VIRTUAL COMMUNITIES AS COMMONS: CASE STUDY OF "CONNECT"

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ABSTRACT

In a world increasingly networked with the help of information technology, where face-to-face communities are more and more supported by computer-mediated communication, and some communities exist solely in virtual space, the perennial social dilemma of cooperation has resurged, intriguing social researchers' attention with new elements brought about by technological advances, such as software applications enabling simultaneous communication of community members through public and private channels, easy access to a variety of documents, anonymous messaging, forums for potentially unlimited number of members who may join or observe, and a number of other IT-enabled community-building tools. In this paper the authors discuss the cooperation problem in virtual communities through the case-study of "Connect", an online community of Croatian scientists. Starting point of the analysis is the observation that cooperation in virtual communities may be encouraged by implementing technological solutions that provide users with incentives to cooperate. With this in mind, the authors inspect the compliance of "Connect" to a set of design principles of robust common-pool resource institutions elaborated by Elinor Ostrom. The study demonstrates that the "Connect" satisfies the majority of Ostrom's principles, with some room for improvement, and fails to satisfy two of them, mainly due to non-existence of technical prerequisites and due to relatively small size of the community. The analysis lays ground for further work aimed at obtaining more prescriptive guidelines that would point to possible improvements in management of common pool resources in virtual communities.

KEY WORDS

CLASSIFICATION

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THE PROBLEM OF COOPERATION AND THE IMPACT OF TECHNOLOGY

COLLECTIVE ACTION, COORDINATION AND COOPERATION

Oftentimes in social life, situations arise when efforts of two or more individuals are needed to accomplish an outcome, i.e. when a collective action is needed [1]. Sometimes collective action requires merely aligning oneself with the others, as in choosing the side of the street to drive on. This is referred to as coordination problem, which is not particularly difficult to manage, as it is obvious that driving on the same side is beneficial for all individuals involved. The advantage of aligning oneself with others, as well as the disadvantage of not doing so, provides clear incentives for everyone to coordinate [2]. A person driving on the right side in the UK would be at a great loss because everyone else there drives on the left side.

Sometimes collective action situations give rise to cooperation problems, which are much more difficult to manage than coordination problems due to a different incentive structure. In such cases, for a given individual, aligning with others requires denying oneself a gain that could be obtained if everyone aligns and the individual shirks. While aligning oneself with others is still beneficial, it is even more so if everyone else aligns and the given individual does not. In other words, in cooperation problems each of the persons involved has an incentive to try to be a free-rider [2]. If everyone wipes off snow in front of her house, a person not doing this would be better-off, because he would not invest any effort and would nevertheless reap benefits from the work of others. Laws and regulations regarding wiping off snow usually exist in order to threaten potential free-riders by sanctions, cancelling thus the effects of negative incentives.

INFORMATION TECHNOLOGY – TECHNOLOGY OF COOPERATION?

Fortunately, even in cases of cooperation problems, there are social and/or technical arrangements which lower the costs of individual cooperation to levels acceptable to most people. Some authors termed such arrangements "technologies of cooperation" [3, p. 29].

Whether information technology belongs to technologies of cooperation is a subject of controversy. Authors who underline negative aspects of technology – threats that technology poses to human dignity, liberty and quality of life – are also extremely suspicious towards the role technology may play in furthering human cooperation. Techno-pessimists predict that, for example, as more people spend more time communicating electronically, time for face-to-face family and community life will diminish further [4]. More optimistic authors, however, come to very different conclusions. Howard Rheingold is of the opinion that "[t]he most profoundly transformative potential of connecting human social proclivities to the efficiency of information technologies is the chance to do new things together, the potential for cooperating on scales and in ways never before possible" [3, p. 114]. According to Jon Katz, "[t]he online world is home to some of the most participatory citizens we are ever likely to have" [5].

Both techno-pessimists and techno-optimists often overlook that incentive structures provided by a given technology are not predetermined by the technology itself but by human beings who envision, invent and implement particular technological solutions. Instead of taking the strategic setting of cooperation as given, we may always ask how one can promote cooperation by transforming the strategic setting itself [6]. Lawrence Lessig, writing on the architecture of cyberspace, points out that "[w]e can build, or architect, or code cyberspace to protect values that we believe are fundamental, or we can build, or architect, or code

cyberspace to allow those values to disappear"[1] [7]. If cooperation is prominent on our list of values, then we may design cyberspace to reflect such a value system.

We are often witnessing that ethical imperatives, however right we may perceive them, are not by themselves powerful enough to encourage people to put a certain value high on their agenda. However, in case of cooperation ethical imperatives are also backed by pragmatic considerations. If incentives to free-ride are overcome and cooperation is sustained, cooperating parties get better-off than they would have been had they not cooperated. The support of such pragmatic considerations may provide additional power to ethical imperatives, which may increase the incidence of cooperative outcomes in human social interactions. Unfortunately, pragmatic reasoning combined with human affinity to interact and cooperate with persons who are more similar to themselves rather than those who are less similar, also gives rise to many undesirable phenomena such as racism, ethnocentrism, sexism, nepotism and other discriminative forms of behaviour.

Information technology, as any other one, is a technology of cooperation whenever it provides the incentives to cooperate, and it is not a technology of cooperation whenever it does not provide such incentives. The choice of whether it will provide the desired incentives is in the hands of the members of society who participate in technological development, and that means all of us, at least to a certain extent [8].

VIRTUAL COMMUNITIES AS COMMONS

A virtual community or on-line community is a group of people who use computer networks as their primary mode of interaction [9, p. 55]. The members of virtual community have shared purposes and interact socially by adhering to tacit and explicit protocols, rituals, and roles using computer network technologies that support interaction [10]. Virtual communities emerge when enough people carry on public discussions long enough, with sufficient human feeling, to form webs of personal relationships in cyberspace [11].

Virtual communities are a kind of commons, where commons is a general term referring to a resource shared by a group of people [12, p. 4]. The word originally denoted common pastureland of an English village where individual herders grazed their cattle [13]. Common resources that virtual communities provide are less tangible than pastureland, nevertheless, they are of importance to their members. Marc Smith identifies three kinds of collective goods that virtual communities provide: social network capital, knowledge capital and communion (cited in [11]). Social capital refers to the value of social networks and social contacts, as well as to the value of trust and reciprocity relations that arise from the networks and contacts [14]. Knowledge capital broadly includes all intelligible ideas, information, and data [12, p. 7] shared by community members. The members often "serve as information hunters and gatherers for each other" [3, p. 116]. Communion refers to various modes of emotional support, empathy and compassion among community members. Communion is closely related to social capital, as emotional ties arise from networks of social contacts.

THE TRAGEDY OF THE COMMONS

Sharing of a common resource leads to a variety of the cooperation problem known as the tragedy of the commons [15]. As common resource is always limited, each user should exploit only a certain share of it in order to avoid overexploitation. However, each one has an incentive to take more than her fair share, hoping that others will not take too much. If everyone succumbs to the temptation, the common resource ends depleted. In the original case of pastureland, it gets overgrazed and the grass ceases to grow. Such misfortunate endings present the tragedy of the commons. Today's social problems involving the tragedy

of the commons include pollution, over-fishing and excessive use of resources in general, traffic congestion problems, overpopulation and many others [13, 15].

As any other common resource, a virtual community is also susceptible to cooperation problems such as the tragedy of the commons. Collective goods provided by the community may be overused. Howard Rheingold, for example, points out that telling a newbie in a newsgroup to read the Frequently Asked Questions is a way for the community to constrain the over-consumption of its knowledge capital [3, p. 116]. If community experts were busy replying to newcomers all the time, their valuable time would be wasted.

Virtual communities, and particularly their discussion forums, are also susceptible to serial exchanges of deliberately hostile and insulting messages. Such exchanges in which emotional intensity often increases to extremely high levels are known as flame wars [16]. If video devices are not used, electronic communication is particularly conducive to flame wars because it is not easy to transmit facial expressions or voice intonations which may moderate the tone of a message[2]. The use of smileys and other emoticons may mitigate this problem to some extent. Pointing to the problems of flame wars and indulgence in ego-trips, Rheingold observes that "[t]he presence of flamers, bullies, bigots, charlatans, know-nothings, and nuts in online discourses poses a classic tragedy of the commons dilemma. If too many people take advantage of open access to seek other people's attention, the excesses of the free riders drive away the people who make the conversation valuable" [3, p. 121]. The most serious excesses may include the misuse of community's communication channels to spread spam e-mail or computer viruses, disseminate racist or xenophobic material, promote or incite hatred, discrimination or violence against particular individuals or groups, etc. [17-18].

OSTROM'S PRINCIPLES OF COMMONS MANAGEMENT

Problems like the tragedy of the commons point to the importance of commons management. Earlier authors writing on the management of commons mainly emphasised the leading role of a central authority in regulating commons. Such explanations, however, could not account for the observation that many local communities find ways of preventing overexploitation of the commons even in the absence of centralised governance. Such self-organised commons are characterised by strong and voluntary collective action, self-governing mechanisms, and a high degree of social capital on the part of the stakeholders [12, p. 5].

After conducting a large set of empirical studies on common-pool resource governance, Elinor Ostrom was able to identify eight design principles of self-organised, robust, long-enduring, common-pool resource institutions [19]:

1. Clearly defined boundaries should be in place.
2. Rules in use are well matched to local needs and conditions.
3. Individuals affected by rules can usually participate in modifying the rules.
4. The right of community members to devise their own rules is respected by external authorities.
5. A system for self-monitoring members' behaviour has been established.
6. A graduated system of sanctions is available.
7. Community members have access to low-cost conflict-resolution mechanisms.
8. Nested enterprises – appropriation, provision, monitoring and sanctioning, conflict resolution, and other governance activities – are organised in a nested structure with multiple layers of activities.

Ostrom has also found that an extremely rich variety of specific rules are used in practice, but no single set of specific rules can be clearly associated with successful management. For this reason principles are helpful to start an investigation, but they are not prescriptive.

APPLICATION TO VIRTUAL COMMUNITIES

Virtual communities are mainly self-organised. Their governance mechanisms often include administrator, moderator and/or editor roles, but their authorities are regularly limited. "Outright attempts to control online communities can kill them or send them underground." [9, p. 57]. As virtual communities are mainly self-governed, Ostrom's principles should apply to them as well.

Taking into account Ostrom's advice that the principles are helpful to start an investigation, we have analysed compliance of a particular virtual community to the eight principles. The choice of the sample virtual community was rather arbitrary. We have chosen "Connect" – a virtual community of Croatian scientists, educators, students, and other science-related staff – mainly owing to our familiarity with its self-governing mechanisms and to our high regard for the role this community plays in Croatian scientific public sphere.

When collecting information, we have been observing the online activities of the community for several months by playing the role of an invisible researcher[3]. This simple method naturally supported our strivings to be present in the setting, to see what is going on without being observed, and to capture the essence of the setting and participants without influencing them [20]. The "invisible researcher's method" is rooted in the tradition of ethnographic studies, and it was originally developed to facilitate the research of traditional communities, but its application easily extends to virtual community settings. After completing the observation stage we have presented a review of main results to the editor of the "Connect::Portal", who gave consent to our publication intentions.

The analysis presented here is mainly descriptive and it attempts to provide preliminary assessment of factors influencing cooperative potential of the community. We shall first review general findings related to cooperation within the "Connect" community. Motivated by the previously mentioned susceptibility of virtual communities to a particular kind of cooperation problems known as the tragedy of the commons, we shall later focus on the community's potential to commons management. We shall attempt to assess this potential by investigating the community's compliance to Ostrom's principles. As the review of general findings will demonstrate, the "Connect" community indeed possesses characteristics of self-organised commons, including strong and voluntary collective action, self-governing mechanisms, and a high degree of social capital on stakeholders' part. This finding supports the plausibility of application of Ostrom's principles to the "Connect" community.

The analysis will also lay ground for further work aimed at obtaining more prescriptive guidelines that would point to possible improvements in management of common pool resources in virtual communities.

"CONNECT" VIRTUAL COMMUNITY

The "Connect" virtual community [21] started in 2004 as an enterprise of a group of enthusiastic young researchers with the vision of creating a virtual meeting place of Croatian scientists and of all those whose work is in any way related to Croatian science. Since 2004 heretofore the community has grown to more than 1300 members[4].

"Connect" is formally structured as a programme of the "Society znanost.org" NGO. The programme consists of several related on-line activities or projects, which include web portal, members' database, virtual sub-communities with the accompanying e-newsletters and mailing lists, focus forum, science initiatives, as well as a section dedicated to on-line management of community's off-line activities. The metaphor used in describing the programme and its projects is the one of a "virtual city" consisting of several "virtual squares" [22].

Prior to analysing the incidence of cooperation and the compliance of "Connect" to Ostrom's principles, we shall briefly review each of the projects with a view to provide contextual information about the range of the community's activities.

CONNECT::PORTAL

"Connect::Portal" [23] occupies a place of a "central virtual square" of the community, where most on-line interactions among community members occur. The portal is a place of numerous on-line discussions, which are organised in thematic threads. Community members freely open new threads and post comments to already existing ones.

Postings to discussion threads are signed and the authors bear full responsibility for what they have written. Signatures on postings are public to community members and invisible to outsiders. The only exceptions are initial postings in discussion threads, where signatures of authors are visible to all. The increased visibility for authors of initial postings is hoped to provide additional incentive to open new threads.

The choice of a discussion topic is entirely free. According to topics, threads are loosely grouped into several wider thematic sections, such as Education, Science, Croatia, World, Jobs, etc. Sections are further divided into subsections, but again the division is not strict as threads freely flow from topic to topic, relate one to another, overlap, and weave in unpredictable ways as lively human discussions often do.

Portal's public discussion space is augmented with a service that enables the exchange of private messages. Members are encouraged to use this service whenever their public discussions meander into private or off topic areas.

CONNECT::DATABASE

"Connect::Database" contains members' short personal data: basic personal information, contact information, area of expertise, and special interests. Some of these data are accessible to members only.

E-CONNECT

"E-connect" [24] encompasses e-newsletters and mailing lists aimed at informing visitors and members about the community's activities. "E-connect" also furthers the growth of professional special-interest groups, which develop as "Connect" sub-communities with their own web-pages, professional discussion forums, newsletters, and mailing lists.

CONNECT::WIKIFF

"Connect::WikiFF" [25] stands for Wiki Focus Forum and denotes an area of community's virtual space set apart for members' collaborative work on various topics of interest. Forum is technically based on the Wiki collaborative technology for organizing information on Web sites that allows visitors to add, remove, and edit content [26]. Members freely open new topics and contribute to already existing ones.

CONNECT::SCIENCE INITIATIVES

"Connect::Science Initiatives" [27] is the most recent of the community's projects. It started in 2006 with the aim to encourage dialogue on various issues related to science and technology. The first undertaken initiative was the organisation of a video-conference on problems and possibilities surrounding the start-up of a modern science institute in developing countries.

CONNECT::PARTY AND CONNECT::GALLERY

"Connect::Party" [28] and "Connect::Gallery" [29] are sections dedicated to on-line management of "Connect" community's off-line activities. Members of community gather annually at a Christmas party. However, this tradition has been somewhat neglected in recent two years.

COOPERATION IN THE "CONNECT" COMMUNITY

The main achievements of "Connect" have so far been related to democratisation of the Croatian scientific public sphere. Approximately 2500 discussion threads have been opened at the community's portal. As one member observed, "Connect", and particularly public discussions at its portal, contributed to bringing many important issues related to science in Croatia from backdoors to public sight [30]. In doing this, "Connect" both provided help to and received help from other media through a kind of mutually reinforcing feedback loop. In one direction, portal discussions have often served as sources of interesting and fresh topics for media coverage, and in the other direction, extensive media coverage has helped the community to attract attention of prospective new members.

The main achievement of "E-connect" has been the establishment of four special-interest sub-communities: astronomers' "Astro Connect" forum, "HR in CH" – a mailing list of Croatian young scientists in Switzerland, the "Kognet" network connecting Croatian scientists and students whose primary scientific interest lies in cognitive neuroscience, and "Geo Connect" – a similar network of those with primary interest in geosciences.

Fourteen topics have been opened so far at the Wiki Focus Forum. Most of them have been related to various issues of professional interest to scientists. Focused collaborative work on preparation of document proposals for the Second Congress of Croatian Scientists presents a recent example of successful cooperation among community members [31].

Another case of successful cooperation involved public nomination of the community's candidates for the vacancies in the National Council for Science [32]. Regular public announcements of job opportunities in science and of vacancies in science-related administrative bodies contribute to the transparency of the related selection and election procedures [33].

An example of cooperative public interviewing is provided by the Guests section of the community's portal, which is devoted to bringing prominent scientists and science officials closer to the "Connect" community [34]. Members themselves propose prospective guests and arrange for their "visits". Over a certain period of a guest's visit members freely ask questions on-line. At the end of the visit, guest provides answers also in an on-line form. Seven guests have visited the portal so far, including the distinguished late professor Ivan Supek.

Finally, cooperation almost certainly occurs through members' direct communication by means of various community services. Cooperative arrangements that emerge in such a way are less publicly visible and their assessment would entail members to answer a research questionnaire, which was not envisioned in this stage of our research.

COOPERATION PROBLEMS IN THE "CONNECT" COMMUNITY

Unfortunately, discussions at the community's portal occasionally get also so highly charged with emotions that civil debate becomes close to impossible. Contrasting opinions and opposing arguments then give way to angry disputes and flame wars. Examples of deliberate flaming include direct exchanges of insults; attacks *ad hominem*; using titles, official and other positions of authority to impress or even threaten members with different opinions; using authoritative or patronising tone and various other methods of disparaging discussion of

participants with different opinions. Various sorts of insinuations and intentional biased portrayal of individuals, groups, events, and situations, known as spins [35], have also been used as weapons of flame wars.

Although these flame wars are not as frequent and intensive as in many other non-scientific forums, their consequences are still destructive to the community's commons. Focus of such heated discussions gradually shifts from the original issues to the trading of insults. Some participants, who find themselves hurt, tend to retreat from the community, while others tend to continue disputes indefinitely, sometimes even through other media. Although this may not be true in general, personal experience of the authors tells that the incidence of flame wars discourages prospective members from entering the community and current members from entering discussions. Fortunately, excesses more serious than occasional flame wars have not been noticed so far.

COMPLIANCE OF "CONNECT" TO OSTROM'S PRINCIPLES

PRINCIPLE 1: BOUNDARIES

The boundaries of "Connect" are drawn by the rules regulating membership in the community. The membership is open to researchers, educators, students, as well as to other professionals if they hold at least a bachelor's degree. Members need not be Croatian citizens, although they have to be related to Croatia in some way. For some of them Croatia may simply be a place of living, education, scientific research, or other science-related activities.

Although membership in "Connect" is open to all practitioners of sciences, social sciences, and humanities, in reality only a fraction of Croatian scientific community uses the opportunity of membership. Members from sciences prevail. One of the reasons for that may be traced to the community's beginnings, when most of the initiators of "Connect" were junior researchers with background in sciences. Another reason may be that practitioners of sciences are usually more proficient in using information technology tools, so that they get used to the community's electronic services more easily than practitioners of other disciplines. In any case, prevalence of members from sciences causes bias in choice of discussion topics towards issues primarily relevant to sciences. These topics attract, in turn, more new members from sciences, and such self-selection mechanism establishes a sort of additional boundary around the community.

PRINCIPLE 2: RULES MATCHED TO LOCAL NEEDS

Membership in "Connect" assumes acceptance of a set of fundamental rules. The rules regulate procedures and mechanisms necessary for the community's existence. Registration procedure, personal data reliability, and data protection are among the main subjects of these rather general and not overly restrictive rules.

Projects such as WikiFF add to these basic rules some more specific rules that are tailored to project-specific needs. Each of the "E-connect" sub-communities maintains a set of rules specifically matched to its needs, as well. These more specific rules are regularly also slightly more restrictive than the general-level rules.

The example of rules that govern public discussions at "Connect::Portal" will illustrate how more specific rules are matched to the needs of ongoing activities, as Ostrom's principle number 2 requires. The portal's rules may be roughly divided into three distinct groups. Firstly, there are technical rules of the "know-how" character. They determine how to format text of a posting, how to post own contribution, how to comment or rate another person's contribution, etc.

The second group consists of the rules regulating content of discussions. These rules primarily prohibit publishing of undesirable content, such as advertisements, messages of political marketing, and public defamation messages. Publishing of copyrighted material is forbidden as well.

The third group of rules is comprised of the netiquette rules, which prescribe manners of public discussion in virtual space. The explicit purpose of these rules is to prevent flame wars. Netiquette rules are, therefore, specially emphasised and links to additional netiquette sources on the web are provided. However, as responsibility for public expression rests on individuals, the netiquette rules have only advisory and not mandatory status.

PRINCIPLE 3: PARTICIPATION IN MODIFYING THE RULES

Rules governing internal workings of the "Connect" community are open to discussion and revision. For instance, rules of "Connect::Portal" are stated in a separate discussion thread and are subject to comments as any other posting. Intentions of modifying the rules are publicly announced by the editor. Modifications of rules are often topics of vigorous public discussions. Rules concerning rating of postings have been particularly contested on several occasions. The controversy surrounding the rating rules will be given more attention when we discuss the system of sanctions.

PRINCIPLE 4: RESPECT OF RIGHTS AND RULES BY AUTHORITIES

There is no point in discussing the role of external authorities, as they have no direct influence over the community.

The role of editor assumes certain internal authority at the "Connect::Portal" and similar roles of moderators exist in "E-connect" sub-communities. Editor is appointed by the "Connect::Portal" project coordinator. Editorial board consisting of three members has been recently established in order to provide support to the editor [36].

The editor's main task is to supervise compliance with the portal's rules. Editor has the right to intervene in cases of severe breach of rules. However, in exercising this right, editor mainly acts as a benevolent, non-intrusive supervisor, who generally refrains from modifying or deleting postings and only issues warnings to participants when discussions erupt into flame wars. Editor also has the last word in discussions concerning rule modifications and changes.

PRINCIPLE 5: SELF-MONITORING SYSTEM

The community's self-monitoring system is implemented as a system of ratings. Members can rate postings of discussions in which they do not participate. They can choose among three positive, two neutral and four negative ratings. The positive ratings are the following: "Insightful", "Informative", and "Interesting". Each of the positive ratings holds one positive point. The neutral ratings are "Neutral" and "Funny". They hold zero points. The negative ratings are as follows: "Off topic", "Superfluous", "Improper", and "Provocative". Each of the negative ratings holds one negative point.

Total rating of a posting is calculated only if at least 3 ratings have been cast. Numerical part or magnitude of the total rating is a sum of all ratings. Textual part of the total rating is a textual label of the most frequent rating of the same sign as the calculated sum. As an example, suppose that a rating got three "Informative" ratings, one "Interesting" rating, and one "Off topic" rating. The numerical part of the total rating of this posting is then calculated as in expression (1):

$$3*(+1) + 1*(+1) + 1*(-1) = +3. \tag{1}$$

The textual part of the total rating is "Informative", because this is the textual label of the most frequent positive rating of this posting.

Ratings are anonymous. The total rating and the distribution of all ratings are public and they are visible to members and to visitors as well.

The primary intention of the rating system is to provide feedback to authors as to how their contributions are perceived by the rest of the community. Ratings are designed with the purpose to rate the manner and tone in which a posting has been written, and not to rate the opinion expressed in the posting. Flaming messages are supposed to receive mostly negative ratings, which should encourage their authors to adjust the manner of expression and the tone of discussion accordingly. Such sanctioning effects of ratings are expected to decrease the incidence of flame wars.

Some members also use ratings for the purpose of filtering, assuming that negatively rated postings hold less valuable content and hence are not worthy of being read.

PRINCIPLE 6: GRADUATED SANCTIONS

Ratings cast by community members provide the first level of the community's system of sanctions. As all members are free to rate postings, this level of sanctions is decentralised.

However, flame wars sometimes continue, without being impeded by negative ratings assigned to flaming postings, and then the second level of sanctions must be activated. This sanctioning level is centralised and mainly consists of warnings issued by the portal's editor. As mentioned previously, the editor also holds the right to delete exceedingly offensive postings, but he uses this privilege only as an instrument of last resort.

PRINCIPLE 7: LOW-COST CONFLICT RESOLUTION

Conflict resolution mechanisms have not been implemented. One of the reasons probably lies in the lack of adequate technical prerequisites. It remains a challenge for social computing practitioners to develop low-cost e-versions of various conflict resolution procedures such as negotiation, mediation, conciliation, adjudication, arbitration, etc. [37].

PRINCIPLE 8: NESTED GOVERNANCE STRUCTURE

Ostrom's principle no. 8 posits that community's governance activities are organised in a nested structure with multiple layers of activities. This principle puts forth the most demanding requirement, which cannot be fulfilled before the governance structure of considerable complexity exists.

The "Connect" community is still too small to afford multi-layered self-governance. However, the "E-connect" sub-community structure testifies that "Connect" is envisioned as a nested self-governing community with multiple layers of special-interest sub-communities, each of them possessing its own governance structure.

COMPLIANCE REVISITED: A DISCUSSION

We may summarize the results of the analysis of compliance to Ostrom's principles by concluding that the principles 1-6 have been implemented, while the principles 7-8 have not been implemented. As an explanation of the failure to satisfy the principles 7-8, we have found that technical prerequisites for the implementation of the principle 7 still do not exist, and that the community is still too small for the implementation of the principle 8. In particular, the first steps towards development of a multi-layered, nested self-governance structure within the community have been made in accordance with the principle 8.

As to the effectiveness of the implemented principles, we have found that the principles 1-4 have been implemented effectively, while the current implementation of the principles 5-6 still leaves room for improvements.

The sanctioning system, and particularly the system of ratings, has been a subject of lengthy discussions at the community's portal, and several weaknesses of the system have been pointed out. Firstly, there is a problem of sample size, because usually only a small number of ratings are cast. Secondly, there is a problem with sample quality because ratings may come from author's "friends" or "enemies" only, and not represent "the silent majority". Thirdly, the effects of ratings are not easily observable or measurable. Fourthly, meaningfulness of the total rating may be called into question.

Unfortunately, there are no ready-made solutions to any of these problems. Mitigating the problem of a small sample size would require introducing additional incentives to rate postings. This could be done, in principle, through some kind of "meta-moderation" or "meta-rating system", where frequent and quality raters would be endowed with more "karma points" [3, pp. 122-123; 38]. More karma points carry more opportunities to rate as a reward. This kind of reward would, however, have no purpose if all members are free to rate any time they want, as they currently are. If only members "with good enough karma" had the privilege to rate and meta-rate, this would exacerbate the problem of ratings' sample quality. In a relatively small community like "Connect", where most of the members know each other, a significant portion of ratings and meta-ratings inevitably concerns (meta-)rater's "friends" or "enemies". If the (meta-)rating ability depended on "good enough karma", this would provide additional incentive to unfairly (meta-)rate "enemies" and eliminate them from the (meta-)rating pool [39].

The problem of ratings' sample quality is rooted in the asymmetry between publicly signed postings and anonymous ratings. This asymmetry, however, cannot be easily removed. On the one hand, abolishing anonymity of raters would discourage negative ratings and diminish the intended sanctioning effect. On the other hand, abolishing publicity of signatures on contributions would diminish both responsibility for written content and incentives to post genuinely valuable content. Moreover, anonymity of contributions to public discussions is utterly at odds with the spirit of scientific community.

Those members who oppose the current system of anonymous ratings, often call into question moderating effects of ratings on the one side, and stress excessively restrictive effects that ratings have on discussions, on the other side. Verifying such arguments, however, is a difficult task. It is hard to measure both whether the frequency and intensity of flame wars has declined, as well as whether the total amount of postings has declined, since and due to the introduction of ratings.

The asymmetry between publicly signed postings and anonymous ratings may be regarded as a reflection of a broader dilemma between freedom of public expression through postings and freedom of anonymous expression of disagreement by means of ratings. If one is more concerned with the freedom of expression, one will typically attach less priority to the rating system. If one is, however, more concerned with the freedom to express disagreement without a possibility of retaliation, one will assign greater priority to anonymous ratings. In scientific communities hierarchy of authorities is typically strong [40]. Those who occupy higher positions in the hierarchy are obviously favoured by publicity of signatures on contributions. As we have already mentioned, positions of authority have been used in flame wars to impress or even threaten members with less authority and different opinions. Therefore, it may indeed be reasonable to assign greater priority to the anonymity of ratings, as is currently the case in the "Connect" community. The fact that certain individuals did not

hesitate to exert pressures on editors to disclose the identity of raters who negatively rated their contributions [41] lends additional support to the stated conclusion.

The community gatherings like "Connect::Party" provide a way to compensate for the lack of trust that anonymous ratings may accidentally instil in some members. Generally, both on-line and off-line events are important for sustaining virtual communities since they strengthen members' identification within the community and with one another [42]. Face-to-face meetings present the most effective way to build personal relationships because they provide opportunities to understand individual communication styles and personal and professional motivations, and allow deeper kind of rapport, or trust to develop [43]. Referring to the three kinds of collective goods provided by virtual communities, we may say that face-to-face meetings facilitate transformation of social network capital into communion.

Concerning meaningfulness of total ratings, objections have been raised that the total rating need not be the most frequent of all ratings, and that postings with starkly different rating distributions may end with an identical total rating. However, as there is no perfect mechanism for extracting a single, summary rating from a multitude of individual raters' preferences [44], any total rating would represent only an approximation of the overall ratings distribution. The implemented total rating approximates the "magnitude" of positive, or negative, majority judgment by the numerical part and the qualitative nature of the majority judgment by the textual part.

FURTHER WORK

Literature on virtual communities is replete with warnings to community developers of how much effort and commitment is needed in order to maintain a viable community. This effort is almost always greater than the effort required to launch a community [9, p. 58].

Notwithstanding any of the previously mentioned problems, the "Connect" community is strikingly self-sustainable. New discussion threads open daily and comments to the existing threads arrive continuously. Debates become hotter from time to time, but in most cases civility is preserved without the editor's interventions.

Yet, from time to time, flame wars erupt and suddenly all the discouraging incentives implemented to contain the flame wars seem in vain. Signed contributions, netiquette rules, the two-level sanctioning system – all of these are not strong enough. What else is required?

The work presented in this paper will hopefully continue and enable us to approach the answer to the stated question more closely. In our further work we aim to increase the sample size of virtual communities being analysed, and to compare the various on-line communities regarding their compliance to Ostrom's principles, as well as regarding the incidence of both cooperative and non-cooperative outcomes. We also plan to increase the sample size of guidelines being taken into consideration. Beside the Ostrom's principles there exist other sets of guidelines for the management of commons, some of which have been specifically adjusted for application to virtual communities [42, 45-47].

By continuing investigations we hope to obtain further insight into factors influencing cooperative potential of virtual communities, better understand specific rules of commons management and the underlying systems of incentives in virtual communities, better explain incidence of successful cooperation and cooperation breakdowns, and perhaps provide advice to social software designers on promising directions of their further work. We hope that our work will provide at least a glimpse at possible ways of using information technology for further lowering the costs of human cooperation.

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REMARKS

[1]The broad meaning of "we" includes our elected representatives in legislative bodies, government, courts, etc.

[2]Referring to our previous discussion of information technology as a technology of cooperation, we stress that susceptibility to flame wars may generally be attributed to certain human characterictics such as conceit and vanity more than to some innate characteristics of the information technology itself. The crucial question again is the one of finding ways in which those human characteristics will be encouraged, or discouraged, by particular technological solutions.

[3]One of the authors is a member of the "Connect" community, which enabled her to collect first-hand information on members' services during preparation of this article. However, none of the authors participated in online discussions. Except for the mentioned membership in "Connect", the authors have not been associated to the "Connect" community, nor to its parental NGO.

[4]All numerical data related to the "Connect" virtual community were collected on 4. June 2008.

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VIRTUALNE ZAJEDNICE KAO ZAJEDNIČKA DOBRA: STUDIJA SLUČAJA ZAJEDNICE "CONNECT"

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SAŽETAK

U sve umreženijem svijetu, gdje se zajednice sve više koriste informacijskom tehnologijom, a mnoge zajednice postoje isključivo u virtualnom prostoru, iznova se javlja vječna društvena dilema suradnje, privlačeći pozornost društvenih istraživača novim elementima koje donose tehnološke inovacije, kao što su softverska rješenja koja omogućuju istodobnu komunikaciju članova zajednice putem javnih i privatnih kanala, laka dostupnost mnoštva različitih dokumenata, anonimnost poruka, forumi za potencijalno neograničen broj sudionika ili promatrača, i brojni drugi alati za izgradnju zajednice temeljeni na dostignućima informacijske tehnologije. U ovom članku autori razmatraju problem suradnje u virtualnim zajednicama putem studije slučaja online zajednice hrvatskih znanstvenika "Connect". Analiza polazi od opažanja da je suradnju unutar virtualnih zajednica moguće poticati primjenom tehnoloških rješenja koja korisnicima umnogome olakšavaju suradnju. Autori provjeravaju usklađenost zajednice "Connect" sa skupom načela izgradnje institucija temeljenih na zajedničkim resursima, koje je formulirala Elinor Ostrom. Studija pokazuje da "Connect" zadovoljava glavninu navedenih načela, uz mogućnosti manjih poboljšanja, te da ne zadovoljava dva načela, uglavnom zbog nepostojanja tehničkih preduvjeta i zbog relativno malog broja članova zajednice. Analiza postavlja temelje daljnih istraživanja, usmjerenih ka nalaženju smjernica i preporuka za moguća daljnja unaprjeđenja sustava upravljanja zajedničkim resursima u virtualnim zajednicama.

KLJUČNE RIJEČI

zajednička dobra, suradnja, načela upravljanja, virtualne zajednice