State of the Art Review for Task 8.4 Network Management

Document status and date:
Published: 30/11/2006

Document Version:
Peer reviewed version

Open Universiteit

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5.1 Objectives

Successful communities are characterized by boundaries which protect their collective good, populated with a heterogeneous group of members to assure their liveliness and equipped with guidelines that foster ongoing interactions among its members. Although norms and rules may arise out of member interaction, policies and purpose of the community need to be communicated in order to set initial boundaries within which to act (Weber, 2004). These policies can then be renegotiated by community members as the network evolves. Task 8.4 will describe models that help explain and understand the functioning of networked communities as well as tools that help manage them, all the while preserving a maximum of user autonomy and control. It will also present policies and identify services that foster successful, self-organizing communities, including their ontological requirements. Such policies and tools are important because they allow for the emergence of network communities that are increasingly self-governed, self-organized and decentralized.

5.2 Models and methods

As far as the functioning of communities is concerned, two kind of models may be discerned. There are models that aim at the dynamic behaviour of communities and mainly have an explanatory function. To the extent that they provide successful explanations, they may also be used as a basis for community design and management. And then there are also conceptual models or domain models that seek to make an inventory of pertinent terminology and describe the way terms are related to each other. Such models do not explain nor provide development or design guidelines, their function is to provide a useful vocabulary. In this section, we will first describe a domain model en then describe various dynamic models, that each focus on a particular aspect of communities.

5.2.1 Domain model

5.2.1.1 *Community*. A learning network is, among other things, a *community* of people (*members*) who share the intention to learn something about a particular *domain of knowledge*. Actually, calling a learning network a community presumes already too much, as its connotation is one of people who somehow interact and have a shared history. We do not assume this to be the case up front, although it may, as a matter of contingent fact, happen to be true for some of the members. Eventually, it will become true. Either way, we assume that *strengthening the social ties within a (learning) community will positively affect learning*. So, through active participation in the community the learning goals people have set for themselves will be attained more effectively, more efficiently, more attractively; or, put differently, reshaping a learning network as a community enhances the quality of the members' learning experience.

There are various ways to back up this assumption, such as social constructivist learning theories and, more generally, the notion that we as social animals – the term goes back as far as Aristotle -simply perform better in a social context. Justifying this assumption is not our present concern.

5.2.1.2 *Activities and roles*. The strengthening of social ties does not come about automatically. Mechanisms that allow or even stimulate the members to interact will have to be implemented. Typically, members engage in some sort of joint *activity*, i.e. they individually carry out *tasks* that fit into some overall activity. It is through their joint participation in an activity that mutual ties are strengthened. With respect to a particular activity, community members may be classified as *participants* and *non-participants*. The latter stay out off the activity entirely, may not even be aware of its taking place, the former carry out tasks. With respect to some activity, participants adopt *roles* that are specific to that activity (although similarly named roles are likely to occur in other activities).

For example, the activity of peer-tutoring in ad hoc, transient (sub)communities (Kester et al., submitted; Sloep et al., submitted) may take place in a learning network's community. Those outside the ad hoc community are non-participants, those inside are participants. In the example, there are two kinds of participants, a tutee, whose task it is to ask a question, and several peer-tutors, whose task it is to answer the tutee's question. Asking a question, answering a question, reacting to someone's answer, rephrasing the original question are all tasks in the overall activity of peer-tutoring.

Playing an initiation game in the course of joining a particular learning network is another example of an activity. Here the initiation game is the overall activity and the notion of a role is to be taken quite literally. Tasks are moves made in the game. A concrete example could be two opposing teams trying to find the way out of a virtual maze. The sole purpose is letting participants get to know each other. All participants may have the same role, although they are on different teams, or there may be role differentiation. Sharing bookmarks through a public site, such as Del.icio.us, is another, relatively simple example of an activity. Here every member might be a participant. There are two roles, active providers and lurkers. The entire activity consists of two tasks only, sharing a bookmark and finding someone else's bookmarks. Lurkers do only the latter, providers do both.

With respect to learning, joint activities may be grouped into two broad categories, depending on the goals of the participants and a few other characteristics (Strijbos, 2004). On the one hand there's *collaborative* work, such as found in project teams. The people on such a team have different responsibilities (division of labour), each participant contributes to a single common goal such as producing a joint report or software product. As a consequence their individual tasks are somewhat synchronized in time, a bit like in online project organization. In a learning situation, the goal to be pursued is set by a teacher in the form of an assignment; often also the allotment of the work is also done by the teacher, as is the setting of an overall time-frame, often also of detailed milestones. Typically, the common end result will be assessed and no distinction will be made between individual contributions. Often, individuals will be assessed too, but that then pertains to their behaviour as a group member.

On the other hand, there is *cooperative* work. Participants all pursue their own private goals, there is no division of labour, and all have their own schedules they adhere to; so there's no synchronization of individual tasks. Teachers are not involved in this, with the exception perhaps of suggesting that teaming up with someone else may be useful. Typically, only individual products are assessed, irrespective of whether they were the result of an individual or joint effort.

5.2.1.3 *Participant characteristics*. Participants in a particular activity need to be describable in terms that are relevant to their role in a given activity. Participants may be described in many different ways, but what matters here are the characteristics that are relevant to the activity they participate in; so this is an abstraction process. Characterizing

them is a way of identifying them. Non-participants do not need to be characterized, at least with respect to the activity in question.

For example, tutees in the peer-tutoring activity are characterized as group by their asking questions. An individual tutee is characterized by the specific question he or she asks. Perhaps there are other relevant characteristics (number of questions asked, courses taken, current course), but these need not been taken into account immediately. Peer-tutors are characterized by their role as question answerers. Each tutor is more or less suitable as an answerer. Their suitability really is an aggregate of content competence, tutor competence, eligibility, and availability. Other characteristics could be taken into account, such as number of questions answered, recent history of questions answered. (Kester et al., submitted; Sloep et al., submitted). With respect to the initiation game – getting out off the maze – all participants adopt the same role within one team. The team is characterized by the progress it has made; this characterization is identical for all members on the same team. With respect to the bookmarking activity, a participant is either a provider or a consumer. A particular participant could be characterized by his or her historical record, by the total number of bookmarks contributed, by the diversity of the bookmarks, etc.

5.2.1.4 *Proximate and ultimate goals*. Every activity in a community has a particular purpose, i.e. the activity's participants engage in the activity because through their participation they pursue a particular goal. One should distinguish between *proximate* and *ultimate* goals. Being part of a learning network, we assume all participants to have a similar ultimate goal, which is to become more proficient with respect to a particular aspect of the domain of knowledge that the learning network covers. The ultimate goals only differ with respect to their exact elaboration: although some learning network users may have identical ultimate goals, most will not. This variation really only means that in a learning network one may learn a variety of different things. Proximate goals are mere means to an end, to the ultimate goal. Proximate goals are therefore like instruments, they help to achieve something else. One's proximate goal is determined by the kind of activity one engages in, they are the goal a participant in an activity pursues. They are also role-specific. Ultimate goals are connected with activities in that activities channel the efforts members make to reach their ultimate goals. Some activities are better channels than others in that they require less effort for a similar effect. Proximate goals are the role-bound goals set by a particular activity. It is through the activity that the achievement of a proximate goal contributes to the achievement of an ultimate goal.

Pursuing a proximate goal in some activity may be a more or less effective means of moving towards the achievement of one's ultimate goals. How effective it is depends on the activity, on its kind but also on the way it has been designed. There are many degrees of freedom in the design of any activity, at least some will affect the activity' effectiveness.

Tutees in the peer-tutoring activity have as their proximate goal to have their question answered satisfactorily and as quickly as possible. Peer-tutors do not have that same proximate goal, theirs is to have their own questions answered when, at another moment of time they have one; or, getting a better grasp of the subject matter by explaining it to someone else. The peer-tutoring activity should be designed in such a way that questions will be answered quickly and efficiently. This brings us to questions about dynamic community behaviour and its theories and models.

5.2.2 Social space

A sound social space is characterized by affective work relationships, strong group cohesiveness, trust (i.e., perceived reliability of the word of other group members and genuine

interest in the welfare of group members), respect, belonging (i.e., recognition of membership) and satisfaction (Kreijns, 2004; Nichani, 2001; Rovai, 2002). Social interaction enhances the emergence of social space. Interaction directed towards the completion of assigned tasks, however, could negatively influence aspects of this social space. When a task entails peer assessment, for example, fear of criticism or reluctance to criticize could interfere with feelings of trust (Rovai, 2002). An individual's expectations of the community could also negatively influence social interaction and hence the emergence of social space. According to Brown (2001), individuals who felt that people needed to join voluntarily or felt that face-to-face association was necessary, only developed a sense of belonging and trust if they joined a face-to-face community of their own volition. So social interaction and, as a consequence, the emergence of social space is facilitated only if socio-emotional-driven interaction is stimulated and not merely task-driven interaction; the same facilitation is observed when people's expectations about a community are met.

More generally still, three social prerequisites should be met in order for social interaction, in particular cooperation, to occur: (1) any two individuals must be likely to meet again in the future (*continuity*), (2) all individuals must be able to identify each other (*recognizability*) and (3) all individuals must be able to know how any other person has behaved in the past (*history*). If individuals only meet once, they are very much tempted to behave selfishly, which negatively influences the cooperation process. In addition, if individuals are not identifiable and no history of a person's behavior is available, group members are more likely to act selfishly because they cannot be held accountable for their actions (Kollock, 1998).

5.2.2.1 Relevant theories. The *social exchange theory* of Thibaut and Kelly (1959) applies Skinner's behaviourism to groups. Individuals strive to maximize their rewards and minimize their costs. Within groups, individuals no longer control their outcomes. Interdependences are created: actions (tasks) of each group member potentially influence outcomes of actions (tasks) of every other group member. Members negotiate throughout their interaction to secure greater personal rewards while minimizing costs.

Systems theory (Millen, 1978; McClure, 1998; Tubbs, 2001) regards groups as systems of interacting individuals. Groups can set goals, and work towards these goals through united action. The task of the group is to analyze inputs, provide feedback to members, and generate decisions regarding group actions. The analysis is focused on the information input that is fed into the group, the processes during group work and the products that are generated as output. Inputs include any factors that are present when the group work begins, such as characteristics of individual members (skill, experience, training, motivation) and group-level factors (group structure and cohesiveness). Processes include communication, planning, conflict and leadership. The outputs include aspects of the group's performance (products, decisions, and errors) and changes in the factors that serve as inputs. Larger groups may be built on a number of smaller groups. This organization is initiated by the system itself, and may undergo both gradual and rapid change.

Expectation-states theory (Berger, Wagner & Zelditch, 1992; Wagner & Berger, 1993) focuses on the cognitive processes that occur within each individual in the group. Newcomers form an impression of the group, and search for information about the other group members. Group members search their memories for stored information about the group and tasks it must face; they take note of the actions of others and try to understand what caused the other member to act in a particular way. Group members allocate status within the group by two types of cues: specific status characteristics (i.e. qualities attested to each individual's level of ability to perform the specific task at hand) and diffuse status characteristics (i.e. general

qualities that group members think are relevant to ability and evaluation). Members with the most status-earning characteristics will rise to the top.

Level-of-aspiration theory (Lewin, Dembo, Festinger, & Sears, 1944; Zander, 1971) is a compromise between ideal goals that people set and more realistic expectations that they develop over time. Applied to groups, group members compare their performance to the group standards and eventually revise their strategies. A group's level of aspiration often slightly exceeds those of individual members. Also, members raise it more after success than they lower it after failure. Difficult goals challenge members to work harder; groups that fail consistently have low group morale and high turnover in membership.

Complexity theory (Waldrop, 1992; Kauffman, 1995) states that critically interacting components self-organize to form potentially evolving structures exhibiting a hierarchy of emergent system properties. This theory takes the view that systems are best regarded as wholes, and studied as such, rejecting the traditional emphasis on simplification and reduction as inadequate techniques on which to base this sort of scientific work. Such techniques, whilst valuable in investigation and data collection, fail in their application at system level due to the inherent nonlinearity of strongly interconnected systems - the causes and effects are not separate and the whole is not the sum of the parts. The approaches used in complexity theory are based on a number of new mathematical techniques, originating from fields as diverse as physics, biology, artificial intelligence, politics and telecommunications, and this interdisciplinary viewpoint is the crucial aspect, reflecting the general applicability of the theory to systems in all areas.

Self-organization theory (Varela, Thompson, & Rosch, 1991; Maturana & Varela, 1992) contends that the behaviour of the system as a whole, and often of the individual parts, is a complex aggregation of the interactions of all the parts. No part controls the whole, or can even control another part outside the influence of the rest of the system. Such systems are said to be 'self-organizing' and the behaviour of aggregates of components is said to be 'emergent'. In these systems, which certainly include living organisms, ecosystems, and social or ecosocial systems, there are no isolated controlling agencies. There is no all-powerful father, boss, or king. There are no control hierarchies among components: no generals, captains, or soldiers. Self-organizing systems are inherently 'democratic'.

5.2.3 Community characteristics

Communities are characterized by (1) boundaries, (2) rules, (3) monitoring possibilities and (4) sanctioning mechanisms (Kollock & Smith, 1996; Koper, et al., 2004). Successful communities have clearly defined boundaries. These boundaries protect the collective good of the community to outsiders and encourage ongoing interaction because the group members are likely to meet again. In addition, communities have a set of rules that govern the use of common resources and that point out who is responsible for producing and maintaining the collective goods. Community members should be responsible for setting and modifying these rules themselves. Individual accountability facilitates cooperation. By monitoring each other's actions in a community, community members see whether their fellow members comply with the rules; if they do, this will make them more willing to comply themselves. A transparent community with clear boundaries and rules allows group members to sanction the behaviour of other group members. This happens mostly by informal social control mechanisms but sometimes more firm measures are necessary. These measures could be as severe as banishment from the group. So, monitoring and sanctioning, if used wisely, are important facilitators of cooperative relations (Kollock & Smidt, 1996).

5.2.4 Community population

The thriving of a community also depends on the characteristics of the people in it. First of all, people differ with regard to their experiences with communities. Often students are divided in *veterans* and *newbies*. Brown (2001) found that veterans showed good community behaviour. They were supporting and encouraging peers, sharing knowledge and experiences, reflecting on past learning, and sustaining friendships and/or acquaintances begun earlier. Newbies, however, depended much less on other group members and were wont to rapidly call for tutor help. They preferred a tight class structure with frequent interaction and helpful assessment from the tutor. It seems therefore wise to populate a community with both veterans and newbies. Because of their experience, veterans model good community behaviour to the newbies. Newbies can turn to veterans for support and encouragement instead of to the tutor. Although this helps to create an online community, veterans need an incentive to continue to interact with newbies. Veterans are willing to do their 'duty' in the beginning but after a while tend to restrict their communication to veterans only, which hinders community building (Brown, 2001).

Second, most people are trend-followers, but it is the trendsetters that make the difference. Nichani (2001) describes three types of trendsetters, that each could have a big influence on the thriving of a community: connectors, mavens and salesmen. Connectors form the 'social glue' of a community; they are very sociable and attentive and have a talent for making friends. Mavens are the information experts that have a talent for collecting information and who are willing to tell others about it. Salesmen are persuaders, they have a tendency to reach out to the unconvinced and persuade them, in this case to join the community. The absence of these trendsetters in a community, which then consists of trend-followers only, will negatively influence elementary features such as belonging, trust and social interaction.

Finally and related to the issue of trendsetting, participants of online newsgroups differ in their inclination to either lurk or post in a community. A lurker, by definition, belongs to a community but never posts in it. The percentage of lurkers in communities is very variable (i.e., ranging from 0% to 99%; Preece, Nonneke & Andrews, 2004). For example, lurkers appear to make up 45.5% of health support communities while the lurker population in software support communities could be as high as 82% (for an overview, see Preece et al., 2004). Reasons for not posting range from 'didn't need to post', 'needed to find out about the group', 'couldn't make the software work', 'didn't like the group' to 'had nothing to offer' (Preece et al., 2004). Posters and lurkers are attracted to and join a community for the same reasons. However, posters feel their needs are better met, perceive more benefit and feel a greater sense of membership than lurkers. Partly because posters do not regard lurkers as inferior members, lurking is not necessarily a problem in active communities (see also Weber, 2004). Without a critical mass of posters, however, a community will never thrive (Preece, et al., 2004).

5.2.5 Community guidelines

Task 8.4 reward and incentive mechanisms need to be in place to encourage users to share, use and contribute knowledge. Additional policies, such as member participation, terms of use, quality standards and procedures, including their ontological requirements need to be considered.

5.2.5.1 *Guidelines for fostering social space.* The *recognisability* of users may be assured by forbidding the use of aliases such as screen names; this seems a reasonable demand to make in the context of a network devoted to learning. If one does not want to be

this strict, users that go by a pseudonym should adopt one and only one persistent pseudonym, i.e. a single pseudonym they keep throughout their membership of the network and use in all interactions.

A *historical record* of user activities is maintained by logging all user-activities. The ones most significant for knowledge sharing - activities that reflect content competency and sharing competency - become part of the user's *profile*. Content competency reflects the user's mastery of the content within the network. Hereto, the profile contains the products that resulted from the learning activities of a user (i.e., papers, reports, assessments). Sharing competency refers to the ability of a user to satisfactorily support peers during a process of knowledge sharing. This information could be acquired by letting users rate each other's performance. To enhance individual accountability (Slavin, 1995), both content and sharing competency of a user is made visible to the members of a particular ad hoc, transient community (there seems to be no reason to stigmatize a person at this stage by making it always available within the entire network). For the same reason, rating should not be anonymous, at most singularly and persistently pseudonymous.

Continuity of contact is guaranteed by demanding that all community members are accessible. But continuity of contact only makes sense if there is extra value that having access to others. Therefore, learning network users should be allowed and stimulated to maintain a rich online identity. This should preferably be done through a digital dossier or *portfolio*. It should contain information on a user's background, but it should also be updated regularly and automatically, almost as a track record of someone presence in the learning network. The portfolio is part of a user's profile.

5.2.5.2 *Guidelines for community characteristics*. The (proximate and ulitmate) goals learners have form the incentive for the process of knowledge sharing. Indirectly this goal strongly influences the amount of social interaction during knowledge sharing within the community. Clearly, a goal that can be reached by only one correct solution will elicit less social interaction than a goal that can be reached through various solutions.

Different interaction-structures can be implemented to mediate the effects of a goal on the social interaction. For example, if the goal can be reached by a limited number of solutions then a peer-tutoring structure could stimulate social interaction. King, Staffieri, and Adelgais (1998) advocate a three-step structure that consists of communication guidelines (i.e., listening, encouraging and giving feedback), an explanation procedure (i.e., the TEL WHY-procedure; telling in one's own words, explaining why and how, and linking of content), and questioning guidelines (e.g., asking comprehension questions or thinking questions). Other examples of structuring interaction within groups are "...*Group Investigation* (Sharan & Sharan, 1992), *Student Teams Achievement Division* (Slavin, 1995), 'Jigsaw' (Aronson & Thibodeau, 1992; Bielaczycs, 2001), *Structural Approach* by Kagan (1994)) (each structure is a scenario to teach specific skills and, although not likewise articulated, it is implicitly assumed that no situation is identical), *Progressive Inquiry* (Rahikainen, Lallimo, & Hakkarainen, 2001), *the use of scripts* (O'Donnell, 1999; Weinberger, Fischer, & Mandl, 2001), *scenarios that prescribe collaboration activity* (Wessner, Pfister, & Miao, 1999), *feedback rules or requirements of a minimum degree of contributions to a discussion* (Harasim et al., 1995)." (*fide* Strijbos, 2004; p.33). From our perspective, 'high-structuring' methods such as peer-tutoring or Jigsaw are most suitable for goals that can be reached by a limited number of solutions because they guarantee a minimum amount of social interaction. 'Low-structuring' methods such as Progressive Inquiry, however, are most suitable for goals that can be reached by various solutions because these methods support rather than elicit social interaction (e.g. negotiation, argumentation) which is believed to be necessary under these circumstances.

5.2.5.3 *Guidelines for the community population*. Specialization of roles has been associated with effective self-organizing systems. Roles help position and clarify the relationship between members. Roles also delineate the responsibility of each member for the production or maintenance of collective goods, and to stimulate the transition of lurkers and passive members to more active poster and co-developers of knowledge.

In other words a community should consist of a mix of members with complementary expertise, all related to the goal of the community. So if, for example, 'answering a content-related question' is the goal of the community, it should consist of members with different levels of expertise related to the content-question since heterogeneity in levels of expertise can have differential effects on learning. Although King and colleagues (1998) found that peer-tutors do not necessarily have to be more competent or more knowledgeable than their tutee counterparts, a study of Hinds, Patterson, and Pfeffer (2001) indicates that tutors equal in competence convey qualitatively different knowledge than more distant tutors. The near tutors - those who are similar to their tutees in expertise level - use more concrete statements during their interactions with the tutee. In contrast, the distant tutors - those with a higher level of expertise - convey more abstract and advanced concepts. Heterogeneity in level of expertise between members thus leads to a wide spectrum of knowledge shared in the community.

5.3 Existing practices

5.3.1 Virtual learning communities

5.3.1.1. *Scholieren.com*: www.scholieren.com.

Community population: Www.scholieren.com is a website maintained by Dutch pupils and meant for Dutch pupils. The community has over 63.000 subscribers, who can post contributions to the site. Most contributors are between 15 and 18 years old; a few are adults. Guests are allowed to view the contents of the site. Scholieren.com dates back to 1997. According to the editors, it is one of the most popular sites for pupils.

Community characteristics: At the website, all kinds of materials are exchanged that can be useful for pupils, for example extracts. Besides , the websites contains various discussion forums, in which pupils can post their questions and problems. Their topics include anything that a pupil can come across, and include much more than education. The forums on homework are classified by subject area. Usually, contributors do not have to wait very long for reactions to their message. It is not unusual to receive five reactions within the first few hours after posting.

Social space: The discussions are moderated by one of the pupils from the website editorial staff. Moderators must be at least 15 years old. There is a distinction between a 'moderator' and a 'moderator+'. A moderator is responsible for one subforum, and can move, remove, adjust and close topics. A moderator+ keeps an eye on one whole forum. A moderator+ can interfere with a subforums if moderator hasn't taken appropriate action. A moderator+ can also ban people from the community. Materials for exchanges are placed in a database. The main categories are book reports and papers. Pupils can search the database and they can post requests for book reports of specific books.

The success of Scholieren.com seems to be determined by several factors. One is the enormous number of subscribers. At any moment there will be a few hundred of the 63.000 subscribers online. The large number of subscribers is the result not only of the huge size of the target group, but also of the urgency of the problems that are discussed. Pupils have a lot

of homework, and often they get stuck and need help. Further, the community consists mainly of peers, which makes it easier for individuals to ask questions. This is strengthened by the possibility to use a nickname (pseudonym), which almost everyone does. Finally, the community is moderated, so that disorderly and undesirable behaviour are reduced.

5.3.1.2. *Fifth dimension*: www.5d.org.

Community population: The Fifth Dimension (5D) is described by its founder Michael Cole as 'a specially designed cultural medium for promoting the all-around intellectual and social development of 6- to 12-year-old children' (Cole 1999). Children and university members can enter the community throughout the year. As a result, at any one moment the community is a mix of newcomers and old timers, in which some children have more experience with the norms and computer aspects of 5D than some Wizard's assistants. This leads to a change in the power relations between children and adults.

Community characteristics: 5D has been developed in the United States in the eighties and it is designed to address certain long-standing problems in American education, in particular the distressingly low academic achievement of many American children, the widely perceived need for them to gain a qualitatively richer experience with new information technologies, and the failure of apparently successful educational innovations to survive beyond the period of innovation and external funding. 5D is a virtual learning environment. 5D runs parallel to the university year and the school year. Working occurs in periods of eight weeks, in which members are active in 5D between one and four days a week. Its heart is formed by activities, which are presented to the children in the form of a cardboard maze, divided into 20 rooms, each of which gives access to two activities. Three quarter of the activities is computer activities, including computer games and educational software. According to the rules of 5D (enshrined in a Constitution, which each child receives upon entering the activity system), children progress through the maze; the whole process takes from several months up to several years. In order to carry out a task, children must first consult a task card that defines progress on that task. Each task on one task card is described at three levels: beginner level, good level and expert level. Higher levels of achievement increase children's freedom of choice in moving within the maze. They also give the child the possibility to alter their avatar, which is very plain in the beginning. Children who complete all the rooms in the maze attain expert status and access to new activities.

Social space: A very important role is played by the Wizard, the ultimate authority. The Wizard is the creator of the Constitution, helps children who experience difficulties, reprimands them in case of antisocial behaviour or working below their abilities, and settles disputes between members of the community. Children report their achievements to the Wizard, and are thus forced to explicate what they are doing. The Wizard is supported by the Wizard's assistants. 5D is run from universities, and the Wizard and the Wizard's assistants are university teachers and undergraduate students. Working in 5D is done from schools, youth clubs, day care, libraries and churches. Success and sustainability of 5D is defined by the interaction between 5D and the environment from which children participate. A quiet environment such as a library shows better learning results, but less chance of sustainability, as 5D is seen as a disturbing element. A noisy environment such as a youth club shows the opposite. [adapted from Cole, 1995 and 1999].

Success factors in 5D include the following. There are several non-personal mechanisms for settling disputes, such as the constitution and the Wizard. Achieving a higher level is rewarded in several ways, e.g. freedom of movement is increased, more activities come within reach, new duties and responsibilities are acquired, the avatar can be altered There is a constant flow of newcomers at all moments, resulting in more equal power relations. Success and sustainability is also defined by the interaction between 5D and the

environment from which children participate. Finally, a further interesting characteristic is the possibility of carrying out the same task at several levels of proficiency.

5.3.1.3 *Notschool*: www.notschool.net
Community population: Users are selected by panels based on set selection criteria.
Community characteristics: Notschool started as an online research project aimed at young people of school age who have been out of the traditional education systems for personal or logistical reasons. Notschool looks at ways to get these people back into learning. It is aimed at those people for whom traditional alternatives such as home tutoring have not worked. It started out with a virtual community of 100 people, but is now being used in Education Authorities in the UK and overseas with over 1700 people. The participants were given the opportunity to develop their self-esteem and be reintroduced to learning, through the support of mentors, buddies, experts and the use of new technology.

Four key factors distinguished the adults in Notschool.net from those in mainstream schools:
• Teams at local level were not teachers.
• They all had 24/7 access to up to date technology.
• They all had unlimited 24 hour access to broad bandwidth.
 • They all had good levels of computer literacy.
Social space: Notschool consists of a highly structured community, with a central support team and several local teams. Each local team contains several mentors and researchers (i.e. the pupils). No titles were used so no distinction could be made between adults or those with authority. Everybody could see who was online. Every comment was attributable. Everyone could see who had read what at what time. All words and phrases relating to school were avoided or changed into more acceptable words.

5.3.1.4 *ESP network*: www.esp.uva.nl
Community population: Teleprojects are collaborative distance learning projects designed by teachers from various countries around a part of curriculum that is thought to be mutually relevant. Leading idea of a teleproject is the combination of local research of pupils around a certain topic and exchange of, and conversation on research results with partner-schools, using a foreign language and electronic mail. Both domain specific teachers, foreign language teachers, and informatics teachers can help improve the activities of their pupils and make new educationally relevant activities possible when participating in teleprojects.
Community characteristics: The European Schools Project started in 1988. A central concept was introduced and refined to structure computer-supported collaborative learning between primary and secondary schools: the teleproject. The concept encompasses Internet-based collaborations between teachers and pupils around 'conversation' topics that are thought to be relevant for learning and teaching of all participants in the project. The topics demand active and authentic learning of the pupils, while for the collaboration a mutual foreign language, and electronic mail or Virtual Learning Environments are used.

5.3.3 Professional network communities, COPs

5.3.3.1 *Cisco Netpro*
Community population: Anonymous browsing of forums. Registration is required to add or reply to posts, and rate.
Community characteristics: There are forums for every possible topic related to networking professional. There is an expert section where experts present events on certain

topics. TechTalks are live events featuring technical presentations and the opportunity for viewers to have their questions answered online. Previously broadcast TechTalks are available for viewing at your convenience.

    Social space: Users can rate topics and indicate whether conversations contain suitable answers. Within each forum the top 5 rated users are displayed, indicating their points, average rating, and badge status. Badges can be earned by number of points. Over forums, the top experts can be listed, showing points, average rating, badge status and the number of posts with satisfactory answers.

5.4 Existing tools

    There are several applications which provide some of the aspects or functionalities that are required for management of social networks or allow implementation and/or enforcement of policies. Some are listed below. Also mentioned are some techniques that are required for implementation of network management tools.

- Relationships
The application should allow creating and managing expressions of personal relationships and build new ones. The FOAF (Friend of a Friend) standard can be used here.

- History of learner's activity
General logging techniques and the use of e-portfolio systems as well as social network analysis can be used.

-- Social Network Analysis
Social network analysis (SNA) determines and visualizes the patterns in interaction between people, groups, organisations, etc in social networks. People form the nodes in the network, while the links between the nodes shown relationships or flows. There are several commercial and some non-commercial applications available to perform these analyses. Examples are Analytic Technology, Inflow, Jung, Visone,

- Awareness and accountability
-- Babble/Loops
A socially translucent system, using awareness and accountability, which support computer-mediated communication, allowing threaded and persistent conversation. A social proxy is a graphical representation of users depicting their presence and activities in relation to the conversation (Erickson et al., 1999; Erickson et al., 2006).

- Recognisability
-- Applications like Orkut (http://www.orkut.com), LinkedIn® (http://www.linkedin.com/), Friendster® (http://www.friendster.com/), MySpace (http://www.myspace.com) and (http://www.facebook.com) Facebook are social network sites that allow people to create their profile and make that available to others. People can link to others and can comment on each other's profile.

-- the ASA-system, under development at the OUNL, that uses peer-tutoring in ad hoc, transient communities as a means to strengthen the social fabric of a learning community.

-- LiveJournal (http://www.livejournal.com) offers functionality at several aspects. It is an open source content management system that lies behind successful online communities, such as LiveJournal.com. LiveJournal combines FOAF services with blogging services; based

around journal it allows people to create communities. Users keep ownership and control over their space.

--ELGG, http://www.elgg.org is a learning application centred around user's profiles. When a user creates a profile it is automatically linked to others with the same interest, but also to resources. Weblogs are used for own reflections, but also communications with the community. Connections to other people and resources are used to build networks to enhance the learning experience. Users have control over how and what they present and can control who sees what.

-- social bookmarking and tagging applications, such as Furl, Del.ico.us and non-commercial variants.

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