

Social Software and Educational Technology: Informal, Formal and Technical Values

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ABSTRACT

Social software is a growing reality worldwide and several authors are discussing its use to promote social interaction in learning contexts. Although problems regarding privacy, reputation, and identity are commonly reported in social software, an explicit concern regarding peoples' values is not a common practice in its design and adoption, in part, due to the lack of research in this subject. The issue of values becomes even more critical as social software crosses the boundaries of people's cultures to pervade every aspect of their lives, from personal relationships to work, from play to education. In this paper we shed light on this scenario by presenting an informed discussion about values in the context of social software, as it may bridge the gap between informal and formal learning. An organization of 28 suggested values is presented in the Value Pie, as a way of informing the design of social software. Our discussion is grounded on Organizational Semiotics and the Building Blocks of Culture.

Keywords

Organizational Semiotics, Culture building blocks, Design, Analysis

Introduction

The Web 2.0 was a milestone in the development of rich and innovative web systems in terms of interactivity, enabling the emergence of the so-called social software (e.g., social networks, wikis, and social bookmarking). Social software is frequently cited as determinant of transformations that are changing the way people relate to digital technology (Pereira et al., 2010). *Twitter*[®], *Facebook*[®] and *Youtube*[®] are examples of how information and communication technology (ICT) has pervaded every aspect of people's personal and social life. This kind of system is used not only at home, but also in workplaces, public organizations, and schools for several purposes, via different devices and with far-reaching consequences.

Sellen et al. (2009) assert that we now live with technology, not just use it. What this means is that a broad set of factors that range from emotion, affect, sociability and human values, to issues of scalability, security and performance, have changed the interaction between people and computers. In fact, interactions have assumed new dimensions and cannot be addressed only as being task-oriented. The concepts we mentioned above, such as human values, motivation, pragmatics, emotion, and affect, that were traditionally left on the margin of approaches to computer systems development, need to be moved to the centre in order to develop systems aligned with the new demands of a society mediated by ICT (Harrison et al., 2007).

Authors such as Chatti et al. (2007), Dalsgaard (2006), Dron (2007), and Klamma et al. (2007), discuss the adoption and use of social software to promote social interaction for both informal learning and distance learning — traditionally centered on Learning Management Systems (LMS). Although these authors have different approaches, and focus on different aspects of the integration between informal and formal learning, they are congruent in suggesting social software as a technical solution for this issue. However, as social software remains a quite unexplored topic by the research community, the understanding of such a complex integration still demands further investigation.

The concept of social software, and the changes and challenges it brings, are being discussed in the literature and through informal discussions in forums and blogs since mid 2004. In Pereira et al. (2010), we presented a review and compilation of discussions indicating the need for a paradigm shift in the way we understand and design social software. As social software, and web applications in general, are available worldwide, we argue that the various elements should be understood as values bounded to cultural aspects of people, groups, organizations, and their environments, which are manifested in the informal, formal, and technical levels of information. As a challenge, we

pointed out the need for studies, investigations, and theories to support understanding and placing values at the core of the analysis and design of social software.

According to Rokeach (1973), the *value* concept seems to be able to unify the apparently diverse interests of the sciences concerned with human behavior. Boyd (2007) asserts that social software is all about the new in web applications, but the new is more related to people's behavior than to the technology itself. Social software introduces many complex issues that pervade every aspect of people's lives, representing opportunities and challenges, benefits and drawbacks, democracy and exclusion. Therefore, taking into account values in social software design is among the most complex scenarios we are facing nowadays. If we consider the design of the systems previously cited, there is little concern for human values such as privacy, reputation, autonomy, among other cultural aspects (e.g., beliefs, behavioral patterns). An evidence of such negligence of the social aspects of these applications, users have been inadvertently serving as beta testers of applications as well as subjects of implicit behavioral experiments to identify the viability of a resource or product. Privacy policies and agreement terms are constantly changed and updated, many times without users' awareness. Products which were not approved in their beta tests are removed/discontinued disregarding possible effects on users. Accessibility issues are usually neglected, making it difficult or even preventing the access of people that do not fit the myth of the "average user".

Other evidences of implications related to values (or to the lack there of) in social software design have been widely reported by media, and can be easily perceived. Solove (2007) was one of the first authors to devote attention to the possible negative effects of social software on people's privacy and reputation. However, as Sellen et al. (2009) highlight, human values, in all their diversity, should be seen according to the way they are supported, promoted, or inhibited by technologies. Specifically, in the context of social software, little is known about values. What these values look like, their roles, the way they can be promoted or inhibited, and the possible means to deal with them still demands investigation.

In this paper we shed light on these challenges by presenting a literature review on values in social software and educational technology, suggesting 28 elements that we approach as interactive values. Grounded on theories such as Organizational Semiotics (Liu, 2000), the Building Blocks of Culture (Hall, 1959), and Values Theory (Schwartz, 2005), we propose the Value Pie: an informed scheme that presents values as bounded to culture and manifested in the informal, formal, and technical layers of information systems.

The paper is organized as follows. First, we present a discussion on values in technology design. Second, we suggest, describe, and exemplify 28 values identified through a literature review on social software and educational technology. Third, we propose the Value Pie and exemplify our discussion in the context of informal and formal learning. Finally, we present our final remarks.

Values in Design

Friedman et al. (2006) define values as something that is important to a person or group of people. In the Values Theory, Schwartz (2005) defines values as desirable, trans-situational goals that vary in importance and that serve as principles that guide people's lives. In this theory, values are understood as beliefs tinged with emotions, as motivational constructs that transcend specific situations and actions, serving as standards or criteria to guide the selection of actions, policies, people, and events.

For Knobel and Bowker (2011), values often play out in information technologies as disaster needing management, because conversations and analysis of the values in technologies generally occur after their design and launch. Consequently, most users are faced with undecipherable and sometimes strange decisions previously made on their behalf, often not to their benefit. Friedman (1996) argues that the cost to disseminate a technology is insignificant when compared to the cost of developing it, so that the values embedded in its implementations are deep, systematic, and easily disseminated. According to the author, although the negligence of moral values in any organization is disturbing, it is particularly damaging in the design of computer technology, because, unlike people with whom we can disagree and negotiate values and their meanings, we can hardly do the same with technology. Therefore, when designing computer technology it is necessary to see human values from an ethical point of view.

In the context of educational technology, researchers such as Chatti et al. (2007), Chen et al. (2009), Dalsgaard (2006), and Roberts and McInnerney (2007), are convinced that systems such as LMS are not capable of supporting learners in an interactive and effective learning process. The authors highlight the inability of educational technologies to promote a continuous social interaction, due to their focus on content instead of people, and the lack of resources to motivate users' participation and interaction outside the limits of a formal course or institution. On the one hand, Dalsgaard (2006) points out the efficiency of such systems regarding administrative issues, its organization in a top-down format, and the management of courses and their activities. On the other hand, Chatti et al. (2007) criticize the one-size-fits-all model adopted by LMS. These authors understand learning as a social process and argue that educational technologies usually treat learning just as "courses delivery", "learning objects", and "learning resources", carrying to the virtual environment the procedures, structure, and activities already existent in traditional learning models in institutions. The cited authors are unanimous in suggesting social software as an interesting alternative to promote learning in informal contexts, as well as to foster social interaction and users' motivation in combination with educational technologies.

Although the previously cited works have pointed out the viability of using social software to promote the integration of informal and formal learning, they are usually concerned with technical issues and/or formal procedures and practices of teaching/learning, not approaching informal learning directly. There is a lack of research that takes into account the impacts of this integration on the values of the stakeholders involved. Understanding the way values are intertwined with the informal, formal, and technical aspects of learning is key to produce educational technologies capable of integrating these aspects.

Some works have explicitly focused on values in technology design. Cockton (2005) proposes a framework to support what he named a Value-Centred Design, which suggests some activities and artifacts to support designers in the understanding of technology design as a process of delivering value. Adopting a different perspective, during the last decade Friedman (1996) has been working on an approach she named Value-Sensitive Design, which is intended to support the concern with human values in the design of computer systems, especially the ethical ones. Sellen et al. (2007) assert that presently the biggest challenge in the design of technology is the explicit consideration of values. Their assertion reinforces the choir of Miller et al. (2007), Knobel and Bowker (2011) and Bannon (2011) who argue for studies, methods, artifacts, and examples to support designers in understanding values in technology design.

A Survey on Values in Social Software and Educational Technology Design

Values are bound to culture (Hall, 1959; Schwartz, 2005). They are intertwined with each other and vary in meaning, importance, and priority according to the culture being analyzed and across time and space. In the context of computer systems, depending on the way the system is designed, it may afford behaviors that are intrinsically related to individuals and the complex cultural context in which they are using it.

Hall (1959) understands culture as a form of communication and, in an attempt to formalize its basic constructs, he proposed 10 areas, or culture building blocks, he named Primary Messages Systems (PMS): Interaction, Association, Learning, Play, Protection, Exploitation, Temporality, Territoriality, Subsistence and Bisexuality — in Liu (2000) approached as "Classification". Each area is biologically rooted, and any culture can be seen as an evolution of human behaviors and interactions mapped by a combination of them. For him, all cultures develop values with regard to these 10 areas. For instance, values in "Association" refer to the way people organize and structure themselves in society; the groups they form, the kind of relationship they develop and maintain, etc. "Family" is a manifestation of the aspect of "Association" in a given culture, and its role, structure, and relative importance in society can be understood as values developed in/by that culture. Values in "Classification" refer to preferred style of dressing, jobs, sports, and so on, of men and women. In the same way, values in "Learning" may be related to valued abilities, knowledge and professions; the relative importance of experience, expertise, meritocracy, and others.

In Pereira et al. (2010), we presented analyses of existing social software as well as a review and organization of some discussions about the subject. In that work, we identified and suggested 13 elements we called the social software building blocks, drawing attention to the need for leaving a technically-centered perspective in favor of one that encompasses and articulates informal, formal, and technical aspects involved in social software.

In this paper, we revisit and expand our literature review on social software and educational technology in order to identify, discuss, and exemplify what we are calling informal, formal, and technical values. For the literature review, we selected three journals and three conferences according to their tradition and importance in the areas of Human-Computer Interaction (HCI) and Educational Technology (due to the growing discussion about the design of technology to support teaching and learning that promote social interaction). The International Journal of Educational Technology & Society, the Computers & Education Journal and the British Journal of Educational Technology were selected based on their tradition, scope, and societal reach. The International Conference on Human-Computer Interaction (HCII), the Conference on Human-Computer Interaction (IFIP TC13-INTERACT), and the Conference on Human Factors in Computing Systems (ACM CHI) were selected in order to consider three of the most important and comprehensive international conferences in the field of HCI.

Initially, the investigation considered all the scientific papers published from 2005 to 2010 at the conferences, and the scientific papers published in the same period in the journals, based on the following keywords: *web 2.0*, *social web*, *social software*, *social network*, *values* and *life-long learning*. Additionally, for the International Journal of Educational Technology & Society, the search was expanded to encompass papers published from 2000 to 2011. Papers published in other journals and conferences which were referenced by the selected papers were also considered — see Table 1. This initial survey resulted in a total of 2,300 papers. In the first stage, 161 papers were selected based on title and abstract. In the second stage, a detailed analysis of the pre-selected papers resulted in the identification of 65 papers relevant to our interest in values, elements, success factors, and guidelines for designing social software and educational technology that promotes social interaction.

Table 1. Literature review

Name		Period	Papers	
			Selected	Relevant
HCII	International Conference on Human-Computer Interaction	2005, 2007, 2009	29	3
IFIP-INTERACT	Conference on Human-Computer Interaction	2005, 2007, 2009	4	1
ACM-CHI	Conference on Human Factors in Computing Systems	2006 - 2010	19	3
ET&S	International Journal of Educational Technology & Society	2000 - 2011	53	16
C&E	Computers & Education	2005 - 2010	9	3
BJET	British Journal of Educational Technology	2005 - 2010	6	2
	Other journals and conferences	-	41	37
		Total	161	65

Regarding the literature on learning technologies, Klamma et al. (2007) discuss the necessary characteristics of collaborative adaptive learning platforms; McLoughlin & Lee (2007) present 12 examples of pedagogical innovations using social software in 4 countries; Dron (2007) proposes 10 principles to the design of educational social software; Roberts & McInnerney (2007) point out seven problems of online group learning and suggest their solutions. These authors consider social software within formal learning contexts where teachers and students have an explicit relationship with an educational institution. They usually focus on technical aspects of social software and formal aspects of learning. The nature of social software is informal. Thus, it may support informal learning through social interaction taking advantage of its ability to deal with users' experience attributes, such as pleasure, motivation, and creative involvement.

Grounded in the relevant papers and in our previous work, we identified 28 elements that represent critical aspects and could be seen as values in systems intended to promote social interaction. Table 2 presents these values, their description, including a formal definition of them by Britannica (2011) — in *italic*, and the most meaningful references whose discussions allowed their identification.

Table 2. Values in social software

Value	Description	References
Accessibility	<p><i>“Providing access; capable of being reached; also being within reach; easy to communicate or deal with”</i></p> <p>Capability of supporting, satisfactorily, a heterogeneous set of users with distinct skills, preferences, needs, perceptual and learning disabilities, and motor and cognitive limitations. Example: the system is fully readable by a</p>	<p>(Hernández-Ramos, 2006)</p> <p>(Almeida et al., 2009)</p>

	screen-reader application.	
Adaptability	<p><i>“Capable of being or becoming adapted”</i></p> <p>Possibility of modifying a system according to its context of use; flexibility of being adapted to different contexts; situations of use that have changed or are unexpected. Example: users can create contact lists and configure the information they want to share with each other.</p>	(Dron, 2007) (Neris et al., 2007)
Aesthetic, Appearance	<p><i>“External show; outward aspect; outward indication; a sense impression or aspect of a thing”</i></p> <p>Characteristics related to attractiveness, beauty, care with the image, and the way things are displayed and presented. Example: standardized interfaces with significant and well designed graphic elements.</p>	(Lazar & Preece, 2003) (Norman, 2008)
Autonomy	<p><i>“The quality or state of being self-governing; especially the right of self-government”</i></p> <p>Users’ ability to decide, plan, and act in a way they believe help them reach their goals. Ability to control the technology and use it to their advantage. Example: features that make the system self-explanatory for novice users.</p>	(Bannon, 2011) (Friedman, 1996)
Availability	<p><i>“The quality or state of being available”</i>; Available: <i>“present or ready for immediate use”</i></p> <p>Refers to the capability of the system, feature, or functionality of being available for use at any time and without interruption. Example: the system is available 24/7.</p>	(Isaias et al., 2009)
Awareness	<p><i>“Watchful, wary; having or showing realization, perception, or knowledge”</i></p> <p>Individual and/or collective perceptions about who is available in the system; who is doing what; what is happening and what happened, etc. Example: users are notified about the news existent since their last logon.</p>	(Chatti et al., 2007) (Glahn et al., 2009)
Collaboration	<p><i>“To work jointly with others or together especially in an intellectual endeavor”</i></p> <p>Possibility for cooperating; working together on the same object. Example: users jointly create, edit, and evaluate an article in a Wiki.</p>	(Knobel & Bowker, 2011) (Vavoula et al., 2009)
Conversation	<p><i>“Oral exchange of sentiments, observations, opinions, or ideas”</i></p> <p>Possibility of two or more users establishing direct communication (synchronous and/or asynchronous). Example: comments, chat.</p>	(Tsai et al., 2008) (Vavoula & Sharples, 2009)
Emotion and Affection	<p><i>“A conscious mental reaction (as anger or fear) subjectively experienced as strong feeling usually directed toward a specific object and typically accompanied by physiological and behavioral changes in the body”</i></p> <p>Feelings, people’s sensations such as welfare, pleasure, fun, engagement, boredom, disappointment, and other aspects related to the user’s experience. Example: users’ fear of suffering discrimination because of information published on their profile; features that allow users to express their affective state.</p>	(Brandtzaeg & Heim, 2009) (Norman, 2008) (Almeida et al., 2009)
Groups	<p><i>“A number of individuals assembled together or having some unifying relationship”</i></p> <p>A set of individuals with characteristics, situations, interests, or purposes in common. Example: a group of people interested in the use of social software in education.</p>	(Roberts and McInnerney, 2007) (Tsai et al., 2008)
Identity	<p><i>“The distinguishing character or personality of an individual”</i></p> <p>The “self” of individuals; the expression of elements of a person’s personality and individuality (who the person is over space and time). Example: the representation of a person’s profile, their activities, personal information, etc.</p>	(Boyd & Elisson, 2007) (Knorr-Cetina, 1997) (Pereira et al., 2010)
Informed consent	<p><i>“Consent to surgery by a patient or to participation in a medical experiment by a subject after achieving an understanding of what is involved”</i></p> <p>Users’ awareness about the possible impacts of their actions. Refers to informing and garnering people’s agreement about what is produced from their interaction with the system and with other users. Example: a user agrees to make his/her profile public even after the system alerting about the risks of</p>	(Friedman et al., 2006) (Miller et al., 2007)

	such a decision.	
Meta-communication	<p>Meta: <i>“occurring later than or in succession to; situated behind or beyond; later or more highly organized or specialized form of”</i>.</p> <p>Communication: <i>“an act or instance of transmitting; a process by which information is exchanged between individuals through a common system of symbols, signs, or behavior”</i></p> <p>Features that make the system self-explanatory; that allow the user to understand how the system works, the reason it was designed in that way, what can be done through the available resources/features, and what are the possible impacts of using them. Example: the system has explanations and offers tips recorded in video and sign language that guide the user regarding privacy settings.</p>	(Hayashi & Baranauskas, 2010)
Norms, rules and policies	<p>Norm: <i>“a principle of right action binding upon the members of a group and serving to guide, control, or regulate proper and acceptable behavior”</i></p> <p>Formal aspects that govern, regulate, and determine how individuals behave, think, make judgments, and perceive the world. Example: the system’s terms and conditions of use.</p>	(Neris et al., 2007) (Lazar & Preece, 2003)
Object	<p><i>“Something mental or physical toward which thought, feeling, or action is directed”</i></p> <p>Artifacts around which social interactions occur (e.g., the talks, the focus, the collaboration, etc.). Example: videos on <i>YouTube</i>, short messages on <i>Twitter</i>, comments, sharing on <i>Facebook</i>.</p>	(Knorr-Cetina, 1997) (Pereira et al., 2010)
Ownership and property	<p><i>“The state, relation, or fact of being an owner”</i></p> <p>The right to possess an object or information, and the right over the actions that can be executed over/with/through this object. Example: a user creates a document, changes it, and shares and transfers its ownership to another user.</p>	(Friedman, 1996) (Sellen et al., 2009)
Portability	<p><i>“The quality or state of being portable”</i>. Portable: <i>“usable on many computers with little or no modification”</i></p> <p>Possibility of using the system, its features and functionalities, through different devices and on different platforms. Ex: access through mobile phone, compatibility with different browsers.</p>	(Isaias et al., 2009) (Sellen et al., 2009)
Presence	<p><i>“The fact or condition of being present”</i></p> <p>Refers to a person being (or not) in a certain place at a certain time. Example: the user is online in the system.</p>	McLoughlin & Lee, 2007 (Pereira et al., 2010)
Privacy	<p><i>“The quality or state of being apart from company or observation; the right to freedom from unauthorized intrusion”</i></p> <p>A claim, entitlement, or right of users to determine what information about them will be available and who has access to that information. Example: the system allows users to show his/her list of friends only to people who are already part of it.</p>	(Cotler & Rizzo, 2010) (Glahn et al., 2009) (Karat et al., 2008)
Reciprocity	<p><i>“The quality or state of being reciprocal; mutual dependence, action, or influence; a mutual exchange of privileges”</i></p> <p>Feeling of mutual benefit; reward for performing a task or for employing some effort to achieve a goal. Example: users that provide high quality contents appear in the “top contributors’ users”.</p>	(Chen et al., 2009) (Glahn et al., 2009) (Klamma et al., 2007)
Relationship	<p><i>“The state of being related or interrelated; a specific instance or type of kinship; a state of affairs existing between those having relations or dealings”</i></p> <p>Some kind of link or social tie between two or more individuals. Example: followers, fans, friends.</p>	(Boyd & Elisson, 2007) (Karat et al., 2008)
Reputation	<p><i>“Overall quality or character as seen or judged by people in general; recognition by other people of some characteristic or ability”</i></p> <p>The perception or collective opinion about an individual constructed by others. Example: the user is an expert in a specific area; the user is known for sending spam and undesirable content.</p>	(Bannon, 2011) (Solove, 2007)
Scalability	<i>“Capable of being scaled; capable of being easily expanded or upgraded on</i>	(Boyd, 2007)

	<i>demand</i> Capability to support a growing number of users and deal with a growing amount of information. Example: the system is able to support thousands of simultaneous accesses and communications without presenting problems.	(Dron, 2007) (Isaias et al., 2009)
Security	<i>“The quality or state of being secure; freedom from danger; freedom from fear or anxiety; freedom from the prospect of being laid off”</i> Refers to how well the system protects the information it contains, whether from external attacks or possible technical failures. Example: the users’ information will not be lost or shared in an unwanted way.	(Karat et al., 2008) (Santana et al., 2009)
Sharing	<i>“To divide and distribute in shares; to partake of, use, experience, occupy, or enjoy with others; to have in common”</i> Possibility for users to make objects or information in their possession available to other users. Example: publication of photos in a social networking system.	(Chatti et al., 2007) (Chen et al., 2009) (Pereira et al., 2010)
Trust	<i>“Assured reliance on the character, ability, strength, or truth of someone or something; one in which confidence is placed”</i> Extent to which another individual, a system, or other artifact, behaves as expected by the users. Example: The system shares only the information approved by the users.	(Dron, 2007) (Karat et al., 2008)
Usability	<i>“Capable of being used; convenient and practicable for use”</i> Refers to interfaces that are consistent, controllable and predictable, easy to use and satisfactory. Example: users do not need to remember system-generated codes in order to accomplish a task.	(Lazar & Preece, 2003) (Tsai et al., 2008)
Visibility	<i>“The quality or state of being visible; capability of being readily noticed; capability of affording an unobstructed view”</i> Possibility for users to be seen, found, or exist in a given context. Example: the system allows users to search and browse other users’ profiles.	(Cotler & Rizzo, 2010) (Roberts and McInnerney, 2007)

The list presented in Table 2 adds to the previously cited findings by considering not only technical and formal issues involved in the context of social software and educational technologies, but also the informal ones. It also includes values particularly relevant to educational technologies. For instance, “meta-communication” has shown to be effective for promoting users’ autonomy (Hayashi & Baranauskas, 2010). “Informed consent” seems to be important in dealing with conflicts between privacy and visibility favoring security (Friedman et al., 2006). Social conventions, rules, procedures, laws etc., are different “norms” that govern how society works and must be explicitly considered. “Accessibility” issues must be a main concern in the design and adoption of any technology. “Emotional and affective” aspects involved in educational technology development, adoption, and use also need to receive attention. The concern with these values seems to be even more critical when we consider informal learning, where there is no formal assistance and guidance; where users need to be autonomous, aware of their possibilities, and the consequences of their actions; where users need to be motivated, confident, and rewarded for their efforts using the technology and interacting with each other. If these values are neglected, we run the risk of importing to educational technologies the problems widely reported in social software (e.g., privacy, reputation, exclusion) without fully taking advantage of its use to encourage the integration between formal and informal learning.

We must highlight, however, that the 28 values do not constitute a definitive or exhaustive list. Indeed, as Friedman et al. (2006) argue, perhaps no list could be, at least in such a broad and complex area. For example, more abstract values such as solidarity, well-being, involvement, motivation, satisfaction, and aspects of user’s experience are represented by the value “Emotion and affection”. Some values may be decomposed (e.g., “collaboration” encompasses “cooperation”, “security” encompasses “safety”) or are transversal to the others (e.g., “norms”). Our main concern when creating this list was to find a balance between making it as comprehensive and diverse as possible without having it be overly complex or detailed.

An Organized Scheme for Values

We previously suggested the importance of taking values into account when discussing informal and formal learning. According to Hall (1959), humans operate at three different levels: informal, formal, and technical. In the learning context, for example, people may learn from observing other people and imitating them (informal); from other’s

explicit feedback, suggestions, and instructions (formal); or from books, guidelines, and other materials that explain and justify things in a coherently outlined form (technical). A given culture may emphasize technical learning while another may be heavily informal. As Hall asserts, we can identify all the three levels in almost any learning situation, but one will always be emphasized.

It is possible to perceive the three levels in action when the adoption of social software to foster educational practices is being considered. There are several informal issues at play, mainly the emotional and affective ones such as students' motivations and teachers' openness to change. There are also formal issues that must be understood and followed, such as the laws, the teaching program, and the students' minimum age. And there are technical issues, which range from choosing the right social software (that respects the formal issues and is in conformity with the informal ones) to the physical structure (space, internet access, network security).

These three levels are also related to the values. For instance, "autonomy" and "identity" are clearly informal issues, while "norms, rules and policies" are clearly formal, and "scalability" and "portability" clearly technical. In this sense, the Organizational Semiotics theory (Liu, 2000) proposes the Semiotic Onion to explain how these levels exist in the context of organizations and information systems. The informal represents the organizational culture, customs, and values that are reflected as beliefs, habits, and individual behavior patterns of its members. The formal corresponds to aspects that are well established and accepted, becoming social conventions, norms, or laws. In this level, rules and procedures are created to replace meanings and intentions. Finally, the technical, situated at the core of the onion, represents aspects that are so formalized that they can be technically approached and supported. In a social perspective to the design of computing systems, Baranauskas (2009) and Baranauskas & Bonacin (2008) draw attention to the need for considering the three levels in an integrated and interrelated way in order to produce systems that make sense to their users, not causing negative impacts on them and the environment in which they will be used.

Aiming at situating the values at the three levels in which humans operate and in accordance to Hall's (1959) areas of culture, we draw on the Semiotic Onion (Liu, 2000) and Schwartz's Circular Model of Values (2005) to conceive the Value Pie — see Figure 1. The Value Pie is divided into 10 slices, each one corresponding to an area of culture, and is composed by three layers: the external layer refers to the informal level, the middle layer refers to the formal level, and the internal layer refers to the technical level. Values placed at the informal level usually have a personal or ethical nature; values situated at the formal level are collective or social values where there is a social rule or system of norms; and values placed in the technical level can be understood as quality attributes or special features of technology.

These values have an interactive nature and each level must not be approached in isolation. For instance, "autonomy" (informal level) may be restricted/promoted depending on the existing "norms and rules" (formal) and on "accessibility" issues (technical). Moreover, Hall (1959) explains that although one level always dominates and although we deal with them separately, the levels are simultaneously present in everything. For instance, based on Schwartz's Circular Model of Values (2005) one may relate "privacy" to aspects of safety, harmony, and stability of the self, which are usually treated as informal concepts. Everyone has his/her own informal understanding of what privacy is and what it means. However, there are social protocols, conventions, rules, and laws that are formally established to define the meaning, limits, and guarantees of an individual's privacy. Finally, there are also some facets of privacy that are so formally accepted that they can be technically supported, such as a curtain to cover a window or a feature for restricting the visibility of personal data in a social network website.

On the other hand, values placed in a same slice tend to have a natural congruence because they are developed in the same area of culture. For instance, all values developed in "Association" have some individual-individual/individual-object (Knorr-Cetina, 1997) association in their nature. "Group" is an association. "Relationship" is a kind of association. "Conversation" usually occurs when there are individuals associated in some way. "Trust" is built on and may reinforce association while the lack of trust may destroy it. Mapping it to a learning context, we can say that the existence of an explicit relationship between two or more individuals (e.g., personal contacts) may favor the emergence of a group (e.g., users interested in games), which may promote conversation among the participants (e.g., forum, chats), and which, in turn, may reinforce trust among the users (e.g., sharing ideas).

The Value Pie is not intended to be a classification scheme in which the elements are assigned to one and only one class within a system of mutually exclusive and non-overlapping classes (Jacob, 2004). Values may be developed at the intersection of multiple areas. For instance, "privacy" is developed at the intersection of "Protection-

Territoriality”. It appears in the “Protection” area because while the aspect of space changes (physical, personal) the aspect of protecting the space remains. Other values, such as “identity” and “norms”, are transversal to the 10 areas. For instance, one may see “identity” as the sum of an individual’s aspects, values, and behavioral patterns, related to the 10 areas (e.g., his/her position in a social group, his/her job, preferences in playing and learning). The value of “norms”, on the other hand, is present in the formal aspect of all the other areas, e.g., learning institutions and their rules (“Learning”), geographical limits and registry of property (“Territoriality”), time zone (“Temporality”), age defining adulthood (“Classification”), etc. The values of “identity” and “norms” appear in the “Interaction” area because it is also transversal to the other areas. For Hall (1959), interaction is at the center of culture and the other areas grow from it: interacting with the environment is to be alive, failing to do so is to be dead; everything people do involves interaction with someone/something else. In this sense, the Value Pie aims at organizing values according to their dominant PMS, and the unfilled spaces may indicate opportunities for reflection and for challenging designers and analysts.

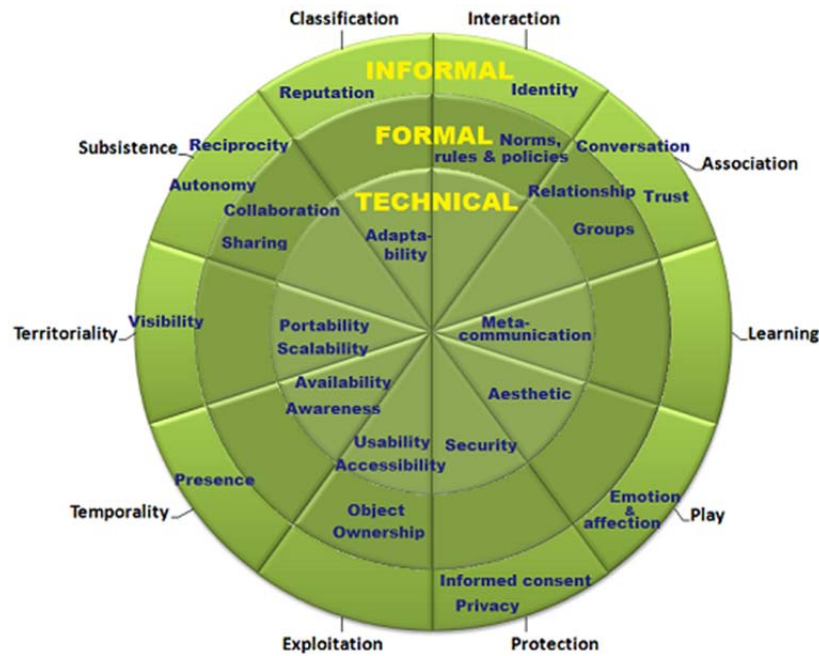


Figure 1. The Value Pie

Conclusion

Usually related to informal contexts, social software has been regarded as bringing both opportunities and challenges to the academy as well as to governmental institutions and private organizations. Researchers of educational technologies were among the first to consider its use in formal settings, evidencing the need for making explicit the values involved in such a complex context.

Although recognized as important, there are few initiatives relating values to technology. In social software, there is even a lack of theoretically grounded approaches for investigating it. In this paper, we presented a survey of social software and educational technology in order to identify elements that should be considered by designers and practitioners when designing or adopting these systems for different usage contexts. As a result, 28 elements were identified and approached as values. Grounded in theories from different areas, we conceived the Value Pie: an informed organization scheme that presents values as bound to culture and manifested in the informal, formal, and technical layers of information systems. The list of values and the Value Pie are a first step in the direction of a value oriented and culturally informed approach to the design of technology intended to promote learning through social interaction. By drawing attention to the diversity of values and their interactive nature, they may be helpful in guiding designers, analysts, and practitioners to consider values when designing their systems.

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