

Knowledge marketplaces: strategic issues and business models

Kostas Kafentzis, Gregoris Mentzas, Dimitris Apostolou and Panos Georgolios



Kostas Kafentzis (kkafe@softlab.ntua.gr) is a Researcher, Gregoris Mentzas (gmentzas@softlab.ntua.gr) is a Professor, Panos Georgolios (pgeorgol@softlab.ntua.gr) is a Researcher, and all are at The National Technical University of Athens, Athens, Greece.

Dimitris Apostolou (dapost@planetey.com) is a Manager at Planet Ernst & Young, Athens, Greece.



***Abstract** An increasing number of enterprises are getting interested in exploiting their knowledge assets outside the organizational borders and in augmenting their knowledge network. A first generation of electronic knowledge marketplaces has been developed in order to provide the platforms for knowledge exchange and trading at inter-organizational level. This paper develops a framework to evaluate the strategic issues, business models, roles, processes, and revenue models of knowledge trading platforms, and provides a detailed analysis of five existing knowledge marketplaces based on this framework. Finally, a set of conclusions is drawn on what issues should be addressed in a knowledge marketplace in order to eliminate the risks and gain the trust of its targeted customers.*

***Keywords** Knowledge management, Strategic management, Business-to-business marketing*

Introduction

Various knowledge management approaches have come to light during the last decade (see e.g. Nonaka, 1991, 1994; Davenport and Prusak, 1998). If we classify these approaches with regard to their commercial nature, namely the exploitation of knowledge assets for direct revenue generation, their community nature, and the availability of knowledge assets to public or private communities, it is evident that the bulk of the research and development efforts has been focused on the intra-organizational knowledge management where many problems have been addressed. The nature of these approaches is non-commercial and they intended to support private communities and closed groups. Yet what seems to be an opportunity for enterprises in the future is to commercially exploit their knowledge assets, namely to blend their knowledge management systems that have contributed to the creation of knowledge bases and a plethora of knowledge assets within enterprises, with electronic marketplaces, that provide adequate transaction mechanisms and viable business communities (see e.g. Fahey, 2001; Satyadas and Harigopal, 2001; Kocharekar, 2001). This is in line with the predictions of analysts – Datamonitor predicts that the market of direct information exchange will be more than \$6 billion by 2005 constituting a significant business opportunity for aware enterprises.

Electronic marketplaces can be defined as interactive business communities providing a central market space where multiple buyers and suppliers can engage in e-commerce and/or other e-business activities (see Bruun *et al.*, 2002; Segev *et al.*, 1999; Raisch, 2001). Their primary aim is to increase market and supply chain efficiency and create new value. As marketplaces evolved two key elements have arisen: first, their ability to provide not only transaction capabilities but also dynamic, relevant content to trading partners; and second, their



“ The primary aim of electronic marketplaces is to increase market and supply chain efficiency and create new value. ”

embracement of dynamic commerce, which involves the buying and selling of goods and services online through flexible transaction models that change over time based on multiple terms such as price, condition of goods, warranty, and shipping costs.

The present paper proposes a framework for evaluating the strategic issues, business models, roles, processes, and revenue models of knowledge trading platforms in an effort to examine the issues that need to be resolved in order for enterprises to effectively exploit their knowledge assets beyond their organizational borders. We have examined around 25 marketplaces including an in-depth analysis based on the proposed framework of five of these marketplaces that trade both tangible and intangible knowledge assets. The five marketplaces were selected with the objective to cover a wide range of types of traded knowledge assets. The main criteria for this selection was the success and market penetration of the marketplaces as well as the novelty of their business models.

The paper is organized in the following manner. The next section presents an overview of how knowledge marketplaces emerged in the recent years. We then develop the knowledge trading framework (KTF), which provides a holistic approach for the examination of the knowledge marketplaces. In the fourth section we briefly present the five knowledge marketplaces that were selected as most representative for our analysis; we give more detailed cases in an Appendix to the paper, which is available upon request by the authors. The results of our analysis follow in the fifth section, in which we present a comparative analysis of the marketplaces, while the last section outlines our conclusions and recommendations for companies wishing to externally exploit the wealth of their internal knowledge assets.

The emergence of knowledge marketplaces

A knowledge market is a place where knowledge is traded. In many fields, knowledge trading is already an established activity. There are vibrant content industries like publishing and broadcasting. Other examples are people-based industries like management consulting (selling the know-how of people) and recruitment agencies (trading in human capital). For some of these knowledge businesses there are active markets in the sense that buyers and sellers go there to trade. There are also markets in intellectual property, such as copyrights and patents.

However, there are many situations where knowledge markets barely exist. The personal nature of much knowledge means that human and social factors loom large in many areas of trading and exchanging knowledge. When professionals and managers seek advice, their first port of call is usually someone in their knowledge network, for example a work colleague or a peer in another organization. If their knowledge needs are greater or not easily obtained through their network, they tend to go first to people and suppliers they already know and trust. Established relationships count for a lot. Much existing buying of knowledge, especially that which is more people-based, takes places through established supply chains; see e.g. the inter-organizational level of knowledge management as defined by Mentzas *et al.* (2000, 2002).

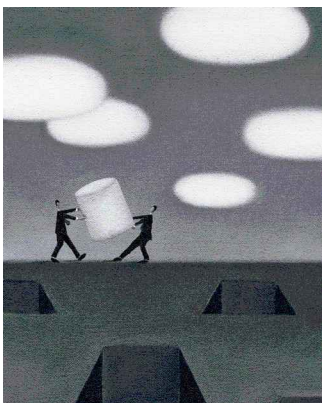
Traditional marketplaces on the contrary are more dynamic. They bring together buyers and sellers who do not necessarily know of each other. They allow participants to compare what is on offer and learn more about what products and services are available. They engender competition and innovation. They also foster cooperation in that suppliers get together to address common concerns. In the real world, trade exhibitions and competitive tendering for services are situations that show some of these characteristics. Conferences are other occasions where professionals can top up their knowledge for a fee. Between such events, professional workers seeking knowledge have to rely on their network or other means, which do not necessarily get them the best knowledge at the keenest price.

Within organizations, the need for continuous access to knowledge has spurred the development of various knowledge initiatives. Davenport and Prusak (1998) suggest that knowledge movement within the organizations is powered by market forces similar to those that animate markets for other, more tangible goods. Like markets for goods and services, the knowledge market has buyers and sellers and brokers and market pricing and exchange mechanisms, even though money is rarely the form of payment. They suggest three main factors at work, the most significant being reciprocity followed by repute and altruism. Reciprocity means that knowledge suppliers can expect to benefit when they become knowledge recipients in the future. Repute gives recognition to the supplier as a knowledgeable person willing to share their expertise. Altruism is where the knowledge supplier is motivated by reasons such as the love of their subject, and their desire to pass on their knowledge to others. When an internal knowledge market operates efficiently both individuals and the firm benefit. Knowledge flows more freely. The organization gains efficiencies and applies knowledge more effectively. Professionals get the knowledge they need to succeed in their level of competence and skills, which should help them progress in their careers.

Outside the organization, similar knowledge exchange mechanisms exist in knowledge networks, whether these are professional societies or special interest groups. Knowledge is also exchanged as part of everyday business conversation. The more aware individuals are of the value of the knowledge they possess, the more care they will take in giving it away freely outside their close network or a formal trading relationship. The growing importance of knowledge indicates that the time is right for the creation of mechanisms to improve the flow of knowledge and to increase the efficiency of knowledge exchange and trading. The Internet provides the right facilities for this to happen (see also Muller *et al.*, 2002).

The pervasiveness of the Internet has already started to shift existing knowledge markets into the Web (see e.g. Skyrme, 2001):

- **Intellectual property trading.** Copyright material, patents and designs are increasingly traded online, widening creator access to a broader market base. Trading sites can also serve as rights clearing houses.
- **Recruitment agencies.** Many types of recruitment, such as computer contracting, are fast shifting into online mode. The pool of job seekers and recruiters is larger. Computerized testing and profile to job matching helps both parties more quickly find mutually beneficial matches. Portal sites such as Carrermosaic.com give hints on writing CVs, links to recruitment fairs etc.
- **Management consultancies.** Their business is knowledge, but they are increasingly packaging it, both for internal use (on their intranets and knowledge bases) and externally, such as Arthur Andersens Global Best Practices and Ernst & Youngs ERNIE (pre-merger).
- **Research companies.** Market and industry researchers, such as Nielsen and Gartner Group now deliver much of their material over the Web or transfer it to clients intranets.



Various developments are also influencing the creation of online knowledge markets. One is the growth of the Internet as a vehicle for e-commerce and knowledge exchange. The shift towards dynamic commerce actually favors k-marketplaces because unlike most markets, the product of exchange – knowledge – has some unique characteristics that do not allow static pricing. It is mostly intangible, making it difficult for the buyer to assess and value beforehand and its value is context-dependent, making it difficult for the supplier to price it in a transparent marketplace of multiple buyers with varied applications.

Moreover the on-going development and extension of mechanisms and tools that efficiently support collaboration and knowledge sharing and also seamlessly integrate these functionalities with corporate knowledge management systems facilitates the formation of dynamic value webs and in general the *ad hoc* on-line collaboration for the creation or transaction of a knowledge asset.

Another important fact is that content is becoming even more critical for k-marketplaces. Buyers need good content description, namely content about the content, to make informed

purchases and valid and appropriate knowledge assets that will satisfy their needs, while sellers need content about transactions and customer feedback as to properly market and differentiate themselves from the competition and address efficiently existing and emerging customer needs. As a result, the accessibility, usability, accuracy, and richness of content directly impacts the value that a marketplace adds on its customers. Additionally intelligent matchmaking capabilities – an area that research has focused for years – arise as a catalytic factor for the success of k-marketplaces.

The knowledge trading framework

Overview of the framework

In order to understand knowledge sharing and trading marketplaces, we need to investigate the organizational structures of business communities consisting of networks of actors, protocols, and logical spaces embedded into business scenarios.

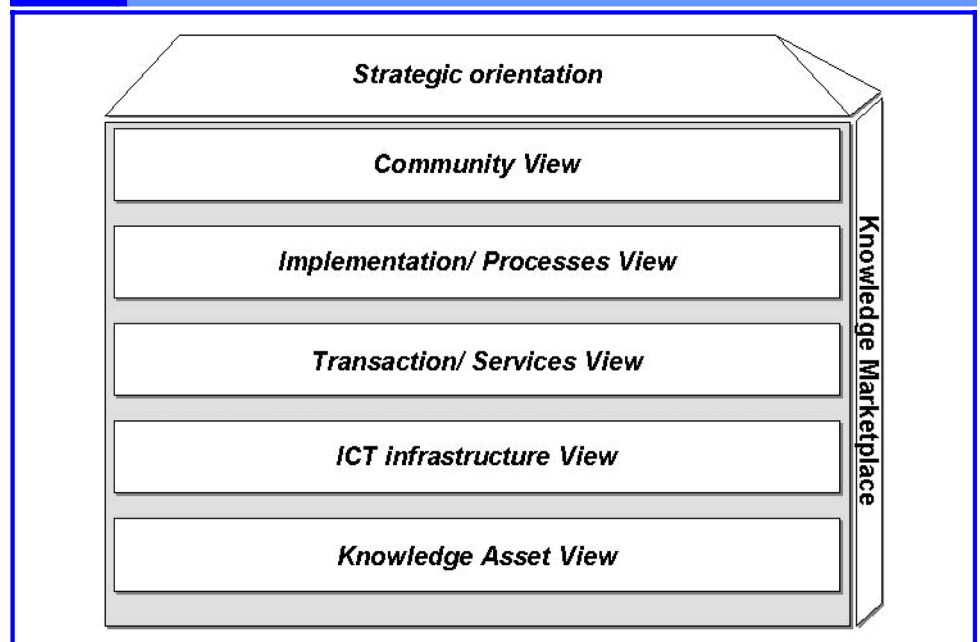
We have the developed knowledge trading framework (KTF), which identifies the core elements to be examined. The KTF is based on the business media framework (BMF) (see Schmid and Lindemann, 1998; Zimmermann, 2000), which is adopted and enhanced by the addition of the strategic orientation and knowledge assets elements in order to capture in a holistic manner all the important issues that are related to knowledge marketplaces. The proposed framework is depicted graphically in Figure 1, while its elements are described below.

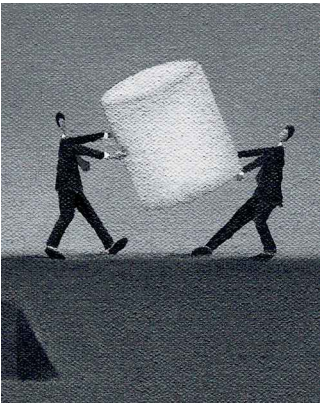
Strategic orientation

The cornerstone of a knowledge marketplace positioning is the value that adds on its participants. The value proposition depends on the knowledge product or service that is offered, its uniqueness, and the means of delivering it to the targeted segment of customers. A unique value proposition can provide a first mover advantage that is an important factor for success and can lead to premium pricing of the knowledge offerings. This leads to the selection of a specific niche that could be a specific customer segment, a specific knowledge domain, a capability/expertise niche, a service niche, or a focused geographic location.

Having selected a niche, the other main element of the strategic orientation is a viable business model that should carefully consider costs and resources and address issues such as liquidity, trust and risk and revenue model.

Figure 1 The knowledge trading framework





The main struggle of a market maker is to ensure liquidity of participants and transactions, especially in neutral marketplaces that face the chicken-egg problem.

Furthermore, to participate in a marketplace the potential customers need the associated risks to be eliminated. The more the risks are tackled efficiently the more their trust increases towards the marketplace. A number of risks ranging from financial ones to risks regarding the quality of products concern participating members and need – except for the proper infrastructure – clear policies and rules.

The right balance between the created value and the imposed fees – namely the revenue model – should be achieved in a way that both the viability of the marketplace is ensured and the participants still consider the cost of participation fair. Major hurdles are the intangible nature of knowledge assets and the difficulties in assessing their real value.

Community view

Participants in any marketplace, no less in k-marketplaces, rarely rely solely on direct information, such as catalog listings or product sheets in making a purchase decision. Such sources do not reveal possible, common problems of the product, or identify alternative products and vendors. To compete their information, buyers typically turn to other buyers of objective third parties.

One of the best ways to supplement the direct information provided by suppliers is to create opportunities for market participants to interact with one another. Today, many markets are enabling participants to make suggestions, offer comments, or engage in dialogues around products, services and suppliers. By doing so, market makers ensure that buyers can obtain online the information they seek from their peers. The seller benefits as well, by having informal opportunities to respond to buyer questions, and to receive feedback about their products and services. As with offline interactions, this communication has another important by-product over time – the development of trust among participants.

However, for these interactions to work successfully we need to describe and structure the business community of primary interest beforehand. Therefore, within the community view the roles of the participating market member are defined. Based on these roles the interaction of the market members is structured by the necessary protocols. Protocols model the admissible interactions among agents providing a set of clear rules and instructions. Apart from specifying the flow of actions they specify the way the marketplace evolves as well. Finally a common language and understanding between the market participants needs to be reached.

Implementation view

In this view the roles and protocols are realized based on the underlying services in terms of specific processes.

There are three types of processes relevant to e-marketplaces. First of all, the on-line processes that allow the participants to accomplish specific tasks and activities with regard to their assigned role and the relevant protocols. These processes are either strict and pre-defined or may derive “on the fly” during the interaction of the members with the platform.

The second type concerns marketplace supportive processes that are associated with the support of the normal operation of the marketplace and the delivery of all the offered services in an efficient way.

Finally, the integration of on-line services with back office operations of participating companies benefits both companies and market makers, since seamless flow of knowledge increases the efficiency of interaction.

Transaction/service view

A market transaction can be understood by means of a phase model following the logical flow of actions. This includes the following phases:

- The **knowledge phase** deals with providing the market participants with the necessary information about the offered products and services – electronic product catalogues, push-

and pull-services or intermediaries, can provide this information. When dealing with complex products like knowledge assets, satisfying results of this knowledge phase can only be expected, when there is a common agreement on logical space; for example in form of an agreed on vocabulary with a shared semantics.

- In the **intention phase** the market agent develops concrete intentions of exchanging goods and services. The results are precise demands and offers. The primary medium to make offers public is the electronic product catalogue. The description of offers must be precise in a way that it is a sufficient basis for signing a contract.
- In the **contracting phase** the negotiation takes place, which in case of success is finalized in a valid and secure electronic contract, possibly by integrating trusted third parties. These contracts are based on the results intention phase.
- The services needed during the **settlement phase** concern the settlement of the electronic contract. This includes the delivery of services, transport of goods as well as the transfer of payments, insurance and other related services.

ICT infrastructure view

This view contains the infrastructure for implementing the services defined in the service view, namely all the hardware and software necessary to run a knowledge marketplace.

Due to the nature of the traded products a lot of services from the traditional knowledge management area will be suitable for the knowledge trading scenario especially during the knowledge and intention phase. In this framework we outline a number of general services. We would propose to evaluate the infrastructure details only if they seem to have a special impact on a certain knowledge trading scenario.

Eppler (1999) distinguishes four general groups of knowledge services: collaboration, content management, visualization and aggregation, and intelligent search and information retrieval (see Table I). These will be the important to consider for knowledge trading.

Collaboration includes all the services that support users to work together while fulfilling a common task. These services include computer supported collaborative work and learning as well as workflow management and project management services. Most of them can be realized by means of groupware elements. Groupware functionalities are services that provide support for communication, cooperation and coordination between the team members.

Usually content management is the most important source of codified knowledge. The content concerning a certain domain can be saved in different formats, like for example documents, video and audio files. Services that belong to the content management area are document management, personal and group information management. Elements of visualization and aggregation services help to identify knowledge that is not completely explicit, but implicitly available for example with some experts and is only hard to codify. The functionalities of

Table I Groups of ICT services for knowledge marketplaces			
<i>Colaboration</i>		<i>Visualization and aggregation</i>	
CSCW	CACL	Knowledge maps	Portals
Workflow management		Taxonomies	
Groupware functionalities		Directories	
<i>Content management</i>		<i>Intelligent search and information retrieval</i>	
Document management		Searching and profiling	
Personal information management		Filtering	Push
Group information management		Sorting	Pull

Source: Eppler (1999)

information retrieval include making sure the successful identification and retrieval of knowledge resources and by means of this offering them for reuse.

Knowledge assets

The starting point for a knowledge trading and sharing scenario is to consider what knowledge assets to commercialize. Skyrme (1999, 2001) distinguishes between two main types of exploitable knowledge assets: those that are primarily people-based and those that are object- or information-based.

Some of the most valuable knowledge-intensive services are those relying on personal knowledge. Specialist expertise associated with deep tacit knowledge, insights and experiences may be productized and put on a knowledge marketplace.

Object-based knowledge assets are typically the result of synthesizing many different elements of knowledge and applying a design and development process. The resulting object-based knowledge assets are most commonly packaged into two main types of media: computer-based and paper-based. The former includes databases, Web pages, and software (e.g. expert systems). The latter includes documents and many other types of publication reports, books, and articles, etc. The same knowledge is often packaged in different ways to meet the needs of different consumers and the different ways in which they will use it.

Many information-based products are passive, in the sense that the information they contain is merely presented to the reader. While with hard copy it is inevitable, by exploiting the functionality of the Internet, the richness and usefulness of information can be increased. Rich content is at the core of most e-marketplaces, even more in k-marketplaces. Sellers need to communicate what they have to sell; buyers need to know what is available. The accessibility, usability, accuracy, and richness of the content directly impacts the transaction. If the information is incomplete, unusable, or unavailable, the buyer cannot make an informed decision. Similarly, suppliers and e-marketplace operators cannot differentiate their products.

Every buyer and supplier has his or her own preferences for the naming, descriptions, and information associated with every product. Where these preferences diverge is where the greatest potential for incomplete or inaccurate data exists. The difference may be minimal for easily understood commodities. However, when it comes to knowledge products, such as a service offering, names, description and other meta-data start to differ significantly.

Survey of knowledge marketplaces

Introduction

This survey provides a comparative analysis and evaluation of knowledge e-marketplaces and aims to uncover the key characteristics of current knowledge marketplaces, to identify the factors leading to success in knowledge trading, revealing strengths and weaknesses of the existing marketplaces and to identify future trends.

In order to structure and analyze a set of selected knowledge e-marketplaces in a way that will enable us to draw useful comparisons and detect lessons learnt for the design of knowledge marketplaces, we employ the KTF, presented in the second section. The KTF provides a holistic approach for the examination of our subject since it comprises and interconnects all the essential factors for the creation and operation of a marketplace. The survey is focused on the business perspective of the e-marketplaces, which are seen from the users point of view. To facilitate this analysis effort an extensive assessment form has been created, that follows the structure of the KTF.

To identify the existing knowledge marketplaces we referred to relevant literature. Our main resources were the Kaieteur Institute for Knowledge Management that provides a directory of knowledge e-marketplaces, Yahoo!Directories and Skyrme (2001). Table II presents a sample of 20 indicative knowledge marketplaces including a short description of their goal.

Table II Examples of knowledge trading on the Web

<i>Name of marketplace</i>	<i>Short description</i>
brainbid.com	Knowledge workers can bid on project contracts in a format called "online projecting". Members participate in a sealed bid process and utilize an online "status tracking engine"
experts.com	Considered as "the Internet's registry of experts", this site is a global resource for locating experts – authors, consultants, specialists, and expert witnesses. Experts.com main objective is to promote and match high level expert professionals with customers
knowledgeshop.com	It is stocked with products and services that enhance knowledge and the development of tangible and intangible assets. Categories include best practices and benchmarking, human resources, motivation and change management, and management science
Pumberbrain.com	Offers targeted solutions, support, information, answers, and advice
exp.com	By joining this programme, members can get personalized advice from experts on a range of topics such as finance, fitness, parenting, pets, and more
expertcentral.com	Features experts organized by area of expertise. Some questions answered for free, with others the experts will propose a fee for helping you
answers.google.com	An open forum where researchers answer your questions for a fee
ideaexchange.com	Idea Exchange – marketplace for buying and selling ideas
infomarkets.com	Connects buyers and sellers of information
intellectexchange.com	Service that connects experts in business, information technology, engineering, and science with those seeking advice and assistance
kasamba.com	Connects users with experts on a wide range of subjects who can answer their questions in real-time over the Web
knexsis.com	Offers online knowledge brokerage services
liveadvice.com	Offers a marketplace for the exchange of personal knowledge and experience
megadox.com	Searchable database of legal, business, technology, educational, and other downloadable documents
qcircuit.com	Database of human experience, with users available for advice, speaking engagements, or seminars
Sharksforum.com	For people with IT questions and assignments
svepartners.com	SVE Partners – a team of Silicon Valley investors and entrepreneurs whose mission is to help individuals turn ideas into a real company for a percentage in ownership and no risk
swapsmarts.com	SwapSmarts is a community where knowledge is traded for expert advice, cash, gifts, or charitable donations
Thoughtshare.com	Thoughtshare Communications – knowledge management software developer that produces the browser companion PlanBee
whathepls.com	Offering Webmaster resources, tool add-ons, and forums including message boards, chatrooms, Webmail, instant messenger, discussion and mailing lists, and more

Five knowledge e-marketplaces were selected for the survey from this first sample with the objective to cover a wide range of types of knowledge assets traded at the moment. The main criteria for the final selection were the success and market penetration of the marketplaces as well as the novelty of their business models. The needed information for our analysis was collected from the Web sites of the selected marketplaces.

A short description of the selected knowledge e-marketplaces is given in Table III, while more detailed studies of these cases are given in an Appendix to the paper (available upon request from the authors).

Knowledge marketplaces can be classified into three basic types regarding the form of the traded knowledge assets:

- (1) Knowledge is in documented form and can be traded independently of its owner. The knowledge asset is pre-fabricated and aims to cover specific a priori specified needs. The knowledge assets are usually stored in the market makers repositories. This type of marketplace includes Knexa.
- (2) Knowledge is exchanged between interacting individuals who communicate using on-line or off-line mediums. In this case, the knowledge asset caters for the specific needs of the buyer and is created on demand. The knowledge flows between the parties may be recorded by an appropriate mechanism. This category includes experts communities like Experts Exchange and HotDispatch.
- (3) This is a hybrid of the two former types. Here, the knowledge asset is a combination of documents and people interaction between the trading parties, yet the documents are especially created for meeting the specific customers needs, which most often happens in the context of a project. Actually, a project is the most common formal type of knowledge services provision. This category includes eWork and eLance as well as a part of HotDispatchs community.

Table IV presents a classification of the knowledge assets traded in the five marketplaces.

Comparative analysis

The objective of this survey was to gain a deeper understanding of the business models and methods employed by existing knowledge marketplaces, based upon the KTF. The comparative analysis follows the same structure as the case studies. The various aspects of knowledge trading that we focused on are classified into the six components of the proposed framework.

Strategic orientation. Knowledge e-marketplaces tend to be in a neutral position, playing the role of an independent intermediary who matches knowledge seekers with relevant knowledge

Table III Knowledge marketplaces selected for the survey

<i>Name of marketplace</i>	<i>Short description</i>
Knexa	Knexa.com created in 1999 the world's first person-to-person as well as business to business knowledge auction, a patent pending e-commerce application that applies dynamic pricing to digital goods such as codified knowledge, software, and multimedia content
Experts Exchange	ExpertsExchange.com has pioneered the IT professional collaboration network marketplace since 1996 with the aim of bringing together professionals in the field of information technology and promoting collaboration among them, in order to provide specific solutions to specific problems
HotDispatch	Hotdispatch.com, founded in 1999, provides a marketplace for IT/IS professionals, systems integrators, and channel partners to buy and sell knowledge services such as questions and answers, project outsourcing, and software exchange
Eworke	Work.com operates one of the largest talent marketplaces on the Web with over 300,000 registered users. eWork is based in San Francisco with additional offices throughout the USA and Europe
Elance	eLance.com, founded in 1998, provides a marketplace for high-quality professional service providers and buyers who are connected in a time- and cost-efficient way in order to fulfil their needs on a project basis

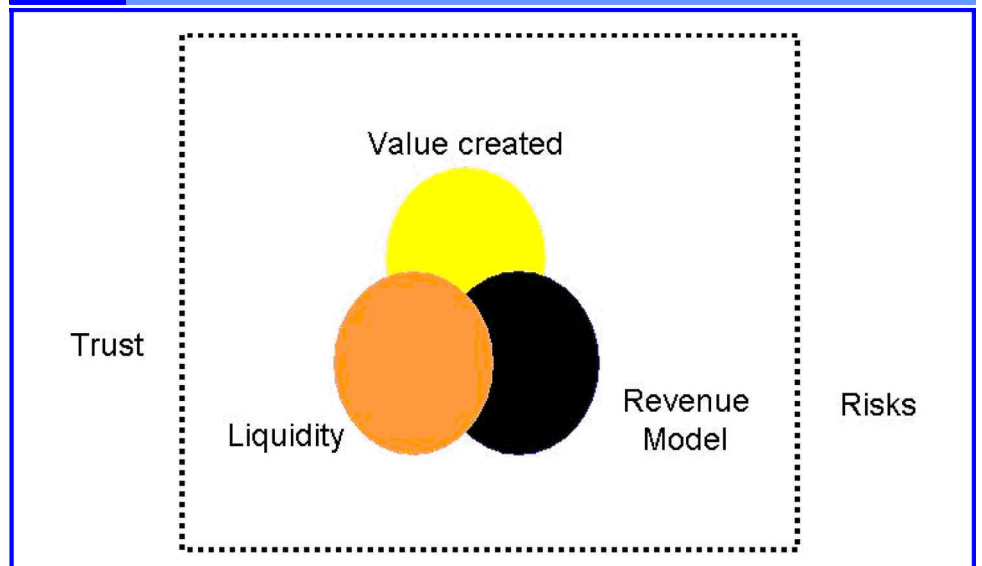
Table IV Knowledge asset types traded in the marketplaces

Marketplace	Knowledge asset type		
	Document	Expert	Project
Knexa	Any digital file format (e.g. text, pictures, drawings, diagrams or illustrations)	Questions and answers	–
Experts Exchange	Documented answered questions	Questions and answers	–
HotDispatch	Documented answered questions and public project deliverables	Questions and answers	Small projects
eWork	–	–	Small and medium projects
eLance	–	–	Small and medium projects

sources which may be of various types and formats, without favoring any specific side. It may happen that the operation of a marketplace is determined to a certain degree by participating partners intending to serve their own interests better. In these cases, the relationship between the market maker and the specific partners should be explicitly stated in order to avoid any misinterpretations of the marketplace goals by potential participants.

This neutral positioning of knowledge marketplaces serves their goal for enhancing market liquidity and thus offering increased market reach for knowledge sellers who can have access to a broader set of potential buyers around the world and vice versa. Especially for small businesses and individuals who do not have the marketing resources to seek out for potential customers in such a scale that knowledge marketplaces offer, the participation in a knowledge marketplace can be very useful. The range and number of potential participants in a knowledge marketplace heavily depends on the strategy followed by the market maker to attract participants, which is strongly interconnected with addressing trust issues, employing a customer acceptable revenue policy and creating unique value for the customers. Figure 2 depicts the general relation between these four elements.

Figure 2 Elements of strategic importance in knowledge marketplaces



It seems to be very clear that the strategic advantage of the first mover, which is usually combined with a “get big fast” strategy, can no longer ensure everlasting liquidity. A focus on building the transaction volume, namely providing the means for realizing on-line transactions successfully in a way that all participating parties are fully satisfied, is coming on the scene. In parallel to providing appropriate functionalities, players who trade the most should be targeted and actively helped by the market maker to migrate their transactions on-line. Yet, attracting these players in the marketplace may involve conceding special privileges that may contradict to the choice of neutrality. Possible bias towards a specific group of customers may lead to hesitation from another group to participate or transact in the marketplace.

The revenue policy of a marketplace, which is translated into an appropriate revenue model, is an important strategic decision since, on the one hand it affects the liquidity, and on the other the profits, and consequently the viability of the marketplace depends on its suitability and effectiveness. It was not surprising to find out that most marketplaces prefer their revenue model to rest on a combination of fees, which are presented in Table V, in order to become less vulnerable to competition and tie their revenue model more accurately to the value being created. The perception of this value is different according to the different types of customers. Knowing the customers assessment criteria is the first step to decide upon a model that will provide the market maker the necessary flexibility to tailor prices to specific customer segments and will allow a more efficient exploitation of the created value using the appropriate revenue mechanisms. These also underpin the view that revenue model development is an ongoing task reflecting at its specific time the value being created in the marketplace.

Finally, we have distinguished three kinds of trust relations that need to be cultivated in a knowledge marketplace; the first one concerns trust towards the market maker, the second one towards the knowledge assets and the last one towards the participating parties. In Table VI we mention the various ways that knowledge marketplaces use to establish trust towards all of the previous categories.

Community view. In every marketplace we examined we found at least two clear and distinct roles:

- (1) the knowledge seeker or buyer who has a need for knowledge, whose need may vary from specific and crystallized to vague and immature; and
- (2) the knowledge provider or seller who owns a knowledge asset, which may be explicit, such as a best practices document, or tacit, like consultancy time.

Other intermediaries, like brokers or trusted third parties or service providers, were included depending on the business model. For example, Knexa houses companies, called knowledge agents, which carry expertise in specific business areas.

Protocols serve the model described in the community view and especially the relevant business community. Besides, the marketplaces have to adhere to general law of their country or region and follow legal obligations given by the arising Internet law and standards, like Netiquette.

The fulfillment of an order or the support of the full transaction cycle on-line represents an important advantage for the marketplaces that provide them. Especially knowledge assets

Table V Sources of revenue selected by the k-marketplaces

Sources of revenue	Knexa	Experts Exchange	HotDispatch	eWork	eLance
Transaction fees	✓		✓		✓
Sales fees		✓	✓	✓	
Fees for value-added services				✓	
Subscription fees		✓			
Membership fees					✓
Advertising fees		✓		✓	

Table VI Trust in knowledge marketplaces

<i>Towards</i>	<i>How to establish trust</i>
Market maker	<ul style="list-style-type: none"> ■ Security: secure payment mechanism (SSL, SET standard); secure transfer of information (e.g. Thawte Digital Certificate, encryption) ■ Privacy statement about the use of customers data and IP; industry standards (netiquette); buyer advocacy like TRUSTe ■ Degree of affiliation: neutral position as knowledge intermediaries ■ Settlement of disputes: clear rules; dispute mechanism → arbitration schemata, within the marketplace (market maker or independent), outside the marketplace (court or TTP) ■ Pricing mechanisms: guarding for frauds; provide a selection of mechanisms ■ Participation of established companies and well-known individuals
Knowledge assets	<ul style="list-style-type: none"> ■ Rating Mechanism (Knexa, E.E.); grade; comments ■ Pre-screened and validated knowledge assets; experts (knowledge agencies in Knexa); trusted third party
Participating parties	<ul style="list-style-type: none"> ■ Rating mechanism (E.E.); grade; comments ■ Authentication/verification (Knexa, yet2.com); concept of identity ■ Payment guarantee; direct payment by the market maker (eWork); Escrow (Hotdispatch) ■ Sense of community; platform to facilitate the social communication of the members; technology and set of norms and values

being intangible and, often, in digital format simplifies the delivery process to a certain degree. On the whole, in knowledge industry both services and products can be delivered on-line depending on the infrastructure of the marketplace. In all the marketplaces examined in the survey the business transaction cycle is completed on-line.

The increased complexity to assess a knowledge asset value, which is connected to its relevancy and applicability to each specific case, may lead to several kinds of disputes. A marketplace needs clear rules and a dispute mechanism as to avoid trouble, like disappointment from the usefulness of an asset, refusal of payment etc, resulting in the loss of trust or even worse in the withdrawal of participants. Resorting to arbitration schemata within the marketplace or by independent third parties should also be stated clearly in the user agreement. In most marketplaces surveyed disputes are solved on an individual basis, which is the easier way. Another way is to call an independent arbitrator to settle the dispute under the specific countries arbitration rules, which happens in HotDispatch.

Protocols regarding the facilitation of collaboration and creation of new knowledge businesses through a virtual organization structure or a looser team formation can accelerate knowledge creation and development within a marketplace. For example, e-Work provides a secure virtual space and the appropriate collaboration and project management tools, which are the main enablers for the development of on-line synergies. The various aspects of knowledge co-creation include infrastructure, project management, legal arrangements, equity and intellectual rights etc.

Finally, knowledge marketplaces have a two-fold role; besides enabling knowledge transactions they provide a venue for people to socialize. This venue is defined by a set of values and norms which are set by the market maker and are usually very strict regarding what is not allowed to be said or done by the participants. When relationships between members develop new groups and sub-communities can be created and evolve following the unwritten rules imposed by the mentality of the specific groups. A space for the social interaction of the members of the marketplace is nurtured in two cases – Experts Exchange and HotDispatch. In Knexa self-evolving, autonomous communities may grow under the wings of the knowledge agencies.

Transaction and services view. The functionality of a marketplace is based on the services that are employed to support the transaction cycle. Services should efficiently deal with all the

issues regarding commerce, collaboration and content in order to enable a customer to carry out a satisfactory transaction and enjoy a pleasant on-line experience.

Therefore, the selected services should address the key inefficiencies in the specific market space and they need to be coordinated to yield synergistic effects and to create new value. Their mix should be dynamic and reflect the on-going changes in the marketplace environment. For example Experts Exchange enriched their services, both in the commercial and the content area by providing an organized library of well-structured previously answered questions accompanied with advanced search tools. A subscription fee is charged for unlimited access to the knowledge assets of the library. By this service Experts Exchange exploits the previously untapped resource of 3,000,000 answered questions.

Specifically, the commerce model is more or less specified by the selection of the trading mechanism(s) (catalogue, auction etc.) and various factors have to be considered before the final selection; product complexity, available liquidity and maturity of trading participants are the most important. HotDispatch provides a reverse auction mechanism since there is the analogous liquidity to ensure the mechanisms appropriate operation. An interesting case is Experts Exchange that operates a patented recognition system to induce its members to participate actively in the marketplace, whose notion is based more upon voluntary participation and reciprocity than on making profit. In Table VII the pricing mechanisms employed by the marketplaces of the survey are presented.

The appropriateness of pricing mechanisms ensures that knowledge assets are priced in accordance to their market value at the specific time of the transaction. Although different kinds of mechanisms match better with different types of assets, the availability of a set of pricing mechanisms can establish trust and help to better depict the value of an asset as perceived by its potential buyer.

Credit and payment mechanisms comprise another crucial service for gaining the trust of the potential members of the marketplace. Payment mechanisms should make it easy for the customer to do business with and reduce the buyer's risk – of course clear terms of trading go hand in hand with trust. Regarding security, the technologies that are broadly used are SSL and

Table VII Pricing mechanisms employed by the knowledge marketplaces

<i>Pricing mechanisms</i>	<i>Knexa</i>	<i>Experts Exchange</i>	<i>HotDispatch</i>	<i>eWork</i>	<i>eLance</i>
Fixed price	✓	✓	✓		
Direct negotiation*	✓		✓	✓	
Auction	✓				
Reverse auction	✓		✓		✓

Note: * In the case of eWork direct negotiation can take place either on-line or by traditional communication mechanisms

Table VIII Types of payment mechanisms employed by the k-marketplaces

<i>Payment mechanisms</i>	<i>Knexa</i>	<i>Experts Exchange</i>	<i>HotDispatch</i>	<i>eWork</i>	<i>eLance</i>
Credit card	✓	✓	✓	✓	✓
Wire transfer			✓		✓
Off-line			✓	✓	✓
Other*			✓		
Micro-payments	✓				

Note: * PayPal® is an email-based service created by HotDispatch to enable individuals and organizations to add a financial reward to any email request they send

digital certificates. Another arising issue especially for marketplaces that handle low cost transactions is dealing with micropayments. Knexa provides a mechanism for dealing efficiently with this type of payments. The payment mechanisms that have been selected by the marketplaces are presented in the Table VIII.

Moreover, value is added and trust towards the marketplace is further established by the provision of a range of payment mechanisms so that the member can choose the one fitting his needs. For example, HotDispatch offers four different payment mechanisms, satisfying customers various needs and establishing a strong trust relationship at first sight.

Another element that enhances the reliability of the marketplace and reduces risks for the buyer is proof of the credibility of the participant as well as the provision of a payment guarantee that shifts the risk of the transaction from the customer to the market maker. Loyalty is further enhanced by the provision of financial and other value-added services such as invoicing. e-Work provides billing and payroll services and also guarantees the professional services providers payment regardless of their clients payment attitude.

It also seems essential for the smooth interaction of the customers with the knowledge marketplace a personal account and repository to be provided to them, which will facilitate them to easily handle their knowledge assets and personal information as well as completing administrative tasks. e-Work provides its users with an account which they can audit and handle all their interactions in the marketplace.

ICT infrastructure view. In terms of the underlying infrastructure, we have concluded to a set of characteristics that the selected technologies have to carry. First of all the platform has to be scalable as to cope with the increased volume of transactions or the number of participants. Second, it has to be flexible in order to adapt to possible focus shifts and increased demand. Third, it should ensure security as to establish trust. Fourth, the platform must offer the possibility of frictionless integration with back-office systems of participating members and support the migration of intimate supplier networks. For example, HotDispatch facilitates the migration of existing internal communities of companies onto the platform with the use of corporate accounts. Finally, an important element is “ease of use” which is achieved by user-friendly interfaces.

With regard to collaboration, trading participants and/or third parties should be easily connected with collaboration tools that satisfy their specific needs for communication and team working. For example, QuestionReader, a patented mechanism available in HotDispatch, handles collaboration issues with success enabling threaded discussion between participants using a mail reader style interface.

Implementation/processes view. A successful value proposition should rely on processes that streamline and transform the traditional processes in the knowledge supply chain. How to conduct business can be a differentiating factor by itself obtaining competitive advantage for the marketplace, both against traditional businesses and against direct competitors. For example yet2.com creates value for its participants by providing them with an anonymous, confidential and secure process for technology transfer and licensing. The proposed process reduces drastically the needed time for locating a buyer or a provider of a specific licensed technology.

Furthermore, integrating the marketplace functionalities with back office systems of the participants, e.g. knowledge management systems, content management systems or workflow management systems, increases value delivered to the user. It also increases switching costs of the customer to competitors.

Knowledge asset view. A marketplace may be focused on a specific industry and its needs for knowledge or it may cater for a variety of industries with a similar knowledge need. In all cases, not only does the quality of content matter but also the quantity of knowledge assets is important. A marketplace that does not have a plethora of items available, even if it is a niche

market, cannot meet and fulfill customer broad range of needs, leading to frustration and loss of trust.

Additionally, the confidence and trust of buyers is increased when the sellers have been validated before they are accepted in the marketplace by the market maker or better by third parties, e.g. commercial chambers. Customer feedback and ratings on products and sellers professional behavior can help buyers gain confidence towards specific suppliers. Knexa uses a three-star rating system for buyers to grade the quality of a knowledge asset, while HotDispatch and Experts Exchange employ a similar system for grading experts' performance.

It seems to be a common ground for most of the examined marketplaces that structuring their knowledge assets catalogue is not an underestimated operation, diminishing this way the risk of frustrated customers unable to locate a proper category suiting their needs or offers. A logical and rich structure of the classification scheme available on a marketplace in parallel to good computer searching algorithms, that make catalogues easily searchable, and items accurately described so they can be easily compared, and can provide satisfactory and quick results to customers searching for specific knowledge. The customers who, approximately or not, very clearly know what could be helpful for their case may initiate a dialogue with knowledge providers and conversely (for example in RFQs), so that needs and offers can be refined. Marketplaces for experts or project outsourcing provide this type of facilities, e.g. Experts Exchange and HotDispatch. Moreover, in complex knowledge assets knowledgeable human brokers can make the most accurate matchmaking giving the marketplace a distinctive advantage.

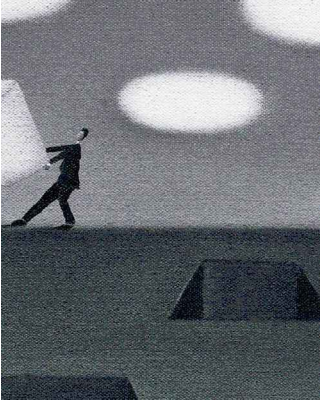
Conclusions

The objective of this survey was to gain a deeper understanding of the business models and methods employed by existing knowledge marketplaces, based upon the KTF, which captures in a holistic manner all the elements that are useful for understanding and analyzing the structure and strategy of knowledge marketplaces. It becomes clear from the analysis of the selected marketplaces the fact that an increasing number of enterprises are getting interested in exploiting knowledge, tacit or explicit, lying outside the organizational borders in parallel to harnessing the internal knowledge resources. The arising need for augmenting the knowledge network of their organizations has led to the participation in various types of the first generation of knowledge e-marketplaces.

Furthermore, it is also evident that the existing marketplaces target individuals and very small companies to supply the knowledge requested by the buyers. In other words the market of knowledge trading between enterprises, where both the supply and demand side is covered by enterprises, is still in its infancy. And it seems to be an attractive market, especially for SMEs who cannot afford to pay the fees that consultants and experts demand, yet they need knowledge of this quality to gain and retain competitive advantage or in other cases just to survive. Yet, some open issues still exist that need to be solved in order for enterprises to adopt knowledge trading.

First of all, well-defined metadata that will provide a clear description of the knowledge assets and its attributes are necessary. Of major importance is the development of commonly accepted domains of expertise, the efficient handling of intellectual property rights and copyrights, that is both a legal and a technology issue, and the capability of the buyers to evaluate knowledge assets by providing commonly accepted quality ratings. Finally accurate, fair pricing, which is not very clear how to achieve, since the life-cycle of knowledge assets is not known, is a crucial issue. By tackling these issues, efficient match making could be

“ The market of knowledge trading between enterprises, where both supply and demand is covered by enterprises, is still in its infancy. ”



achieved, thus gaps between offer and demand in the knowledge marketplace could be minimized.

Second, electronic contracts are necessary for the establishment of trust and consequently the frictionless development of on-line trading. Here answers should be provided for how to deal with digital rights and quality assurance and relevant mechanisms should be developed to support the business processes of on-line contracting.

Third, another issue that arises is the flow of tacit knowledge on on-line media. What is apparent from the previous analysis is that existing marketplaces do not integrate expert's advice with documents efficiently. How to plug-in expert networks, which have to be reliable, in knowledge marketplaces in order to provide their expertise in cost-efficient ways still remains unspecified. Finally, a last issue is building trust relationships on-line. Here, it has to be defined how to create trust when attracting a customer and how to retain and cultivate this trust as the relationship evolves.

It is certain that some of the existing knowledge marketplaces will not prove to be viable whilst on the other hand a number of new and innovative ones will arise as the need for knowledge from outside the boundaries of organizations increases. Comprehending these needs as well as the peculiarities of knowledge trading in contrast to traditional e-commerce are the main enablers to creating viable and profitable business communities that add real value on their customers.

References

Bruun, P., Jensen, M. and Skovgaard, J. (2002), "e-Marketplaces: crafting a winning strategy", *European Management Journal*, in press.

Davenport, T. and Prusak, L. (1998), *Working Knowledge: How Organisations Manage What They Know*, Harvard Business School Press, Boston, MA.

Eppler, M., Seifried, P. and Röpneck, A. (1999), "Improving knowledge intensive processes through an enterprise knowledge medium", *Proceedings of the 1999 ACM SIGCPR; Conference Managing Organizational Knowledge for Strategic Advantage; The Key Role of Information Technology and Personnel*, pp. 222-30.

Fahey, K., Srivastava, R., Sharon, J.S. and Smith, D.E. (2001), "Linking e-business and operating processes: the role of knowledge management", *IBM Systems Journal*, Vol. 40 No. 4, pp. 889-907.

Kocharekar, R. (2001), "K-commerce: knowledge-based commerce architecture with convergence of e-commerce and knowledge management", *Information Systems Management*, Springer.

Mentzas, G.N., Apostolou, D., Abecker, A. and Young, R. (2002), *Knowledge Asset Management: Beyond the Process-centric and Product-centric Approaches to Knowledge Management*, Springer-Verlag, London, forthcoming.

Mentzas, G.N., Apostolou, D., Young, R. and Abecker, A. (2000), "Knowledge networking: a holistic approach, method and tool for leveraging corporate knowledge", *Journal of Knowledge Management*, Vol. 5 No. 1, pp. 94-106.

Muller, R., Spiliopoulou, M., Lenz, H.-J. (2002), "Electronic marketplaces of knowledge: characteristics and sharing of knowledge", *Proceedings of the International Conference on Advances in Infrastructure for e-Business, e-Education and e-Medicine on the Internet, Italy*.

Nonaka, I. (1991), "The knowledge-creating company", *Harvard Business Review*, November-December, pp. 96-104.

Nonaka, I. (1994), "A dynamic theory of organisational knowledge creation", *Organisation Science*, Vol. 5 No. 1, pp. 14-37.

Petra, S. (2000), "The pivotal role of community building in electronic commerce", *Proceedings of the 33rd HICSS Conference, Hawaii*.

Raisch, W.D. (2001), *The e-Marketplace Strategies for Success in B2B e-Commerce*, McGraw-Hill, New York, NY.

Satyadas, A. and Harigopal, U. (2001), "Cognizant e-business solutions: linking the new e-business wave with knowledge management", IBM paper.

Schmid, B. and Lindemann, M.A. (1998), "Elements of a reference model for electronic markets", *Proceedings of the 31st Hawaii International Conference on Systems Science (HICCS'98)*, Hawaii, January, pp. 193-201.

Segev, A., Gebauer, J. and Färber, F. (1999), "Internet-based electronic markets", *International Journal on Electronic Markets*, Vol. 9 No. 3.

Skyrme, D. (2001) *Capitalizing on Knowledge: From e-business to k-business?*, Butterworth-Heinemann, London.

Skyrme, D. J. (1999) *Knowledge Commerce: Succeeding in a Global Knowledge Marketplace*, Knowledge Economy Conference, Beijing.

Zimmermann, H.-D. (2000) *Understanding the Digital Economy: Challenges for new Business Models*. In: Chung, M. H. (ed.): *Proceedings of the 2000 Americas Conference on Information Systems*, Long Beach, CA, (2000).