Value Annotation of Web Resources: the ValueML Language

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***Abstract*—In the multimedia design field, we have recently witnessed a shift of focus from products and the user' s experience to social effects of technologies and the quality of life. In this context, values play an important role. They may be inscribed within an artifact as symbolic meanings or as a built-in use consequence. In spite of their growing relevance, there is not yet a markup language for value annotation. This paper describes a proposal for filling this gap. After a brief review of various perspectives on the concept of value and relevant taxonomies, we discuss the syntax and semantics of a preliminary version of the ValueML language together with an example of annotation of a commercial video clip.**

Keywords-value; annotation; semantic web; markup languages.

I. INTRODUCTION

In spite of the growing relevance of values in information technology [1], computer systems [2] [3], human computer interaction [4], multimedia, and game design [5] [6], there is still no common interchange language for the analysis and annotation of web resources that deal with this kind of abstract constructs. This paper describes a proposal for filling this gap.

The need for value annotation of communicative artifacts is present in several application domains. In the fields of Marketing and Brand Communication, for instance, values constitute an important component of web sites, commercial videos and advergames. They may refer to the advertised product or service (i.e., a value proposition) or, more generally, to a company's brand identity (i.e., the brand core values) and brand world (i.e., the brand world ethos). Political parties, religious communities, as well as social activists focus on values as one of the fundamental content and theme of their messages in designing web sites and blogs. Sometimes, values are explicitly communicated. L'Oreal, for example, started out its campaign "Beauty for all" by explaining the deep values (e.g., passion, innovation, entrepeneurial spirit, open-mindedness, excellence, and responsibility) that were at the base of its messages with an explicit document published on the web [7]. Most often, values are implicitly inscribed within digital discourses - namely, written texts, visual advertisements, commercial videos, web sites, games - by an appropriate selection and composition of content (e.g., denotative, connotative, and narrative meanings) and expression (e.g., plastic features of visual and auditory signs). The project Values at Play (VAP), for example, is an initiative aimed at investigating the role of social, moral, and political values in digital games [8]. It builds on the premise that games, like other computer and information systems, may embody values in their architecture, interaction paradigms, and mechanics. In the same vein, Value Sensitive Design [9], Value Centered Design [10], Design for Subjective Well-Being [11], and Design for Sustainability [12] explore conceptualizations and methods for facilitating values conscious design, while Generative Semiotics studies values in narrative products [13]. In addition, values are an important component of cultures. Therefore, independently of explicit design intentions, values are inevitably inscribed within communicative artifacts as a reflection of the culture of their clients, designers and developers (Culture *in* Design). Alternatively, communicative artifacts can be intentionally designed to adapt to the culture of target users (Design *for* Culture). This is at the base of the localization of web resources, a challenging issue addressed by several approaches in the field of cross-cultural design. In all the above cases, it seems important to be able: i) to identify the values that are embedded in products (Which values?); ii) to associate values with design choices (How values are communicated?), and iii) to explicate the goals and intentions that are at the base of the selection of those particular values and their expression in the considered artifact (Why?). The annotation of a communicative artifact with its inscribed values could be exploited for several tasks ranging from resource filtering and retrieval, to content repurposing or reuse. Notice that assuming that computer systems and web resources express or embody values means assuming that they are not morally neutral and that it is possible to identify *tendencies* in them to promote or demote particular moral values, and norms [14]. Such tendencies are embedded in the sense that they can be identified and studied largely or wholly independently of actual uses of the artifact, although they manifest themselves in a variety of uses of the system (not necessarily in all uses!).

The paper is organized as follows. In Section II we discuss the concept of value from different perspectives and we illustrate available taxonomies and vocabularies of values. Next, in Section III we state the scope and the aim of the study by focusing on the values that are inscribed within an artifact during its development stage. The main requirements of a language for value annotation are then introduced in Section IV together with a possible solution, i.e., the ValueML. A simple example of analysis and annotation of a video commercial using the proposed language is presented in Section V to show the effectiveness

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of the approach. Finally, in Section VI some conclusions are reported.

II. STATE OF THE ART

A. The concept of value

The concept of value has several meanings according to the specific perspective from which it is considered [1] [15] [16] [17]. Looking at existing literature, the term "value" is interpreted as:

- an enduring belief that a specific mode of conduct or end-state of existence is personally or socially preferable to an opposite or converse mode of conduct or end state of existence (i.e., value as enduring belief system);
- the monetary sacrifice people are willing to make for a product (i.e., value as exchange);
- the utility of the physical properties of the product, which is realized only upon its use (i.e., value as perceived utility);
- an indicator of how much one desires a product or fears of loosing it (i.e., value as attachment);
- sign or meaning, e.g., an index of social status, lifestyle, modernity (i.e., value as meaning);
- an indicator of how the interaction with a product is aesthetically, cognitively or affectively worth to be made (i.e., value as good experience).

In addition, there is the need to disambiguate among different concepts that are in some way correlated such as values, needs, desires, preferences, and goals (see for example [1]). For some scholars values are abstract, desirable trans-situational goals; for others they are relatively stable individual preferences that reflect socialization; yet others consider values as cognitive representation of needs. In his Value Theory [17], Schwartz, defines values as "desirable, trans-situational goals, varying in importance, that serve as guiding principles in people's lives". Most importantly, he identifies five main features of the conception of value that are implicit in the works of many theorists and researchers:

- values are beliefs tied inextricably to emotions;
- values are a motivational construct. They refer to desirable goals people strive to attain;
- values transcend specific actions and situations;
- values serve as standards or criteria to guide selection or evaluation of action, policies, people or events;
- values are ordered by importance relative to one another.

We argue that a clear understanding of the meaning of value is an important step toward the development of a *value ontology* for applications in the Semantic Web field.

B. Value taxonomies

Several efforts have been made, in the past, to classify values and propose appropriate (with respect to specific criteria) value taxonomies. Schwartz, for instance, proposed a set of ten basic values each one described in terms of its motivational goal. They are: self-direction, stimulation, hedonism, achievement, power, security, conformity, tradition, benevolence, and universalism [17]. These values are structured on a circular pattern where congruent values (e.g., achievement and power) are located on adjacent positions while conflicting values (e.g., achievement and benevolence) on opposite sides. Boztepe, focusing on user's values, proposed a classification including nineteen different values clustered into four main categories namely, utility, social significance, emotional, and spiritual [15]. Value Sensitive Design focuses on values in computer systems such as privacy, freedom from bias, informed consent, accountability, property rights, to name only a few [9]. Specific taxonomies have been proposed in marketing [18] and in game design [8]. Floch, for example, distinguishes four types of product values - namely, practical, critical, utopian, and ludic values - that are at the base of the main marketing strategies. Friedman et al. [9] uses a set of seventeen values (e.g., diversity, justice, inclusion, equality, environmentalism, creativity, trust, etc.) for the analysis and design of digital games. Recent research in Positive Design focuses on hedonic values (e.g., pleasure) and eudaimonia (e.g., personal flourishing) [11]. What emerges from the comparison of current literature is that available proposals are very different in terms of: i) number of values considered; ii) level of generality; iii) granularity of proposed distinctions, iv) types of values considered, and v) terms used to denote the values. Some values (e.g., autonomy, self actualization) are common to various approaches while others (e.g., informed consent, humor) are present only in some vocabularies. Some vocabularies are more heterogeneous than others merging general and specific values or values having different nature such as hedonic values (e.g., pleasure) with ethical (e.g., morality, virtue), political (e.g., justice), and cultural values (e.g., life quality, happiness). Moreover, not all approaches accurately define the concepts represented by their vocabularies; so there are ambiguities (i.e., multiple interpretations of values) and "semantic confusion" within and across vocabularies. What is needed is a conceptualization that integrates existing proposals (or part of them) into a coherent and comprehensive framework that could be used as a guiding framework for media content annotation. An interesting step toward this goal is the work by Brey reported in [5]. The author illustrates an articulation of axiology that provides structure and overview to relevant values belonging to traditional theories (e.g., ethics, aesthetics, and politics) including cultural values of Theories of Good applied to new media.

III. SCOPE AND AIM OF THE STUDY

A. The values inscribed within a product

Our study is intended to focus on values that are (intentionally or unintentionally) inscribed within a communicative artifact during design and system implementation. We call these values the "Values *in* the product" to distinguish them from other kinds of values such as, for example, the values of the stakeholders (e.g., the client's, designer's or user's internal conceptions of what is worth/important in life), the economic value of the product (i.e., its exchange value), or the value of the product as

experienced by a user during its use (i.e., the perceived use value). The latter two interpretations - namely the exchange and perceived use values - can be referred to as the "Value *of* the product". The values inscribed in a product are strictly connected to the choices taken by designers and developers during production since these decisions are made on the base of criteria that are usually value-laden. For communicative artifacts, these choices may refer to several aspects such as, for example, i) the adopted conceptual model or meta-model of the artifact; ii) the articulation of content meaning; iii) meaning presentation or expression, and iv) technology. Here are some examples. The adoption of the Semantic Markup for Web Services (OWL-S) instead of the Web Service Modeling Ontology (WSMO) reflects different values and has different ethical implications as discussed in [19]. In a narrative commercial clip, ethical or moral values can be inscribed in the story (content) or expression (e.g., aesthetic values); in a digital game they can be embodied in game mechanics (i.e., in game rules), game dynamics or experience (i.e., hedonic pleasure). In Persuasive Technologies [20], Design for Sustainable Behavior [12], and in applications inspired to Nudge Theory [21], values are directly related to the intended behavior or state we want to be enabled, induced or fostered in users. According to the above discussion, we can distinguish the following two main cases:

- an artifact may have embedded values understood as special kind of built-in consequences. This conception (i.e., *causalist conception* of embedded values) relates values to causal capacities of an artifact to affect the environment. In other words, the artifact use causes a state of the world that realizes some kind of value;
- an artifact may be expressive of values (i.e., *expressive conception* of embedded values) in that it contains symbolic meanings that refer to values. These values may represent the values of designers, clients or users. This does not imply that it also functions to realize these values. It is conceivable that the values expressed in artifacts cause people to adopt these values and thus contribute to their realization. Whether this happens or not remains an open question.

B. *The problem addressed: value annotation*

Generally speaking, value taxonomies and vocabularies can be exploited in three different use cases:

- manual annotation of multimodal resources with inscribed values;
- automatic value detection and classification. The goal, here, is to model the means/ends relationships existing between measurable features of multimodal artifacts and abstract constructs such as value concepts;
- value generation, that is, simulation of specific values by an appropriate selection and composition of multimedia content and expression.

Our study focuses on the first use case. The problem we intend to address is thus the following: to design a general-purpose language for the manual annotation of values inscribed within a multimodal resource. The language should let the annotator to define the scope of a value annotation and to describe the value itself by referring to a specific and shared vocabulary. We envisage several possible ways in which the annotation could be used including:

- retrieval and selection/filtering of resources or part of them on the base of intended embodied values. It may be possible, for example, to annotate specific fragments of a multimodal resource with intended values and then retrieve the fragments using the values as key words;
- reuse a resource for new goals or contexts (i.e., repurposing). The identification and value annotation of multimodal fragments enables a designer to reuse the content of the fragment for new goals/objectives or in new communication contexts;
- exploitation of design knowledge embodied within an artifact for new products. Linking values to fragments is a way to explicitly represent how values are communicated in *that* artifact. This knowledge is design knowledge that may be used as inspirational for innovative products and design solutions;
- construction of a shared data base of value annotation resources that can be used as a ground base or training set for automatic recognition of values or for scientific research.

IV. THE VALUEML

The following is an initial unstructured list of requirements for the development of a language for value annotation. They are based on an understanding of the needs arising from concrete scenarios of manual annotation of multimodal texts. The desired language should allow the annotator to represent:

- the *intended* values a designer/author wants to be embodied in the multimodal resource under development. The focus is thus on annotation during the design and the development of the communication message rather than during its final use. This is not to deny that annotations made by the users are important. Simply, social tagging comes after the product has been developed and published and has different goals. It may be used, for example, to assess the effectiveness of intended value communication;
- values that have been expressed by different semiotic modalities (e.g., written texts, static and dynamic images, sound objects) and dispersed across content (e.g., narratives, denotative and connotative meanings) and expression (e.g., plastic features). As an example, brand values and brand ethos could be communicated by a story while aesthetic values by the product look and feel;
- non-economic values. We are interested in moral, ethical, political, aesthetic, and cultural values rather than the economic value of the product;
- values that belong to different taxonomies. The language should be sufficiently flexible so that the annotator is not constrained to use a specific vocabulary but can select among a set of available vocabularies the one that better satisfies his/her goals in the design situation at hand. The design of the language must be modular so that the appropriate vocabulary of descriptors for the target use can be chosen;
- values at different aggregation levels. In other words, it should be possible annotate the entire resource, as well as specific fragments or parts of it. Moreover, it should be

possible to trace the time course of values in dynamic products such as audio-visuals;

- values associated to specific components in narrative texts. For example, it should be possible to associate specific values to the characters of a narrative told by a video and track the evolution of these values during story events. Alternatively, it should be possible to associate a value to the events of the story, or the consequences of these events;

- the relevance of an intended value with respect to other values inscribed within the same product and a measure of confidence in the attribution of that value to that fragment (i.e., a confidence of annotation accuracy);

- complex values i.e., combination of simple values occurring simultaneously in a particular segment of a resource;

- how a value is communicated in the product that is the modality (e.g., by expressive or narrative features);

The following section describes the main features of a draft language proposal intended to satisfy most of the above design requirements.

A. *Language syntax and semantic*

ValueML uses a XML-based syntax. Structurally, ValueML uses elements and attribute names to indicate the type of information being represented; attribute values provide actual information. The proposed language adheres to the following syntactic principles:

- the value annotation is self-contained within a 'value' element;

- all values belong to a specific controlled vocabulary;

- the annotating data is a value label; it is explicit from which vocabulary the value label is chosen. We draw on existing literature to propose a set of value categories;

- the link to the annotated material (i.e., the target) is realized by a reference using a URI and the reference has an explicit role. Two roles have being proposed namely: 'expressedBy' and 'signifiedBy';

- the modality of value expression or signification is specified, e.g., by storyline content, sound objects or visual plastic features;

- the target of annotation (scope) may be a block of text, an image or part of it, a segment of an audio or video asset, a node of a XML document (e.g., a SMIL presentation);

- a set of contextual elements can be used to describe the type of resource, its name, its web URL, etc.

V. CASE STUDY

We illustrate an example of annotation of a specific multimodal resource: a commercial clip. The aim is to assess the feasibility of value annotation with ValueML in a concrete case.

A. *A test bed: the Citroen BX ad campaign*

The clip selected for the analysis and annotation represents a well known ad campaign by Citroen [22]. It was produced in 1982 to advertise the BX model. Our choice is motivated by the availability of original script and critical essays about the considered video that provide the main source of annotation knowledge [18].

Annotation is preceded by an analysis of the clip that is driven by a semiotic meta-model of the video as discussed in [23]. The meta-model distinguishes four interrelated levels of analysis (Figure 1): i) the textual level representing the concrete/physical manifestation of the video content in terms of audio-visual features; ii) the discourse level referring to thematic, figurative, rhetorical aspects; iii) a shallow narrative level describing the story told by the video in terms of abstract roles (called actants) and narrative schemas (e.g., the narrative canonical schema), and, iv) a deep narrative level that uses a specific tool called semiotic square to articulate deep semantic meanings such as narrative values (axiology). Signification unfolds by crossing these levels from shallow features of the video to the most abstract and deep ones.

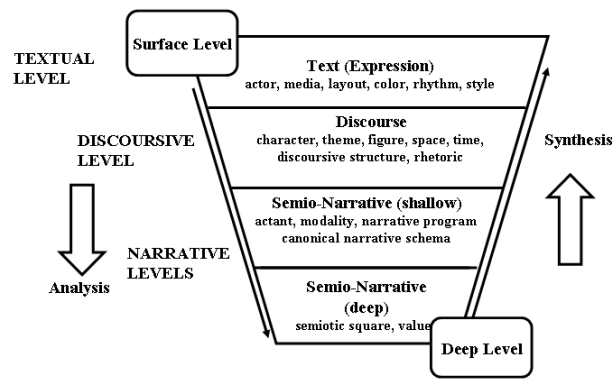

Figure 1. A schematic view of the meta-model used for the analysis of the video commercial.

At the deep Semio-Narrative level, values have been classified according to Floch [18] into four classes namely, practical, critical, utopian and ludic values. They represent the vertices of a semiotic square. Practical values refer to utility, usefulness; critical values to convenience, performance, quality; utopian values to identity, reflection, social relations, and ludic values to surprise, madness, astonishment, irony and pleasure including aesthetic pleasure. The selection of specific values in the construction of a story allows the author to realize specific marketing strategies. In the considered video clip, values are communicated as follows:

- the first segment of the video (time interval: [0 s, 33 s], 14 shots) represents practical values (see Figure 2). A red car leaves Paris at midnight (Minuit, Paris ...) under the rain. After 8 hours it gets to the sea (.. 8 heures, la mer). The car is presented as a safe, confortable, and quick mean to escape from the everyday city life. Onboard a young lady, takes off her hat, smiling. An off screen voice (by Julien Clerc) sings: "J'aime, J'aime, J'aime";

- a following segment (time interval: [34 s, 40 s], 3 shots) is used to communicate ludic values (see Figure 3). The car suddenly dives in the sea without it could be possible to attribute this mad action to the driver that is never shown. The plunge, unexpected and irrational, represents the negation of practical values shown in the previous segment;

Figure 2. Four key frames of the first segment of the video clip representing practical values.

Figure 3. Two key frames of the second segment of the video clip representing ludic values.

Figure 4. A key frame of the final segment of the video clip representing utopian values.

- a final segment (time interval: [41 s, 47 s], one shot) represents utopian values (see Figure 4). Here, the car (Citroen BX) is no more an instrument, it is a subject, it lives (Citroen BX. Elle vit.).

Figure 5 shows the semiotic square with the trajectory of values expressed by the Citroen BX clip during presentation. Practical and ludic values are communicated through the visual track, while the utopian valorization is explicitly expressed by a voice over.

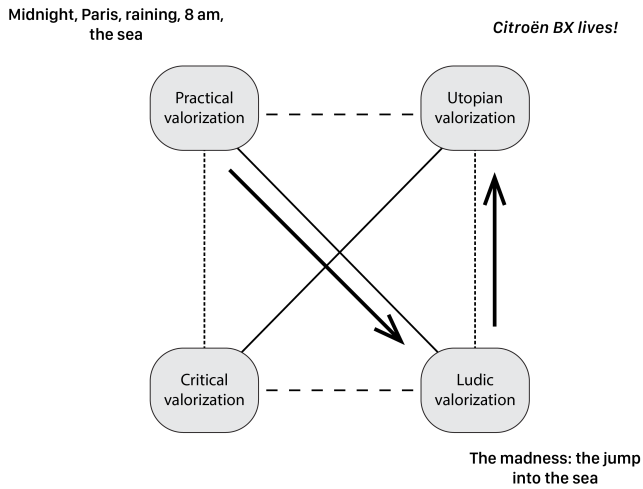

Figure 5. Semiotic square of consumer values

B. Value annotation

Figure 6 shows a simple example of annotation of the considered video clip using the ValueML.

```
<valueml vocabulary="floch-semiotic-square">
 <info>
  <meta:media-type>  video  </meta:media-type>
  <meta:media-name> citroen_bx.webm </meta:media-name>
  <meta:doc> Commercial clip by Citroen. The spot has
   been produced by RSCG in 1982. It is available at the
   URI:https://www.youtube.com/watch?v=jH2HLRpIq2Y </meta:doc>
</info>
<value>
  <category name="practical-valorization" relevance="0.9"
    confidence="0.9"/>
  <reference role="signified_by" uri="citroen_bx.webm?t=0,33"
    modality="by_storylineContent"/> </value>
<value>
  <category name="ludic-valorization" relevance="0.8"
    confidence="0.9"/>
  <reference  role="signified_by" uri="citroen_bx.webm?t=34,40"
    modality="by_storylineContent"/> </value>
<value>
  <category name="utopian-valorization" relevance="0.8"
    confidence="0.9"/>
  <reference  role="expressed_by" uri="citroen_bx.mp4?t=41,47"
    modality="by_soundObjectContent"/> </value>
</valueml>
```

Figure 6. Annotation of the video clip with ValueML.

The attribute 'vocabulary' specifies the set of values that are used for the annotation, i.e., the Floch's classification. Within the 'info' element various metadata are present to describe several contextual information such as resource type, name, and description. Value annotation starts with the 'value' element. 'Relevance' and 'confidence' are specified by a continuous unitless scale such as [0,1]. The expression of a value may be masked by another one, it may be inhibited, minimized or even exaggerated. Therefore, the human annotator needs to indicate the degree of importance and confidence that a certain attribution is correct. The 'role' and 'uri' attributes within the 'reference' element are used to associate values to video segments and to describe the type

of relationship existing between annotated and annotating data. The 'modality' attribute specifies the features of the video that are charged with value meaning thus realizing a means/ends chain.

VI. CONCLUSIONS

To our knowledge, this is the first attempt to propose a language for value annotation of web resources. Analogous projects exist in the field of Affective Computing and Sentiment Analysis [24]. We refer, in particular, to the recent W3C initiative of EmotionML for the annotation of expressed emotions [25]. ValueML is inspired to such an effort; it may be seen as a complementary resource for describing experiential and socio-cultural aspects of artifacts.

Current experiments have confirmed the feasibility of the approach and the effectiveness of this preliminary version of the language. However, more analyses are required, before addressing formalization, in order to identify limitations and possible improvements. As multimedia designers, we expect to gain knowledge about how values can be, and are actually embodied in artifacts. A goal is, for example, to better understand the relationship existing between the axiological level and the narrative one. Which kind of properties should be possessed by the main components of a narrative (e.g., space, time, characters, relationships, passions, events) in order to effectively communicate a given set of values? This knowledge could be used to enrich the domain of possible values associated to the 'modality' attribute. Another open issue regards the specification of scales. Should they be continuous or discrete, unipolar or bipolar, etc. We have postponed a more detailed specification of scales after the acquisition of more knowledge. The final step will be the design and implementation of an ontology to define the terms of the ValueML language, to relate the terms to one another, and to define mappings between value vocabularies when possible.

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