wrong perceptions*. In addition a high *general absorptive capacity* may also be the result of substantial experience in the transfer of capabilities in the course of M&As, alliances or joint ventures. And finally the choice of successful policies for the allocation of *M&A resources*, a motivating design of monetary incentives or the *grant of autonomy* to the weaker partner may mark the M&A-experienced organization. In fact, “may” is the important statement in these examples. The dissolution of ‘prior acquisition experience’ into several dimensions which can influence an M&A’s outcome represents one result this study generates from its literature-based analysis. It offers an explanation why previous research differs in the assessment of the relevance of acquisition experience: Experience is no separate factor, but a combination of several independent characteristics of an organization.

The next proposed test addresses the conceptual and numerical equivalence of the model’s parameters. In this regard especially those variables have to be examined thoroughly which are used to describe intangible elements. The complications which arise in the modelling of such essentially non-quantifiable variables have been treated repeatedly in the SD literature (e.g. Warren, 2002). Nevertheless a representation of social or socio-technical systems inevitably includes this kind of elements. The way chosen to implement intangible variables in the merger dynamics model as relative values ranging from 0 to 1 is related to the scaling methods the social sciences use to measure social constructs like trust, morale, and the like. This linkage offers the theoretical opportunity for empirical testing and provides a certain level of equivalence of the numerical dimension to the ‘real world’, even though no direct units of measurement can be defined. Furthermore the measurement of abstract constructs like capabilities can be seen critically. Since in these cases a definition of the construct is suggested with the intention to offer a criterion for quantification also for these cases a sufficient degree of analogy and measurability can be assumed, aware that a brief definition of abstract constructs always is preliminary.

Next, in direct relation to the parameter assessment, the dimensional consistency of the variables is addressed (Forrester & Senge, 1980; also Sterman, 2000), since two small targets for criticism might be seen here: The units check in Vensim reports four issues of concern, none of them is an actual error, all four are warnings about the use of dimensioned inputs for table functions. Since the definition of a relation between two variables with different dimensions has been intended in all four cases, e.g. to model an input changing over time like in the table functions representing the policy for monetary incentives, these warnings can be disregarded. The two actually problematic elements are the *time factor* and the *working capacity leverage*. Both have been modelled with a

clear intention, the latter is not explicitly covered in this piece. Nevertheless the fact that both are set to a value of one may raise suspicion about their character and may imply that they are merely scaling factors. This has to be denied. For both factors reasonable scenarios can be depicted which cause a parameterisation different to one. That both are set to one is basically done to clarify the traces of distant impacts on the respective variables these two factors influence as well, without adding another disturbing manipulation.

Finally Forrester and Senge (1980) see a model's behaviour under extreme conditions as a source of additional confidence. The merger dynamics model has been tested with *the identified capabilities* for both capability transfer structures as well as the *cultural difference* set to zero. In both cases the affected stock-flow structures do not show any questionable or surprising behaviour, but stay at zero during the whole simulation. The initial values of the two *numbers of employees* cannot be set to zero for technical reasons since both are repeatedly used in the denominator of fractions. Furthermore the baserun has been adjusted by feeding 1,000,000 identified capabilities into both capability transfer structures. Due to the problems in the exact quantification this extreme value has also been considered important. The behaviour of the key variables of the run 'one million capabilities' is shown in Figure 14.

The basic pattern of the capability transfer is comparable to the one seen in the baserun (compare Figure 10), it only occurs at a different level. Thus the model seems to be stable in this regard. Also the cultural dynamics react neutrally to the extreme input. Interesting is the fact that it does not take significantly longer to transfer and apply one million capabilities each way than to do so with 2,000 and 750, respectively, even though the *number of interactions* hits its capacity restriction of 32,000 interactions per month, resulting from 100 employees in B and a mean interaction time of 1/320 months. The reason for this phenomenon can be found in the extremely high *willingness to collaborate* which develops in both organizations as soon as a significant number of capabilities is *applied.* It is in turn caused by the strong effect of the *performance* generated from the *applied applications*: Due to the larger total number of capabilities the *performance* is raised to a different dimension—the *performance* of the baserun model is not even at noise level for this extreme example. Consequently two observations can be stated as a result of this particular simulation: Firstly, the model is apparently stable regarding the number of capabilities fed in. This weakens the difficulties of the quantification of capabilities addressed above. Secondly, the *performance orientation* of the employees has to be defined thoroughly. If the corresponding *table function* or the *performance effect of a single capability* are ill-dimensioned and not harmonized with each other regarding their dimensions the model overstates the employees' reaction to the application of the transferred capabilities. This seems to be realistic to some extent: In both runs both the *LKUP performance orientation of employees* tables for A and B are calibrated to induce an increase in the corresponding *willingness to collaborate* of up to 0.24 if the *performance* increases by €1m. But in the baserun only total effects of €1m for B and €1.6875m for A are assumed. Therefore the policy rewards the completion of these processes with incentives leading to a plus of 0.24 and 0.405 in the *willingness to collaborate,* respectively. This is a reasonable level, comparable to the incentive packages in a medium sized company. But to offer the same incentives—worth 0.24 per €1m for a

process with a projected effect of €4.5bn (A) and €1bn (B) as for the 'one million capabilities' case—is obviously not realistic.

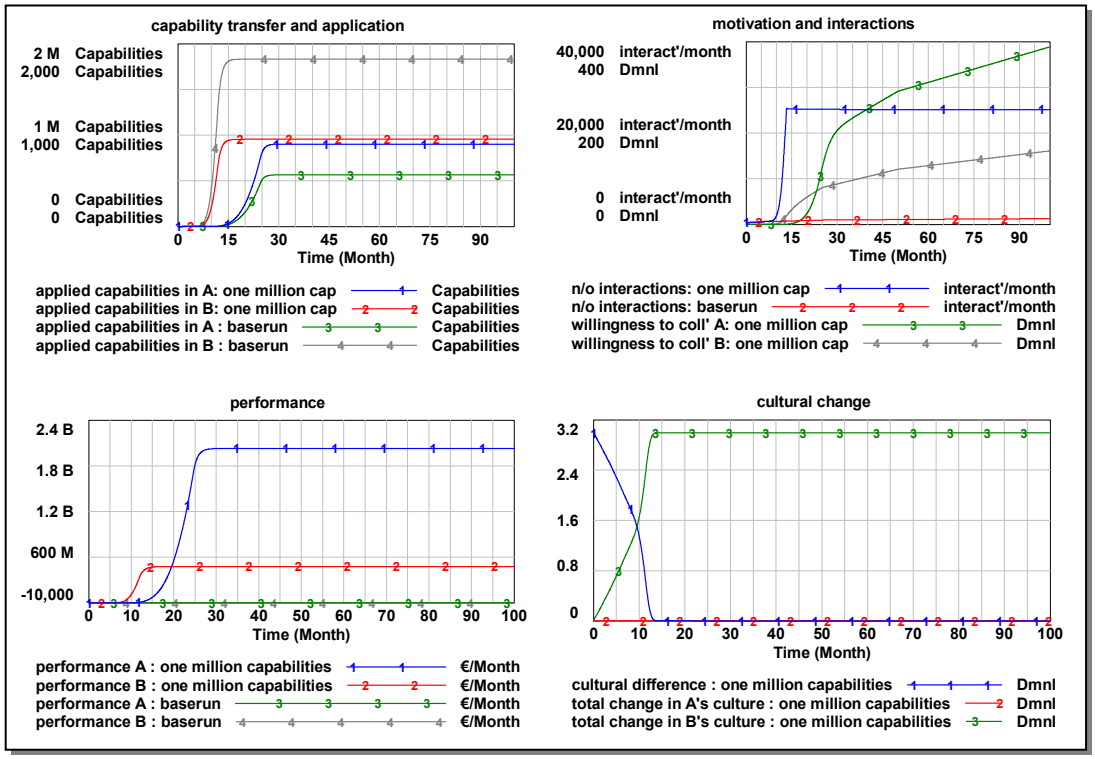

Figure 14: Model behaviour with one million capabilities to be transferred each

The stability of the model is a major criterion of its usability. The basic ability of the model to generate a behaviour which is comparable with the literature has been demonstrated during the presentation of the simulation results above. Thus the merger dynamics model can be considered to offer some reasonable insights into the dynamics of post-merger integration processes, both on a structural as well as on a behavioural level.

Insights into merger dynamics

The aim of this study has been an integrative description of the dynamics of the post-merger integration phase. The application of a literature-based system dynamics model as means of investigation differs from both the methods usually used in the management sciences to examine such phenomena, as well as from the generally described procedures to build a system dynamics model. As a consequence the generated insights are of different nature as well.

The description in a system dynamics model which integrates the different facets of the post-merger capability transfer processes and the social interactions connected to them generates new ideas about the structure underlying the observable phenomena. The construction of a formal model has fostered a more precise characterization of widely used and discussed terms like 'capability transfer'. Its definition as the process of the effective integration of one organization's capabilities into the value chain of its

partner offers a clear criterion for empirical analyses. The clarity of this definition is a direct effect of explicit modelling.

The inconsistent findings of previous studies on particular M&A success factors can be explained at least partly by the hypothesis that most of those proposed predictors are not one-dimensional factors but obviously cover several variables influencing the outcome of an integration process in one notion. The "prior acquisition experience" often discussed (King et al., 2004) is only one example which can clearly be disaggregated into several, independent factors. Similarly the question to what extent the relatedness of the two merging companies' businesses influences the outcome of an acquisition is approached from a different perspective. The comparatively little importance of this element for the capability transfer process presents a possible explanation for the contradictory results of studies on M&A success also for this construct.

Even though these clarifications are merely outcomes of the modelling process of the stock-flow structure and thus might have resulted from any model of this kind, the specific literature-based approach of the study gives these insights a different character and foundation. As explained above, a test of the consistency and completeness of the literature base on post-merger integration is one of the purposes of this model. The building process reveals that in spite of the vast number of publications a conclusive portray of the problems of post-merger integration is not available from the current knowledge base. Related research on the inter-organizational relationships in strategic alliances and joint ventures, as well as on change management offers complementing ideas and concepts. Nevertheless their transferability is always limited due to the differences in the dimensions of the integration task on the one hand and the hierarchical character of an M&A on the other hand. The hypotheses about causal relationships expressed in the model structure offer a starting point for further research on the specificities of post-merger situations in comparison to other forms of organizational change and of inter-organizational relationships.

Apart from these theory-related outcomes concerning the structure of the research problem some practical benefits result from the present study. First of all a comprehensible visualisation of the complex interdependencies between different aspects of post-merger management is achieved. The stock-flow diagram allows a better communication and understanding of the mutual influences of corporate culture, capability transfer and value creation, the employees' perception of the integration process, and the managerial policies. In addition the simulation results stimulate a dynamic perception of the causalities and effects of post-merger changes. Even though a numerically precise projection of the model is not achieved (and not aimed for), a general representation of possible post-merger trajectories can be obtained. The positive effects of both the visualisation of the complex network of interrelations as well as the possibility to simulate and thus 'experience' the interaction between the model's elements foster the learning about dynamic phenomena.

Several starting points for further research arise from this study. The empirical identification of reference modes for the stocks in the system are the maybe most obviously desired supplement, but at the same time also the most difficult task. But the implications from the integration of the different research areas provide several interesting issues which are more feasible. A test of the proposed structure causing an

organization's absorptive capacity, for example, is considered a valuable contribution fostering the consistency of the knowledge base. The empirical determination of precise parameters or at least dimensional relations of parameters to each other would increase the model's ability to generate reliable results. With such data, for example, an expansion of the model is imaginable which exploits the generated time series of the performance figures and provides the possibility to compare different scenarios on the basis of a fictitious net present value of the post-merger integration process—the ideal basis for every investment decision. Since the model allows an exclusive evaluation of the integration, a more detailed ex ante projection of a deal's potential for value creation may be possible. This criterion would then pave the way for a consideration of the pre-merger decision and evaluation processes, which includes the identification process of the desired capabilities, among others.

Studies of post-merger dynamics with literature-based system dynamics models advance the generation of theoretical insights concerning the quality of the existing knowledge base as well as the learning processes about the complex social interferences during this phase of value creation. Neither the topic nor the applied method lack the potential for future investigations if only the various linking points for research and application are used thoroughly.

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[i] Barney (1991:101) explicitly includes both resources and capabilities into his considerations although he only uses the term "resources" in his further explanations.

[ii] The structure modelled in the present study focuses the aspect of assimilation and thus understands the *ability to understand external knowledge* only in this context.

[iii] This may also be seen as a representation of the concepts researchers address as the 'relatedness of A's and B's business'. Relatedness between A's and B's activities is one of the classic criteria that has been researched as a determinant for M&A success. Its correlation with M&A success yet is controversial (Haspeslagh & Jemison, 1991). Its influence on the relative absorptive capacity might explain its partial relevance for success without giving it high priority.

[iv] The link between a capability's strategic value and its tacitness as it has been explained further above is actually unimportant for the purpose of this study. The question whether a capability has been imitated by competitors in the mean time or not lies outside the boundary of the model since it does not influence the performance level caused by the mere post-merger integration. Thus a direct connection between *tacitness* and *strategic relevance* has not been included. If desired, it may be preliminarily accounted for the (external) imitation through a decrease of the *strategic relevance* over time, reflecting the anticipated threat. The omission of the link actually offers the additional possibility to portray the transfer of explicit (codified) capabilities which are of high strategic interest, e.g. patents.

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