Towards a Hospital Cooperation Maturity Model - Construction and Evaluation of a Maturity Model and a corresponding Tool for the Identification of Challenges and Success Factors for Cooperation in the Hospital Sector

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With the introduction of case rates, the increase in regional competition and the increased quality awareness of patients, hospitals are faced with fundamental challenges. Experiences from health systems that have been working under these conditions for some time have shown that the following capabilities are crucial for their survival: Development of efficient supply structures, improving competitiveness and ensuring a high quality of treatment. In terms of a holistic supply and a quality advantage, the ability for intra- and inter-organizational with other medical service providers is therefore of fundamental importance.

Together with five hospitals from Switzerland and Germany, the researchers followed a maturity approach for measuring success factors for cooperation. They describe the identification of these factors and their evaluation with practitioners. Furthermore they present results of an initial pilot survey. As underlying foundation the multidimensional business engineering approach has been identified as an appropriate framework in order to reflect the organizational complexity of hospitals.

Keywords
Business engineering, hospital cooperation, process orientation, cooperation capabilities

1. Introduction

1.1 Paradigm Shift in Health Care

Health care costs have risen continuously in recent years. This applies in particular for the DACH (Germany (D), Austria (A), and Switzerland (CH)) countries. Thus, the health expenditure amounted to 10.4% in relation to the gross domestic product in Germany in 2008. Health expenditure in Austria made up 10.5% in the year 2008 and even 10.7% in Switzerland in the same year. Switzerland therefore had the third highest health expenditures in the world behind the U.S. with 16% and France with 11.2% [1]. In contrast, health expenditures in the European average amounted to only 9% on average [1].

The largest proportion in relation to the health spending accounts in all countries for inpatient care, i.e. spending on mainly public hospitals [1]. However, the end of the cost spiral has not yet been reached [2], [3]. As a result of increased life expectancy a further increase of health costs for the coming years is assumed [3], [4], [5]. In addition to the consequences of demographic change, or more precisely, the mismatch between the life and work time [5] - the increased use of new technologies and the rising demands in medical services of a progressively ageing population will lead to a further escalation in healthcare spending [6].

In order to stop this trend of increasing health expenditures in the hospital sector several initiatives have been launched. One of the most controversial discussed initiatives is the introduction of case-based billing of medical services, based on diagnosis related groups (DRG) [7]. This new medical billing system was at first introduced in Austria in 1997. Germany followed in the year 2004. For the year 2012 Switzerland is expected also adapt this flat rate payment.
1.2 Diagnosis Related Groups (DRG)

The DRG based payment contributes to the political aim of the German speaking countries to reduce or at least stabilize the fixed costs of inpatient care [7], [7]. In contrast to the retrospective payment of benefits on the basis of daily packages or units of time (reimbursement), the new payment system brings a flat fee per case for the hospitals, based on the major diagnosis of each individual case [7], [9]. The remuneration package (DRG) is calculated from the average price of a particular treatment over several referral hospitals and is adjusted each year [7], [10]. By introducing an average billing rate per case, transparency and comparability between health service providers should be improved and therefore lead to a stimulation of competition between hospitals or other health service providers. The increased competition, in turn, is expected to an improved quality and a reduction in costs of inpatient care [8], [11].

It becomes a goal for hospitals to stay below the DRG package with their overall treatment costs. This allows them to earn money for investments and to be able to survive [12]. The DRG-system on the other hand allows hospitals a more entrepreneurial behavior by compensating loss-treatment cases with lucrative ones. DRGs are therefore meant to serve as an incentive for a timely patient care and a high numbers of cases [8], [13]. Furthermore DRG will foster intra- and inter-organizational cooperation as not single medical services but whole cases are compensated via DRG. Therefore the idea of a shared value creation process, as well as flawless cooperation with downstream and upstream related health care providers in the chain of treatment becomes critical [14].

1.3 From Function to Process Orientation

Due to the introduction of the diagnosis related groups, hospitals are facing two main challenges. On the one hand they have to strategically optimize their portfolio of medical services (specialization) in regard to their competencies. On the other hand they have to be able to provide these services at costs that are below the flat rate for the treatment, as determined by the DRG.

When other industries, such as for example the automotive industry were faced with margin erosions due to falling prices and rising competition, they increased the division of labour [15], [16]. Companies focused on a specific range of services (dubbed as their core competence) and formed networks with other providers and suppliers to serve their customers in a holistic way [17]. Basic prerequisite for this however is a clear strategic positioning of each actor. This is done by defining the services and customers and the right partners for cooperation’s and networks to exchange pre- or part services in order to jointly offer a complete portfolio. At the same time, the increased competition within these industries leads to the improvement of efficiency. The production process was continuously optimized and standardized. The increasing standardization (i.e. the definition of rules, processes) in turn made an easier exchange of services possible, thus improving the ability to cooperate.

Similar to the development described above, an increasing trend of specialization also takes place in the hospital market. However, benefits from efficiency and effectiveness can only be won if hospitals succeed to optimize their services and integrate them along the whole value creation process [18], [19]. This means that they are forced to reduce redundancies and optimize processes in regard to their value creation along the whole process of patient care [20] and therefore change from a function-oriented to a process-oriented way of working [21]. As a result, hospitals are under an increasing pressure to accomplish three goals: developing efficient supply structures, maintaining or rather improving their competitiveness and - at the same time - ensuring a high quality of treatment. In terms of a holistic supply and a quality advantage, the ability to cooperate with other medical service providers is of fundamental importance.

Thus hospitals are increasingly facing the challenge to link up with other medical providers according to their strategic position and the desired portfolio. However for the design and the construction of such networks, hospitals have to know methods to identify their actual status and the aim of cooperation in regard to its different elements such as strategy, operations, resources and used
technologies. Furthermore they need to answer which initiatives or steps will be necessary for the development from the actual to the desired status.

Together with representatives of the management of 5 hospitals, researchers of an institute at the university tackled these questions and recognized that methods to measure the success of cooperation and systematically develop the ability to cooperate are missing in practice. Therefore, a research project between practitioners and researchers started to close these gaps and develop a method to measure the ability to cooperate.

2. Conceptual Background

2.1 Intra- and Inter-organizational Business Cooperation

The forming of business cooperation is a common strategy employed by organizations to both cope with changing environmental conditions and better achieve the organizational goals by adapting to external pressures that might stress on the firms resources [22]. Therefore, cooperation can be more or less understood as strategies of symbioses in order to maintain or grow the company’s competitive advantage [23]. However, with the increase of the number of stakeholders and interests in business cooperation’s, the level of complexity also increases. Hence, numerous scholars document the need for a dedicated and holistic management based on measurable success criteria [24], [25], [26] and a sound definition of the framework for cooperation and partner selection on the other hand [27] in order to handle the inherent complexity of inter-firm relationships [28]. Hospitals are particularly characterized by a high number of autonomous business units and different interests of the stakeholders involved. Therefore, hospitals are complex organizations and thus collaborations within or between hospitals often difficult. [18].

2.2 Framework for Cooperation Modelling

According to the high degree of complexity in hospitals researchers were looking for a model with the ability to map and reduce such complexity. It was therefore evident that the underlying framework for constructing a method and divide the problem into sub-questions must have been multidimensional in order to map strategical, operational, and technological aspects fostering or hindering the ability to cooperate. This is provided by the Business Engineering (BE) framework as it is described by Österle and Winter in 2003 [29] and shown in figure 1.

This framework considers corporate interoperability from a strategic, organizational, and system (covering resources, technology etc.) point of view and has been successfully used in various fields of business research in order to explain complex business networks and possible ways of their transformation into an information age organization [29]. This framework is well-tried to study and engineer organizations and organizational relationships based on different capabilities on the different organizational layers. By addressing these different aspects on the different organizational layers this framework was chosen as a structuring foundation for the identification of the aspects influencing the ability of hospitals to link up with partners.
2.3 Definition of the Ability to Cooperate

According to previously published work [30], [31], [32], the ability to link up with other business partners has been called “networkability” and constitutes an organization’s capacity to efficiently and rapidly engage relationships with business partners [29]. In terms of the ability to cooperate with other hospitals, a strict prerequisite however is the ability for process orientation within the organization in order to enable flawless integration [33], [17]. Yet, to transform hospitals to process-oriented organizations, certain expectable basics must be defined in these organizations. The BE Framework was further developed and several characteristics and capabilities which hospitals must address to a certain degree in order to enable process orientation were proposed [31]. These levers for organizational design are called design objects. Figure 2 provides an overview of the design objects in the field of healthcare proposed by [31].

In order to assess whether and how far certain criteria that underly the design objects are addressed and satisfied, the use of a maturity model seems suitable.
2.4 Maturity Models

Maturity models are a proven and widely used method for the assessment and improvement of processes, skills and other criteria. Originally designed to evaluate software development processes by the U.S. Defense Department, maturity models have been further developed for evaluating development processes in different areas [34], [35]. The special feature of maturity models is the fact that the object (e.g. process, skills) will be assessed on the basis of fixed maturity levels (usually 5). In addition, reference processes or initiatives to reach the next maturity level are also defined in a maturity model. Therefore, maturity models are suitable for both, the use for identifying improvement potentials and guidance for action for continuous improvement [36], [37].

In regard to the healthcare context, Gericke et al. [17] provide a conceptual base for the construction of a model and the contained design objects. This model and its contents have been further developed by Rohner & Mettler [31] in order to further specify the relevant objects on the different layers of the BE framework necessary in order to qualify the ability for cooperation. Based on such a maturity model approach, it is possible to measure the relation of the status quo to the desired state and the resulting derivation of recommendations for action. Furthermore it becomes possible to compare the results of different organizations and the chosen orientations in terms of process improvements.

Therefore a maturity based approach seems to be useful in order to assess the ability to cooperate between hospitals. Following the steps proposed by Rosemann et al. [38], the basics of the construction of the maturity including the identification of elements based on the business engineering framework are provided. Furthermore the results of the evaluation of the constructed model are described.

3. Construction of the Cooperation Maturity Model

Based on the BE framework and the design objects identified as constituent for cooperation [30], [16] [31] criteria were formulated to reflect and assess the maturity of the different design objects. The proposed criteria were then discussed and revised repeatedly with the managers of the five hospital partners, forming a focus group [39], [40]. The work followed the design research path described by Rosemann [41] in order to ensure relevance of the later measured criteria. After the revision process, the following criteria where indentified as relevant for the assessment of the ability to cooperate regarding services and products on the different layers of business engineering. Table 1 shows a list of all the criteria that were identified for being necessary in order to improve the ability to cooperate.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Strategic layer</th>
<th>Org. Layer</th>
<th>Information Layer</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Assessment of the ability to cooperate with external partners</td>
<td>Assessment of the ability to cooperate with internal partners</td>
<td>Assessment of Information Management</td>
</tr>
<tr>
<td>Documentation</td>
<td>Assessment of Information about services received from external</td>
<td>Assessment of Information about services which are provided by the own department</td>
<td>Assessment of the provided operative and analytical information</td>
</tr>
<tr>
<td>Availability</td>
<td>Assessment of the Information on the availability of externally received services</td>
<td>Assessment of Information regarding the availability of services provided by the own department</td>
<td>Assessment of the data and information availability</td>
</tr>
<tr>
<td>Quality</td>
<td>Assessment of the quality of externally received services</td>
<td>Assessment of the quality of services provided by the own department</td>
<td>Assessment of the data and information quality</td>
</tr>
<tr>
<td>Ease of Integration</td>
<td>Assessment of ability to integrate externally received services into the own value chain</td>
<td>Assessment of ability to integrate services provided by the own section into the internal value chain</td>
<td>Assessment of the data integration along the care process</td>
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<tr>
<td>Degree of Standardization</td>
<td>Assessment of the degree of standardization of externally received services</td>
<td>Assessment of the degree of standardization of the services provided by the own department</td>
<td>Assessment of the standardization of data and information</td>
</tr>
<tr>
<td>Clear responsibilities (role, influence, etc.)</td>
<td>Assessment of the degree of assigned responsibility for improving the ability to cooperate with external partners</td>
<td>Assessment of the degree of assigned responsibility for improving the ability to cooperate with internal process partners</td>
<td>Assessment of the degree of responsibility for an integrated Information management</td>
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<tr>
<td>Liability</td>
<td>Assessment of the degree of liability of cooperation's and the optimization of underlying processes</td>
<td>Assessment of the degree of liability for internal cooperation's</td>
<td>Assessment of the liability of the employees for an integrated Information management</td>
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<tr>
<td>Willingness to support</td>
<td>Assessment of the level of willingness to support inter-organizational cooperation's by the own employees</td>
<td>Assessment of the motivation to foster intra-organizational cooperation's</td>
<td>Assessment of the motivation to foster an integrated Information management</td>
</tr>
<tr>
<td>Qualifications &amp; Skills of employees</td>
<td>Assessment of the training of the employees ability to support inter-organizational cooperation</td>
<td>Assessment of the training of employees ability to support intra-organizational cooperation</td>
<td>Assessment of the training of the employees ability to foster an integrated Information management</td>
</tr>
<tr>
<td>Involvement of employees</td>
<td>Assessment of integration of concerned employees in decisions on a strategic level</td>
<td>Assessment of the integration of concerned employees in internal networking efforts</td>
<td>Assessment of the integration of employees in the IT and Software selection process</td>
</tr>
<tr>
<td>Negative Redundancy</td>
<td>Assessment of dealing with unwanted redundancies on a strategic level</td>
<td>Assessment of dealing with unwanted redundancies in regard to the services provided by the own department</td>
<td>Assessment of dealing with unwanted redundancies in regard to the used software and hardware</td>
</tr>
<tr>
<td>Completeness</td>
<td>Assessment of the completeness of services within the own service area</td>
<td>Assessment of the completeness of service portfolio provided by the own department</td>
<td>Assessment of the coverage of the information needs of the own department.</td>
</tr>
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</table>

In a second step, the identified criteria were used to develop a questionnaire for assessing the current “as-is” maturity compared to the “target” maturity in regard to each criterion. According to Ahern et al. and Luftman [37], [42] different predefined maturity levels were developed for each criterion. In contrast to the 5 maturity levels (“Initial/Ad hoc”, “Committed”, “Established and Focused”, “Improved”, “Optimised”) proposed by Ahern and Luftman, it was decided to use 4 maturity levels (“Initial/Ad-hoc”, “Committed”, “Established and Focused”, “Optimised”) in order to avoid the “middle” choice which is often preferred by practitioners [43].

In the developed questionnaire, the maturity level of each criterion was assessed on all three levels of the BE framework, yet the description of the maturity of the criteria was adapted to the focus of the
specific BE Layer. The focus of the maturity assessment of the criteria at the strategic level was on the assessment of the networking capability with the outside of the organization or between departments. Similarly, on the organizational level the assessment of the maturity levels of the criteria focused on cooperation skills (i.e. process orientation, process management). On the IT level, the maturity of the criteria was assessed in terms of their cooperation enabling character.

4. Evaluation of the Cooperation Maturity Model

4.1 Test of Applicability in Practice

A questionnaire concerning the usability of the cooperation maturity model in hospital practice was worked out and evaluated for comprehensibility, evaluable and completeness [44] in two phases with two rounds each. In the first phase several managers of all the participating hospitals were asked to rate the questionnaire in regard to the above mentioned criteria. Overall the structure and the content of the questionnaire were found to cover all the important aspects for rating the usability of the questionnaire aimed at rating the cooperation maturity model. This result was expectable as most of the evaluating persons in this phase were participating in the identification of the criteria. In regard to the comprehensibility and evaluability, the managers rated the language of the questionnaire to be much too scientific, using too many words from a business context in order to be understandable for medical interns and nurses. Therefore the language was adapted and in the second round of the first evaluation phase the questionnaire was approved by the managers. In a second phase the questionnaire was evaluated by practitioners of each professional group - management, physicians and nursing - of the different hospitals in regard to the same criteria mentioned above.

A total of 30 practitioners were interviewed, including 9 members of management (30%), 10 doctors (33%) and 11 nurses (37%). These professionals have been sent the questionnaires with the request to fill it out in regard to the ability to cooperate of their own department. Therefore they had to fill out the questions on every layer in order to gain a multi perspective view on the perquisites of cooperation in a pluralistic context such as hospitals. In a subsequent interview, the practitioners were asked for their feedback in regard to the above mentioned criteria. The interviewers followed the same procedure by asking for the above mentioned evaluation criteria. They did not influence the answers of the representatives at any time but took the opportunity to note interesting context information.

Overall, the interviews showed that the maturity model on the one hand and the questions on the other hand were understood by the representatives of all professions. Also the structuring of the criteria and questions along the Business Engineering framework and its layers have been understood and agreed upon. In addition, the structure along the different layers was perceived as a good help for navigation within the questionnaire and its logic by non-economists. However, the interviews showed also that some participants had difficulties to differentiate between the actual (as-is) and the desired state (target state) based on full text maturity descriptions, regarding a specific criterion. Furthermore two representatives of the professional group of nurses had difficulties to understand the questions on the strategic level. However, this statement never applied to persons in leading positions.

4.2 Example of an Assessment

The data acquired in phase two of the evaluation (actual use of the cooperation maturity model) was analyzed and an excerpt of the first results will shortly be discussed in regard to their reliability. For this reason the results have been analyzed with respect to a sector comparison. Therefore data was evaluated across professional groups and hospitals. The left graph of figure 4 shows the evaluation in terms of the ability to cooperate with other organizations (inter-organizational networkability). The graph on the right shows the results of the assessment of intra-organizational cooperation skills (intra-organizational networking capability) and therefore measures the ability for process orientation based on the identified criteria. In both graphs the subjective “as-is” state (dark blue) is compared to the “to-be” state (light blue).
Figure 4 Sector comparison: Maturity Assessment of potentially cooperation influencing criteria on a strategic level (left figure) and on an organizational level (right figure).

Figure 5 Sector comparison in regard to an integrated information management.

The results of the sector comparison show a relatively constant difference between actual and desired state on the strategic level. However, the results show a high deviation (2) with respect to the negative redundancy, followed by clearly higher desired maturity of the services provided by the own hospital and its quality assurance (1.35). The high level of negative redundancies was often declared in such a way that there would be little coordination between departments in regard to the services offered. For this reason, the same or similar medical services would be offered by different departments in the same hospital, without any alignment of the services and competencies in regard to the strategy of the hospital. Another factor which was often criticized in terms of the ability to cooperate with other hospitals was the assurance of the quality of care. In the interviews it was found that medical personnel often distrusted the quality of medical services provided by other hospitals. A phenomenon that is clearly counterproductive in view of cooperation.

This observation was also confirmed at the process level. Here the largest challenge identified was the assurance of the process performance in terms of quality of the own department (2) in order to build trust and increase the willingness for cooperation. This result emphasizes the importance of quality control to improve confidence in the internal and external collaboration.

In terms of an integrated information management, the interoperability of the used systems (1.18) is identified as major challenge for a better networking capability.

Summarizing the deviations for each level, one arrives at the result that the biggest challenge for networkability is perceived at the strategic level.

5. Conclusion and Outlook

Background of the research project described in this paper is the paradigm shift from a function-oriented to a process-oriented care in the German-speaking EU countries. As a result of this change, hospitals are under increasing efficiency and quality pressure. Similar to previous developments in
other industries, a growing specialization and compression of services take place in the health care market. Thus, as result of the increasing division of labor hospitals are forced to cooperate with each other and with other medical service providers.

In a joint research project between an institute of a university and five hospitals from Germany and Switzerland an approach for an assessment of the ability to cooperate on the basis of a maturity model was developed. This assessment is based on networking-related criteria that were identified in focus groups with experts and practitioners during the project. As underlying foundation the researchers identified the multidimensional business engineering approach as the appropriate framework in order to be able to reflect the complexity of hospitals.

The research described in this paper proved that the language and the structure on the basis of the BE framework which was adapted to hospitals was understandable for practitioners. A maturity assessment of cooperation-related criteria was therefore possible. Furthermore in a first test with the assessment and an exemplary analysis of the gathered data it could be shown, that the representation of the results is suitable for a fast comparison of “as-is” to the desired situation.

However it was also noted during the evaluation that an assessment of the maturity based on full-text descriptions was difficult for people who were not familiar with the idea of maturity models. For further research therefore should be examined whether an assessment of the maturity based on a Likert scale is more accepted.

Moreover the researchers recommend the testing and use of the generated model on a larger scale with more hospitals of different organizational structure and supply orders. The application of the assessment on the basis of an online platform could fulfill these requirements. Furthermore such a platform with several hospital partners would enable comparisons between departments and hospitals in regard to their model strategies to improve the ability to cooperate. Such a platform could be seen as enabler of knowledge transfer with the aim to improve the ability to cooperate in and between hospitals based on reference strategies and practices.

References