Business and IT Alignment in
Dutch Vocational Education and Training Organizations

A.J.Gilbert Silvius
Benny de Waal
Utrecht University of Applied Sciences
gilbert.silvius@hu.nl

ABSTRACT

The alignment of information technology (IT) and business processes and strategy is still a relevant area of concern in many organizations. Educational institutions are no exception to this, with low alignment maturity being reported (Luftman and Kampaiah, 2007). This paper reports a study into the business and IT alignment maturity of the Dutch Vocational Education and Training sector. A survey study was undertaken to assess the alignment maturity levels in these organizations, as a baseline for further development. In the study, the following questions were put forward: *Is alignment in the educational sector really as low and problematic as can be concluded from earlier studies?*, *If alignment in the education sector is low, is it because of lack of ambition or because of lack of ability?* and *Do different education organizations have different levels of alignment?*
The study showed that the Dutch Vocational Education and Training sector scored almost a full maturity level higher than the maturity score reported by Luftman and Kempaiah (2007). However, when benchmarked with other industries, the score is still low. Based on the relatively high level of the desired alignment scores, we could conclude that this low level is not because of lack of ambition.
The study also showed that the top-scoring institutes had a different distribution of their alignment than the low-scoring institutes. This result provides a development path for institutes that want to grow their alignment level.

Keywords
Business and IT Alignment, Education sector, Maturity

INTRODUCTION

Information technology (IT) has changed the way organizations manage their business processes, produce their products, deliver their services and communicate with (potential) customers (Brynjolfsson and Hitt, 2000). A key success factor in organizations is therefore an effective and efficient alignment of the way IT supports business strategies and processes. The necessity and desirability of aligning business needs and IT capabilities has been examined in numerous articles (Pyburn, 1983; Reich and Benbasat, 1996; Chan et al., 1997; Luftman and Brier, 1999; Maes et al., 2000; Sabherwal and Chan, 2001) and its

importance is well recognized (Cumps et al. 2006). The alignment of business and IT, however, continues to show up as a top concern for business and IT managers (Society of Information Management, 2003, 2004, 2005, 2006, 2007, 2008, 2009). Some authors expect that "alignment is even more problematic in the idiosyncratic context of (higher) education' (Albrecht et al., 2004). This expectation finds support in Luftman and Kempaiah's study in 197 organizations (Luftman and Kempaiah, 2007), which ranks education as the lowest scoring industry sector on alignment maturity. Given the opportunity that IT offers in teaching and learning (Gilbert, 1994; Geoghegan, 1994), this position should be worrying.

This paper reports a study into business and IT alignment maturity in Dutch secondary vocational education and training organizations. As the role of IT in these organizations is expanding into the instructional applications, the need for cooperation between education and IT department is of growing importance. As part of the professionalization of the information function in these institutions, this study was conducted into the maturity of alignment between the educational organization and the IT department. In order to be able to outline a development path for a growth in maturity, the study both assessed the current, 'as-is', level of alignment, as the desired, 'to-be' level.

The rest of this paper is structured as follows. After a brief introduction into the concept of business and IT alignment and the maturity assessment model, the related literature on alignment in educational institutions will be reviewed. Next, the context of the study will be set, by introducing the vocational and education training sector in the Netherlands and the results of the study will be presented. The paper will conclude by formulating some conclusions and suggestions for follow-up.

BUSINESS AND IT ALIGNMENT

Business and IT Alignment (BIA) can be defined as "Business & IT Alignment is the degree to which the IT applications, infrastructure and organization, the business strategy and processes enables and shapes, as well as the process to realize this." (Silvius, 2007). An influential conceptualization of BIA is that of Henderson and Venkatraman (1993). Their widespread framework of alignment, known as the Strategic Alignment Model (Figure 1), describes BIA along two dimensions. The dimension of strategic fit differentiates between external focus, directed towards the business environment, and internal focus, directed towards administrative structures. The other dimension of functional integration separates business and IT. Altogether, the model defines four domains that have been harmonized in order to achieve alignment. Each of these domains has its constituent components: scope, competencies,
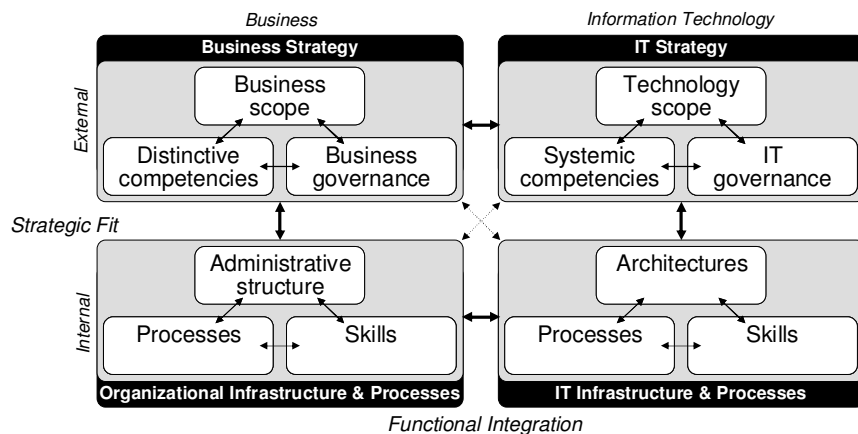

Figure 1. The 'Strategic Alignment Model' (Henderson and Venkatraman, 1993).

governance, infrastructure, processes and skills.

Despite of the apparent importance of aligning IT and business, the majority of publications is rather vague in terms of how to practice alignment (Maes et al. 2000). A frequently used framework[1] for measuring or developing alignment is Luftman's alignment maturity model (Luftman, 2000). In this model six criteria are used to determine the maturity of the alignment of IT and business. These six criteria are described in table 1

BIA maturity variable	Description
Communication	How well does the technical and business staff understand each other? Do they connect easily and frequently? Does the company communicate effectively with consultants, vendors and partners? Does it disseminate organizational learning internally?
Value measurement	How well does the company measure its own performance and the value of its projects? After projects are completed, do they evaluate what went right and what went wrong? Do they improve the internal processes so that the next project will be better?
Governance	Do the projects that are undertaken flow from an understanding of the business strategy? Do they support that strategy? Does the organization have transparency and accountability for outcomes of IT projects.
Partnership	To what extent have business and IT departments forged true partnerships based on mutual trust and sharing risks and rewards?
Scope and Architecture	To what extent has technology evolved to become more than just business support? How has it helped the business to grow, compete and profit?
Skills	Does the staff have the skills needed to be effective? How well does the technical staff understand business drivers and speak the language of the business? How well does the business staff understand relevant technology concepts?

Table 1. Alignment maturity variables (Derived from Luftman, 2000).

In the concept of BIA maturity, the level of maturity indicates an organization's capability to align IT to business needs. As in many maturity models, Luftman's BIA maturity assessments involves five levels of maturity:
1.   Initial / Ad Hoc Process
2.   Committed Process
3.   Established Focused Process
4.   Improved / Managed Process
5.   Optimized Process

In this study we adopted Luftman's model as a framework for analyzing the alignment maturity of the education and training organizations.

ALIGNMENT IN EDUCATION ORGANIZATIONS

The role of IT in educational organizations has been subject to high, and perhaps, inflated expectations. IT was expected to revolutionize teaching and learning through new instructional technologies (Gilbert,

---

[1] Application of Luftman's maturity model has been reported by Ekstedt, et al, 2005; Cumps, et al., 2006; Silvius, 2007; Luftman and Kempaiah, 2007; De Haes and Van Grembergen, 2008; Silvius et al., 2010.

1994; Geoghegan, 1994). It was expected that the individual needs and abilities of the students would regulate the pace of the learning (Spotts, 1999), with faculty members as mentors rather than lecturers. Students would learn by exploration and discovery, and access to education would be unlimited (Geoghegan, 1994). However, contrary to predictions and isolated examples of individual success with instructional technology in the classroom, technology is not being regularly integrated into instruction (Geoghegan, 1994; OTA, 1995; Albrecht et al., 2004). And while IT is one of the fastest growing budgets in (higher) education, "institutional leaders sometimes view IT and its practitioners skeptically as purveyors and promoters of [..] gadgets and capabilities that fail to recognize the organization's fundamental purpose and character" (Albrecht et al., 2004). For this reason, the sector's low score on Luftman's alignment maturity study, as shown in table 2, is no surprise.

Industry	# of Companies	BIA maturity score						
		Communi-cation	Value measurement	Gover-nance	Partner-ship	Scope and Architecture	Skills	Overall maturity
Retail	7	3.65	3.57	3.52	3.9	3.81	3.51	3.7
Transportation	3	3.1	3.8	3.57	3.53	3.63	3.6	3.54
Hotel/Entertainment	6	3.46	3.46	3.53	3.44	3.62	3.45	3.49
Services	27	3.18	3.21	3.28	3.32	3.28	3.22	3.2
Insurance	6	3.16	3.15	3.3	3.17	3.24	2.9	3.15
Manufacturing	46	3.22	3.1	3.15	3.3	3.17	2.9	3.15
Health	5	3.06	2.79	3.34	3.06	3.24	3.17	3.11
Chemical	7	2.78	2.84	2.93	2.87	3.28	2.84	2.93
Financial	57	2.83	2.92	2.98	2.86	3.03	2.7	2.9
Government	6	2.94	2.7	3.07	3.07	2.99	2.67	2.9
Oil/Gas/Mining	3	2.96	2.86	2.92	2.84	3.22	2.64	2.9
Utilities	7	2.96	2.94	2.81	2.84	3.13	2.6	2.88
Pharmaceutical	14	2.74	2.58	2.71	2.64	2.85	2.71	2.7
Educational	3	1.86	1.74	1.66	1.41	1.78	1.83	1.71

Table 2. Alignment scores per industry sector (Luftman and Kempaiah, 2007)

In a study by ECAR, the EDUCAUSE Center for Applied Research, on IT alignment in higher education, however, "an overwhelming majority of the survey respondents, perceive that IT is well aligned with institutional priorities" (Albrecht et al., 2004), despite their opinion that IT planning and governance are not effective. The same report suggests that the respondents may be "kidding themselves" and that "things are not as well aligned as they think".

The ECAR study also reported differences in alignment levels in education institutions. Their main findings can be summarized as follows (Albrecht et al.,2004). Institutions with relatively high alignment have:
- A clearly articulated vision and/or priorities;
- Consider planning important and closely linked to the institutional budget;
- Have published an institutional IT plan and plan continuously;
- Report stable or dynamic environmental climates (as opposed to turbulent or volatile climates);
- Perceive the IT governance process to be effective;
- Perceive the IT strategic planning process to be effective;

- Have greater communication with and involvement of key stakeholders, including faculty members and lecturers;
- Had clearly documented objectives at the time IT initiatives were approved.

Base on these findings, our study aimed to shed some light on the following question:

- Is alignment in the educational sector really as low and problematic as can be concluded from Luftman and Kempaiah's study?
- If alignment in the education sector is low, is it because of lack of ambition or because of lack of ability?
- Do different education organizations have different levels of alignment?

DUTCH VOCATIONAL EDUCATION AND TRAINING ORGANIZATIONS

Secondary Vocational Education and Training (VET) institutions (in Dutch: MBO, Middelbaar Beroeps Onderwijs), are the main supplier of skilled workers to the labor market and are often regarded as the 'foundation of the economy' and the 'backbone of society'. Approximately 40% of the Dutch working population have completed a vocational course to at least a secondary level. The Dutch association of VET colleges, the 'MBO Raad', represents all government funded colleges for secondary vocational education and training and adult education in the Netherlands. On behalf of its members, the association promotes the collective interests of the sector, supports common activities of the colleges and acts as an employers' organization.

There are currently 630,000 students in the Dutch VET sector, 485,000 of them taking part in regular VET courses. The remainder follows adult education programs. The government invests about 2.6 billion euro's annually in this sector, which represents approximately 12% of the total budget for education. The VET sector consists in 70 VET colleges comprising regular VET colleges, agricultural VET colleges and specialized vocational colleges. All VET colleges have a strong local orientation. The VET colleges offer education and training in technology, economics, personal/social services, health care and adult education. The agricultural VET colleges offer pre-vocational secondary and VET in the agricultural and food technology sectors. Specialized vocational colleges offer programs for one branch of industry only, such as graphic arts and design, butchery, house painting, furniture making, the fishing industry and shipping and transport. Colleges can differ in the amount of students. Some have over 30.000 students, in different locations.

Within the colleges the role of IT is expanding. This has not only to do with information supply within the institutions or between the government, but also with the IT opportunities in education or possibilities of supervising students. In this realm the cooperation between education and IT department is an important issue.

THE STUDY

Research design

The study was designed as a survey study. The survey was the alignment maturity questionnaire, as published by Luftman (2000), translated into Dutch. Ten of the 70 VET colleges participated in the study, that took place in the months November 2009 until January 2010. The colleges varied in amount of students (2000 – 20.000), employees (300 – 2200 fte) and number of locations (1 – 50). Further, the colleges were situated geographic all over the Netherlands.

Within the participating colleges, the sampling was stratified according three main focus groups: educational professionals, IT professionals, and intermediaries between the educational department and IT department.
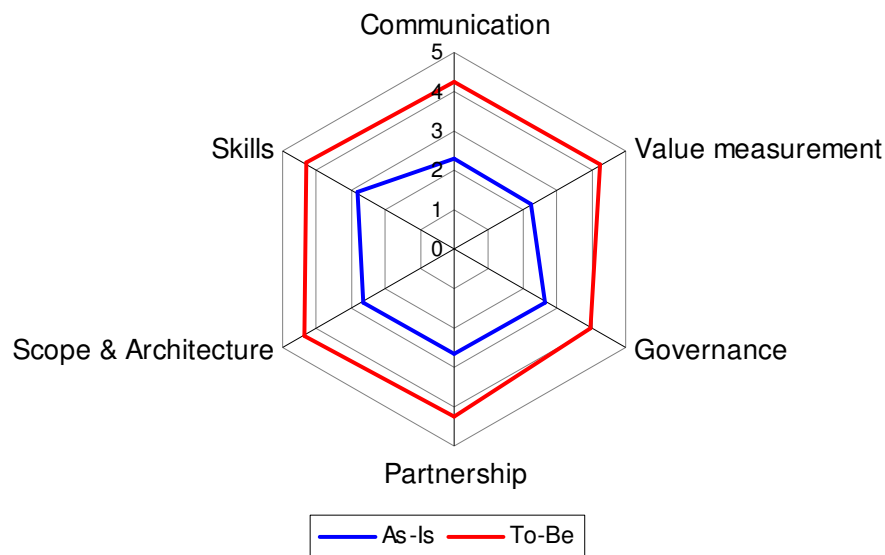
Respondents

The questionnaire was filled in during a team session in which first the purpose of the research was explained. After that the different people filled in the questionnaire. If a team session was not possible, the questionnaire was sent through internet. A total of 88 persons completed the questionnaire. The sample consisted of 52% educational professionals, 33% IT professionals, and 15% intermediaries. The average age of the respondents was 48 years (ranging from 20 to 63 years), and 77% were male and 23% female.

After completion of the questionnaire the maturity level on each variable was calculated. The results are presented in the next session.

Results overall

In figure 1 the overall results of the maturity on each variable is shown for the as-is and to-be situation. For the as-is situation the maturity levels lie between 2 and 3. The variable skills has the highest maturity level (2,87), the variable value measurement the lowest (2,23). In the to-be situation, all variables has a maturity level of 4 or more. This is a difference of almost 2 levels for each variable.

Figure 1: Maturity level As-Is and To-Be for all respondents (N=88).

Table 3 gives another representation of the overall maturity levels. The overall score is almost one maturity level (0.85) higher than the maturity Luftman and Kempaiah found in their study (Luftman and Kempaiah, 2007), but in the benchmark with other industry sectors, it is still the lowest maturity level.

	As-Is	*To-Be*
Overall Maturity	**2,56**	**4,26**
Communication	2,32	4,27
Value measurement	2,23	4,26
Governance	2,65	3,99
Partnership	2,63	4,26
Scope and Architecture	2, 65	4,41
Skills	2,87	4,34

Table 3: Maturity level As-Is and To-Be for all respondents (N=88).

The pattern of scores on the different maturity variables is also a little different than in Luftman and Kempaiah's study. In both studies, 'Skills' and 'Scope and Architecture are amongst the high scoring variables, and 'Value measurement' and 'Partnership' amongst the low scoring variables, but for 'Governance' and 'Communications' some different scores were found. 'Communications' scored the highest level of maturity in Luftman and Kempaiah's study, but scored as one of the lowest in our study. For 'Governance' it's the other way around, high in our study and relatively low in Luftman and Kempaiah's study.

From the high 'To-Be' scores, it can be concluded that the respondents surely have the ambition to improve alignment in their organization. The reason for the low 'As-Is' alignment scores should therefore result more from lack of ability than from lack of ambition. As one of the most important reasons for low alignment in the education sector, Albrecht et al. (2004) suggest a cultural misfit between 'IT culture' and 'Academic culture'. Table 4 illustrates this misfit.

IT Culture	*Academic Culture*
Emergent profession	Mature profession
Change agent	Values tradition and Skepticism
Institutional focus	Disciplinary focus
Focus on production	Focus on innovation
Quest for consensus and alignment	Quest for truth
Organizational anonymity	Reputation driven
Activities/services rendered transparent	Labyrinth in processes and practices
Speed is valued objective	Speed may be antithetical to quality
Short life cycle for products, services, outcomes and technology	Work products designed to endure for years, decades, or even centuries
Use a highly idiosyncratic and technical language to communicate intentions	Uses a different highly idiosyncratic and technical language to communicate expectations

Table 4. The cultural misfit between IT culture and academic culture (Albrecht et al., 2004).

Results by focus group

Table 5 shows the results of the maturity on each variable by focus group for the as-is and to-be situation. In the as-is situation differences between the focus groups occur on the variables communication, value measurement, and governance. In all cases the educational professionals indicated a lower maturity level, the intermediaries in most cases the highest level. On the variable communication, the educational professionals indicated on the aspect 'understanding of the business by IT' a lower maturity level (2,62), than the intermediaries (3,62) and IT professionals (3,38). Further differences were found on 'effectiveness of cooperation' and 'degree of standards'. The main differences on the variable value measurement were found on the aspect 'underlying link between Business and IT' and 'service level agreements'. Here, the intermediaries gave a higher score than the educational and IT professionals. By the variable governance, the main differences were on the aspects 'structure and reporting' and 'IT investment'. All focus groups gave for these aspects different maturity levels.

In the to-be situation no great differences were found between the educational professionals, intermediaries en IT professionals.

	As-Is			To-Be		
	Education	*Intermediair*	*IT*	*Education*	*Intermediair*	*IT*
Overall Maturity	**2,48**	**2,69**	**2,62**	**4,22**	**4,28**	**4,29**
Communication	2,18	2,54	2,44	4,23	4,25	4,35
Value Measurement	2,17	2,50	2,21	4,25	4,33	4,23
Governance	2,54	2,69	2,78	4,03	4,05	3,92
Partnership	2,54	2,73	2,73	4,14	4,26	4,38
Scope and Architecture	2,62	2,68	2,66	4,37	4,39	4,48
Skills	2,81	2,97	2,91	4,31	4,40	4,35

Table 5: Maturity level As-Is and To-Be by focus group (N=88).

Results by VET college

Figure 2 shows the overall maturity level for each participating VET college. The highest level is 2,97, the lowest is 1,90. This is an difference of more maturity level.
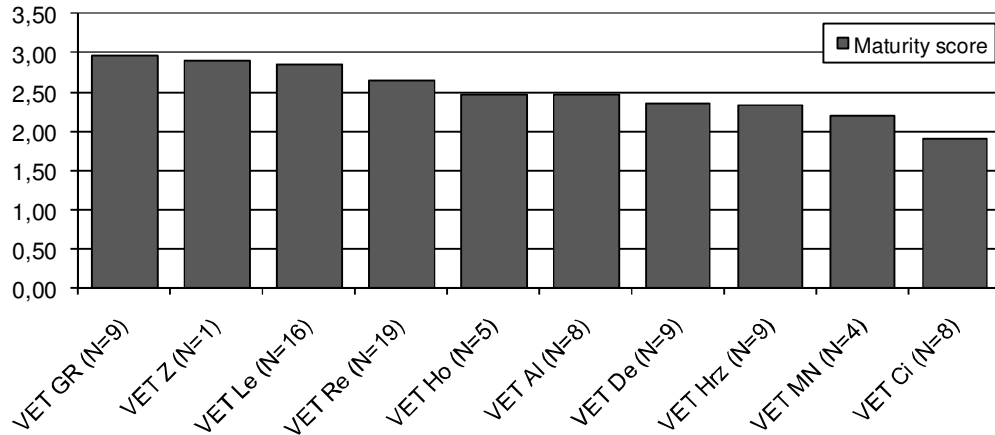
Figure 2: Overall maturity level by VET colleges.

The maturity levels for each variable by VET college are presented in table 6. From this, it is shown that the differences between the colleges are consistent by all variables. That is, when a college had a high overall maturity level, than the maturity level of the variables was also high, and vice versa.

\ School Maturity scores \	VET GR (N=9)	VET Z (N=1)	VET Le (N=16)	VET Re (N=19)	VET Ho (N=5)	VET Al (N=8)	VET De (N=9)	VET Hrz (N=9)	VET MN (N=4)	VET Ci (N=8)
Communication	2,6	2,7	2,6	2,3	2,5	2,3	2,0	2,4	1,5	1,9
Value measurement	2,5	2,2	2,5	2,2	1,9	2,1	2,2	2,5	1,9	1,8
Governance	3,2	3,1	3,1	2,5	2,7	2,4	2,7	2,1	2,4	2,3
Partnership	3,3	3,2	3,0	2,6	2,6	2,7	2,5	2,2	2,5	1,8
Scope & Architecture	3,0	2,3	2,9	3,1	2,4	2,4	2,0	2,6	2,3	2,0
Skills	3,3	3,9	2,9	3,2	2,7	2,8	2,7	2,4	2,5	1,7
Overall maturity score	**2,97**	**2,90**	**2,85**	**2,66**	**2,47**	**2,46**	**2,36**	**2,34**	**2,20**	**1,90**

Table 6: Maturity level on each variable by VET college.

However, there is some difference between the top-scoring VETs and the bottom group. In the maturity assessment of the top-scoring VETs, the variables Skills, Partnership and Governance consistently score the highest maturity levels. Also the lowest scoring variable is consistent: Value measurement. For the lowest scoring VETs, the highest scoring variables are more diffused.

CONCLUSIONS

Our study concerns the assessment of BIA maturity in the Vocational Education and Training sector in the Netherlands. With this study we aimed to shed some light on the low alignment scores reported in the education sector and to provide practical advice for the participating organizations on how to develop their alignment.
Based on our study of the related literature, we formulated the following questions:
- Is alignment in the educational sector really as low and problematic as can be concluded from earlier studies?
- If alignment in the education sector is low, is it because of lack of ambition or because of lack of ability?
- Do different education organizations have different levels of alignment?

Regarding the level of alignment maturity, we found that the Dutch VETs scored almost one maturity level (0.85) higher than the maturity score found by Luftman and Kempaiah (2007). However, in the benchmark with other industry sectors, this is still the lowest maturity level.

Regarding the reason for the low alignment score we can conclude that this is not because of lack of ambition. The desired 'To-Be' alignment scores in our study scored almost two maturity levels higher than the 'As-Is' scores.

Regarding different levels of alignment between colleges, we found that indeed, that the level of alignment differed almost one full maturity level in our sample of 10 organizations. The top-scoring VETs consistently scored the variables Skills, Partnership and Governance highest and the variable Value measurement lowest. This may be an indication of the development path with which educational institutions may grow their alignment level.

CONTRIBUTION

On first sight the results of the study may not be surprising. The educational sector is not known to be advanced in the use of IT or the alignment between organizational requirements and IT capabilities and this is once more confirmed. The most interesting result, however, is not the overall BIA maturity level, but the difference between high scoring organizations and low-scoring organizations. In his work on alignment, Luftman (in Luftman and Kampaiah, 2007) suggests that all six variables of his maturity model should be developed in balance with each other. There is no 'silver bullet' and all variables matter. However, the different studies on BIA maturity never analyzed different patterns of scoring on the level of the organization. In our study we found that the top-scoring organizations consistently scored the variables Skills, Partnership and Governance highest and the variable Value measurement lowest. This result could indicate that the six variables of the maturity model are not 'equal' in the development of alignment. They may all be important in the sense that none can be neglected, but some may be more important in the development of alignment than others. For example if Partnership in an organization is on a high level, indicating that there is good 'faith' in the contribution of IT, why would then also a high level of Value measurement be required? If the vision of IT's contribution to business is there, why does it need to be measured?

It will be interesting to analyze more of the available data on BIA maturity on the level of organizations and scoring patterns. In our further studies we will follow this path of reasoning.

REFERENCES

Albrecht, B., Bender, B., Katz, R.N., Pirani, J.A., Salaway, G., Sitko, T.D. and Voloudakis, J. (2004), 'Information Technology Alignment in Higher Education', ECAR, Educause Center for Applied Research, Vol. 3.

Brynjolfsson, E. and Hitt, L.M. (2000), 'Beyond Computation: Information Technology, Organizational Transformation and Business Performance', Journal of Economic Perspectives, Vol. 14, No. 4, pp. 23-48.

Chan, Y.E., Huff, S.L., Barclay, D.W. and Copeland, D.G. (1997), 'Business Strategy Orientation, Information Systems Orientation and Strategic Alignment,' Information Systems Research, Vol. 8, No. 2, pp. 125-150.

Cumps, B., Viaene, S., Dedene, G, and Vandenbulcke, J. (2006), 'An Empirical Study on Business/ICT Alignment in European Organisations', 39th Hawaii International International Conference on Systems Science (HICSS-39 2006), CD-ROM / Abstracts Proceedings,Waikoloa, Big Island, HI, USA,

De Haes, S. & Van Grembergen, W. (2008), 'Analysing the Relationship Between IT Governance and Business/IT Alignment', 41st Hawaii International Conference on Systems Science (HICSS-41), Waikoloa, Big Island, HI, USA.

Ekstedt, M., Jonsson, N,. Plazaola, L., Molina, E.S. and Vargas, N. (2005). 'An Organization-Wide Approach for Assessing Strategic Business and IT Alignment', PICMET conference.

Geoghegan, W. (1994), 'Stuck at the barricades: Can information technology really enter the mainstream of teaching and learning.', AAHE Bulletin, 47 (1), 13-16.

Gilbert, S. W. (1994), 'If it takes 40 or 50 years, can we still call it a revolution?', Educational Record, 75 (3), 19-28.

Henderson, J.C. & Venkatraman, N. (1993), 'Strategic alignment: Leveraging information technology for transforming organizations', IBM Systems Journal, Vol. 32, no. 1.

Luftman, J.N. and Brier, T. (1999), 'Achieving and Sustaining Business-IT Alignment.', California Management Review, Vol. 42, No. 1.

Luftman, J.N. (2000), 'Assessing Business-IT Alignment Maturity', Communications of the Association for Information Systems, Vol 4, Article 14.

Luftman, J.N. and Kempaiah, R. (2007), 'An Update on Business-IT Alignment: "A Line" Has Been Drawn.', MIS Quarterly, Vol. 6 No. 3, pp. 165.

Maes, R., Rijsenbrij, D., Truijens, O. and Goedvolk, H. (2000), 'Redefining Business-IT Alignment through a unified framework', white paper, http://imwww.fee.uva.nl/~maestro/PDF/2000-19.pdf.

Pyburn, P.J. (1983), 'Linking the MIS Plan with Corporate Strategy: An Exploratory Study' MIS Quarterly, Vol. 7, No. 2, pp. 1-14.

Reich, B.H. and Benbasat, I. (1996), 'Measuring the Linkage between Business and Information Technology Objectives.', MIS Quarterly, Vol. 20, No. 1, pp. 55-81.

Sabherwal, R. and Chan, Y. E. (2001), 'Alignment Between Business and IS Strategies: A Study of Prospectors, Analyzers, and Defenders.', Information Systems Research, 12(1), pp. 11-33.

Silvius, A.J.G. (2007), 'Exploring Differences in the Perception of Business & IT Alignment', in Communications of the IIMA (CIIMA), ISSN: 1543-5970, Volume 7 Issue 2, International Information Management Association Inc., San Bernadino CA, October 2007.

Silvius, A.J.G., De Haes, S. and Van Grembergen, W. (2010) 'Explorative study on the influence of national cultures on Business/IT alignment maturity', accepted for publication in the International Journal on IT/Business Alignment and Governance (IJITBAG), IGI global publishing, Hershey PA.

Society of Information Management (2003, 2004, 2005, 2006, 2007, 2008, 2009), 'Execs provide insight into top management concerns, technology developments in new SIM survey', (http://www.simnet.org/Content/NavigationMenu/About/Press_Releases/PressReleases.htm).

Spotts, T.H. (1999), 'Discriminating factors in faculty use of instructional technology in higher education', Educational Technology & Society, Vol. 2, No. 4.

U.S. Congress, Office of Technology Assessment (1995), 'Technology & Teaching: Making the connection', OTA-EHR-616. Washington D.C.: U.S. Government Printing Office.

About the Authors

A.J.Gilbert Silvius is Professor of Business, ICT and Innovation at Utrecht University of Applied Sciences. Gilbert has over 20 years experience as a consultant in the area of business and IT. He joined Utrecht University in 2003 and has since published on IT business value, Business IT Alignment and Project Management.

Benny M.E. de Waal is lecturer and researcher at the Research Centre for Innovation and Business of Utrecht University of Applied Science. He obtained his bacholor of applied sciences at the University of Applied Science Breda and his masters of art at Tilburg University. Formely, he was employed as a researcher at Eindhoven University, the Netherlands.