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Strategic alliances in education: the Knowledge Engineering Web

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The field of higher education shows a jumble of alliances between fellow institutes. The alliances are strategic in kind and serve an economy-of-scales concept. A large scale is a prerequisite for allocating the budgets for new educational methods and technologies in order to keep the educational services up-to-date. All too often, however, strategic alliances remain no more than dead letters, fêted by boards of management, but lacking innovative power. The current paper reviews the K-Web case, one of few successful strategic alliances in education in the Netherlands. The K-Web alliance started in 1997 and aimed at a joint development of digitized learning materials in the domain of knowledge engineering. At its start five universities in the Netherlands were involved; in 2002 more universities joined the alliance. Based on the K-Web case, this paper identifies and explains the critical factors for successful co-operation and proposes a number of guidelines for making strategic alliances work. The guidelines involve issues on governance, project management, the partners' autonomies, conflicting pedagogies and conflicting technologies. The K-Web strategy seems to indicate a passable route, which may be helpful for other alliances.

Introduction

In the past years, institutes for scientific education and vocational training have increasingly been searching for strategic alliances to reinforce their position in the educational market. In the Netherlands, which has 14 universities and some 60 schools of higher vocational training, a jumble of co-operations, consortia and alliances can be observed (Digital University, E-merge, Apollo, SURF, among others). The tendency for close collaboration and mutual involvement is not only a direct consequence of Dutch culture, which indeed values highly harmony and

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mutual agreement, but the inclination to that behaviour is enforced by economic circumstances too. Clearly, all collaborations between universities are strategic in nature and serve an economy-of-scale concept. A large scale is nowadays a prerequisite for allocating budgets needed to keep educational services up to date (Bates, 2000). Today, the need for educational changes and innovations is greatly amplified by the ascent of the information and communication technologies (ICTs) and their applications. For instance, many Web-based learning management systems are being introduced right now in order to improve the flexibility, service level and cost efficiency of education. The introduction of such educational technologies deeply intervenes in the institute's organizational structure, its internal workflow as well as its technical infrastructure. High investments are needed for many years, even though the outcomes may be insecure. Various authors (Bates, 1995; Westera *et al.*, 2000, among them) pointed out that new technologies in education would lead to increased unit cost, even when no substantial improvements are made. The need for an economy of scale that justifies the high investments for ICT-based innovations urges universities to enter into strategic alliances with fellow institutes. However, all too often strategic alliances appear to be nothing but 'hot air'. Boards of management may have raised their glasses to celebrate new agreements, while after some time fundamental differences in culture, interest and pedagogical approach make all 'beautiful' intentions fade away.

This paper reviews the establishment of one of the very few university alliances in the Netherlands that actually succeeded in building up a mutual win–win situation. As part of a wider consortium between universities, the CIHO (Consortium for Innovation of Higher Education in the Netherlands and Flanders), the project was evaluated to be one of the best two projects out of many dozens. The project was called K-Web, short for Knowledge Engineering Web. In Dutch the project was first called the BOK-project (1997–2000) and then the LOK-project (2000–2002) (BOK stands for Brede Onderwijsinnovatie Kennistechnologie; LOK stands for Landelijk Onderwijsweb Kennistechnologie). Its main point was the joint creation, sharing and delivery of learning materials in the domains of knowledge engineering and artificial intelligence.

The course of the article is as follows. We will first outline the context of the project and the actual results. To evaluate the K-Web case we will introduce a framework of four consecutive phases, each of which corresponds with a different state of the alliance's maturity. Then we will focus on the genesis of the alliance and the strategies chosen to arrive at such a successful co-operation. In conclusion, we will identify and discuss relevant issues of this approach that may well be transferable to other strategic co-operations.

The K-Web

By the end of the 1990s, five Faculties of Knowledge Engineering and Artificial Intelligence entered into a strategic alliance in order to withstand a number of shared problems. The participants were: the University of Groningen, Utrecht University, CIBIT representing the Utrecht Polytechnic of Professional Education, Universiteit Maastricht and the Open University of the Netherlands; at a later stage the Universiteit van Amsterdam and the Vrije Universiteit Amsterdam joined the alliance. All Faculties were facing severe matters, such as limited staff, shrinking budgets and small numbers of students. While each Faculty fully arranged its own curriculum, quite some overlapping parts in the courses offered could be observed. Moreover, all Faculties

experienced difficulties in keeping up with the rapid developments in the domains of knowledge engineering and artificial intelligence. The speed of the development meant that these domains appeared as highly dynamic and unstable; for instance, new specialisms emerged (and disappeared) at high rates. As a consequence, the curricula showed weak spots or sometimes even ignored new fields. Furthermore, students and staff noticed an unpleasant contrast between the fast-changing topics of research and development performed at the universities, and the way in which the teaching was arranged and offered. It was felt that exactly in this particular domain, which carries the latest topics on knowledge construction, knowledge handling, reasoning, knowledge organization and knowledge technologies, the applied educational methods and technologies should be up to date as well (van Ditmarsch *et al.*, 1998). For a proper approach to all these problems, the partners set out to develop a shared database of learning resources, covering a wide range of topical subjects. Each of the partners had to contribute from its own field of expertise, meanwhile making the learning materials available for the other partners according to their needs. Obviously, the implementation of such an idea would help solve the problems described above. As a result of a six-year route, the partners succeeded in achieving this idea in full.

The K-Web comprises a Web-based learning environment that offers students over 100 self-contained learning tasks in a multitude of sub-domains. Figure 1 lists the domains involved.

The learning tasks facilitate time-independent and place-independent learning. A generic format to describe the learning tasks has been specified. This format comprises a structured task description, learning objectives, required prior knowledge, an indication of study load, a variety of learning resources, including computer-supported simulations, demonstrations, programming tools, papers, references, feedback and hints. For each learning task, tutors have access to additional directions for incorporating the task within the curriculum, for avoiding bottlenecks and for assessing students' learning outcomes. By the end of 2003, 108 learning tasks, with an average study load of 15 hours, were available in the K-Web. The number of learning tasks is still growing. To enter new learning tasks, the K-Web includes an associated authoring environment, which allows authors to create, test, add or adapt their contributions online. So far, 65 faculty members from the various partners have been registered as authors. In many cases, these authors have been involved in more than one learning task, working in close co-operation with fellow authors from other institutes. Some 200 lecturers (including 65 authors) have been registered on the K-Web. The actual number of students who worked on one or more of the learning tasks was 650. Inspired by the domains concerned, the partners agreed to develop two

Introduction to knowledge engineering	Logic for AI
Knowledge-system development	Knowledge logic
Project management and methodologies of knowledge-system development	Non-monotonous reasoning
Knowledge management	Machine learning
Knowledge acquisition	Introduction to complex agent systems
Natural language interfaces	Multi-agent systems and cognitive robotics

Figure 1. Content domains covered by the K-Web

elementary intelligent agents to support authors, teachers and students with their actions. These agents were: (1) the *learning-tasks news monitor* which notifies tutors about the new tasks in certain domains, and (2) the *self-study monitor* which assists in the mutual communication between tutors and students about students' progress on their tasks.

In addition to the contents described above, the K-Web embodies a set of organizational arrangements that enable and support a dynamic community of students and professionals. For each of the partners the project has manifestly contributed to the improvement and innovation of their curricula, while at the same time achieving a better quality against reduced costs. Although tutors were allowed to tailor the learning tasks to their special needs, it turned out that most tutors preferred to use these well-designed tasks unchanged. By simply sending out students to carry out one or more relevant learning tasks, tutors achieved better quality against reduced efforts (Huisman, 2002). This is exactly what the K-Web aimed at. Yet, this success story may easily disguise a number of problems that had to be solved during the ride. Quite often, the co-operation had a tough time because of conflicting views, disagreements or lack of progress. In contrast with many other strategic alliances, however, the K-Web partners always succeeded in finding acceptable and effective modes for continuation of the alliance.

Development phases of the strategic alliance

Very little is known about how to create a successful alliance. Some alliances are initiated by leading and powerful parties in order to start auxiliary branches and find new target groups (University of Zeeland, initiated by Universiteit Utrecht; Polytechnic Groningen and Leeuwarden, initiated by Universiteit Twente) or to encourage international student mobilities and language training (often funded by the Erasmus programme or Socrates programme of the European Union). Other alliances focus on internal gains and improvements rather than on external extensions (Digital University, CIHO).

In practice, the intended close and productive co-operation between universities that brings mutual advantages and prosperity has to be developed energetically along a number of subsequent stages. Below we distinguish four stages, each of which corresponds with a different state of the alliance's maturity. Figure 2 shows the four phases of the K-Web project and the associated time scales.

The pre-alliance phase is characterized by informal communication without any obligations. Yet, common problems are recognized and a strategic alliance is started to solve the problems. The stabilization phase is the phase of habituation of the partners; gradually the co-operation

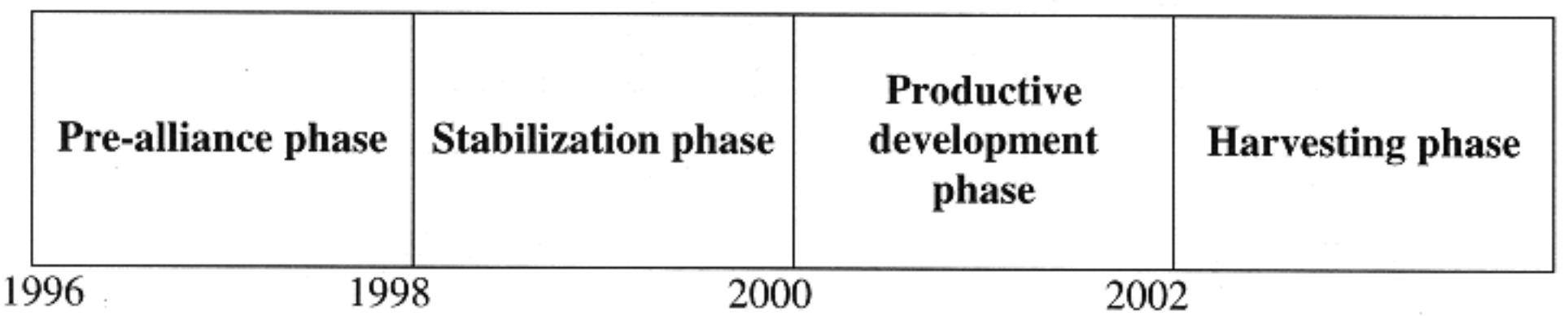

Figure 2. Phases of the K-Web alliance

produces results and thus establishes the alliance. Next comes the phase of productive development, which delivers collective solutions. Finally, the consortium enters the harvesting phase: the solutions are implemented and applied to solve the initial problems. It is argued that the harvesting phase, which is supposed to yield the envisioned outcomes of the alliance, can only be reached when fundamental 'hang-ups' in each of the preceding phases are successfully removed.

The pre-alliance phase

Although the Boards of Governors of the universities might have different opinions, a strategic alliance needs many favourable circumstances. Pre-existing relationships are mostly a good breeding ground for further co-operation. In the absence of a contemplated strategic alliance many bilateral and multilateral relationships exist at various levels. Scientific and managerial university staff meet at conferences, work together in national or international committees and discuss common problems. Such informal networks are extremely important for initiating joint activities and creating sustainable partnerships. At this stage, mutual curiosity, sympathy and signs of interest are the dominant characteristics. The relationships are without any obligations; they are polite and fraternal, but only as long as efforts do not take too much time.

The pre-alliance phase of the K-Web project showed exactly this pattern of informal communication between the professionals. Time and again the problems of innovation, the specialist domains and the overlapping areas were discussed, and occasionally even an exchange of materials took place. In 1995, the national assessment committee of computer science education in the Netherlands gave a large incentive to innovations in students' training. The committee was quite explicit on these points in their recommendations.

To intensify the relationships between scientists and teachers of the many universities it is necessary to extend informal talks to meetings with a formal basis by involving the right managerial levels. New opportunities to raise additional funding may well help achieve such a formal agreement. This is exactly what happened in the K-Web case when the Dutch authorities launched a new incentives policy for educational innovation. The associated funding is known as the Quality and Learnability Budget (in Dutch K&S funds). It has proved to be the decisive factor for establishing a formalized co-operation. Supported by the respective governing bodies, five universities decided to set up a project outline for the joint innovation in the domains of knowledge engineering and artificial intelligence. Various modes of co-operation and its consequences were discussed. Basically, the discussions focused on the question of what should be shared and what would not. Figure 3 lists the framework of eight main options under consideration.

The options range from a shared pedagogic model to exchanging teachers. The options are characterized by five criteria—namely pedagogy, content creation, content delivery, student support and examination.

The harrowing news is that, at this stage, none of these options was thought to be feasible by the partners, in the foreseeable years. For instance, a shared pedagogic model would be in conflict with the unique pedagogic preferences and identities of each partner. This holds even more for collective course development and collective course delivery, while many compromises would be necessary to please all partners. Collective examination leaves the courses

Options	Pedagogy	Content creation	Content delivery	Student support	Examination
Shared pedagogic model	Joint	Self	Self	Self	Self
Collective course development	Joint	Joint	Self	Self	Self
Collective course delivery	Joint	Joint	Joint	Self	Self
Collective examination	Self	Self/Joint	Self	Self	Joint
Merged education	Joint	Joint	Joint	Self	Joint
Using partners' courses	Partner	Partner	Self	Self	Self
Sending out students	Partner	Partner	Partner	Partner	Partner
Exchanging teachers	Partner	Partner	Partner	Partner	Partner

Figure 3. Framework of co-operation modes

intact, but is at odds with the authority of each university to set their own standards. A merging of the education implies the start of a national super-university, which in turn might question the rationale for the existence of each separate partner. The use of external course materials might be interesting for specialized domains, but would rarely fit smoothly into the internal curriculum. Outsourcing a whole course by sending out students to one of the partners touches on the 'ownership' of students, which is decisive for governmental subsidies. The exchange of teachers may help occasionally, although it drains away the expertise of fellow universities. In these discussions, it became clear that co-operation could only succeed when each partner's autonomy was to be respected. Owing to a common feeling that success was near and economic forces were promising, a way out was found. The eventual project outline was formulated in the objective of 'joint development of raw learning materials'. The basic idea was to build a central database that should be filled with interesting resources and made available to all partners. Of course, the raw materials needed to be refined and adapted by local teachers so as to make them suitable for different contexts. This way, each partner was able to preserve its own educational signature, albeit by concealing the origin of their courses for their students. Eventually, the K&S funds supported all partners, and the project could take off. For political reasons and to stress the importance of the project even further, the project was positioned as part of an already existing consortium of higher education (the CIHO).

The stabilization phase

The delight about the K&S grant quickly faded away when the project started and the well-chosen words had to be put into action. After a few sessions, major differences of opinion surfaced, which brought the just wetted alliance close to an existential crisis. The actual willingness for concessions appeared to be rather small. Because any proposition meant additional efforts for the participants and interference with usual business, the initial euphoria and commitment was replaced by reservedness, reticence and due suspicion. The communication

became transactional in that each partner tried to achieve maximum results against minimum concessions.

One of the first questions to be answered was what requirements the materials should meet in order to allow easy reuse by the partners. The search for a common format, which could serve diverse pedagogical contexts, turned out to be a blind alley, as did the specification of quality standards. Also, the deployment of people was a major problem: who would be available for additional efforts in some unstable co-operation with uncertain outcomes? The necessary time-consuming assemblies and travelling were hardly alluring. Occasionally, defensive hindrance by individuals occurred because of the perceived fallacy of the computer replacing the individual teacher. Furthermore, the differences between the programmes seemed to be underestimated: each partner was pursuing its own course profile, both in the matter of pedagogy and in the university view of teaching the subjects.

There were also problems in managing the project, because none of the partners would allocate the project manager the power of assigning tasks to their faculty. All of these problems may be labelled by the notion 'tactical in its kind': again, the persistent autonomy of each partner seemed to frustrate further co-operation. When all was said and done, the partners apparently showed a lack of faith in the merits of the project. This observation might be closely connected to the strategic paradox of co-operating with one's own competitors. Let us note that all universities operate in the same market of secondary-school leavers.

In addition, the technological implications of this project turned out to be a great worry. An extended debate concerned the technical infrastructure, i.e. its compatibility with various operating systems, preferred browser software, authoring tools, file formats, search facilities, security issues, etc. Soon the various camps were in disagreement with each other, not being able to find a way out. Yet, for all of these problems a solution was found.

Three important moves overcame the impasse. First, the parties involved understood that the authority of the project management should be supported. To this end a steering committee was formed whose members represented the partners and had the authority of assigning tasks to a local faculty. In support of the project manager, this steering committee adopted a dominant steering role. Second, the steering committee decided that the basis for co-operation should be the common expertise in knowledge engineering and artificial intelligence rather than technical-system development or pedagogical issues. The steering committee decided to focus on joint-content teams in a number of sub-domains. This worked out very well: experts in the same sub-domain got along with each other pretty well. The demands and needs of the partners were considered in advance by the steering committee and so it was decided what content types should be developed. Third, the steering committee was prepared to take decisions on complex questions and, even more importantly, they decided to lower the project's ambitions in order to serve its feasibility (Westera & van de Vrie, 1998). In particular, technical and pedagogical issues were reduced by choosing simple solutions that might work for the time being.

Through these measures the project appeared to recover: the enthusiasm returned, the content teams became productive and gradually a large amount of learning material became available. Technology was ascribed an auxiliary role. A simple but effective ftp-site was set up to access, upload and search the materials. Also, a pedagogical meta-design for the materials was kept fairly simple. Guidelines, examples and style sheets for authors were developed in order to support a standard format for the materials, be it that deviations from the standard format were

overlooked. The steering committee emphasized the development of content; technology and pedagogy took on second and third place, respectively. By the end of a three-year development period an impressive amount of material had been made available. The co-operation had stabilized and had successfully reached its targets, be it with lowered ambitions. So far, the success of the K-Web project was also expressed by an evaluation of some 40 CIHO projects, which all concerned the innovation of education through co-operations between universities. The K-Web project was assessed as one of the two best projects of the CIHO consortium (Verreck & de Volder, 2000).

So far so good, however, the partners strongly suffered the drawbacks of their reduced ambitions. In summary, the project ended up with a pile of raw materials that were valuable as such, but required radical revision to allow reuse in different contexts. For some, the outcome was encouraging, for others it was discouraging. The partners quite fairly understood that stopping the project at this stage might signify a severe failure, with very little of the materials actually being used by the partners in the future. At this point the alliance proved to have reached sufficient stability to avoid a renewed crisis. The alliance defined a supplemental project to extend and intensify the co-operation and to restore or even outstrip the initial ambitions: all agreed that an additional effort would be necessary to achieve a refinement of these materials in order to make these directly presentable to students. Actually, this decision comes close to the option of 'collective course development' in Figure 2, which had been rejected earlier. Mutual trust and optimism made the argument of institutional autonomy vanish into thin air. Clearly, the possibility of additional funding by a national innovation fund (SURF Education Fund, the Netherlands) helped considerably.

The phase of productive development

While in the previous phase, reservedness and suspicion marked the starting conditions, the next phase showed some quite positive feelings and attitudes: enthusiasm, progress, creativity, flexibility, belief and confidence. Obviously, a solid basis had been formed for the alliance to become really productive. To prolong the K-Web project, a new project outline was written and submitted to the SURF funds. The proposal meant a fundamental step forward in the way the partners would work together. Instead of producing raw materials that still needed to be adapted and refined by each partner, the alliance now aimed at the creation of self-contained learning objects, which were ready to be presented directly to students. Apparently, the clamour for the partners' autonomies and peculiarities, which initially obstructed the joint development of end products, had become irrelevant. The maturity of the alliance and the associated mutual confidence firmly re-established the initial motives for setting up an alliance at all: the limited staff, shrinking budgets, ill-covered specialist fields, small numbers of students, content overlapping, the need for innovation, all of these arguments were ponderous as never before. An important additional drive was in essence pedagogical in kind. All partners struggled with the transition from the objectivist tradition, which focuses on the object of our knowing and posits that learners receive bits of knowledge to be stored unvaryingly in their heads, to the constructivist paradigm. Rather than on the object of our knowing, constructivism focuses on the mind's process of making meaning from external inputs: learning and understanding is assumed to be an active process of knowledge construction within the environment (Kolb, 1982; Brown *et al.*, 1989; Duffy & Jonassen, 1993;

Westera & Sloep, 1998; Westera *et al.*, 2000). It supposes that learners create their own view of a domain. Such a view is composed of multiple perspectives on the information sources that the learner has used. So far, all partners had emphasized the acquisition of knowledge *per se* and found that students performed insufficiently in the sensible application of knowledge in problem cases. Altogether, there was an urgent need amongst the partners for learning materials that would support the training of complex skills, that would allow active knowledge manipulation by the students and that would provoke creative student behaviours. The alliance now set itself the objective to develop jointly a virtual environment that would act as a shared skills-lab for students offering a variety of self-contained learning materials, enriched with demonstrators, toolkits, development kits, data sets, interactive simulations, animations, and so on. Indeed, the K-Web would represent a dynamic and creative community of students and professionals in the fields of knowledge engineering and artificial intelligence. And so it did.

For a start, the SURF grant became available, which certainly helped quite considerably. The alliance literally became productive: various content teams started to refine the existing raw materials and to add a whole range of new learning tasks as well. Gradually, the success of the alliance filtered through to the external world, while marking the K-Web as the shining example of a strategic co-operation between universities. After some time, two additional universities were welcomed to join the alliance (Universiteit van Amsterdam and Vrije Universiteit Amsterdam). They were happy to jump on the bandwagon, while on the one hand, contributing their specialist expertise and, on the other hand, sending their students to the K-Web to carry out appropriate learning tasks. Interestingly, this extension was accompanied by additional funding from the Digital University, a promising, brand new consortium in the Netherlands, funded by the Ministry of Education. Apparently, the Digital University was eager to be part of the K-Web success. Now, the project had become the only project ever to be sponsored by three rival funds.

Apart from the agreeable conditions of the alliance during this stage, six important factors promoted the alliance's success. First, the steering committee's role became even more pronounced, in that it enforced mutual agreement about the technological infrastructure and the educational format; at earlier stages, these issues had appeared to be severe bottlenecks. Second, in contrast with the previous stages, one of the parties was allocated a recognized and dominant role in finding acceptable solutions for the various problems. The Open University of the Netherlands (OUNL) took up this role, which nicely fitted its legislative mission statement '...contributing to the innovation of higher education...'. Indeed, for many years the OUNL had already participated in a multitude of co-operations. Third, it was felt necessary to develop a general pedagogic format that would guarantee structured and high-quality learning materials that would be suitable for reuse in diverse pedagogical contexts. Although earlier efforts for a common format failed, now the time was ripe to agree on a common format. It was a generic format based on the idea of structured learning tasks that would include assignments, learning objectives, knowledge sources, specification of prior knowledge, feedback, and so on. At this stage, it was hard to understand why such an elementary format could not be agreed upon previously. Also, guiding instructions for tutors were provided. Fourth, the technological infrastructure was again kept as simple as possible. It was developed by the OUNL. They chose to derive it from proven technologies of the OUNL's Web-based learning environment '*Studyweb*' (based on the use of ASP technology, Windows NT-server and Access database). It comprised a simple but effective Web-based delivery environment, a distributed (Webform-based) author

environment, a test domain, a centralized authorization management, a search engine and some file-transfer facilities. The technical facility could be kept 'simple', exactly because it was supposed to complement and not to replace each partner's existing learning management system. A fifth factor of importance was the way the implementation was arranged. Quite some effort was made to instruct and train authors about how to develop a learning task and how to deal with the authoring environment. Also, the OUNL arranged a remote service to support authors. Regularly, plenary meetings were convened to exchange ideas amongst the authors involved. A sixth factor concerned the way partners agreed upon handling copyright issues. Basically, the partners conducted a paper transaction: contributions of the participants to the K-Web would not be paid for and each partner could freely use the available learning materials in their educational programmes. The mutual commitment and trust prevented partners from cutting corners.

By the end of this productive development phase the SURF-organization carried out an independent evaluation of the K-Web project and its outcomes (Huisman, 2002). The evaluation firmly established the project's success and its favourable 'first-things-first' strategy. It held up the K-Web alliance as an example in higher education and suggested investigating the possibilities of transferring the model to other alliances. It pointed at the challenge for the next phase: the actual use of the learning tasks by students and the establishment of the K-Web community.

The harvesting phase

While writing this paper, the harvesting phase is just starting. Contentment and pride are dominant feelings amongst the partners: a long route seemed to have come successfully to an end. To stress the alliance's collective approach, the OUNL's project leadership was transferred to one of the other partners: the Universiteit Maastricht has taken over the project's leadership. At this stage, increasingly more students, sent by their local tutors, are visiting the K-Web in order to carry out appropriate learning tasks. Even though external funding had stopped, the partners have agreed to continue the alliance. So far, the partners, being only too aware of the risk of decreasing or collapsing involvement, have composed a new plan to consolidate and improve the K-Web. Maintenance, improved quality assurance and increased use by students are the main objectives for this harvesting phase. Also, the generic pedagogic model will have to be reviewed and refined. Especially, the fitting of learning tasks into existing curricula has to be elaborated. Sooner or later, the ever-growing collection of learning tasks will have to be restructured, while possibly linking a number of tasks into a curricular sequence. Having downplayed the technical ambitions of the K-Web so far, further technical improvements will be necessary. The partners are considering the extended use of intelligent support agents, streamlined user management and the conversion of learning content to XML-standards to make it transferable to standard learning management systems. Meanwhile, other universities as well as business companies are expressing their interest in joining the alliance. The partners are now considering the possibility of making the K-Web materials accessible as open source. Also, the K-Web approach has been adopted by other alliances in the Netherlands: a national project on Economics and Financial Planning of the Digital University has borrowed the K-Web approach and its technical infrastructure, as did a number of universities to create jointly content in bio-informatics.

Despite its successes, the K-Web project still runs the risk of failure in the long run. While external funding of the project has come to an end, all activities now have to be financed through

the partners' ever-shrinking primary budgets. Revenue for such an innovative project will hardly be financial in kind: as stated by Bates (2000), new technologies may improve the level of educational services, but rarely will lead to reduced cost. Therefore, it is questionable whether parties will be able to sustain the funding of these 'additional' efforts on their own accounts, because these may easily be supplanted by urgent local priorities. Especially when small departments or sections take part in the alliance, as is the case in the K-Web, it is likely to split up. One might presume that collective gains could only be reached by arranging collective, that is, external funding. Time will tell how stable the K-Web alliance will be.

Conclusions

The general conclusion for a strategic alliance to become successful is: 'be patient and take sufficient time for the alliance to mature'. It is important to establish a stable configuration of partners, which is able to withstand setbacks and conflicts. The development of mutual trust, belief and confidence, which are essential to achieve collective successes, may take many years. When looking back, a number of additional, effective strategies can be derived from the K-Web case. Below we will briefly enumerate these:

- Exploit pre-existing relationships.
- Express common problems and interests.
- Use external funding for the substantiation of informal ambitions.
- Combine both shop-floor support and managerial support.
- Do not rest on formal agreements at management level.
- Never question or challenge the partners' autonomies.
- When necessary, lower the alliance's ambitions to proceed.
- For a start, consider the development of raw learning materials rather than final products.
- Consider the support of a steering committee, representing the right management levels.
- Identify one of the parties for leadership, avoid a time-consuming democracy of details.
- Focus on the core matters first: content development rather than pedagogy or technology.
- Regard technology as auxiliary: look for simple technological solutions.
- Do not harp on about pedagogical dogmas, but look for common needs.
- Seek agreement on elementary models.
- Set up a separate implementation plan, do not interfere with internal policies.
- Agree on ownership of copyrights at an early stage: avoid sending bills, rely on paper transactions.
- Let the achievements be assessed by an independent third party.
- Do not stop before having reaped the effects.
- Do not neglect maintenance, quality assurance and user support.

Without claiming general validity of these conclusions, the present case study shows a number of common patterns that can be observed elsewhere too. Obviously, ups and downs seem to occur regularly and may easily lead to wrong assessments of the project's viability. Patience, persistence, mutual confidence and the preparedness to agree on attainable ambitions are critical conditions for success. To a certain extent, the lessons learned as mentioned above may look self-evident. But for a full understanding of their significance it is necessary to scrutinize

meticulously the underlying patterns and pitfalls as described in this paper. Making strategic alliances work is quite a job, but the K-Web strategy seems to indicate a passable route, which may be helpful for other alliances.

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References

Bates, A. (1995) *Technology, open learning and distance education* (London and New York, Routledge).

Bates, A. W. (2000) *Managing technological change. Strategies for college and university leaders* (San Francisco, CA, Jossey-Bass Publishers).

Brown, J. S., Collins, A. & Duguid, P. (1989) Situated cognition and the culture of learning, *Educational Researcher,* 18, 32–42.

Duffy, T. M. & Jonassen, D. H. (1993) *Designing environments for constructivist learning* (Berlin, Springer-Verlag).

Huisman, W. (2002) Evaluatierapport IOWO, in: *Eindrapport van de projecten LOK en LOKplus* (Utrecht, Stichting SURF), 81–92.

Kolb, D. A. (1982) *Experience, learning, development: the theory of experiential learning* (Englewood Cliffs, NJ, Prentice Hall).

van Ditmarsch, H., van den Herik, H. J. & van de Vrie, E. M. (1998) Interuniversity innovation in knowledge technology education, *NVKI Nieuwsbrief,* 15(5), 140–143.

Verreck, W. A. & de Volder, M. (2000) *Innoveren van hoger onderwijs in een consortium; opbrengsten van projecten en samenwerking in het Consortium voor Innovatie van Hoger Onderwijs* (Heerlen, Open Universiteit Nederland).

Westera, W. & Sloep, P. B. (1998) Towards a self-directed competence-based learning environment in distance education, *Educational Technology,* 38(1), 32–37.

Westera, W., Sloep, P. B. & Gerrissen, J. (2000) The design of the virtual company; synergism of learning and working in a networked environment, *Innovations in Education and Training International,* 37(1), 23–33.

Westera, W. & van de Vrie, E. (1998) Ruimte voor eigenzinnigheid, *Tijdschrift voor Hoger Onderwijs & Management,* 6, 44–49.