An Online Community Framework-based Analysis of an Existing Online Community

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Abstract: An important requirement for developing successful online communities is to understand the impacts of software design on their evolution. This requirement motivated the development of the Online Community Framework (OCF), a theoretically-based analytic tool for helping designers understand and produce computer technology to support social activity online. This paper reports the first extensive use of OCF to analyze in detail a long-standing and successful Brazilian online health support community, the Multiple Sclerosis Sufferers Society. The paper discusses OCF's performance as an epistemic tool and proposes a number of issues for future research.

Keywords: Multi-user applications, Online Communities, User Experience Evaluation, Online Community Framework

Resumo: Um importante requisito para o desenvolvimento de comunidades online de sucesso é compreender a influência que o projeto do software exerce sobre a evolução dessas comunidades. Este requisito motivou o desenvolvimento do Online Community Framework (OCF), uma ferramenta analítica fundamentada em teoria que ajuda os designers a compreender e produzir tecnologia que dê apoio à atividade social online. Este artigo reporta a primeira aplicação extensiva do OCF para analisar em detalhes uma comunidade online de saúde brasileira de sucesso, a Sociedade Brasileira de Portadores de Esclerose Múltipla. O artigo discute a eficiência do OCF como uma ferramenta epistêmica e propõe algumas questões para trabalho futuro.

Palavras-chave: Aplicações multi-usuário, comunidades online, avaliação da experiência do usuário, Online Community Framework

1. Introduction

Communities are complex structures, characterized by the intense and varied social interaction among its members, as well as by their dynamic nature – they develop and continuously evolve. An important requirement for developing successful online communities is to understand the impacts of software design on their evolution. This requirement motivated the development of the Online Community Framework (OCF) (de Souza and Preece, 2004), a theoretically-based analytic tool that can be used to leverage knowledge about how social activity is enabled and affected by technology. Up to now, OCF has not been used extensively to analyze online communities in depth. In this paper we report the first use of OCF to analyze in detail a long-standing and successful online community, the Multiple Sclerosis Sufferers Society (MSSS) (SPEM, 2004)[1].

This study started in October 2003 and involved over eight months observing a number of Brazilian online health support communities. The observation was guided by our knowledge of and experience with semiotic engineering (de Souza, 1993, 2001, 2004), discourse analysis theory and research (Wetherell, Taylor and Yates, 2001a, 2001b), and online communities (Preece, 2000). MSSS was started in 2001 by a sufferer of multiple sclerosis[2] (MS), and has since developed into a successful online community with approximately 500 members and 12 000 exchanged messages. Its success seems to be due to the personal initiative of its creator, who also manages and moderates this community's activities. Throughout its existence, the community has proved to be a privileged *locale* for its members to interact socially and support each other emotionally, especially in view of some of the problems that this disease can cause to the sufferers.

In January 2004 there was a great change in MSSS. Its website was totally restructured and a new socializing environment was created to which everyone should migrate. A new *Interaction* area was provided to facilitate contact with the website's designer and with people affected by MS. In it, forum, group, chat, and e-mail tools can now be used for a variety of purposes. The manager of MSSS proposes, somewhat arbitrarily, that the forum and the group tools serve distinct purposes. The group tool should be used to view and post photos from sufferers' family and friends, and he invites visitors to use the forum in order to talk to each other about MS. He also invites them to take part in chat meetings with MSSS members in order to talk freely and synchronously to other friends. Finally, he suggests to visitors that they use the e-mail tool in oder to get in touch with him.

Interaction tools are thus used by MSSS members to support each other while exchanging information and sharing experiences among themselves. Up until January 2004, the group tool was an MSN Group. In practice, members used it mainly for sharing photos of family and MSSS events, and both the forum and chat tools were used to give and receive support through conversation. Nevertheless, due to technical problems an Internet service provider, a new group tool had to be created to substitute the forum – a Yahoo Group. Everyone should migrate from the forum to this new group. The MSSS manager and two members of the community led the others in the emigration process. However, up until the end of March 2004, members were still using the forum and the other two group tools in order to exchange information and experiences and to support each other.

[1] The research was carried out with the informed consent of MSSS manager.

[2] Multiple sclerosis is a chronic neurological disease whose cause is unknown and for which there is no cure.

The forum tool is a third-party product created in December 2001 by another MS sufferer – not the one who created MSSS. In March 2003 the MSSS creator took over the responsibility to manage the forum. By the end of March 2004, anyone could feel free to read and post messages in it without registering and a total sum of 10 823 messages had been exchanged. The tool does not provide information about the number of members possibly because no registering is required and hence the notion of *membership* has no formal representation in the environment.

We have no information about when the MSN Group was created, but its creator and manager, the MSSS creator, joined it in June 2002. By late March 2004, any interested person could read exchanged messages and view published photos, but in order to post messages and publish photos it was necessary to become a registered member. Whoever wished could become a registered member of this group without having to obtain explicit permission from the manager. The group had then 308 registered members, 374 messages had been posted, and 94 photos had been published.

The Yahoo Group was also created by MSSS creator, in January 2004, as a response to technical problems in the forum tool, as mentioned above. By the end of March 2004, every member of the community was allowed to read exchanged messages and view published photos, but in order to post messages and publish photos it was required to become a registered member. Anyone interested could register to become a member of this group, without having to wait for explicit permission from the group manager. By that time, 94 visitors had become members, 1 141 messages had been posted, and 14 photos had been published.

MSSS deserves special attention, because it has been facing a delicate transition period, which may be a threat to its evolution. Up until January 2004, messages exchanged among members generally characterized it as a successful online community, namely a community that perceives itself as successful; one that has existed for a long time (over a year, in this case); and one that promotes intense interaction among members (around 500 members, having generated over 12 000 messages). Members explicitly said: "*I have received much moral support while talking to you*, …, *we are already connected with one another*"; "*I have also lost a lot of things, even friends. However, I am sure that I have lost in quantity – quality I have found here*."; "*We all form a family by choice…*"; "*… we have made this place into our home, a community of siblings…*"[3].

However, since January 2004, the content of the messages has changed. The intense emotional support they used to offer one another has been gradually replaced by factual information exchanges about the disease and its treatment. In some messages members have explicitly manifested their dissatisfaction and sadness with this change: "*I would like to do something in order to make our group go back to being as close as it used to be in the previous website.*"; "*Let's all pull together again before this group dies?*"; "*I miss the frequent contact we kept in the previous group…*". It is particularly interesting to notice that one member alludes to *the previous website* as a happier place (or *locale*), merging technological, social and emotional dimensions into one experience that is missed now that technology has made them move on.

This a prime opportunity to evaluate OCF's performance as an epistemic tool. Epistemic tools are not used to generate direct answers to a problem, but to increase

[3] All messages exchanged have been translated into English by the authors. Emphases such as capital letters, bold, different colors, etc. have been removed. Original texts can be found in (SPEM, 2004).

the problem solver's understanding of the problem itself as well as the implications it brings about. In the context of multi-user applications, which is the case of online communities, OCF helps evaluators understand how design decisions may shape the interactions of people with the application and with other people. So, we used the OCF to analyze MSSS, hoping to find out if technology has in any way caused or facilitated this problematic change in the community (as perceived by members). This is OCF's main purpose as an analytic tool. Our goal was to explore and understand more deeply the type of knowledge that an OCF-based analysis can offer to an evaluator, as well as the costs and benefits of using it for extensive studies like this one.

In the next section we briefly present OCF. In section 3 we describe the analysis process carried out for MSSS. Next we report the results of our analysis, strengthening our arguments by means of excerpts taken from messages exchanged among MSSS members. We conclude the paper by discussing OCF's performance as an epistemic tool, and presenting our future research agenda.

2. The Online Community Framework

OCF is a theoretically-based analytic tool for helping designers understand and produce computer technology to support social activity online. One of its main goals is to make them reflect on how their design may impact the birth and the evolution of the online communities. OCF has a remarkably epistemic nature, in the sense that it seeks to empower designers with knowledge and knowledge-increasing strategies.

A distinctive characteristic of OCF is its theoretical nature. OCF follows the principles of semiotic engineering, a theory in which interactive software is a one-shot message sent from designers to users about how the latter should interact with the application in order to achieve a certain range of goals and experiences intended by the former (de Souza, 1993, 2001, 2004). In this perspective, the perceived quality of interactive software is not only a function of how well designers understand and interpret users' requirements, but also of how well they communicate this back to users through their designs. This theorical foundation explains OCF's emphasis on communication, as we will see further on.

Another important aspect for understanding OCF is its underlying definition of online community (OC): "a group of people, who come together for a purpose online, and who are governed by norms and policies" (Preece, 2000). People, purposes, policies and software are the key componentes of an OC, and sociability and usability, the key factors that impact its success. This definition permeates all of OCF's constituents, namely: the online community constituent; the usability and sociability constituent; and the interpretive constituent. The three constituents and the relations among them are shown in Figure 1.

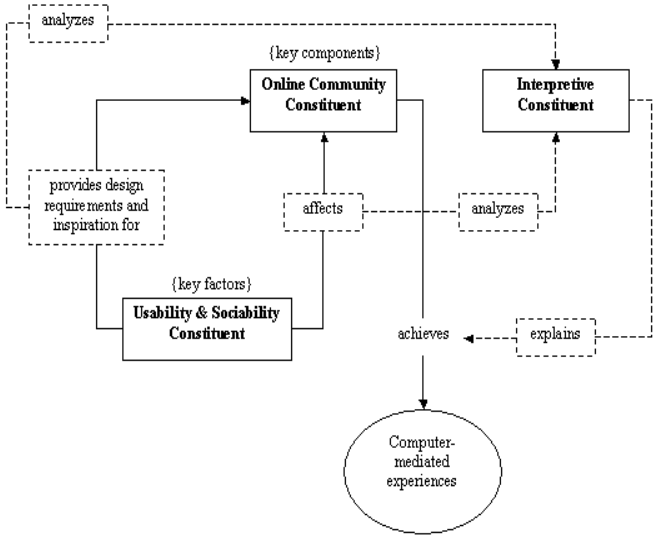

Figure 1 The overall constituent structure of OCF

The online community constituent (OC Constituent) forms an idealized abstraction of an OC (Figure 2). It contains a set of entities (i.e. rounded shapes), the main relations among them (i.e. lines linking two entities), and attributes (e.g. name, role, goal) of both entities and relations. The four key entities in it are `Community`, `People`, `Purposes` and `Polices`, which recursively unfold into other entities and relations. The `communications` entity is particularly important in view of the fundamental role played by communication (both between designers and users, and among users themselves) in the success of an OC.

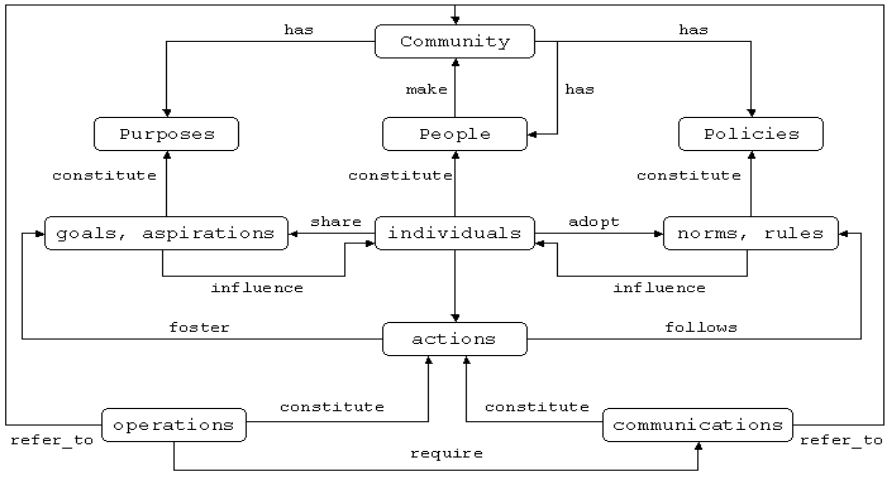

Figure 2 The online community constituent of OCF

The MSSS `community`, for example, `has` the `purpose` of enabling people affected by MS to clarify their doubts, to get information about the disease, and to share their experience with each other. MSSS individual members are the `individuals` who `constitute` the `people` that `make` the `community`, namely MS sufferers. MSSS `policies` are not stated on the community's website. However, some of the `norms and rules` that `constitute` its `policies`, and that `influence`

the individuals' actions (both operations and communications) are explicity and clearly stated in each of the environments where they actually interact.

The usability and sociability constituent refers to the OC's goals and needs that must be considered in the development of computer applications meant to support the social activity of communities online. Sociability is concerned with social interactions online, while usability centers on what happens at the human-computer interface. A sociability goal of MSSS, for instance, is that it should be an open community, which therefore requires that anyone can drop in and out as they please. A usability issue related to this particular requirement is that, for example, MSSS designer should carefully consider individual differences such as gender, age, physical capability, educational training, experience with computers, and the like, with respect to joining, participating in and leaving the community. Another usability requirement related to sociability aspects in MSSS is to offer various forms of communications to users in order to facilitate interpersonal contact, especially in view of how the disease may affect sufferers with different degrees of severity (e.g. some sufferers may have difficulties to type quickly, which poses additional difficulties in chats).

Finally, the interpretive constituent (Figure 3) is stronlgy committed to the principles of semiotic engineering, namely to the communicative nature of interactive software. This constituent enables evaluators to assess how technology is affecting human communication, both between designer(s) and users, and among community members themselves. The main source for evaluation are the messages pertaining to the OC Constituent's communications entity.

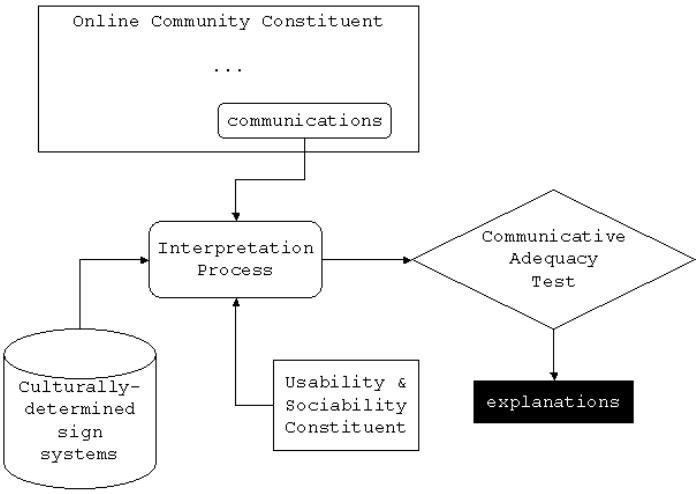

Figure 3 The interpretive constituent of OCF

An important element of the interpretive constituent is the Communicative Adequacy Test (CAT). It helps evaluators assess communication, and provide explanations for computer-mediated communication experiences enabled by technology. The evaluator inspects communication online by answering the following questions: (i) Do I (as an evaluator committed to a user's perspective) understand this message?; (ii) Can I detect whom the message is from?; (a) Who means it?; (b) Who has written it?; and (iii) Is the system interfering with the communication?

In order to illustrate how CAT is carried out, let's consider the following message sent from the forum's manager and moderator to its members:

"*Hi, everyone. Due to problems with [our ISP...,] I've created a new MS group in Yahoo's website, which allows us to exchange messages just like we do here. I've placed a link for you to register in this new group right at the beginning of our forum page. The group is completely open and anyone can leave his/her message there. See you all there! Cheers, ...*"

Since this is a piece of communication among MSSS members, it is part of the OC Constituent's `communications` entity. An evaluator who wishes to perform CAT on this specific message should answer each question mentioned above in relation to it. In other words, the evaluator should tell whether he can understand this message, see who is sending it, decide whether the message has been spontaneously meant and phrased by the sender, and see if the computer system is interfering with human communication.

CAT results derive from the answers given to such questions, and may vary depending on: which values are used to answer the questions; the usability and sociability guidelines adopted by the evaluator; and the set of sign systems taken as reference for the test. The latter refers to the various coding systems through which designers and users produce and interpret meaning, such as natural language, interface widgets, emoticons, and the like. For example, binary yes/no answers yield a more restricted perspective on potential problems than multi-valued answers (e.g. values on a Lickert scale or an open set of values from free text answers).

An OCF-based analysis of multi-user application enables evaluators to identify and understand sociability problems, as well as usability problems related to sociability. The purpose of the analysis is to generate knowledge about how sociability and usability may be improved to prevent problems in computer-mediated communication, both between designers and users, and among users themselves.

3. An Online Community Framework-based Analysis

3.1. The Analysis Process

We adopt the perspective that interactive software is a message sent from designers to users. The message informs the users the designers' understanding regarding who they think the users are; and what they think users want or need to do, in which preferred ways, and why. In the context of multi-user applications, such message informs the users not only that they can communicate and interact with one another through the application, but also how the application supports them provided that a certain set of technological conventions be known and adopted. Therefore, from a semiotic engineering perspective, the designer should express the values embedded in the technology as well as the design rationale that guided its development and deployment. All of this is achieved by computer-mediated communication, either explicitly (through help messages, tutorials, etc.) or implicitly (through interactive patterns and interface sign choices that convey and reinforce the designer's intent). It is also by means of communication that members of an OC try to reach their goals and satisfy their needs. Preece (2000, p.36) says: "*Online communities serve many purposes, but the support of information exchange and communication are particularly important.*" Together, these two perspectives show that communication is technologically and socially crucial for the sucess of an OC.

We have decided to analyze MSSS based on the messages exchanged both between its creator and users, and among its users. An important point about the community's creator is that he *designed* (to a considerable extent) the online

environment where the community evolves. He thus shares with the designers of MSN Groups and Yahoo Groups the responsibility for how the *software* appears to users. We were interested in "listening" to the designer's one-shot message, with a special emphasis on knowing the MSSS creator/designer's understanding of who is MSSS and which are, for him, the adequate means of communication for this community. So we have concentrated on messages that deal with these two issues: those that introduce MSSS and those that support socialization by means of the various communication tools made available for users.

For each message, we have: (I) instantiated the `communications` entity of the OC Constituent, (II) performed CAT, and (III) consolidated the knowledge obtained in steps (I) and (II). In general, the first step consists in attributing values to the `communications` entity's attributes. CAT consists in answering the set of questions that constitute this test. And the last step consists in instantiating other entities of the OC Constituent that are implied in the message.

Another important characteristic of the analysis process is our methodological perspective while analyzing MSSS: that of HCI researchers with specialized knowledge of OCF, but who are not part of the community. This position brings about advantages and disadvantages. Theoretical knowledge allows us to explore OCF's analytical power. Our detachment from the community potentially increases our chance of identifying problematic situations not foreseen by the designer and not clearly perceived by members (Velho, 1981). On the other hand, a detached position probably leaves some questions unanswered, unless there is a direct contact with the users (who probably know the answers). Therefore, it may be necessary to complement an OCF-based analysis with information elicitation methods involving real or potential users of the application (e.g. interviews, observation and analysis of the users' discourse).

We will now describe the attributes of OCF's `communications` entity and present the CAT instance used in the analysis of MSSS, related to steps (I), instantiating the attributes of the communications entity, and (II), instantiating CAT. Next we describe the attributes of the other OCF entities that need to be instantiated in the third step of the analysis, namely the consolidation of the knowledge obtained in steps (I) and (II).

3.2. Attributes of the `communications` Entity

The selection of attributes of the OC Constituent's `communications` entity was also based on theory – specifically on the speech act theory (Austin, 1962; Searle, 1969, 1979) and on contributions from pragmatics and discourse analysis area (Grice, 1975; Brown and Yule, 1983). Following we describe each attribute and then relate them to their theoretical origin.

`Identifier` = the identifier of the message being analyzed or, in other words, the identifier of a specific instance of the `communications` entity.
`Speaker` = the one who issues the message.
`Listener` = the one who receives the message.
`Topic` = topic of the message (i.e. what the message is about).
`Content` = the content of the message.
`Context` = information on the circumstance in which the message is sent and which the evaluator believes to be taken into account by the speaker, when formulating the message, and by the listener, when interpreting it.

Form = form of the message. For instance, text in natural language, hyperlink, image, icon, button, etc.
Speaker_intent = the intention of the speaker when sending the message, from the evaluator's perspective.
Appropriateness = the message's adequacy to the situation. This attribute unfolds into the following:

- **Quantity** = how informative the message is (it should be as informative as necessary; neither more nor less).
- **Manner** = how clear and unambiguous the message is.
- **Relevance** = the contribution of the message for the development of the conversation.
- **Quality** = the quality of the message has to do with the coherence and consistency of the information it provides, both with respect to the message's own internal contents and to what has already been said in previous messages, during an ongoing conversation.

Listener_understanding = linguistic knowledge the listener must have to be able to understand the message. This knowledge is acquired through the listener's repeated exposure to signification systems (see Figure 3).
Listener_response = for the evaluator, which action(s) the user will perform as a reaction to the message sent.
Pre_conditions = specific circumstances necessary for the fulfillment of the speaker's intention.
Post_conditions = effects the transmission of the message may produce in the application's context as a whole, including the individual users (i.e. listeners), the community and the application's status.

Attributes Speaker_intent, Listener_understanding, Pre_conditions, Listener_response and Post_conditions have their origin in the concepts of illocutionary act, necessary conditions for the performance of illocutionary acts, preparatory conditions and perlocutionary act taken from speech act theory. The other attributes originate mostly from pragmatics and discourse analysis. Appropriateness, for instance, refers to maxims of the cooperation principle proposed by Grice (Grice, 1975). Originally, the quality maxim is about the truthfulness of the information provided. However, when transferred from logic, where it was first proposed, to the social context of OCs, the quality of a message seemed to be more about the coherence and consistency of the information it conveys, than about truth conditions established by a logic model.

3.3. CAT Instance

In section 2, we mentioned that CAT results are obtained from the answers given to the questions posed during the test, and that they may vary. Variations arise mainly from: the values that answers may take; the usability and sociability guidelines adopted by the evaluator; and the signification systems taken as reference for the test. In Table 1 we present the CAT instantiation values used in the analysis of MSSS.

CAT Questions	Possible Answers
(i) Do I understand this message?	{Yes, I understand this message.; No, I do not understand this message; I understand only part of this message.}

(ii) Can I detect whom the message is from? (a) Who means it? (b) Who has written it?	 {System; User} {System; User}
(iii) Is the system interfering with the communication?	{Yes; No}

Table 1 Possible answers used in CAT instatiations for MSSS

In order to understand the complete meaning of the answer 'System' (see questions iia and iib), we must introduce another concept from semiotic engineering, namely the designer's deputy. Since software is a message (hence, a communicative act) produced by the designer and meant for the users, there must be at interaction time some kind of entity that will act on the designer's behalf, so that true communication is achieved. This entity is in fact the system, which does not have any constitutive intention or initiative except by virtue of an encoding of the design intent into various program components. The system is, therefore, the designer's deputy, a communication agent that carries the designer's message and hopefully achieves the design intent. Thus, a message sent "by the system" is, in fact, meant by the application designer, and written on his behalf.

On Tables 2 and 3, we show how test results are computed and present eight typical scenarios that can usefully be taken as stereotypes for communication breakdowns in OCs (de Souza and Preece, 2004). In the next section we instantiate actual communications from MSSS corresponding to some of these scenarios.

CAT	Scenario A	Scenario B	Scenario C	Scenario D
i	Yes	No	Yes	No
iia	System	User	User	System
iib	System	System	System	System
iii	Yes	{Yes / No}	Yes	{Yes / No}
Result	Check usability. There may be usability and sociability problems.	Check usability regardless of III.	Check sociability.	Check usability regardless of III.

Table 2 Computation of CAT result

CAT	Scenario E	Scenario F	Scenario G	Scenario H
i	Yes	No	No	Yes
iia	System	System	User	User
iib	User	User	User	User
iii	Yes	{Yes / No}	{Yes / No}	Yes
Result	Check sociability.	Check sociability regardless of III.	Check scaffolds regardless of III. If III = Yes, then check usability.	Check usability.

Table 3 Computation of CAT result (continued)

The computation of CAT result shows which usability and sociability guidelines the evaluator has taken into account and how, as well as which signification systems he/she has adopted as reference. For instance, in Scenario G, we see a situation where: (i) the evaluator does not understand the message; (iia) the evaluator takes the user to mean the message, and (iib) to have written it; and (iii)

whether the system is (Yes) or is not (No) interfering with communication is irrelevant. This situation points to a user having difficulty to express herself. The result mentions "scaffolds", namely support tools for succesful communication (e.g. rules of etiquette, bilingual dictionaries, spell checkers, emoticons, and the like). It also says that if the value of (iii) is Yes, then usability should be checked. In other words, if the evaluator suspects that technology is interfering with human communication (for instance, by providing only comic emoticons in a forum where severe grief is the theme of conversation), there are likely to be usability problems waiting to be solved.

3.4. Attributes of Other OCF Entities

The third step of the analysis of MSSS consolidates and registers the knowledge obtained in steps (I), instantiating the attributes of the communications entity, and (II), instantiating CAT. In the next section, we will see that the messages analyzed are basically about the community, its purpose, its members and its policies (as a consequence of the fact that we are analyzing messages that introduce the community and the socialization tools offered to its members). Thus, in the third step, we instantiate entities `Community`, `Purposes`, `People` and `Policies` of the OC Constituent and register in the instances themselves the knowledge acquired on how these entities are manifest in MSSS. The attributes of each of these entities are:

`Community`:

`Identifier` = the identifier of the community being analyzed (i.e. the identifier of a specific instance of the `Community` entity).

`Name` = the name of the community, as stated in the message.

`Description` = the description of the community, as stated in the message.

`Purposes`:

`Identifier` = the identifier of the purpose being analyzed (i.e. the identifier of a specific instance of the `Purposes` entity).

`Description` = the description of the purpose, as stated in the message.

`Completeness` = the evaluator's level of satisfaction in relation to the quantity and clarity of the information provided on this specific entity in the message. This attribute registers the evaluator's reflection, based on the `Appropriateness/Quantity` and `Manner` attributes, on what is said about the entity.

`Coherence` = the evaluator's level of satisfaction in relation to the relevance of the message to the user-system conversation, as well as to the coherence of the information provided about this specific entity in the message (i.e. internally), and between such information and what has already been said about the entity in other messages (i.e. externally). This attribute registers the evaluator's reflection, based on the `Appropriateness/Relevance` and `Quality` attributes, on what is said about the entity.

`People`:

`Identifier` = the identifier of the member information being analyzed (i.e. the identifier of a specific instance of the `People` entity).

`Description` = what is said in the message about members of the community.

`Completeness` = see entity `Purposes`.

Coherence = see entity Purposes.

Policies:

Identifier = the identifier of the information on the community's policies being analyzed (i.e. the identifier of a specific instance of the Policies entity).

Items = policies of the community, as stated in the message.

Completeness = see entity Purposes.

Coherence = see entity Purposes.

4. The Analysis of the Multiple Sclerosis Sufferers Society According to the Online Community Framework

In this section, we present the analysis of MSSS. The analysis was based on messages exchanged directly or indirectly between MSSS designer and users. They talked about who the community is and which, according to the designer's opinion, are the most adequate means of communication for the community[4]. They are mainly messages that introduce MSSS (a case of direct communication) and the set of socialization tools made available for users (a case of indirect communication, or *metacommunication*, in semiotic engineering terms). For each message, we (I) instantiate the communications entity of the OC Constituent, (II) perform CAT and (III) consolidate the knowledge obtained in steps (I) and (II).

OCF being an epistemic tool, the material presented in the following sub-sections constitutes the knowledge we gained by analyzing MSSS with respect to the impact of certain design decisions on the online social activity of community members.

4.1. The analysis

Here is an excerpt of the message sent from the designer's deputy (i.e. the system) to the users, on the community's home page [5].

Message 1

"*The MSSS – Multiple Sclerosis Sufferers Society, is a virtual community of sufferers of this disease, created by Marcelo Morita, who is also a MS sufferer, and who launched it on the Internet in December 2001. Its aim is to bring about clarification, information and interaction among sufferers of this disease. After all, we are not the only ones with this illness.*"

Following the steps of the OCF-based analysis process, there are:

I. Instantiation of the communications entity

This is an entity of the type communications with attributes

Identifier = MSSS_Presentation.

Speaker = the system (i.e. the designer's deputy).

[4] In the present work, our study is focused on asynchronous communication, therefore we will not analyze the Chat tool.

[5] We invite the readers to visit MSSS website at http://www.spem.kit.net, so that they have an idea of the website's look and feel.

Listener = a user.
Topic = MSSS presentation.
Content = what MSSS is, who the community members are, who the designer is, when the website was launched, and what the purpose of the community is.
Context = MSSS website's home page.
Form = text in portuguese.
Speaker_intent = to persuade MS sufferers to join the community in order to achieve the goals stated in the message (i.e. to clarify their doubts, exchange information about the disease and interact with other sufferers).
Appropriateness =

i. Quantity: not ok. We are satisfied with the information provided about the community's purpose and its intended members. Nevertheless, given that the topic of this message is to present MSSS, and that, according to the OC Constituent, a community has purposes, people and policies, we observe that this message lacks information about the community's policies.
ii. Manner: ok. The message is clear and not ambiguous.
iii. Relevance: ok. This MSSS presentation is an important communication for the development of the conversation which is starting between the user and the system about the community, and also for the interaction among the community members.
iv. Quality: ok. The conversation is just starting.

Listener_understanding = the user needs to speak portuguese and to know what a virtual community is.
Listener_response = it is expected that the user learns what both MSSS and its purpose are.
Pre_conditions = none, aside from the knowledge informed in the Listener_understanding attribute.
Post_conditions = the user feels satisfied with his/her understanding of the message, becomes interested in the community and continues exploring the rest of the website's home page; the user does not completely understand the message (e.g. he/she does not know what a virtual community is), but since he/she is interested in knowing who the community is, he/she continues exploring the home page; the users does not understand the message, and although being interested in the community he/she chooses to leave the website.

end.

The attribute Appropriateness/Quantity makes the evaluator reflect on how informative the message is. In this process, we notice that the message that introduces MSSS describes the community, its purpose and its members, but it does not describe its policies.

II. Communicative Adequacy Test

(i) Do I understand this message? Yes, I understand the message.
(ii) Can I detect whom the message is from?

(a) Who means it? The system. (In fact, the system's designer through his deputy, as we have already noted. See that first person of discourse – *I* – is not used. Instead, the designer, who means this message, refers to himself as *Marcelo Morita*.)

(b) Who has written it? The system.

(iii) Is the system interfering with the communication? Yes, the system is interfering negatively in the communication. According to the OC Constituent, a community has purposes, people and policies (relations <Community has Purposes>, <Community has People> and <Community has Policies>) . By presenting MSSS in a static page like this, where community policies are not mentioned, the sender of this message does not tell potential members about norms and rules to be followed (relation <norms, rules constitute Policies>), leaving room for the members to adopt and practice individual unilateral norms and rules (relation <individuals adopt norms, rules>), which can be conflicting with those of the others. Since the norms and rules influence the members' actions (relations <norms, rules influence individuals> and <individuals perform actions>), the lack of information about the community's policies represents a potential threat to the success of the interaction among MSSS members.

CAT result: check usability. There may be usability and sociability problems.

Comment: At this point, we do not know whether the problem detected by CAT is a sociability problem (in case MSSS does not have any policies) or a usability one (in case the policies exist, but have not been mentioned on the website). Even if it is a usability problem, it is important to mention that usability problems may cause sociability ones (Preece, 2000). For instance, a new MSSS member may post a message advertising a product whose results have not yet been recognized by the medical community. Some members may be indifferent to the product, others, however, may manifest their wish to try it, which may leave some members worried and irritated with such messages. Consequently, some members may post messages containing a more aggressive tone, going against MSSS purposes, and others may decide not longer to participate in the community. The relevant point here is to show how new knowledge is gained or prompted through questions that arise as the evaluator proceeds with the analysis.

III. Consolidation of the knowledge obtained in steps (I) and (II)

This message presents the community, informs its purpose, and for whom it was created. Thus, it refers to the Community, Purposes e People elements of the OC Constituent, instantiated as follows:

This is an entity of the type Community with attributes
Identifier = MSSS.
Name = Multiple Sclerosis Sufferers Society.
Description = virtual community of Multiple Sclerosis sufferers.
end.

This is an entity of the type Purposes with attributes
Identifier = MSSS_Purposes_1.
Description = to allow MS sufferers to clarify their doubts, exchange information about the disease and interact with other sufferers.
Completeness = ok.
Coherence = ok. This is the first message on the purpose of MSSS.
end.

This is an entity of the type People with attributes
Identifier = MSSS_People_1.
Description = MS sufferers.
Completeness = ok.
Coherence = ok. This is the first message on the intended members of MSSS.
end.

Interesting results of the analysis of this message are (a) the description of who the community is, what its purpose is, and for whom it is intended; (b) the observation that there is a lack of information about the community's policies; (c) the perception that the lack of this information represents a potential threat to the success of the interaction among MSSS members; and (d) the identification that this may give rise to usability or sociability problems.

Following our interest in examining the communication in MSSS, the next message to be analyzed is the one provided in MSSS website's *Interaction* page.

Message 2

"*Here you have:*
An Internet group, created in MSN's website and now also in Yahoo, where you can see/post pictures of your family and friends; There is a space that works as a virtual discussion forum, about MS; And also a chat, open 24 hours a day, so you can call your virtual friends or not and use it when you want."
In addition to this text, there are links to: our group in MSN; our group in Yahoo; cultural tips in Sampa[6]; chat.

Following the steps of the OCF-based analysis process, there are:

I. Instantiation of the communications entity

This is an entity of the type communications with attributes
Identifier = MSSS_Interaction.
Speaker = the system (i.e. the designer's deputy).
Listener = a user.
Topic = socialization tools available to the users.
Content = presentation of the socialization tools and their purposes: a group in MSN and another one in Yahoo where members can post pictures of relatives and friends; a virtual discussion forum on MS; and a chat room to invite virtual friends or not.
Context = MSSS website's interaction page.
Form = text in Portuguese and links that are supposed to correspond to the content of the text, except for the absence of a link to the virtual discussion forum on MS.
Speaker_intent = to encourage the users to use the socialization tools as presented in the message.
Appropriateness =

[6] "Sampa" is a tender reference to the city of São Paulo.

v. `Quantity`: not ok. There is no information on the purposes of the groups in MSN and in Yahoo (e.g. when to use one and when to use the other) and on how to access the virtual discussion forum on MS.

vi. `Manner:` not ok. The message is not clear, for it lacks clarifying information on the socialization tools. The purposes of the forum and chat tools are implicit: to discuss about MS and to chat. However, this description leaves some questions unanswered, such as: What type of discussions and conversations are encouraged in the forum and the chat tools (e.g. exchange of experiences, information, any kind of discussion)?

vii. `Relevance:` ok. The presentation of the MSSS website's Interaction area is an essential communication, since one of the goals of this community is to encourage interaction among MS sufferers.

viii. `Quality:`

- Internally, the content of this message is not coherent, as it provides access (i.e. link) only to some of the socialization tools mentioned in the text and there is no explanation about the reason for the lack of access to one of the tools.
- The content of this message in not coherent with what was said about the Interaction area on the website's home page: "*in the Interaction area – the user will be able to meet other MS sufferers, from all over Brazil and/or the world, to see or post a picture, to read and participate in the forum on MS*...". In fact, in the Interaction area, the user has access to tools that allow some of these activities – only *some*, for, as we could see, the user is not provided access to the discussion forum on MS.

`Listener_understanding` = the user needs to speak Portuguese and to know what the following terms mean: MSN website / group in MSN, Yahoo / group in Yahoo, virtual discussion forum, chat, and virtual friends.

`Listener_response` = it is expected that the user understands how to use the socialization tools available in the MSSS website – that is, it is expected that the user becomes aware of them and knows when to use each one. If the user is a MS sufferer, it is expected that he/she uses one or all of the socialization tools.

`Pre_conditions` = none, aside from the knowledge informed in the `Listener_understanding` attribute.

`Post_conditions` = the user feels satisfied with his/her understanding of the message and joins the groups (MSN and Yahoo); the user does not understand the message and does not join the groups; the user does not understand the message but joins the groups in order to explore them.

`end.`

The `Appropriateness/Quantity` attribute induces the evaluator to consider whether this message provides enough information on its topic, so that the speaker's intention can be satisfied. We have observed that there is no information on why there are two group tools (and very similar, by the way) and how to access the virtual forum mentioned in the text. The absence of this last piece of information was also identified in the `Appropriateness/Quality` attribute, since the text mentions three tools but only provides access to two of them without explaining the reason for this. The lack of both pieces of information is reflected in the `Appropriateness/Manner` attribute, because it makes the message obscure. This attribute has also helped us realize that the purposes of the forum and chat tools are not explicitly described.

II. Communicative Adequacy Test

(i) Do I understand this message? I understand only part of the message. I do not know the purpose of the two group tools provided (i.e. when should I use one or the other). Besides, since there is no access to the virtual forum mentioned in the text, I do not know whether the forum is yet another socialization tool or a space within the group tools.

(ii) Can I detect whom the message is from?

(a) Who means it? The system.

(b) Who has written it? The system.

(iii) Is the system interfering with the communication? Yes, the system is negatively interfering in the communication, since the message *meant* and *written* by the system was not completely understood by the user. By not clarifying which of the socialization tools are available to community members and what is the purpose of each of them, the designer leaves room for the user to use the group tools differently from the way intended by MSSS designer, not due to a conscious decision by the user but because he/she will not know why they were created (i.e. the relation <goals, aspirations constitute Purposes> might not be true in this community). This problem reaches a higher dimension if we consider that the users' expectations and goals regarding the use of the tools can be different or not compatible with one another (i.e. the relation <individuals share goals, aspirations> might be violated). Therefore, we can note that the misuse of these tools creates a situation that favors the emergence of problems in the interaction among community members (given that <goals, aspirations influence individuals>).

CAT result: check usability. A user receives an incomprehensible system message. This is very probably a usability problem.

Comment: It is worth noting again that usability problems in an OC can lead to sociability problems.

III. Consolidation of the knowledge obtained in steps (I) and (II)

This message introduces the socialization tools available for MSSS members and informs the purpose of each of these tools. Thus, we have instantiated the Purposes element of the OC Constituent as follows:

This is an entity of the type Purposes with attributes

Identifier = MSN_MS_Group_Purposes_1.

Description = to allow MS sufferers to see and post pictures of relatives and friends.

Completeness = not ok. Information is missing on the purpose, more specifically on the difference between the groups in MSN and in Yahoo.

Coherence = ok. This is the first message on the purpose of the MSN group.

end.

This is an entity of the type Purposes with attributes

Identifier = Yahoo_MS_Group_Purposes_1.

Description = to allow MS sufferers to see and post pictures of relatives and friends.

Completeness = not ok. Information is missing on the purpose, more specifically on the difference between the groups in MSN and in Yahoo.
Coherence = ok This is the first message on the purpose of the Yahoo group.
end.

This is an entity of the type Purposes with attributes
Identifier = MS_Forum_Purposes.
Description = to discuss about MS.
Completeness = not ok The purpose is implicit.
Coherence = ok. This is the first message on the purpose of the forum.
end.

The most important outcomes of the analysis of this message are (a) the presentation of the purpose intended by the MSSS designer for the groups and the forum created; (b) the observation that the purposes are not clearly presented; (c) the perception of the risks this lack of clarity imposes on the success of this community's online activity; and (d) the identification that this is probably an application usability problem.

In order to explore the communication that takes place in MSSS, we will now analyze a message that appears in the home page of the group created in MSN, with a description of this group (provided and maintained by its creator).

Message 3

"*Welcome to this virtual community for MS (Multiple Sclerosis) Sufferers from all over the world.*

This group in MSN is a "branch" of a website I set up at the following Internet address: http://www.spem.kit.net/

My name is Marcelo Morita Oliveira, I am 27 years old and I have MS.

Visit the website and learn more about me, this illness, support centers for sufferers all over Brazil, and a lot more.

You can also visit our other MS group, at the Yahoo's website: http://br.groups.yahoo.com/group/socpem

- to meet new friends, talk to other MS sufferers all over Brazil;

- or to join the chat that takes place every weekend / holiday starting at 4 pm.

For messages posted here, follow the group rules listed in this link, http://www.spem.kit.net/regras.htm. All messages that do not follow these rules will be deleted."

Analyzing this message according to the OCF-based analysis process, we find out the following.

I. Instantiation of the communications entity

This is an entity of the type communications with attributes
Identifier = MSN_Group_Presentation.
Speaker = a user (the group's creator, manager and moderator, who is also the designer and manager of MSSS, the creator, manager and moderator of the group in Yahoo, and the forum's manager and moderator).

`Listener` = a user (everyone who visits the group).
`Topic` = presentation of the group created in MSN.
`Content` = who the group is, which is its relation with the MSSS website, access to the MSSS website, who the creator of the group is, access to the Yahoo group, possible purpose of the group (we cannot know whether the purpose provided refers to the group in MSN or in Yahoo), access to the rules that must be followed when posting messages.
`Context` = MSN group's home page.
`Form` = text in Portuguese and access links.
`Speaker_intent` = to encourage other users to participate in the MSN group according to its informed purpose and rules, to participate in chat sessions, and to visit both the MSSS website and the group's site in Yahoo.
`Appropriateness` =

i. `Quantity`: not ok. We are satisfied with the information provided about who the group is, who are their intended members and which are its rules. However, there is no explanation about the difference between this group and the one in Yahoo responding to questions such as: Which is the purpose of these groups? What are they intended for? When is it more appropriate to use one or the other? In what do they differ? Note that the same problem was detected in the previous message.
ii. `Manner:` not ok. It is not clear in this message whether the purpose presented refers to the MSN group and/or to the Yahoo group.
iii. `Relevance:` ok. The presentation of the group is an important communication to make users decide to participate or not.
iv. `Quality:`
    - Internally, this message is incoherent regarding the intended members of the group. Right at the beginning, the group's creator presents it as a virtual community of MS sufferers from all over the world. However, when informing the purpose of the MSN group and/or the Yahoo group (we cannot say for sure), he only mentions Brazilian MS sufferers. Besides, if the idea is to really gather people from all over the world, the message should not be written only in Portuguese. Thus, one cannot really know who the intended members of the MSN group are.
    - Comparing the content of this message with what was said about the MSN group in Message 2 (about the socialization tools available to the users), again we identify an incoherence, now regarding the purpose of the group. In Message 2, the purpose stated was to allow MS sufferers to see and post pictures of relatives and friends. However, in the present message (Message 3), the informed purpose is to make new friends and talk to other Brazilian MS sufferers, as well as to join the chat[7]. We should note that, in practice, the speaker in both messages is the same, once the designer of the MSSS website is the creator of the MSN group.
    - Comparing the content of this message with that of Message 1 (presentation of MSSS), we can observe an incoherence regarding the

[7] We do not know for sure whether the purpose informed in Message 3 refers to the group in MSN, to the group in Yahoo, or both. This is one of the cases that require the use of another information elicitation method to clarify the value of an attribute. However, for the analysis made in the present work, without any contact with MSSS members, we assume that the purpose presented in this message refers to both groups.

intended members of the group. In the present message, the creator mentions both MS sufferers from all over the world and Brazilians, while in Message 1 the designer of MSSS refers generically to MS sufferers, without specifying where they are from. Therefore, for the first time, the following doubt arises: Are the members of MSSS the same as the MSN group?

- Still comparing the content of the messages above, the purpose of the MSN group stated in Message 3 and the purpose of MSSS (Message 1) is coherent – the former leads to the latter.

`Listener_understanding` = the user needs to speak Portuguese and to know what the following terms mean: virtual community, group in MSN, group in the Yahoo website, and chat.

`Listener_response` = it is expected that the user understands who the group in MSN is, i.e. why it was created, what should the user expect, etc. If the user is a MS sufferer, it is expected that he/she participates in the group and/or the chat, respecting the rules, and visits both the MSSS website and the Yahoo group.

`Pre_conditions` = none, aside from the knowledge informed in the `Listener_understanding` attribute.

`Post_conditions` = the user understands the message, becomes interested in the group and continues to explore the rest of the home page; the user does not fully understand the message but, being interested in the group, continues to explore the home page; the user does not understand the message and leaves this page.

`end.`

Attributes `Appropriateness/Quantity`, `Manner` and `Quality` reveal to us, evaluators, that there is a failure in the user-system communication regarding the group's purpose. Reflecting on the quantity of the information provided in the message, we have realized that there is no explanation of the reason for the existence of two similar groups. Considering the clarity of the information, by means of the `Appropriateness/Manner` attribute, we have registered that the message does not clarify whether the stated purpose refers to the group in MSN and/or to the group in Yahoo. Finally, the reflection motivated by the `Appropriateness/Quality` attribute has demonstrated incoherence among the purposes of the MSN group stated in different messages.

Our reflection based on the `Appropriateness/Quality` attribute has also lead to a user-system communication failure concerning the intended members of the group, which leads to a first question on the identity of MSSS, i.e. of the community as a whole. Internally, the message does not clearly explain whether the group was created for MS sufferers from all over the world or from Brazil. Externally, when compared with the MSSS presentation message (Message 1), we have also questioned, although not very emphatically, whether the intended members are the same. We are immediately lead to consider the implications should this not be the case: Are MSSS and the MSN group not the same community?!

II. Communicative Adequacy Test

`(i) Do I understand this message?` I understand only part of the message. The purpose of the group, who its intended members are and why there are two groups are not clear.

`(ii) Can I detect whom the message is from?`

(a) Who means it? The user.

(b) Who has written it? The user.

(iii) Is the system interfering with the communication? No, the system (in this case, MSN) is not interfering in the communication. When creating a group in MSN, the creator is free to describe the group, therefore the message was elaborated and written by the group's creator without system interference.

CAT result: check scaffolds. This is very probably a communicative problem of the user.

Comment: We register that this communicative problem of the user may cause sociability problems in the community.

In order to illustrate how scaffolds can improve user communication and ultimately the sociability of the community, we will explore the problem regarding the intended members of the group. Being aware that MSN groups are likely to gather members from different countries throughout the world, MSN designers can consider incorporating linguistic scaffolds for users. For example, the creator of the MS MSN group would benefit from having a translation tool which he could use to translate the presentation message of the group from Portuguese to English, a language commonly used in international meetings.

III. Consolidation of the knowledge obtained in steps (I) and (II)

This message presents the group, informs for whom it was created and what its purpose is, and provides access to the rules that must be followed by members when posting messages. Therefore, it refers to the Community, Purposes, People and Policies elements of the OC Constituent, instantiated as follows:

This is an entity of the type Community with attributes
Identifier = MSN_MS_Group.
Name = <no name>.
Description = virtual community of Multiple Sclerosis sufferers.
end.

This is an entity of the type Purposes with attributes
Identifier = MSN_MS_Group_Purposes_2.
Description = to allow MS sufferers to meet and talk to other people with MS from all over Brazil, and to take part in the chat.
Completeness = not ok. It is not completely clear whether the informed purpose refers to the group in MSN. If this is the case, then we do not know the difference between the groups in MSN and in Yahoo.
Coherence = not ok. It is not coherent in relation to what was said about the purpose of the MSN group in Message 2.
end.

This is an entity of the type Purposes with attributes
Identifier = Yahoo_MS_Group_Purposes_2.
Description = to allow MS sufferers to meet and talk to other people with MS from all over Brazil, and to take part in the chat.

Completeness = not ok. It is not completely clear whether the informed purpose refers to the group in Yahoo. If this is the case, then we do not know the difference between the groups in MSN and in Yahoo.

Coherence = not ok. It is not coherent in relation to what was said about the purpose of the Yahoo group in Message 2.

end.

This is an entity of the type People with attributes

Identifier = MSN_MS_Group_People_1.

Description = MS sufferers from all over the world.

Completeness = ok.

Coherence = not ok, internally and when compared to what was said about this entity in Message 1.

end.

This is an entity of the type Policies with attributes

Identifier = MSN_MS_Group_Policies_1.

Items = 1. Medicines/treatments can be mentioned. But do not prescribe/suggest anything to anyone, because only a qualified professional: neurologist, psychiatrist or others with updated exams and information on the patient are able to do that more safely; 2. Let's avoid arguments, don't post messages with jokes involving: politics or religion, even though it is intended as something innocent, there might always be someone who feels offended. Note: I am taking this measure because there are countless other participants in the group and we don't want to hurt anyone's beliefs or convictions; 3. Please respect the participants' ideas, even though they are opposite to yours. If you want to disagree, do so politely. If any argument takes place among two or more participants, all related messages will be deleted; 4. I kindly ask you to avoid advertising products/services of all kinds; 5. If any not legalized/recognized product/service is offered, it will be denounced to the competent authorities; *If you receive an advertisement of any product/service, do not reply, just click the link below to send a notification e-mail; **If you see any message disobeying these rules, click here… and send an e-mail; ***All messages that disrespect these norms will be deleted.

Completeness = ok.

Coherence = ok. Up to this moment, nothing else has been said about the policies of the MSN group.

end.

Interesting results of the analysis of this message are (a) the presentation of the MSN group; (b) the perception that there are communication problems between the group's creator and its users regarding the purpose and the intended members of the group; (c) the identification of the risk such problems represent for the success of the social interaction among the members (the possible implications of communication failure regarding the purpose have been explored in the analysis of Message 2), and finally; (d) the observation that the system is not interfering in the communication between the group's creator and its users, i.e. that the problem detected probably reflects a communicative difficulty of the system's user (i.e. MSN's user).

Continuing the analysis of communication in MSSS, we will now examine a message provided in the group's home page at Yahoo, which contains the description of the group, made available and maintained by its creator.

Message 4

"*Welcome all who live with Multiple Sclerosis (MS): relatives, friends, sufferers, among others.*

You can read/post messages from/to this group.

For messages posted here, follow the group rules listed in this link. All messages that do not follow these rules will be deleted.

My name is Marcelo Morita. I am the creator of MSSS, in www.spem.kit.net, the manager of the MS forum, in http://inforum.insite.com/br/em, and also an MS sufferer.

In order to reply to messages, or to have access to other areas, you need to become a registered member.

In Database – take a look at our MS glossary and/or create you own data table.

All registered members are allowed to create/take part in: polls; see/post pictures; and do everything else the group offers.

If you are having difficulties reading the text, select Internet Explorer's menu option View – Font size – Medium or the size which makes you feel comfortable.

Access our MSN group here...
Take part in our chat here...
or click here, follow the instructions, and download the Yahoo Messenger to chat with your friend whenever you want."

Following the steps of the OCF-based analysis process, we can see the following.

I. Instantiation of the `communications` entity

`This is an entity of the type` communications `with attributes`

`Identifier` = Yahoo_Group_Presentation.

`Speaker` = a user (the group's creator, manager and moderator, who is also the designer and manager of MSSS, the creator, manager and moderator of the group in MSN, and the forum's manager and moderator).

`Listener` = a user (everyone who visits the group).

`Topic` = presentation of the group created in Yahoo.

`Content` = welcome to the intended members of the group, access to the rules that must be followed when posting messages, who the group's creator is, access to MSSS website, access to the forum on MS, some instructions for using the avaiable features, access to the MSN group, access to the group's chat ("our chat"), access to the download of the Yahoo Messenger, together with a suggestion on when to use it ("to chat with your friends whenever you want").

`Context` = Yahoo group's home page.

`Form` = text in Portuguese and access links.

`Speaker_intent` = to encourage other users to participate in this Yahoo group, to abide to the existing rules, to participate in chat sessions, and to visit both the MSSS website and the group in MSN.

`Appropriateness` =

i. `Quantity`: not ok. We are satisfied with the information provided about who the group is, who are their intended members and which are its rules. However, there is no explanation about the difference between this group and the one in Yahoo responding to questions such as: Which is the purpose of these groups? What are they intended for? When is it more appropriate to use one or the other? In what do they differ? Note that the same problem was detected in the previous message.
ii. `Manner:` not ok. It is not clear in this message whether the purpose presented refers to the MSN group and/or to the Yahoo group.
iii. `Relevance:` ok. The presentation of the group is an important communication to make users decide to participate or not.
iv. `Quality:`
    - Internally, the message is coherent.
    - Comparing the content of this message with what has already been said about the intended members of MSSS and MSN group, we identify an incoherence. The previous messages mention only MSSS sufferers, whereas this one encompasses everyone who deals with the disease.
    - With respect to policies, we observe a coherence between what is stated in the present message and in Message 3 (presentation of the MSN group). The policies of both groups are the same.
    - The present message does not explicitly inform the purpose of the group. Nevertheless, we can compare the content of this message with that of Message 2 (presentation of MSSS interaction tools) regarding the features offered to users. The former mentions only the possibility of seeing/posting pictures of relatives and friends, while the latter states that users can read and post messages, check the MS glossary, create data tables, etc. These features support MSSS purpose, stated in Message 1 ("*...to bring out clarification, information and interaction among sufferers of this disease.*").
    - It is worth mentioning that in fact all messages analyzed so far are stated by the same speaker. MSSS designer is the creator of MSN and Yahoo groups.

`Listener_understanding` = the user needs to speak Portuguese and to know what the following terms mean: MSSS website, forum, database table, group in MSN, chat, and Yahoo Messenger.

`Listener_response` = it is expected that the user understands who the group in Yahoo is, i.e. why it was created, which features are offered to its members, etc. If the user deals with MS, it is expected that he/she participates in this group, respecting the rules, and makes use of the available features. Besides, it is expected that the user visites the website of both MSSS and the Yahoo group, and, if he/she wishes, be able to download the Yahoo Messenger.

`Pre_conditions` = none, aside from the knowledge informed in the `Listener_understanding` attribute.

`Post_conditions` = the user understands the message, becomes interested in the Yahoo group and keeps on exploring the rest of its home page; the user does not fully understand the message, but, being interested in the group, continues to

explore its home page; the user does not fully understand the message and leaves this page.
end.

The reflection triggered by the Appropriateness/Quantity attribute revealed that there is no information on the purpose of the Yahoo group and, consequently, on how this purpose relates to the purposes of the other interaction tools mentioned in the message. The absence of these pieces of information is reflected in the Appropriateness/Manner attribute, since it makes the message unclear. Reflecting on the Appropriateness/Quality attribute, we identified a strong incoherence among what is said about the intended members of the Yahoo group, the MSN group (Message 3) and MSSS (Message 1). This incoherence reinforces the doubt raised in the analysis of the previous message about MSSS identity. Are the groups in MSN and Yahoo two different groups? If so, who are the prople that make MSSS? The union of the members of both groups?

II. Communicative Adequacy Test

(i) Do I understand this message? I understand only part of the message. It is not clear which is the Yahoo group's purpose, neither how it relates to the other socializing environments.
(ii) Can I detect whom the message is from?
(a) Who means it? The user.
(b) Who has written it? The same user.
(iii) Is the system interfering with the communication? No, the system (in this case, Yahoo) is not interfering in the communication. When the user creates a group in Yahoo, he/she is free to describe the group. This implies that the message was meant and written by the group's creator without system interference.

CAT result: check scaffolds. This is very probably a communicative problem of the user.
Comment: We register again that this communicative problem between the creator of the group and its users may cause the community sociability problems.

III. Consolidation of the knowledge obtained in steps (I) and (II)

This message presents the Yahoo group and informs for whom it was created (i.e. who its intended members are), as well as the rules that members must follow when posting messages. It thus refers to the Community, People and Policies elements of the OC Constituent, instantiated as follows:

This is an entity of the type Community with attributes
Identifier = Yahoo_MS_Group.
Name = <no name>.
Description = <no brief description>.
end.

This is an entity of the type People with attributes
Identifier = Yahoo_MS_Group_People_1.
Description = everyone who deal with MS.
Completeness = ok.

Coherence = not ok, when compared to what is said about this entity in Messages 1 and 3.
end.

This is an entity of the type Policies with attributes
Identifier = Yahoo_MS_Group_Policies_1.
Items = 1. Medicines/treatments can be mentioned. But do not prescribe/suggest anything to anyone, because only a qualified professional: neurologist, psychiatrist or others with updated exams and information on the patient are able to do that more safely; 2. Let's avoid arguments, don't post messages with jokes involving: politics or religion, even though it is intended as something innocent, there might always be someone who feels offended. Note: I am taking this measure because there are countless other participants in the group and we don't want to hurt anyone's beliefs or convictions; 3. Please respect the participants' ideas, even though they are opposite to yours. If you want to disagree, do so politely. If any argument takes place among two or more participants, all related messages will be deleted; 4. I kindly ask you to avoid advertising products/services of all kinds; 5. If any not legalized/recognized product/service is offered, it will be denounced to the competent authorities; *If you receive an advertisement of any product/service, do not reply, just click the link below to send a notification e-mail; **If you see any message disobeying these rules, click here… and send an e-mail; ***All messages that disrespect these norms will be deleted.
Completeness = ok.
Coherence = ok. Yahoo group's policies are the same as the ones of the MSN group[CMAB1].
end.

Important outcomes of the analysis of this message are (a) the presentation of the Yahoo group; (b) the perception that there is no information about the group's purpose (in Message 2, we explored some possible implications of the lack of this information for communication among members); (c) the observation that there are communicative breakdowns about the intended members of the diverse socializing environments of MSSS; (d) the identification of the risks that problems (b) and (c) impose on the social interaction among members; and finally (e) the chance that these may be communicative problems of the group's creator without system interference.

The last message to be analyzed is the one stated at the forum's home page. We reach it following the link provided on the Yahoo group's home page.

Message 5

"*Forum created by Antonio Marcos Silva, MS sufferer.*

Since Mar/2003, this forum is being coordinated by Marcelo Morita, also an MS sufferer and creator of the MSSS website.

The forum continued with the support of ALPEM – Londrina Association of Multiple Sclerosis Sufferers.

Due to several technical problems with inforum, we are moving to a group in Yahoo.

Click here to access the new forum and/or migrate..."

"*This space is open to everyone who deals with MS, Multiple Sclerosis. Relatives, friends and sufferers of this disease.*

Here you have:

** A glossary with some of the medical terms commonly used in our cases;*

** A space with some links to sites about MS;*

** A download area with files listing important rights to those who have special needs and chronic diseases, such as MS;*

** A space with FAQ on the disease, which are some frequent questions about the disease and their corresponding answers;*

** Also, we will talk about anything here, you can share ideas, information, victories and anguishes about the disease, but follow these rules:*

1. In the messages posted here, medicines/treatments can be mentioned. But do not prescribe/suggest anything to anyone, because only a qualified professional: neurologist, psychiatrist or others with updated exams and information on the patient are able to do that more safely.

2. Respect the participants' ideas, even though they are opposite to yours. If you want to disagree, do so politely. If any argument takes place among two or more participants, all related messages will be deleted.

3. I kindly ask you to avoid advertising products/services of all kinds.

4. If any not legalized/recognized product/service is offered, it will also be denounced to the competent authorities.

** If you receive an advertisement of any product/service, do not reply, just click the link below to send a notification e-mail.*

***If you see any message disobeying these rules, click here and send an e-mail.*

**** All messages that disrespect these norms, will be deleted.*"

Following the steps of OCF-based analysis, we have:

I. Instantiation of the `communications` entity

`This is an entity of the type` communications `with attributes`

`Identifier` = Forum_Presentation.

`Speaker` = a user (manager and moderator of the forum, who is also the designer and manager of MSSS, the creator, manager and moderator of the groups in MSN and in Yahoo).

`Listener` = a user (everyone who visits the group).

`Topic` = presentation of the forum on MS.

`Content` = who the forum creator is, who the forum coordinator is, who supports the forum's continuity, information on the change to a group in Yahoo, access to the new group, who the intended forum members are, list of resources available, list of rules to be followed when posting messages, orientation on how to proceed in case the user detects a message that violates the rules, consequences of violating the rules.

`Context` = forum's home page.

`Form` = text in Portuguese and access links.

`Speaker_intent` = to encourage people who access this site to participate in the Yahoo group (and not in this forum).

Appropriateness =

i. Quantity: not ok. Too much information is provided about a group that is supposed to have been discontinued, while there is too few information about what to expect from the group in Yahoo (i.e. its purpose).
ii. Manner: not ok. The message is ambiguous. The excess of information about the forum may discourage one to move to the new group, while encouraging him/her to join this assumedly discontinued forum.
iii. Relevance: ok. The forum is very active, so a general presentation of it and the information that the members are moving to another group are an important communication to make the users interested or not in visiting this new group.
iv. Quality:
    - Internally, the above-mentioned incoherence is related to the ambiguity detected based on the reflection about the Appropriateness/Manner attribute. If the speaker's intention is to make users join the Yahoo group and no longer use the forum, then detailed information on the forum itself should not be given.
    - Comparing what is said about the intended members of the forum in this message with what has been said in previous messages about the members of MSSS and of the MSN and Yahoo groups, we identify an incoherence in relation to MSSS and to the group in MSN (which mention only MS sufferers), and coherence in relation to the group in Yahoo (which includes everyone who deals with the disease).
    - Regarding the policies, there is an incoherence between what is said in this message and in Messages 3 and 4 (presentation of the groups in MSN and Yahoo, respectively). The policies of the MSN and Yahoo groups have one extra rule in relation to the forum.
    - This message does not clearly inform the group's purpose. However, we can see that the resources available in the forum meet the purpose of MSSS (stated in Message 1 as "*...bringing out clarification, information and interaction among sufferers of this disease.*") and the purpose of the forum as intended by MSSS designer (in Message 2, the forum is presented as a virtual forum for discussions about MS).
    - We should note that the speaker of all these messages is the same one, for the designer of the MSSS website is also the creator of the groups in MSN and in Yahoo, and of the forum.

Listener_understanding = the user needs to speak Portuguese and to know what the following terms mean: forum, MSSS website, group in Yahoo, and download.

Listener_response = it is expected that the user understands what the forum is. If the user deals with MS, it is expected that he/she participates in the new group in Yahoo.

Pre_conditions = none, aside from the knowledge informed in the Listener_understanding attribute.

Post_conditions = the user understands the message and accesses the group in Yahoo; the user understands the message but decides to participate in the forum; the user does not understand the change that is happening in the forum and starts to participate, or continues participating, in the forum.

end.

Reflecting on the Appropriateness/Quantity attribute, we noticed that there is an unbalance between the amount of information provided about the forum (too much, for a group that is supposed to be ending) and the group in Yahoo (too little, for a group that should attract new members). This unbalance is repeated in the Appropriateness/Manner and Quality attributes, making the message ambiguous and incoherent. Reflection on this last attribute also points to an incoherence regarding the intended members of the forum, of MSSS and of the group in MSN, as well as the policies of the forum and of the MSN and Yahoo groups.

II. Communicative Adequacy Test

(i) Do I understand this message? I understand the message.
(ii) Can I detect whom the message is from?
    (a) Who means it? The user.
    (b) Who has written it? The same user.
(iii) Is the system interfering with the communication? No, the system (in this case, InForum) is not interfering in the communication. When creating a forum, the creator is given free space to describe it, therefore the message was elaborated and written by the group's creator without system interference.

CAT result: ok.

III. Consolidation of the knowledge obtained in steps (I) and (II)

This message presents the forum, informs who its intended members are and the rules that must be followed when exchanging messages. Therefore, it refers to the Community, People and Policies elements of the OC Constituent, instantiated as follows:

This is an entity of the type Community with attributes
    Identifier = MS_Forum.
    Name = < no name >.
    Description = <no brief description >.
end.

This is an entity of the type People with attributes
    Identifier = MS_Forum_People_1.
    Description = everyone who deal with MS.
    Completeness = ok.
    Coherence = not ok. There is lack of coherence when we compare what is said about this entity in this message and in Messages 1 and 3.
end.

This is an entity of the type Policies with attributes
    Identifier = MS_Forum_Policies_1.
    Items = 1. In the messages posted here, medicines/treatments can be mentioned. But do not prescribe/suggest anything to anyone, because only a qualified professional: neurologist, psychiatrist or others with updated exams and information on the patient are able to do that more safely.; 2. Respect the participants' ideas, even though they are opposite to yours. If you want to

disagree, do so politely. If any argument takes place among two or more participants, all related messages will be deleted.; 3. I kindly ask you to avoid advertising products/services of all kinds.; 4. If any not legalized/recognized product/service is offered, it will also be denounced to the competent authorities.; * If you receive an advertisement of any product/service, do not reply, just click the link below to send a notification e-mail.; ** If you see any message disobeying these rules, click here and send an e-mail.; *** All messages that disrespect these norms, will be deleted.

`Completeness` = ok.

`Coherence` = not ok, in relation to what is said about this entity in Messages 3 and 4.

`end.`

The main results from the analysis of this message are (a) the presentation of the forum, (b) the observation that there is no clear information about the group's purpose (in Message 2, we explored the possible consequences of the absence of such information for the communication among group members), (c) the perception that there are failures in the communication about MSSS members and (d) about the policies of the diverse environments in this community, and finally (e) the fact that these failures do not necessarily imply that one cannot understand the message, but may disrupt the realization of the speaker's intention when transmitting it.

These are the main excerpts of our OCF-based analysis of messages exchanged between the designer and the users of MSSS. The messages are about who the community is and what, for the designer, are the socialization tools that more appropriately respond to the members' communicative needs. In the next and final section we discuss OCF's performance as an epistemic tool, and present our future research agenda.

5. Discussions and Future Research

In this paper we have described the first extensive use of OCF to analyze in great detail an existing OC, namely MSSS, a Brazilian online health-support community. The contributions of this research are threefold. First, we have reached a deeper understanding of the community itself. Second, we have acquired deeper knowledge about the use of OCF as an analytic tool. Third, the research has raised new relevant issues for our research agenda.

Semiotic engineering is aligned with Schön's view of what design is and consequently what kind of knowledge designers need to have in order to be successful (Schön, 1983). Schön advocates that designers are usually faced with unique problematic situations, rather than with clearly defined problems. Thus, one of the most fundamental tasks in design is to frame the design situation as a new problem. Since design problems are almost always unique, solutions are also likely to be unique. The uniqueness of both design problem and solution results from the fact that designers interpret and frame problematic situations in diverse and strongly contingent ways, responding to highly situated needs and values of oriduct users and consumers. Schön claims that designers must have a particular kind of knowledge that will help them understand each problematic situation, frame the problem(s) perceived in it, decide how to solve it (them), and compare alternative solutions. In his view,

designers should be equipped with essentially epistemic tools, namely tools that increase their understanding of the problem itself and of candidate solutions.

The nature of the design tools derived from semiotic engineering is thus essentially epistemic. These tools trigger the designers' reflection about numerous and unique problematic situations. By so doing, such tools enable designers to increase constantly their knowledge, to improve considerably the decision-making process inherent to design, and to improve consistently the quality of their products. In the context of multi-user applications, the semiotic engineering epistemic tools help designers formulate and explore issues involved in the design of such applications. OCF is one of these tools. It was proposed as an analytic tool to help designers understand existing technology-supported online social activities, which includes understanding the impacts of their design decisions on the evolution of OCs. In other words, OCF was proposed to leverage knowledge on how online social activity is enabled and affected by technology.

The OCF based analysis of MSSS proved to be particularly helpful in handling the unique problem of understanding this specific OC, and how technology may influence its life and growth. It pointed to problems in the communication between the community's designer and members regarding all three key components of an OC: People, Policies and Purposes.

With respect to People, there is a lack of coherence among the various ways to communicate who are the intended members of all three groups in MSSS. This gives rise to doubts about the community's identity, as revealed in some actual situations involving MSSS designer and members. We have already shown some instances of messages that point towards the source of important problems faced by this community. But there are many others we have found in our extensive study. Specifically about people's identity and roles, for instance, in one message the moderator of the Yahoo group informs members that the group has a new moderator. Then, another message sent some days later from a member of the Yahoo group to members of the MSN group shows us that she takes the new moderator of the Yahoo group to be also the moderator of the MSN group. The subject of her message is "*To the moderators*", and she starts by making explicit reference to the moderators' names. She gets a response message where another member of the MSN group shows that for him Yahoo and MSN are two distinct groups. In it, the author says he is sure that the new moderator of the Yahoo group is *not* the moderator of the MSN group.

Another situation which reveals that members have doubts about MSSS identity is one in which the manager of the Yahoo group creates a database table in order to find out the profile of the members of this group. Some of the attributes of this table include the date when the disease has been diagnosed, the kind of MS the person is affected by, and the sufferer's main occupation.

With regard to Policies, there is a lack of information about this community's policies in the message that presents MSSS. This problem may be compensated by the more clearly stated policies presented separately in each of the various environments where members actually interact. This design decision seems to reinforce the association between policies and messages (instead of policies and community), manifested in the presentation messages of the forum and both groups in MSN and Yahoo. Excerpts from these messages can be paraphrased as: "For messages posted here, follow the group rules listed here. All messages that do not abide to these rules, will be deleted." In other words, the *community* policies are strongly linked to the *messages*, showing that one's behavior online is in fact what one says online. Although this is true, the effect of *introducing* such rules in message-posting areas,

and not in community-presentation area, does not inform members early enough (i.e. at the community's home page) about the community's practices and strategies. Moreover, the community's current alternative ends up by being a means to influence the behavior of people who are already members, instead of telling potential members about the bonds and values that keep them together (and that should be inviting for non-members who consider joining MSSS). This is found out only as members begin to act in the community through message-exchanging, and opens the possibility for misunderstandings and inadverted misconduct.

With respect to Purposes, the purpose of all three groups is unclear. This has negative effects on communication among MSSS members, since it leaves room for conflicting purposes in using the group and forum tools. Members can follow their individual inclination, and eventually contribute to a weakening of the community's cohesion. This is actually happening in MSSS. Some members have arbitrarily chosen to use only one of the interaction tools, while others preferred to use more than one, for purposes and contexts that are unclear. Thus, in practice the members of the Yahoo group, the MSN group and the forum are not the same, which disperses and weakens the community.

The OCF-based analysis also revealed that communicative breakdowns concerning People, Purposes and Policies may be a threat for the evolution of MSSS, since they jeopardize the success of interaction among members, an essential activity for the survival of online communities. Messages exchanged among MSSS members clearly demonstrate that they not only perceive, but also regret the difficulties they are facing. Members say things like: "*I would like to do something in order to make our group go back to being as close as it used to be in the previous website.*"; "*Let's all pull together again before this group dies?*"; "*I miss the frequent contact we kept in the previous group…*"

The extensive analysis reported in this paper illustrates the kind of knowledge generated by an epistemic tool such as OCF. It calls the evaluators' attention to certain aspects of an OC that are systematically related to others and to the success of the community as a whole. For instance, we have seen that the problem in the communication between MSSS designer and members regarding the purposes of all three groups in MSSS affects the People component of this community. The lack of clear instructions about when is more appropriate to use each group ended up dispersing MSSS, which made members feel even more confused about who its actual members are.

The analysis also reveals the consequences of some design decisions, deliberate or not, for the success and evolution of an OC (e.g. the way the designer communicates his/her design view to the users). While leading evaluators to acquire a deeper understanding of the community, the OCF-based analysis invites them to think of possible solutions for detected problems, as well as to consider the complexity of their implementation. Candidate solutions can themselves be explored using OCF, since the method can be applied to design specifications and low-fidelity prototypes as well.

The MSSS analysis has thus increased our knowledge about the community as a whole, as well as about the probable effects of certain design decisions on the community's success and evolution. Our experience reinforces our belief in the relevance of contributions of OCF in knowledge-intensive OC design activity.

When compared to predictive inspection methods (e.g. heuristic evaluation, compliance with design guidelines, and so on), we realize that OCF-based analyses supplement them by providing a clearer and richer description of how the constitutive

elements of an OC affect one another and the community itself. Predictive inspection methods of analysis tipically result from statistically significant empirical studies that aim at associating certain features of interactive software with particular kinds of user reactions. These methods usually do not have any commitment to describing how these features relate to one another, and their explanatory power is causal in a very strict sense (i.e. they typically provide explanations based merely on co-ocurrence). So, OCF's explanatory power stands out as an additional resource for researchers using predictive thoeries and methods.

Additionally, since OCF relies on sound theoretical principles to formulate explanations about computer-mediated communication experiences, it includes a capital dimension in the study of online communities - culture. Semiotic theories such as the one adopted by Semiotic Engineering center on culture, and cultural variables are not likely to vary much from one individual to another provided that the cultural boundaries within which conclusions are expected to hold are clearly defined. This explains the importance of the set of culturally-determined sign systems input to CAT.

While planning and performing the OCF-based analysis of MSSS, we realized the intense effort and theoretical knowledge required to perform these activities. Since OCF was proposed as a tool "to support evaluators, designers, moderators and users in identifying and understanding mainly sociability problems and related usability problems in OCs and other software that supports social interaction online" (op.cit. p.4), further research is needed in order to find out how OCF should be instantiated and presented so that people with different background knowledge will be able to use and explore it.

A noteworthy challenge for our analysis came about when we tried to model MSSS using OCF's OC Contituent. We were not sure about how the three different groups that constitute this community (namely, MSN group, Yahoo group and forum), and the relationship among them, should be represented. How should "the community" itself be represented? These questions are still open, and we believe that they constitute an important research issue for online communities that can spread across different technologies and different websites, growing organically in cyberspace.

Another interesting issue that sprang from this research is whether OCF can be used *dimensionally*. By this we mean to use OCF in order to analyze only certain dimensions of OCs, in isolation from other dimensions. For instance, in the analysis of MSSS, the attribute `Appropriateness` of the `communications` entity triggered rich and clarifying reflections about how adequate a particular communication is to the current situation, with regard to how informative, clear, relevant, coherent and consistent the message is. These reflections shed some light on which is the possible cause of the difficulties the community is facing. We believe that a dimensional application of OCF may be useful for confirming hypotheses, while a complete analysis may be useful for helping evaluators to identify problems in an OC. For example, an evaluator who suspects that members of an OC are not getting a specific designer's message due to problems related to the fulfillment of conditions necessary to the success of communication can instantiate the OC Constituent's `communications` entity with attributes based on the speech act theory's concepts such as illocutionary act, necessary conditions for the performance of illocutionary acts, preparatory conditions and the like (Austin, 1962; Searle, 1969, 1979). For these and other situations, it would be interesting to examine the possibility, costs and benefits of devising dimensional applications of OCF as alternatives to a complete analysis.

Our next steps include further experiments and elaboration with OCF, both in practice and theory. Upon MSSS designer's spontaneous demand, we will give him feedback on his design based on the analysis we reported here. We will also give him suggestions about how to redesign the community's website in order to turn the current incoherent and incomplete discourse into a coherent and complete one. In other words, we will give him suggestestions on how to improve the communication of his design vision to the users. Our intention is to compare the website's usability and sociability before and after the redesign, highly valuable evidence of what epistemic tools can actually do in this kind of design situation.

The evaluation of OCF's performance certainly does not end with this paper. We will analyze MSSS using two other methods of analysis derived from theories that supplement semiotic engineering, namely the usability and sociability guidelines for evaluating online health support communities (Abras, 2003) and the underlying discourse unveiling method (Nicolaci-da-Costa, 1989, 1994; da Silva et al., 2003). The first purpose of such analysis is to triangulate our findings about MSSS with other resources coming from alternative research methods. Likewise, we intend to examine possible relations between CAT results and usability and sociability problems detected by other methods of analysis.

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