

**EXPLOITING KNOWLEDGE AND LEARNING
ACROSS ORGANISATIONS: THE ROLE OF THE
BROKER AND INFORMATION TECHNOLOGY IN
LEARNING NETWORKS**

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ABSTRACT

The new knowledge-based economy necessitates increasingly the collaboration between different organisations. Despite the recent upsurge in elearning and knowledge management systems, the vast majority of these systems focus on either individual users or individual organisations.

This article is about knowledge and learning across organisations. It introduces the concept of the Learning Network, examines how learning networks are formally established, and how they can increase the participants' knowledge and learning capability. Based on our experience from AC Styria (an Austrian automotive regional cluster) this paper analyses the role of the broker in such networks and provide a constructive set of recommendations for using IT to support learning and knowledge sharing at the inter-organisational level.

INTRODUCTION – THE CONCEPT OF THE LEARNING NETWORK

An innovative scheme has been introduced recently in several countries in Europe, referred to as Learning Network (LN). The term learning network does not refer to networks where learning simply happens as it is the case with Communities of Practice (CoP) – groups of people who share a concern, a set of problems, and who deepen their knowledge and learn by spontaneously interacting on an ongoing basis (Wenger et al., 2002). On the contrary, learning networks are inter-organisational structures, formally established to increase the participants’ knowledge and innovative capability. Learning networks are formally established and defined; have a structure for operation with boundaries defining participation; have a primary learning target; have formally developed processes that can be mapped on the learning cycle; have practical learning outcome that can be measured (Bessant et al., 1999).

Examples of learning networks include professional associations (Institute of Mechanical Engineers, UK), sector based associations of firms with common interests in the development of the sector (Automotive Cluster of Styria, Austria), industry research and technology networks (The Welding Institute, UK), supply-chain initiatives (particular firms supplying to a major customer - e.g. Toyota – Kyokoryku, Japan), region based networks (3rd Italy), government-promoted networks (London Innovation and Technology Counselor’s network, UK).

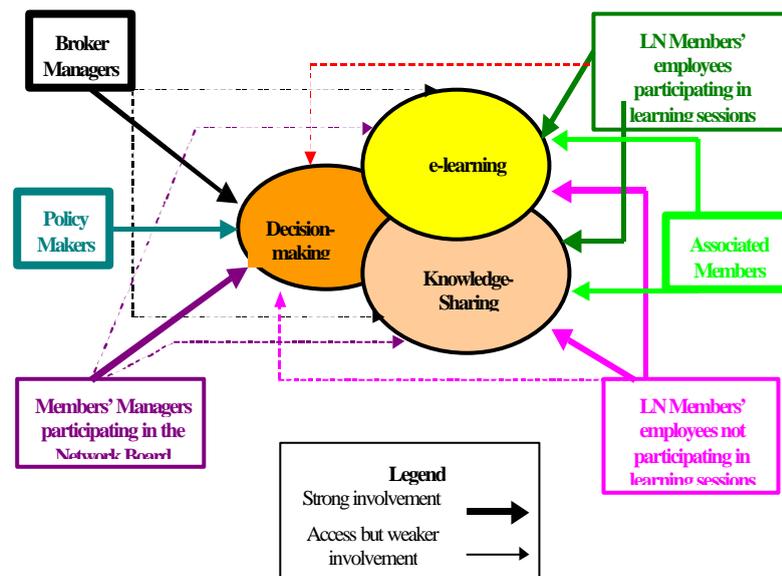


Figure 1: Main functions and roles of a Learning Network

Learning networks exploit the widely used approach termed “action learning”: the active participation, challenge and support of groups of employees facing similar problems (Pedler et

al., 1991). The whole idea of action learning is based on the combination of personal example (the action dimension) with the notion of learning community. This concept stresses the value of experiential learning and the benefits which can come from gaining different forms of support from others in moving around the learning cycle. Self-learning within a group has much to offer to organisational learning and competitive advantage; the experience of regional clusters of small firms provides one important piece of evidence in support of this. It has been increasingly recognised that organisational knowledge results from complex and multi-faceted interactions among different individuals. Previous research has shown (Bessant and Francis, 1999) that the successful operation of a learning network requires (see Figure 1):

- the intensive interaction of the people (from the broker and/or the members) with decision making authority (in order to avoid superficial learning);
- the interaction of the members to share knowledge and exchange experiences;
- the diffusion of captured knowledge within the organisation, by allowing all people to access the learning content in order to benefit a wider set of people and enable the conversion of learning outcome to specific changes in organisational routines.

THE ROLE OF THE BROKER IN LEARNING NETWORKS

A learning network, just like any other dynamic network (Snow and Miles, 1992), needs a coordinator (a net broker). Brokers help companies to identify synergies (Reiss, 1997), organise network activities and act as facilitators (Hatch, 1995). Their task is to spread the network concepts, promote cooperation, organise groups of firms; in essence the broker is the organisation with the central responsibility for facilitating the network and the “members”, usually but not always private firms, which are the primary beneficiaries of learning taking place within the network (Franke, 2000).

Snow et. al. (1992) identified three net-broker roles, the role as architect, lead operator, and caretaker. In the role of the architect, the net-broker has to search and select suitable partner companies for the network community. The net-broker, acting as lead operator, is primarily responsible for the management and maintenance of the network community. Furthermore, the net-broker is responsible for the overall project management. On the other hand, either a partner company of the network or the net-broker itself takes over the project management of the network on the operational level.

Learning networks require continual enhancement if they are to operate smoothly and effectively. The caretakers' main duty is to support the process of ‘learn to cooperate and cooperate to learn’ (Prange et al., 1996). Thus, the caretaker is engaged in nurturing and disciplinary behaviour. For example, if the net-broker notices that a member falls behind technologically, or in some other way devalues its usefulness to the network, the net-broker takes appropriate actions to rectify the situation. On the other hand, if the net-broker notes that a web member gains advantages at the expense of other partners, the net-broker’s challenge is to point out the dysfunctional effects of such behaviour on the overall system and teach the

offending web member how to behave more appropriately for the common good (Snow et al., 1992).

In order to identify the knowledge management activities of the net-broker, Franke (2000) broke down the whole net-brokerage process into the three main learning network management processes:

- Initiation of the network. In this phase the broker acts as an architect (Snow and Thomas, 1993). The learning network architect determines the design and resources needed to build a competitive partnership network.
- Maintenance of the network. The maintenance of the learning network is an ongoing process; the net-broker acts mainly as a lead operator and caretaker (Franke, 2000). The key postulate of the learning network is that member companies learn to cooperate with each other and in return that members learn from the cooperation with others. Therefore, the net-broker organises special interest groups where web members can learn and exercise their cooperation skills. Furthermore, the net-broker acts as caretaker in case a member suffers a lack of knowledge, by helping and advising the member in order to improve the knowledge base. Another task of the net-broker is to maintain the total knowledge base of the learning network. Internally, the net-broker keeps track of the existing knowledge base of the individual partners and the learning network in general. Externally, the net-broker observes markets and competitors in order to react to any changes. This could mean that the net-broker realizes that the learning network misses knowledge in a particular field, i.e. new technology, new markets, etc. In order to fill the knowledge gap the net-broker could either search for new member companies keeping the required knowledge or the net-broker could organise training or seminars, which would enable existing members to acquire the missing knowledge.
- Formation and operation of the network. Having identified an opportunity for sharing knowledge and learning in the initiation phase, the net-broker defines a number of tasks, searches for the necessary knowledge within the learning network and if it is necessary subcontracts external knowledge, and brings all the knowledge elements together.

THE ROLE OF IT IN LEARNING NETWORKS

Two fields which are undergoing major IT-enabled rethinking and innovation are the ones of learning and knowledge management (Angehrn, 2002). Multimedia, groupware and the internet in general are stimulating the emergence of new models and systems aimed at improving the efficiency and quality of knowledge creation and diffusion processes (Angehrn and Nabeth, 1997) which are being gradually adopted by educational institutions and corporations worldwide. However, 'globalising' or 'disembedding' (Giddens, 1990) knowledge is a challenge not always successfully met, and failure to consider the higher complexity of, for example, the endemic and existential components of knowledge, lies at the heart of many disappointments in experimenting with new models of technology-mediated learning and distributed knowledge management. For instance, specific IT tools for virtual teamwork offer great opportunities for collaborative, distributed knowledge diffusion and creation whilst virtual teams are emerging as the favoured organisational arrangement for accessing and melding IT-

averse knowledge components. We may distinguish between five different ways through which learning can be enhanced within a learning network:

First, decision-making in learning networks is critical for the success of learning since decision-making results to the specification of a variety of issues related to learning process and content. Previous research has shown that the most successful learning networks allow a participative decision-making process, to capture the opinion of as many members as possible, with an increased interaction between them before the actual decision-making sessions. A collaborative platform has the potential to facilitate the decision-making process and allow the intensive communication among a large number of individuals and organisations.

Second, one of the most usual problems of learning networks is the restriction of learning during the formally organised learning sessions of the network. If a manager is unable to follow one learning session due to time, travel or work restrictions, he/she has no way to access the missing part of his learning trajectory. Developing an appropriate Knowledge Management System (KMS) for the network can enable its members to minimize their losses from missing particular sessions.

Third, even if somebody has been in the relevant learning session he/she has no way to re-access the content of the learning session once he/she goes back to his/her organisation. The development of a KMS can help the network to increase both the duration and the efficiency of learning. For instance, an appropriate system can help with preparing better and follow-up more sufficiently the actual learning sessions. Furthermore the exchange of knowledge can be expanded through a system in between the learning sessions increasing the efficiency of learning.

Fourth, a very important barrier for increasing the efficiency of learning networks is related to the difficulty of the individual managers who participate in the learning sessions to pass the captured knowledge in the rest of the organisation. A KMS which would allow more people from the organisations to access the issues discussed during the learning sessions can reduce significantly the diffusion barrier.

Finally, members that join a learning network at a certain time cannot benefit from previous learning that had been taken place in the network, missing a valuable part of the learning trajectory. An appropriately developed system can provide training services to lately joined members enabling them to cover part of the lost ground. The system can incorporate functions to keep related documents and other material (e.g. training courses etc.).

EXPERIENCES AND LESSONS-LEARNED FROM DEPLOYING INFORMATION TECHNOLOGY IN LEARNING NETWORKS

The aforementioned issues are addressed by the Knowlaboration project, a European research effort supported by the European Commission's IST programme. The Knowlaboration project examines the business issues, the related concepts and the necessary technology for inter-organisational learning networks. The aim is to develop, apply, validate and exploit a dynamic

tool-set (software platform and methodological guidelines) that will assist European inter-organisational learning networks to empower their members and the involved individuals to define, develop and manage the content and the process of their learning.

In this section we will briefly describe the characteristics of the learning network studied emphasising and analysing the learning and knowledge sharing processes taking place, in order to identify the implications these characteristics have on the technology needed for supporting the operation of the network.

The AC Styria Case

The Styrian government and the local business promotion agency co-financed and created the AC Styria auto cluster in 1996. Their idea was to establish an independent association that would market with one voice the automotive skills and talents located in Styria. The founder's main interests were to improve the climate for inward investments; improve the performance of their supplier; improve the network between themselves; create network-qualified companies, to improve the possibilities of a successful and reliable outsourcing. The main characteristics of the AC Styria network are described below.

Joining the Network. ACstyria serves as an information broker; it also encourages peer-to-peer contact. There are two different types of partners: the first type consists of partners who come because they can get information for a variety of different issues while the second type are companies that join because they are interested mainly in the networking and the relationships that they are able to establish with ACstyria. In the later group there are also companies that find the network as a marketing channel for selling their products or services.

ACS takes a customizable approach in attracting and recruiting new members. E.g. if they are approaching a production company they already know that their main concerns involve knowledge areas and training. Currently there are 200 member companies, 85 core groups and 6 partners in research and development sector (like the University of Graz).

Decision-making. Four full-time employees manage the work at ACstyria. They are guided by a five-member Board of Directors, who meet three to five times a year to review finances and the strategic planning for the network. For most tactical decisions - that do not require financing - the shareholders do not intervene. ACstyria makes an effort to include member companies in the tactical decision making process. Although ACS members lack time but they are concerned about dissemination of information.

Learning Processes. ACS uses formal and informal communication in different ways and for different purposes. The network is not an academic or virtual project, but a real life network whose most significant feature is practicality. ACS functions mainly as an inward looking network in the sense that it mainly addresses knowledge sharing within its members. Nevertheless, it also imports knowledge from outside the network and then transfers it to the network members. The latter is accomplished mainly through invitation of academics that are active in fields related to the automotive industry.

It appears that the diversity of partners—small, medium and large companies, as well as involvement of local universities and research centers—creates a rich pool of information that

feeds the cluster. According to AC Styria’s director, most partners are concerned about staying abreast of industry news. This is not surprising given that the automotive industry is subject to strict quality regulations. Companies are pressured to get better and better at what they do while at the same time lowering their costs.

In what is essentially a classic inter-organizational learning model, ACstyria facilitates learning by bringing together people who deal with the same problems but in different contexts. Nearly all of its partners, for example, must contend with logistics issues.

There are different kinds of learning subjects, for example, quality management. ACS appoints “managing” responsibilities and roles to people from the participating members. For instance, it uses quality managers from members to lead and facilitate knowledge sharing regarding quality management issues through the whole network. Members reduce the cost because they get experience from other companies.

ACS is organizing learning sessions focused on an individual company and/or direct suppliers of a big company. In these sessions knowledge exchange occurs primarily in an informal way (tacit to tacit knowledge) Network members exchange knowledge mostly in an informal way because they know each other. The individual learning sessions which take place within the member’s premises, allow the ACS staff to meet several people from within the organization. In that way ACS is trying to pass the knowledge to the rest of the organization.

Knowledge	ACStyria Network
tacit to tacit	group discussions,
sympathised knowledge	seminars, factory visits, workshops
tacit to explicit	Quality managers train their workers,
conceptual knowledge	Workshops, learning sessions
explicit to explicit	Organisation of learning sessions i.e. on
systemic knowledge	government regulations
explicit to tacit	not applicable
operational knowledge	

Table 1: Learning Mechanisms deployed by the ACSnetwork

Other learning mechanisms include factory visits, seminars and workshops. The organizations of conferences and impulse events, the use of telephone advisory services and the development of self-helped publications (like the monthly newsletter “members only”) are also means of learning.

A new area AC Styria is exploring as a way of generating income and meeting customer needs is training. Training, in fact, appears to be one of the most pressing issues for partners. Rather than get into the training business themselves, the ACstyria is responding to this need by serving as a sort of “matchmaker” between training companies and partner companies. Understandably most partners are focused on immediate survival. A recent customer satisfaction survey conducted by a local university student showed that partners are mainly concerned with practical issues, such as: value analysis, storage logistics, general survey of the logistic systems, e-procurement, future of virtual engineering, benchmarking, lack of IT-specialists and customer – supplier contracts.

Motivation. ACS seems to encourage trust among members for their mutual benefit. Member companies are willing to exchange knowledge if it is on infrastructural and operational issues, e.g. a particular metal joining process or on quality management issues. But when it comes to issues that one used for competitive advantage and for differentiation (like marketing techniques), people will not share their experiences. This is a common problem in the highly competitive automotive industry and ACS does not seem to have face it yet.

DESIGNING AN ICT SYSTEM TO SUPPORT THE AC STYRIA NETWORK

The Knowlaboration project is designing and developing an ICT system to specifically support the setting-up, maintenance and operation of learning networks. The *KNOWLABORATION* system is designed to support six main categories of users:

- (a) The managers of an organization, which co-ordinates or wish to co-ordinate a learning network;
- (b) The managers of the members who have decision making responsibilities within the network; the number of managers with such responsibilities vary from a few people representing all members to one representative from each participating organization.
- (c) The employees who participate in actual learning sessions of the network; these people are predominantly coming from private companies but they could also come from other non-profit organizations like trade unions and public sector organizations.
- (d) The employees who do not participate in specific learning sessions of the network; usually members appoint specific persons to follow the learning sessions of the network who however find it difficult to convey the learning content of the sessions to the rest of the organization.
- (e) The employees of associated members (if existing) who can also reap the fruits of learning that is taking place within the network, if the network decides to allow access to learning material; this is the case of members which pay reduced subscription and have limited participation and access to the network.

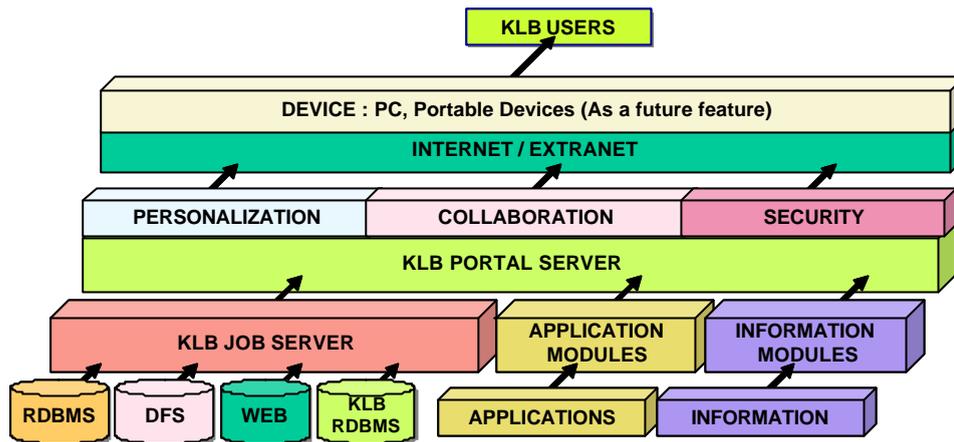


Figure 2: General Architecture of the NOWLABORATION System

As shown in figure 2, the Knowlaboration system consists of several subsystems, which provide different functionality to the different types of users.

Knowlaboration Portal Server

Is the core engine of the system. In this subsystem all the main functions of the system are processed in order to provide the user with the feeling of a transparent integration between all the subsystems. The Knowlaboration Portal Server provides:

(1) Content Management

Manages all the system's content in such way that enables the Information creation and the production of the user-visual content.

(2) Document Management

Manages all the system's documents, providing all the main functionalities, such as:

- Multiple categories with additional Meta data for searching purposes
- Uploading of any type of document with full text indexing capability as well as meta data declarations
- Versioning of documents
- Proximity search functionality by using meta data and keyword searchcriteria that are gathered automatically from the hierarchical category structure.

(3) Personal File manager

It provides a complete corporate web based storage and file management solution for Knowlaboration users, resembling the Microsoft Windows Explorer look and feel.

(4) Project Workspace

Provides a private workspace for user groups that will develop knowledge, which later on can be published to the public Knowlaboration System. All basic functionalities of the Knowlaboration System are also available here (Document management, Content Management, Search, Calendar, Communicative tools etc.)

(5) Search / Metasearch

Provides a complete search environment for retrieving data from any Information object available. It also provides the functionality for search the web simultaneously to the local search in order to provide the most accurate results to the user.

(6) Reporting and auditing

A special tool for auditing the usage of the system and generating of query based reports in order to enable the knowledge officers decide what information is valuable to the users and how this should be published.

Knowlaboration Job Server

Manages all the system's content by accessing different data sources. It also performs standard jobs in order to update the contents and the index that will be later used for searching the system.

The Knowlaboration Job Server provides:

(1) Smart Caching

Offers caching functionality for accelerating the presentation and the retrieval of different information that is used regularly from the Knowlaboration users.

(2) Content Aggregation Engine

Offers the ability to Aggregate content and information of different format and provide a uniform data object presentation to the user. This enables the searching of information within the large database of the system.

(3) Intelligent Agents, Crawlers Engine

Offer the ability to automatically collect data from different sources by declaring specific rules that the content should comply. The Agents are programmed by the administrator or other privileged users in order to perform the jobs in such a way that do not create any load to the system. Multi Server/ Application environment

(4) Distributed File Systems Indexing Engine

Offer the ability to connect to existing file systems, thus enable for easier access of existing information without the need of data migration procedures during the installation of the system.

(5) Administration Interface

The subsystem will provide a full administration environment in order to help the system administrators perform daily maintenance and administrative tasks.

Knowlaboration Security Engine

Manages all the system's security.

Collaboration Tools

These tools allow the collaboration of the users in several ways (synchronous / asynchronous) The Collaboration tools are: E-Mail, Forums, SMS messaging, Chat engine, Instant messaging, Video conferencing / Audio conferencing

Personalization Engine

This engine allows the filtering of information to the user in such way that it meets personal criteria given by him/her. The personalisation can extent to user groups (channels) or each user according to the level of IT knowledge each one carries.

The personalisation features are:

(1) Pages personalization

Each user / group is able to dynamically build as many pages as he/she wants by selecting available information or application modules and placing them on a page. The whole procedure should be very easy in order to allow even the less experienced computer users to use this functionality. This way each user can form the appearance of the content or the applications that he uses in such way that suit his personal needs and preferences.

(2) Colors personalization

Each user can select personal colors so that the whole application suits his preferences in terms of colors.

(3) Language personalization

Each user can select a pre installed System Language in order to have a more friendly use of the system. The Language setting affects only the messages, dialogs and user interface of the System and not the content. The content is presented in its original language used in the insertion phase.

(4) Information personalization

Each user can select what kind of information he/she would like to see. This way all useless information is filtered and not shown to the user.

RECOMMENDATIONS FOR EFFECTIVELY DEPLOYING INFORMATION TECHNOLOGY IN LEARNING NETWORKS

From our experience and interaction with the learning network we have derived a constructive set of recommendations for effectively deploying IT. These design principles are not recipes, but rather embody our understanding of how modern IT can help learning networks.

The first recommendation highlights the need to support the three main learning network management processes: (1) The initiation phase, that concerns itself with the setting up of the learning network. The IT tools should provide: a detailed checklist with which potential community-initiators, mechanisms to identify the type of members that such a community would require and planning facilities to ensure the workability of the community. (2) The maintenance and improvement phase, that concerns itself with sustaining the momentum of the community that has been set up and sustain active knowledge sharing within the community. The IT tools should provide: facilities to support the maintenance and growth of the network and member management facilities that will help users integration for the main activities of the network. Typical features of the kind include synchronization of calendars and synchronous events. Other useful facilities aiming at promoting and marketing the network to relevant stakeholders include invitations, minutes of recent events and hot topics. (3) Facilities during the operation phase should monitor if the individual members can see benefits for themselves and their business.

The second recommendation is referring to the integration of the system with existing business processes. Participation in a learning network usually competes with other priorities in the lives of members. It is crucial to make participation as easy and efficient as possible. ICT therefore should make participation easy, provide time and attention management, through functionalities such as personalized knowledge/application portals, subscriptions, tours of new activity and archiving of interactions, integration with work systems.

The third recommendation clarifies that the learning network system should address the issues of presence, visibility and motivation. Personal identities are a crucial aspect of participation. Members bring their identities to the community and their participation both develops and shapes their identities. IT can help with features such as member profiles, ranking and preferences and presence awareness. A collaborative community such as a learning network has also a sense of communal identity that is primarily formed by cultivating “alive and real” relationships between the members. The use of personal profiles in the ICT system can reveal relationships, support private interactions and interpersonal and mentoring relationships.

Fourthly, a learning network should thrive to deliver value both to their members as well as to the stakeholders and the network as a whole. In the short-term, members need to find immediate value in their participation. Preserving the time of experts within the network is for instance an important concern. The IT system should provide mechanisms for asking

questions, lists of FAQ's, databases of answers, intelligent access to experts and brainstorming facilities. The value that the network delivers also has a long-term dimension. It derives from a sense of accumulation over time. In order to define "best practises" the IT system should provide repositories for artefacts, taxonomies, search mechanisms and learning agenda.

The value of belonging to a learning network derives not only from having access to peers, but also from having access to the leading edge in the broader world. Therefore as a fifth recommendation, we stress the need for IT facilities that assist in the direction of providing connections to the world include: what is happening, what is hot in the field, new developments, new technologies, evaluation and reviews, external experts, reference material, news and announcements of external events, directory of external experts, links to other sites and library of references.

Learning networks usually have members who take an active role in cultivating the community and may participate in the decisions that affect the operation of the network. The sixth recommendation is about offering a variety of administrative tools to monitor and configure the use and effectiveness of the network space. Typical features of this kind include: logs and statistics for monitoring, polling and voting facilities, assessment tools and surveys, performance indicators and finally switches and policy enforcement algorithms.

EPILOUE

The new knowledge-based economy necessitates increasingly the collaboration between different organisations. Despite the recent upsurge in elearning and knowledge management systems, the vast majority of these systems focus on either individual users or individual organisations. This article briefly introduces the concept of the learning network, highlights the role of the broker in it and provides a constructive set of recommendations for using IT to support learning and knowledge sharing at the network level.

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