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# IT capabilities within the Dutch SME first line health care sector

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**Abstract**

The complexity of Information Technology (IT) is increasing; so are customer expectations. Consequently it is not easy for especially small and medium enterprises (SMEs) to keep track of all IT-developments, let alone leverage them in business operations with the aim to satisfy increasingly demanding customers. This also holds for the health care sector. This research is focussed on first line health care, and deals with the following research question; 'which IT capabilities do SMEs within the first line health care sector need to have at their disposal in order to reach Business/IT-Alignment (BITA) maturity?' Using the best practices ITIL, ASL and BiSL (cf. Bon, et al. 2007), IT capabilities are formulated. Based on the theory of Luftman (2000) business/IT-alignment and maturity is measured. Quantitative research of 123 first line health care SMEs in the Netherlands, confirms a moderate to strong correlation between the IT capability constructs 'Organisation', 'Processes', 'Knowledge' and 'People' on the one hand, and BITA maturity on the other. The results indicate that SMEs within the first line health care sector should invest in IT capabilities related to the enterprise's 'Organisation' and 'Processes' to strive for increased business and IT maturity.

***Keywords:*** IT capabilities, Business/IT-Alignment, Small Medium Enterprises, Health care

## 1 Introduction

In the health care sector information is exchanged constantly. For this sector the use of IT is becoming increasingly relevant (Krijgsman, et al. 2013). But the sector also faces major challenges; for example, the Dutch health care sector has become expensive, laws and regulations are being redesigned and the budget responsibilities are shifting from national to local governments (Rijksoverheid, 2014). This shift is combined with cost cuts: the local governments need to do more with less money. The national government believes IT could deliver a solution for this discrepancy. To maintain the quality and safety of personal information and to increase the interoperability between, and the integrity of the care organisations,

formal requirements and standards are formed (Website Nictiz, 2014; Website Steunpunt NEN 7510, 2014).

This also applies to SMEs within the health care sector who are now also required to use standardized applications such as Electronic Health Record systems in order to meet the requirements, formal standards and expectations of the client and supplier. This means they are likely to spend more on IT compared to SMEs in other sectors where there might be less formal requirements and standards.

SMEs in Europe, divided in micro, small and medium organisations do not always have the resources and/or capabilities to build, implement, innovate and maintain their IT besides their business (cf. Ihlström and Nilsson, 2001). Where in this context IT refers to infrastructural, application and functional resources and capabilities.

The increasing need for well-designed and well-implemented IT that is also aligned with the business (Business/IT-Alignment, abbreviated as BITA) has been a top priority for the boards of complex large organisations for the last decades (Merali, et al. 2012). Alignment of IT with the business results in more competitiveness and performance (Porter and Millar, 1985; Henderson and Venkatraman, 1989). IT Knowledge may also lead to better organisational performance (Brynjolfsson and Hitt, 1996; Scheper, 2002; Melville, et al. 2004; Ross, et al. 1999; Silvius, 2010).

Most SMEs recognise the importance of IT, but they focus on improving their own business processes (Janssen, et al. 2013), instead of investing in IT to increase competitiveness (Harindranath, et al. 2008; Dinges, et al. 2013). Research within the Dutch health care sector shows that IT can deliver added value to the business. It especially improves the communication between the doctor and patient, or between multiple health care organisations. (cf. Krijgsman, et al. 2013).

Many small and micro organisations depend on external IT services. The IT supplier has become in charge and is able to regulate their own innovation; therefore they can dictate the price. Custom fit is too expensive and because of the increasing amount of standards and requirements, the complexity of IT and the costs of IT are growing. In some cases IT has become unaffordable for SMEs.

There are many frameworks that are used for managing IT. Such as the Information Technology Infrastructure Library (ITIL), the Application Services Library (ASL) and the Business information Services Library (BiSL) (Bon, et al. 2007; Pols, 2012; Pols, et al. 2012). However, these frameworks are too complex and detailed to use within SMEs. To quote an IT-SME expert consultant from MKB-ICToplossingen: “SMEs and therefore SMEs within the health care sector, are in desperate need of practical help and scalable models to focus on main subjects of IT management.” (Lind, personal communication, 2014). The above implies that there are some limitations to the capabilities of SMEs in terms of BITA.

Consequently, the research question is; 'which IT capabilities do SMEs within the first line health care sector need to have at their disposal in order to reach BITA maturity?'

This research was intended to result in a validated list of relevant IT capabilities for SMEs within the Dutch first line health care sector. Since such a list is essentially an artefact that requires designing, a design research approach was chosen. Hevner

defined the design science research approach within the context of IT and developed a framework (Hevner, et al. 2004). Because this research is also focussing on IT, the Information System Research Framework of Hevner (Hevner, et al. 2004) was used as a format for this research. The first phase of this research was knowledge based (described in section 2: context and theory). In order to define the concepts and context of this research digital libraries, and professional literature was explored and explorative interviews of case experts were conducted. In the second phase, the concepts from literature and interviews were checked and operationalized using a qualitative research approach (described in section 3: framework operationalization). In the third phase (IS research and justify) a quantitative validation was performed within the context of Dutch first line health care organisations. This resulted in the validation of a proposed research framework (described in section 4: framework validation). Conclusions and recommendations for further research are provided in section 5.

# 2 Context and theory

## 2.1 Research context

Within the Dutch health care sector a patient can get unapproved help at first line health care organisations, such as general practitioners, dentists, and pharmacists. To reach the second line, such as hospitals, the patient needs to have an approval of the general practitioner (Bos, et al. 2011).

First line health care organisations are established nearest to the patients. Therefore they are mostly organised in micro/small organisations and are nationally spread. The figures of registered general practitioners give a good example (Table 1).

| Year | Solo | % | Duo | % | Group | % | Total |
|---|---|---|---|---|---|---|---|
| 2010 | 1597 | 17,8 | 2544 | 28,3 | 4840 | 53,9 | 8981 |
| 2011 | 1606 | 18,0 | 2510 | 28,2 | 4790 | 53,8 | 8906 |
| 2012 | 2266 | 25,5 | 3378 | 38,0 | 3245 | 36,5 | 8889 |
| 2013 | 2505 | 28,3 | 3405 | 38,4 | 2955 | 33,3 | 8865 |

**Table 1:** Total of general practitioners divided in size (Website Nivel, 2014)

The second and third line health care organisations are centralised to cut the indirect costs and to use expensive machines more effectively and efficiently (Bos, et al. 2011). Because of centralisation these organisations are generally above the staffing limit of SMEs.

So the first line health care organisations are the ‘first in line’ to collect information about the patient and are organised in micro/small organisations. They need to have IT at their disposal to communicate with other health care organisations and the patient. Therefore the first line health care organisations are the most relevant for this research.

## 2.2 IT capabilities

The literature reveals several theoretical and practical frameworks which contains organisational capabilities that purport to help organizations achieve more competitiveness. Some of the frameworks that are referred to and used more frequently are:

A. The star model of Galbralth (Galbraith, 1973)
B. The model of Scott Morton and Rockart (1983)
C. The Balanced Score Card (Kaplan and Norton, 1992)
D. The INK model; business model used by among others health care organisations (INK, 1992)
E. The 7s model of McKinsey (Kaplan, 2005)

This research is focussing on the IT capabilities that purport to help organizations achieve more competitiveness by reaching a higher BITA maturity. The literature does not reveal any IT capabilities in this context, so a translation is made.

The structures of the organisational frameworks are different from each other. Especially the amount and the names of the constructs (capabilities) differ. When the definitions of the constructs are compared (Table 2), most of the constructs can be classified to the composed capabilities IT needs to support in accordance with ITIL (Bon, et al. 2007).

| **ITIL** | **A.** | **B.** | **C.** | **D. (translated from Dutch)** | **E.** |
|---|---|---|---|---|---|
| People | People | Individuals and roles | Learning & Growth | Employees | Staff |
| Knowledge | | | | Leadership | Skills |
| Processes | Processes | Management processes | Internal processes | Employee management, means, process improvement/ renewal | System |
| Organisation | Structure, Strategy | Organization structure, Culture, Strategy | Vision and Strategy | Strategy and policy | Structure, Shared values, Strategy |
| Management | | | Financial, Customer | Society, Board and sponsors, customers and partners | Style |

**Table 2:** Composed capabilities compared with elements of theoretical frameworks

To create the best fit with IT, the individual IT capabilities were derived out of the composed capabilities that are described in ITIL. Therefore the definition of capabilities for this research is derived from ITIL namely: “Capabilities represent the ability of an organisation to coordinate, maintain and implement resources to add value. They evolve over the years” (Bon, et al. 2007).

Together with ASL and BiSL, ITIL has proven itself internationally as an IT library of ‘best practices’. Therefore these practical frameworks are used to determine the composed and individual IT capabilities that are relevant for Dutch SMEs. To do so, the description of the individual elements are studied, rewritten to IT capabilities and translated in Dutch. The fundamental choices are briefly described.

The composed capability ‘People’ is a combination of capacity, creativity, analysis, perception, education, assessment, leadership, communication, coordination, empathy and confidence (Bon, et al. 2007). IT people also need these elements,

whereby IT capacity, IT creativity, IT analysis, IT education and IT coordination can be effective when the right IT staff is hired. So these elements are IT resources. The remaining elements (perception, assessment, leadership, communication, empathy and confidence) are translated to individual IT capabilities.

The composed capability 'Knowledge' is a combination of awareness, experience, insightfulness, information, and intellectual property (Bon, et al. 2007). All these elements are translated to individual IT capabilities.

The composed capability 'Processes' refers to algorithms, methods, procedures and routines (Bon, et al. 2007). By comparing the frameworks, the composed IT capability Processes is divided into four subcategories, government, management, maintaining and innovation. By combining the processes of ITIL, ASL and BiSL, the subcategories are divided into three or more individual IT capabilities.

The composed capability 'Organisation' refers to an active configuration of people, processes, applications and infrastructures that facilitate all operating activities. This capability is composed of, functional hierarchies, social networks and common objectives (Bon, et al. 2007). The IT organisation needs the same elements, whereby social networks refers to the goodwill IT gained by the business and common objectives need to be flexible to move along with the innovation of the business.

The composed capability 'Management' is a system of leadership, administration, government, performance, measures and incentives and is cultivated, coordinated and controlled by management (Bon, et al. 2007). These elements have been classified into composed IT capabilities 'People' and 'Processes'. Therefore the composed IT capability 'Management' is scrapped.

### 2.3 Business IT alignment

Around 1965 the concept of aligning business and IT was born (Leavitt, 1965). IT was one of the unique values that should be aligned with the structure, task and people of the organisation. More recently BITA refers to a process of continual adaption and changes (Henderson and Venkatraman, 1993). It is the extent of IT mission, goals and plans to facilitate, and to be facilitated by, the business (e.g. Reich and Benbasat, 1996). It is a continual process of combining business and IT deliberately to increase organisational performance (e.g. Maes, et al. 2000). BITA refers to applying IT in an appropriate and timely way, in harmony with business strategies, goals and needs (cf. Luftman, 2000).

Although BITA may be defined in several ways, it remains evident that in recent times BITA has become a top strategic priority for especially the boards of complex large organisations (Merali, et al. 2012). For this research BITA is the ability of IT to design and facilitate the business and also the process to realise this (Silvius, 2007).

The theoretical framework of Luftman (2000) shows six measureable process variables "communication", "competency/value measurements", "governance", "partnership", "scope and architecture" and "skills". Organisational performance can be more effective and efficient when the variables of BITA are more mature and balanced (Luftman, Kempaiah, 2007). The measurement of BITA in maturity levels has been done successfully before (Scheper, 2002). Luftman makes use of five

maturity levels that conform with the core concepts of the Carnegie Mellon's Software Engineering Institute's Capability Maturity Metric (Luftman, 2000; Derksen, 2008). Critics argue that organisational performance will not increase if one only considers BITA maturity (Silvius, 2007; Oosterhaven, 2011; Abcouwer, 2014). Because this research is focussed on SMEs in the first line health care sector, where the maturity of BITA might often be immature "ad-hoc/committed process", the assumption is that the introduction of BITA will have a positive effect on the organisational performance.

Using the previously stated literature and insights, the following research framework is proposed (Figure 1). The following hypothesis is constructed: *The 'right' deployment of IT capabilities contributes to the alignment of Business and IT, which will have a positive effect on the organisational performance of SMEs within the Dutch first line health care sector.*

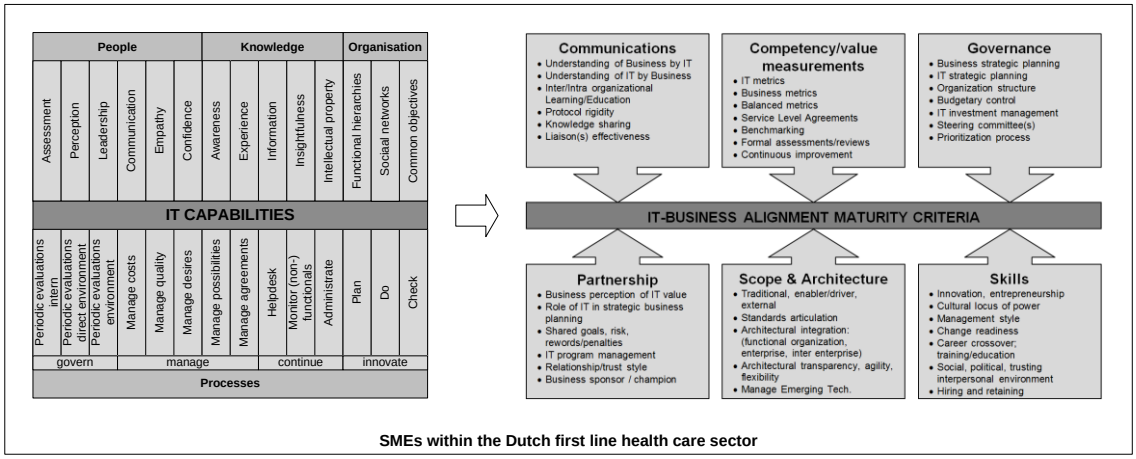


**Figure 1:** Theoretical research framework

The theoretical research framework is built on two concepts that are based on two factors:

- The level of individual IT capabilities an organisation has at their disposal.
- The maturity level of the six BITA variables according to the model of Luftman (2000).

This model was further operationalized and validated as described in the next section.

## 3 Framework operationalization

The concepts of the framework were validated by four quantitative IT-SME expert interviews and two quantitative BITA experts interviews. IT-SME experts were selected to cover the external context of IT within first line health care organisations. They represent an IT-health care initiative of the national government 'Nictiz', an IT consultancy organisation 'Atos', the sector association of Dutch physiotherapists 'KNGF' and an IT-SME supplier 'MKB-ICT oplossingen.nl'. The experts have a thorough knowledge and experience (senior/director level) of IT within SMEs in the context of the Dutch first line health care sector.

### 3.1 IT capabilities

The IT-SME experts were asked if the derived IT capabilities were valid to the definition and complete. With a 5-points Likert scale the experts have given their opinion about the value of each individual IT capability to SME first line health care organisations varying from not valuable to extremely valuable.

The results (see appendix A) show that not every individual IT capability is relevant. To select the most relevant individual IT capabilities, IT capabilities were selected using the following criteria:

- The average score of the individual IT capability is ≥ 3.5 points.
- The distribution score of the individual IT capability is ≤ 3 points.

This resulted in a total of 14 relevant individual IT capabilities divided in four composed IT capabilities.

1. People; IT perception, IT assessment, IT communication, IT confidence
2. Knowledge; IT awareness, IT insightfulness, IT information
3. Processes; IT monitor (non)functionals, IT administrate, IT plan, IT do, IT check
4. Organisation; Social network, Common objectives

To further explore the relation between 'IT capabilities' and 'BITA maturity', statements were developed to which participants could respond on a 5-point Likert scale with options varying from strongly disagree (coded as 1) to strongly agree (coded as 5). For every relevant individual IT capability a statement was formulated using the definition of the individual IT capability.

### 3.2 Business IT Alignment

After rating IT capabilities, the IT-SME experts were asked to answer the BITA questionnaire of Luftman translated in Dutch (Silvius, 2009). Three IT-SME experts answered all questions, one (of 'KNGF') did not complete the questionnaire.

The results (see appendix B) show that the experts confirmed the assumption that the BITA maturity would be very low (ad-hoc/committed process) within SMEs in the context of Dutch first line health care organisations. Furthermore all IT-SME experts find the questions unreliable for SMEs within the Dutch first line health care sector. The questions contain too much technical jargon and are focussed on organisations with at least an IT department. Besides that, the risk of nonresponse is high, because of the large amount of questions.

Therefore the questionnaire was shortened. A selection of Luftman's BITA elements (Luftman, 2000) was made, based on the following criteria:

- The element needs to fit the chosen BITA definition.
- The element needs to fit in the context of this research.
- The element needs to be unique compared with the relevant IT capabilities.

After studying the definitions of the 38 elements of the BITA model and comparing them with our criteria, 18 elements were selected. Three elements were selected for each BITA variable. For each selected element, the original formulation was evaluated by a non-IT respondent (with Dutch health care experience). Consequently a few technical terms were replaced, or defined. The answers of the

BITA questions were numbered varying from ad-hoc process (coded as 1) to optimized process (coded as 5).

### 3.3 Research context

Finally, the context of this research was determined by formulating four questions. The first is about the type of health care organisation the respondent works for. The second and third are related to the definition of SMEs to determine whether the answers will be valid for this research. And the fourth is about the perspective of the respondent as to who is responsible for IT related factors.

The selected, translated and formed questions resulted in a full questionnaire. To ensure the validity of the questions, a health care expert, a BITA expert and four specialists of scientific research and Business-IT reviewed this questionnaire. The respondents confirmed that the questions are related to the concepts of this research and suggested some minor changes. Consequently the introduction was shortened and technical terms (e.g. 'business' and 'benchmark') were explained. This resulted into the definitive questionnaire (available in Dutch upon request to the authors).

## 4 Framework validation

To validate the framework, a digital survey (Google Forms) was conducted among six types of Dutch first line health care organisations (Table 3). The selection was based on national spread. In order to identify participants the central registration database of Dutch health care organisations 'zorgkaartnederland.nl' was consulted. A total of 3490 email addresses was collected. An invitation for filling in the survey was sent out via email with a link to the digital questionnaire.

| Sort care organisation | Total registered | Total send |
|---|---|---|
| General practitioners | 4667 | 249 |
| Physiotherapists | 7022 | 1491 |
| Dentists | 4613 | 276 |
| Psychologists | 1872 | 484 |
| Pharmacists | 1918 | 836 |
| Obstetrical care | 602 | 154 |
| | 20694 | 3490 |

**Table 3:** Selection of Dutch first line health care organisations

Data was collected during a period of four weeks (December 8, 2014 – January 6, 2015) and analysed with Microsoft Excel. In total 127 responses were collected of which 123 came from relevant organizations corresponding with the definition of SMEs. Besides the 123 filled-in surveys, around 90 emails of one-man organisations were also received in which respondents indicated that the survey did not fit their situation as they did not have a separate IT function. One respondent indicated that the questions (still) contained too much technical jargon.

With 64%, physiotherapists filled in the most relevant surveys, followed by psychologists (14%), pharmacists (8%), dentists (6%), obstetrical care (6%) and general practitioners (2%). Most responses (71%) came from organisations with 2-9 Full-time equivalent (FTE), followed by 1 FTE (23%) and 10-49 FTE (6%). In response to the question about who is responsible for IT (from the perspective of the

respondent) 67% indicated that he or she is responsible. 14% said they had an IT employee, 13% said their colleague without an IT background were responsible and 6% said their IT department was responsible for IT related factors.

### 4.1 Validity of the questionnaire

To measure the validity of the internal consistence of the questionnaire we used the formula of Cronbach's alpha. This formula results in a number varying of infinitely negative to +1 points. A minimum of ≥ 0.6 points is needed to determine the validity (Verhoeven, 2011). However statistics experts find ≥ 0.7 points is the minimum (Bland and Altman, 1997). For this research the minimum of sure validity is based on ≥ 0.7 points. The scores below 0.6 points are not deemed valid. The scores between 0.6 and 0.7 are doubtful, but considered useable (see Appendix C).

The internal consistence of the total response is the most valid ($0.60 \leq \alpha \leq 0.91$), followed by the response of the group 2-9 FTE ($0.58 \leq \alpha \leq 0.91$). The response of the groups 1 FTE and 10-49 FTE is too small to analyse separately. Besides that the group 1 FTE have possibly answered the questionnaire with a focus on the relationships between their own business and more external IT organisations. Therefore we have chosen to analyse the total response and the response of the group 2-9 FTE.

### 4.2 Framework validity

The hypothesis of this research states we are assuming there is a relationship between the deployment of IT capabilities and BITA maturity. Because this research is not an experiment, we cannot prove a causal link. But we are able to look for possible relationships or correlations. To find and declare a (possible) relationship three steps need to be made (Burns and Bush, 2014).

- Calculate the significance (p-value ≤ 0,05) to prove the existence of the relationship.
- Determine the direction of the relationship (negative or positive correlation coefficient).
- Determine the strength of the relationship (value of correlation coefficient).

First correlations are determined between the individual IT capabilities, the composed IT capabilities 'the arithmetical average of the related individual IT capabilities' and the BITA variables 'the arithmetical average of the related BITA variable factors', B7: the BITA maturity 'the arithmetical average of the six BITA variables'. The results (see appendix D) show that most of the correlations are weak or moderate.

To determine the significance and direction of the relationships of the composed IT capabilities to the BITA maturity, a multiple regression analysis was performed based on the total response.

Firstly predictors of B7: BITA maturity by SMEs within the Dutch first line health care sector were investigated and thereafter the predictors for the separate BITA variables.

Table 4 indicates that the multiple correlation coefficient is 0.689. This implies a strong correlation between the composed IT capabilities and BITA maturity. The variance in BITA maturity can be explained by 47.5% (R Square) of the combined composed IT capabilities. Still about half of the variance in BITA maturity is unexplained.

| Response | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| 123 | 0.68888409 | 0.474561289 | 0.456749807 | 0.579383774 |

Predictors: (Constant), A1: People, A2: Knowledge, A3: Processes, A4: Organisation
**Table 4:** B7 BITA regression summary

The 'ANOVA' results are presented in table 5. The F value of 26.644 and corresponding p-value (Sig.) of 0.000 reveal that the regression test is statistically significant. This means that a significant proportion of the combined composed IT capabilities variables explain the variance in BITA maturity within Dutch SME first line health care organisations.

| | df | Sum of Squares | Mean Square | F | Sig. |
|---|---|---|---|---|---|
| Regression | 4 | 35.77543367 | 8.943858418 | 26.6435604 | 0.0000000 |
| Residual | 118 | 39.61089575 | 0.335685557 | | |
| Total | 122 | 75.38632942 | | | |

Dependent Variable: B7: BITA
Predictors: (Constant), A1: People, A2: Knowledge, A3: Processes, A4: Organisation
**Table 5:** B7 BITA ANOVA results

Table 6 presents a more detailed view. The results reveal that three of the four composed IT capabilities (A1, A3 and A4) serve as predictors for the BITA maturity of SMEs within the first line health care sector. Those predictors are statistically significant (Sig. ≤ 0.05). The strongest predictor is A4: Organisation with a coefficient (β) of 0.335, followed by A3: Processes and finally A1: People. A4 and A3 are positive. This means that it is likely that SMEs within the first line health care sector which have an IT organisation or IT processes at their disposal, will have a higher BITA maturity.

| | Coefficient (β) | Std. Error | T | Sig. |
|---|---|---|---|---|
| (Constant) | 0.559919032 | 0.288909523 | 1.938042838 | 0.05500686 |
| A1: People | -0.223948309 | 0.099106684 | -2.259669086 | 0.025676774 |
| A2: Knowledge | 0.190454375 | 0.099260335 | 1.918735971 | 0.057433316 |
| A3: Processes | 0.281392714 | 0.071454552 | 3.938065593 | 0.000139447 |
| A4: Organisation | 0.335423213 | 0.0797807 | 4.204315264 | 0.00005122 |

Dependent Variable: B7: BITA
**Table 6:** Correlation and P- values composed capabilities versus BITA

To analyse the predictors of the separate BITA variables, six regression tests were performed. These tests imply a moderate to strong correlation between the combined individual IT capabilities and the separate BITA variables (Table 7). The R Square values are above 24% and the p-values show the six tests are statistically significant. This confirms the findings of the first regression test.

| Dependent value | B1 | B2 | B3 | B4 | B5 | B6 |
|---|---|---|---|---|---|---|
| Summary R | 0.666 | 0.649 | 0.604 | 0.569 | 0.568 | 0.491 |
| Summary R Square | 0.444 | 0.421 | 0.365 | 0.323 | 0.323 | 0.241 |
| ANOVA; F | 6.153 | 5.620 | 4.441 | 3.686 | 3.681 | 2.447 |
| ANOVA; Sig. | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.005 |

Predictors: (Constant), A1a, A1b, A1c, A1d, A2a, A2b, A2c, A3a, A3b, A3c, A3d, A3e, A4a, A4b

**Table 7:** Summary regression analysis

The p-values and correlation coefficients of table 7 have been further analysed. Based on this it is found that:

- B1: Communication, is predicted the strongest by the individual IT capability 'Common objectives' (Sig. 0.001/β 0.417) followed by 'IT check' (Sig. 0.027/β 0.249) and 'IT Information' (Sig. 0.014/β 0.209).
- B2: Competency/value measurements is predicted the strongest by the individual IT capability 'Common objectives' (Sig. 0.034/β 0.255) followed by 'IT Information' (Sig. 0.004/β 0.228).
- B3: Governance, isn't predicted by one or more individual IT capabilities.
- B4: Partnership, is predicted the strongest by the individual IT capability 'Social network'(Sig. 0.007/β 0.277).
- B5: Architecture, is predicted by the individual IT capability 'Common objectives' (Sig. 0.010/ β 0.363) and 'IT Assess' (Sig. 0.022/β -0.414).
- B6: Skills, is not predicted by one or more individual IT capabilities.

As there was a possibility that the questions had not been answered correctly by the group 1 FTE, the multiple regression analysis was also done with the response of only the 2-9 FTE group. The test results of the 2-9 FTE regression analyses are comparable with the results of the total group analysis. The multiple correlation coefficient (0.665) and R Square 44.2% are a bit lower but the implications are the same. Also the 'ANOVA' test results remain statistically significant.

A further examination of the four composed IT capabilities reveal that the composed IT capability "People" is not a predictor of BITA maturity while B4: Organisation and B3: Processes are still predicting BITA maturity. The six separate regression tests indicate that the statistical significance of the individual IT capabilities 'IT Information' and 'IT Assess' are diminishing.

## 5 Conclusion and further research

The research question was; 'Which IT capabilities do SMEs within the first line health care sector need to have at their disposal in order to reach for BITA maturity?'

The results show a weak to moderate correlation between the relevant IT capabilities and BITA maturity. The regression analysis confirms a positive relationship of the combined composed IT capabilities and BITA maturity. 47% of the variance in BITA maturity within Dutch SME first line health care organisations can be explained by the overall IT capabilities construct.

A closer look at the composed IT capabilities (e.g. People-related) reveals that the relationship is getting weaker and the most remote individual IT capabilities are not showing a relationship with BITA maturity variables. So the BITA maturity cannot be explained by one or two individual IT capabilities.

Silvius (2007) states that BITA refers to the extent with which IT infrastructure, applications and organisation can facilitate strategy and processes. So BITA is about cooperation between IT and business, and within those business parts. Therefore it is logical that the combination of IT capabilities is stronger than a single individual IT capability.

It can be concluded that the combination of the composed IT capabilities with their relevant individual IT capabilities is most relevant to improve the BITA maturity within Dutch SME first line health care organisations. This implies that it is very likely that the deployment of IT capabilities will contribute to the alignment of Business and IT.

The regression test of the total response reveals that the composed IT capabilities 'Organisation', 'Processes' and 'People' are significant for the relationship with the BITA maturity. However the relationship of 'People' is dubious, because the correlation coefficient is negative and the regression test of the selection 2-9 FTE doesn't show a significant relationship. Therefore it can be assumed that it would be best for the BITA maturity within Dutch SME first line health care organisations if they have the composed IT capabilities 'Organisation' and 'Processes' at their disposal. Further research, like an experiment, needs to be done to determine if this relationship is causal in nature.

A more detailed analyses of the individual IT capabilities reveals some uncertainty about the significant relationships with the BITA variables that are shown in the regression test of the total response and of the selection 2-9 FTE. Based on this it can be argued that it is not possible to determine (with certainty) which individual IT capabilities a Dutch SME first line health care organisation needs at their disposal. However it is possible to give an indication that possibly results in a better BITA maturity within Dutch SME first line health care organisations. The statistical analyses reveals that the correlation between 'Organisation' and BITA maturity is the strongest, followed by 'Processes' and BITA. Within the composed IT capability 'Organisation', the individual IT capability 'Common objectives' (to have a common vision and strategy) shows the most significant relations with the individuals BITA variables. It is therefore possible to argue that the relationship between individual IT capabilities and BITA maturity is predicted by 'common objectives', followed by the IT processes 'Do' and 'Check'. Further research may reveal more knowledge on these relationships.

This implies that the 'right' deployment of IT capabilities contributes to the alignment of Business and IT. Therefore our hypothesis is confirmed: The 'right' deployment of IT capabilities contributes to the alignment of Business and IT, which will have a positive effect on the organisational performance of SMEs within the Dutch first line health care sector.

The SMEs within the Dutch first line health care sector need to have the composed IT capabilities 'Organisation' and 'Processes' at their disposal, but the combination of all four composed IT capabilities will give the best results.

This research is focussing on the Dutch SME Healthcare sector. The findings are not validated within a broader context such as within the context of other European countries. Because the (IT) developments, the point of view of external stakeholders and (local) governance, laws and regulations are not fully comparable between different European countries, the findings cannot simply be generalised.
There are however similarities with other European countries. For instance UK healthcare is changing because of IT possibilities. The UK Government tries to modernise a health service with the help of IT (Greenhalgh and Stones, 2010). In Belgium and England there are government programs to help SMEs to use IT in a profitable way. Practice shows that SMEs are not familiar with, or do not use, these government programmes (Harindranath, et al. 2008; Dinges, et al. 2013). Most SMEs recognise the vitality of IT, but they focus on their own business (Janssen et al., 2013). SMEs are in general focussing on doing more with less, instead of investing in IT to grow and increase competitiveness (Harindranath, et al. 2008; Dinges, et al. 2013).

This shows that the practical problem is not related to the borders of the Dutch first line healthcare sector. We suggest further research (across the borders of the Dutch first line healthcare sector) on the relationships between IT capabilities and BITA maturity within the European SME first line health care.

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## Appendix A; Response experts value of IT capabilities

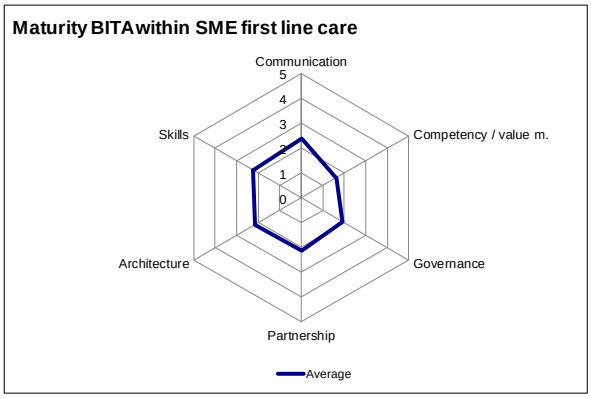
| | People | | | | | | Knowledge | | | | | Processes | | | | | | | | | | | | | | Organisation | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | IT perception | IT assessment | IT leadership | IT communication | IT empathy | IT confidence | IT awareness | IT experience | IT insightfulness | IT information | IT intellectual property | PE intern IT | PE IT direct environment | PE IT environment | Manage IT costs | Manage IT quality | Manage IT desires | Manage IT possibilities | Manage IT agreements | IT Helpdesk | Monitor IT (non-) functionals | IT Administrate | IT Plan | IT do | IT check | IT Functional hierarchies | IT Social network | IT common objectives |
| Nictiz | 4 | 4 | 5 | 3 | 3 | 5 | 3 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 3 | 3 | 3 | 3 | 3 | 1 | 4 | 5 |
| Atos | 5 | 5 | 1 | 3 | 1 | 4 | 5 | 2 | 3 | 5 | 3 | 3 | 3 | 4 | 3 | 3 | 4 | 4 | 4 | 3 | 5 | 4 | 3 | 3 | 3 | 3 | 4 | 2 |
| KNGF | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| MKB ICT | 5 | 5 | 1 | 5 | 5 | 5 | 3 | 3 | 4 | 4 | 1 | 4 | 4 | 4 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| Average | 4,8 | 4,8 | 3 | 4 | 3,5 | 4,8 | 4 | 2,8 | 3,5 | 4 | 2,8 | 2,8 | 2,8 | 3 | 2 | 2 | 2,3 | 2,3 | 2,3 | 3 | 4 | 3,8 | 3,5 | 3,5 | 3,5 | 3 | 4 | 3,8 |
| Average | | | | | | 4,13 | | | | | 3,40 | | | 2,83 | | | | | 2,15 | | | 3,58 | | | 3,50 | | | 3,58 |

5 = Valuble for SMEs within the Dutch care sector to have at their disposal
1 = Not valuble

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Min | 4 | 4 | 1 | 3 | 1 | 4 | 3 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 3 | 3 | 3 | 3 | 1 | 3 | 2 |
| Max | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 4 | 4 | 4 | 3 | 3 | 4 | 4 | 4 | 4 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Difference | 1 | 1 | 4 | 2 | 4 | 1 | 2 | 4 | 3 | 3 | 4 | 3 | 3 | 3 | 2 | 2 | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 4 | 2 | 3 |

## Appendix B; Response experts BITA maturity

| | Communication | | | | | | Competency / value m. | | | | | | Governance | | | | | | | Partnership | | | | | Architecture | | | | | Skills | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 |
| Nictiz | 2 | 3 | 1 | 5 | 1.5 | 2 | 4 | 1 | 1 | 1 | 3 | 2 | 2 | 4 | 2 | 2 | 2 | 3 | 1 | 2 | 1 | 3 | 1 | 3 | 2 | 2 | 3 | 2 | 1 | | 2 | 4 | 1 | 3 | 2 | 2 | 4 | 3 |
| Atos | 5 | 2 | 1 | 5 | 1 | 3 | 2 | 4 | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 5 | 2 | 3 | 1 | 2 | 3 | 2 | 4 | 3 | 5 | 4 | 1 | 2 | 4 | | 3 | 2 | 1 | 2 | 2 | 2 | 4 | 4 |
| MKB ICT | 2 | 2 | 2 | 2 | 1 | 3 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 3 | 1 | | 1 | 1 | 3 | 2 | 1 | 1 | 2 | 1 |
| | 3 | 2.3 | 1.3 | 4 | 1.2 | 2.7 | 2.3 | 2 | 1 | 1 | 1.7 | 2 | 1.3 | 2.7 | 1.3 | 2.7 | 1.7 | 2.3 | 1 | 1.7 | 1.7 | 2 | 2 | 2.3 | 2.7 | 2.7 | 1.7 | 2.3 | 2 | ### | 2 | 2.3 | 1.7 | 2.3 | 1.7 | 1.7 | 3.3 | 2.7 |
| Average | | | | | | 2.4 | | | | | | | 1.6 | | | | | | | 1.9 | | | | | 2.1 | | | | | | 2.1 | | | | | | 2.2 |
| Min | 2 | 2 | 1 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 0 | 1 | 1 | 1 | 2 | 1 | 1 | 2 | 1 |
| Max | 5 | 3 | 2 | 5 | 1.5 | 3 | 4 | 4 | 1 | 1 | 3 | 2 | 2 | 4 | 2 | 5 | 2 | 3 | 1 | 2 | 3 | 3 | 4 | 3 | 5 | 4 | 3 | 3 | 4 | 0 | 3 | 4 | 3 | 3 | 2 | 2 | 4 | 4 |
| Difference | 3 | 1 | 1 | 3 | 0.5 | 1 | 3 | 3 | 0 | 0 | 2 | 0 | 1 | 2 | 1 | 4 | 1 | 2 | 0 | 1 | 2 | 2 | 3 | 2 | 4 | 2 | 2 | 1 | 3 | 0 | 2 | 3 | 2 | 1 | 1 | 1 | 2 | 3 |



## Appendix C; Cronbach's alpha

| | | A1: People | A2: Knowledge | A3: Processes | A4: Organisation | | B1: Communication | B2: Competency / value m. | B3: Governance | B4: Partnership | B5: Architecture | B6: Skills | B7: BITA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total | α | 0.86 | 0.60 | 0.89 | 0.66 | | 0.83 | 0.79 | 0.74 | 0.75 | 0.78 | 0.62 | 0.91 |
| 1 FTE | α | 0.81 | 0.29 | 0.95 | 0.77 | | 0.80 | 0.79 | 0.73 | 0.78 | 0.82 | 0.66 | 0.92 |
| 2-9 FTE | α | 0.89 | 0.69 | 0.86 | 0.62 | | 0.84 | 0.78 | 0.76 | 0.78 | 0.77 | 0.58 | 0.91 |
| 10-49 FTE | α | 0.54 | -0.28 | 0.54 | 0.79 | | 0.83 | 0.89 | 0.39 | 0.09 | 0.78 | 0.75 | 0.84 |

## Appendix D; correlations between IT capabilities and BITA maturity

| *Total* | *A1: People* | *A2: Knowledge* | *A3: Processes* | *A4: Organisation* | *A1a: IT perception* | *A1b: IT assessment* | *A1c: IT communication* | *A1d: IT confidence* | *A2a: IT awareness* | *A2b: IT insightfulness* | *A2c: IT information* | *A3a: IT monitor (non) func* | *A3b: IT administrate* | *A3c: IT plan* | *A3d: IT do* | *A3e: IT check* | *A4a: Social network* | *A4b: Common objectives* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| B1: Communication | 0,28 | 0,42 | 0,50 | 0,53 | 0,17 | 0,27 | 0,28 | 0,22 | 0,17 | 0,36 | 0,39 | 0,41 | 0,36 | 0,42 | 0,36 | 0,54 | 0,35 | 0,57 |
| B2: Competency / value m. | 0,22 | 0,46 | 0,57 | 0,38 | 0,12 | 0,21 | 0,27 | 0,15 | 0,20 | 0,31 | 0,48 | 0,46 | 0,48 | 0,46 | 0,51 | 0,45 | 0,19 | 0,47 |
| B3: Governance | 0,19 | 0,40 | 0,50 | 0,42 | 0,11 | 0,17 | 0,22 | 0,15 | 0,19 | 0,33 | 0,35 | 0,43 | 0,37 | 0,45 | 0,37 | 0,48 | 0,29 | 0,45 |
| B4: Partnership | 0,36 | 0,36 | 0,39 | 0,53 | 0,34 | 0,30 | 0,31 | 0,27 | 0,30 | 0,37 | 0,15 | 0,31 | 0,23 | 0,40 | 0,28 | 0,43 | 0,48 | 0,43 |
| B5: Architecture | 0,20 | 0,36 | 0,45 | 0,37 | 0,13 | 0,14 | 0,27 | 0,16 | 0,24 | 0,26 | 0,30 | 0,39 | 0,34 | 0,35 | 0,38 | 0,40 | 0,21 | 0,45 |
| B6: Skills | 0,29 | 0,35 | 0,35 | 0,39 | 0,24 | 0,28 | 0,29 | 0,18 | 0,20 | 0,35 | 0,24 | 0,27 | 0,22 | 0,33 | 0,24 | 0,42 | 0,26 | 0,41 |
| B7: BITA | 0,34 | 0,51 | 0,61 | 0,57 | 0,24 | 0,30 | 0,36 | 0,25 | 0,28 | 0,43 | 0,42 | 0,50 | 0,44 | 0,52 | 0,47 | 0,60 | 0,39 | 0,61 |

| *2 - 9 FTE* | *A1: People* | *A2: Knowledge* | *A3: Processes* | *A4: Organisation* | *A1a* | *A1b* | *A1c* | *A1d* | *A2a* | *A2b* | *A2c* | *A3a* | *A3b* | *A3c* | *A3d* | *A3e* | *A4a* | *A4b* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| B1: Communication | 0.37 | 0.42 | 0.47 | 0.53 | 0.25 | 0.34 | 0.34 | 0.35 | 0.19 | 0.45 | 0.34 | 0.36 | 0.32 | 0.36 | 0.37 | 0.52 | 0.33 | 0.57 |
| B2: Competency / value m. | 0.23 | 0.40 | 0.54 | 0.34 | 0.18 | 0.19 | 0.28 | 0.16 | 0.20 | 0.33 | 0.39 | 0.40 | 0.42 | 0.41 | 0.54 | 0.38 | 0.16 | 0.43 |
| B3: Governance | 0.18 | 0.31 | 0.46 | 0.36 | 0.13 | 0.15 | 0.20 | 0.13 | 0.17 | 0.30 | 0.27 | 0.37 | 0.32 | 0.39 | 0.35 | 0.42 | 0.25 | 0.37 |
| B4: Partnership | 0.38 | 0.33 | 0.46 | 0.54 | 0.31 | 0.36 | 0.36 | 0.29 | 0.27 | 0.37 | 0.17 | 0.36 | 0.24 | 0.40 | 0.36 | 0.51 | 0.45 | 0.46 |
| B5: Architecture | 0.16 | 0.28 | 0.46 | 0.31 | 0.10 | 0.11 | 0.24 | 0.10 | 0.23 | 0.24 | 0.20 | 0.37 | 0.35 | 0.31 | 0.45 | 0.36 | 0.13 | 0.41 |
| B6: Skills | 0.29 | 0.32 | 0.37 | 0.38 | 0.29 | 0.28 | 0.30 | 0.14 | 0.25 | 0.29 | 0.23 | 0.29 | 0.25 | 0.32 | 0.25 | 0.41 | 0.29 | 0.35 |
| B7: BITA | 0.35 | 0.45 | 0.60 | 0.54 | 0.27 | 0.31 | 0.38 | 0.25 | 0.29 | 0.43 | 0.34 | 0.47 | 0.41 | 0.48 | 0.51 | 0.57 | 0.35 | 0.57 |

| Value of coefficient | Strength of relationship | Colour |
|---|---|---|
| ± 0,81 tot ± 1,00 | Very strong | |
| ± 0,61 tot ± 0,80 | Strong | |
| ± 0,41 tot ± 0,60 | Moderate | |
| ± 0,21 tot ± 0,40 | Weak | |
| ± 0,00 tot ± 0,20 | No relationship | |