Parameters of User Interface Design for Cultural Information Systems: An Interdisciplinary Approach.

Part 1: A theoretic model concerning the various modes of User Interfaces that could be formed during the production processes of a Cultural Information System

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Abstract

This article introduces a theoretic model concerning the various forms of interfaces encountered in a Cultural Information System. Based on parameters, the potential cooperative relations of specialities participating in the process of Cultural Information System production provide a wide spectrum of interface forms, which could be approached through relative interpretative procedures, in physical, virtual or combined environments. The study of cultural content promotion methods, through an interdisciplinary approach, suggests new ways of information management, as well as new representation practices, which constitute the basis of new negotiation methodologies. Cultural Information Systems through a variety of possible interfaces, formed according to each given promotion strategy, suggest the study, within a broader research field, of new ways of information structure management, introducing new kinds of knowledge formation and consequently new interpretation tools of awareness. As a result of the interdisciplinary approach regarding Cultural Heritage management and subsequently of the possibility of parameterization regarding the forms of scientific fields and the practices of the specialities involved, a new design field is defined, the Cultural Information Interaction Design field. Major characteristic of this field is parameterizability; concerning both representation and interaction design models, as well as the design of information intake processes through sensorial approaches. The best application example of this model is found within the framework of contemporary exhibition design, where various representation methods and practices are gathered together constituting a uniform cultural post-environment. The particular nature of the design field concerned, as regards the ability of each given team of scientists to design and subsequently negotiate a wide spectrum of interfaces, makes it an interesting, and at the same time still un-explored design field, where experimental approaches of representation models can be examined in both physical and digital as well as in combined interaction environments.

Keywords: Interdisciplinary Collaboration, Parameterization, Cultural Information Interaction Design, Polymorphy of User Interfaces, Meta – Environments, Diversiform Interpretation Approaches.

Zusammenfassung

In diesem Artikel wird ein theoretisches Analysemodell für mögliche Grenzen einer Schnittstelle präsentiert, die ein kulturelles Informationssystem haben kann. Auf der Grundlage von Parametern ergeben mögliche Kooperationsbeziehungen von Fachbereichen,

die an Prozessen zur Produktion kultureller Informationssysteme (Cultural Information Systems) teilnehmen, ein breites Spektrum an Formen von Schnittstellengrenzen, an die man sich mittels entsprechender Interpretationsverfahren in natürlichen, visuellen oder gemischten Umgebungen annähert. Die Untersuchung von Methoden zur Projizierung kulturellen Inhalts mittels eines interdisziplinären Ansatzes schlägt neue Methoden für das Informationsmanagement sowie Rekonstruktionsverfahren vor, welche die Grundlagen für neue Methodiken der Verhandlung mit dem Gesuchten bildet. Die kulturellen Informationssysteme stellen dem Forschungsfeld im weiteren Sinne mittels der polymorphen Schnittstellengrenzen, die sie je nach der jeweils gewählten Projizierungsstrategie bilden, neue Methoden zur Verwaltung von Informationsstrukturen zur Untersuchung und bilden somit neue Methoden zur Herausbildung von Wissen und folglich neue Instrumente zur Interpretation der Erkenntnis. Als Ergebnis wird auf Grund des interdisziplinären Ansatzes an die Verwaltung des kulturellen Erbes und folglich der Möglichkeit einer Parametrisierung der Arten an wissenschaftlichen Feldern sowie der Verfahren der involvierten Fachbereiche ein neues Gestaltungsfeld abgegrenzt, nämlich das Feld der Gestaltung von Interaktion kultureller Information (Cultural Information Interaction Design). Hauptmerkmal dieses Modells ist die Parametrisierbarkeit sowohl, was die Konstruktion von Reproduktionsmodellen betrifft, als auch bezüglich der Konstruktion von Interaktion und von Verfahren der Hinzufügung von Information mittels Szenarien intuitiver Ansätze. Das vorliegende Modell findet sein bestes Anwendungsbeispiel im Rahm der modernen Ausstellungskonzipierung, da es verschiedene Methoden der Reproduktion verbindet, die sich zu einer einheitlichen kulturellen Meta-Umgebung zusammenfügen. Die Besonderheit, die dieses konkrete Konstruktionsmodell bezüglich der Eigenschaft bietet, dass die jeweilige Gruppe an Wissenschaftlern ein umfassendes Spektrum an Schnittstellengrenzen konstruieren und anschließend verhandeln kann, macht es zu einem interessanten und zugleich bis jetzt noch unerforschten Konstruktionsfeld, wo experimentelle Ansätze von Reproduktionsmodellen sowohl in natürlichen als auch in digitalen und in gemischten Interaktionsumgebungen untersucht werden können.

Schlüsselwörter: Interdisziplinäre Kooperation, Parametrisierung, Gestaltung von Interaktion Kultureller Information, Polymorphie der Benutzerschnittstellen, Meta-Umgebungen, Diversiforme Interpretationsansätze.

Résumé

L'article présente un modèle théorique d'analyse des interfaces utilisateur possibles que peut porter un système informatique culturel. S'appuyant sur les paramètres, les rapports de synergie possibles entre les spécialisations qui participent au processus de production de Systèmes Informatiques Culturels (Cultural Information Systems) aboutissent à la création d'une large gamme de formes d'interfaces utilisateur qui sont abordées au moyen de processus interprétatifs correspondants, dans des environnements physiques, virtuels ou mixtes. L'étude des méthodes de présentation du contenu culturel, au travers d'une approche interdisciplinaire, propose de nouveaux modes de gestion de l'information et de pratiques de représentation, constituant les fondements de nouvelles méthodologies de négociation avec ce qui est demandé. Par l'intermédiaire des interfaces utilisateur polymorphes qui sont formées en fonction de la stratégie de présentation choisie, les systèmes informatiques culturels imposent l'étude de nouveaux modes de gestion des structures de l'information dans le champ élargi de recherche, constituant de nouveaux modes de création du savoir et, par conséquent, de nouveaux outils d'interprétation de la connaissance. L'approche interdisciplinaire de la gestion du patrimoine culturel et, ultérieurement, la possibilité de paramétrisation quant aux types de champs scientifiques mais aussi des pratiques des spécialisations impliqués, délimitent un nouveau champ de conception, celui de la conception de l'interaction de l'information culturelle (Cultural Information Interaction Design). La principale

caractéristique du champ en question est la paramétrisation possible aussi bien du point de vue de la conception de l'interaction que de celui de la conception des processus d'appréhension de l'information au travers de scénarios d'approches sensorielles. Le meilleur paradigme d'application du présent modèle est celui de sa mise en œuvre dans le cadre de la conception moderne d'expositions, puisque s'y rencontrent divers modes de représentation qui composent un méta-milieu culturel unifié. La caractéristique particulière du champ de conception en question, à savoir sa qualité qui permet au groupe de scientifiques de concevoir et, par la suite, de négocier une large gamme d'interfaces utilisateur, en fait un champ de conception intéressant et, en même temps, encore inexploré offrant la possibilité d'étudier des approches expérimentales de modèles de représentation et ce dans des milieux d'interaction aussi bien physiques que numériques et mixtes.

Mots clés: Collaboration Interdisciplinaire, Paramétrisation, Conception de l'Interaction de l'Information Culturelle, Interfaces Utilisateur Polymorphes, Méta-Milieux, Diversité des Approches Interprétatives.

I. Introduction

During the process of producing a cultural product, we usually deal with the following stages: firstly, the stage of constitution of the group of scientists who will be involved in the given subject matter; secondly, the stage of negotiation of the subject matter at issue within an interdisciplinary framework; and thirdly, the stage of promotion strategies using the appropriate (re)presentation practices.

The distinctiveness of cultural content in relation to the amplitude of information that constitutes it, even in an early form before the stage of its negotiation, defines cases of development of extremely complex information systems.

It is obvious that these systems, during their production processes, hold individually as well as in combination, characteristic features of every field involved, due to the incorporation of theoretic models and practices of various knowledge fields from a broad spectrum of sciences.

Through this interdisciplinary aspect, the Cultural Information Systems expand the ways of information negotiation, promoting, in this way, new forms of expression to the broader research field of design.

II. Studying Possible Forms of User Interfaces in the Case of Cultural Heritage Management

Although today the term *user interface* is used for interaction environments between humans and computing systems [1], in a broader sense, this meaning can identify "interface" formations in every communication activity.

In this regard, user interfaces are found over time and are directly related to socio-cultural criteria [2].

As a result, in the user interfaces used every time, typical features of the implemented relative social institutions, cultural aspects and technological backgrounds are

distinguished. These parameters are appeared in every formation in respect both of representation practices and interpretative approaches.

So in a broader meaning of the term, user interface could be defined as the *negotiation boundary - reference area* that functional units / systems in a mutual relation delimit among themselves. In this "communal" [3] space, common typical characteristics are met, which contribute to the jointly adaptive approach to attributes, set of codes and interpretations.

Examining a Cultural Information System through an interdisciplinary framework we observe its inherent versatility as regards the management of the informational material, thus providing a wide spectrum of interfaces and consequently forming multifarious methods of interaction with the content.

The multiplicity, which characterises Cultural Information Systems, is a result of three parameters:

Firstly, the subject to be negotiated can have any form: from a scientific research, such as the evolution of the human species based on the Darwin's theory, to a natural object, such as the statue of Niki of Samothrace.

Secondly, the approach through many and different scientific contexts provides a great amount of information and correlations about the studied subject.

Thirdly, as a result of this interdisciplinary negotiation through a broad spectrum of sciences and based on the particularities introduced by the practices of each knowledge field, cases of representation model formation appear not only in digital forms but also in analogue and combined forms.

So, according to the representation practices, many and various forms of user interfaces are formed, which hold typical characteristics of each cooperative relation.

III. A Theoretic Organization Model of the Production Processes of a Cultural Information System

In an attempt to define the knowledge fields covering the production of a Cultural Information System we could imagine a formation of levels like the one that appears in figure 1. In this schematic representation, three levels (*a*, *b, c*) are presented in stratified layers, which represent each category of the knowledge fields involved.

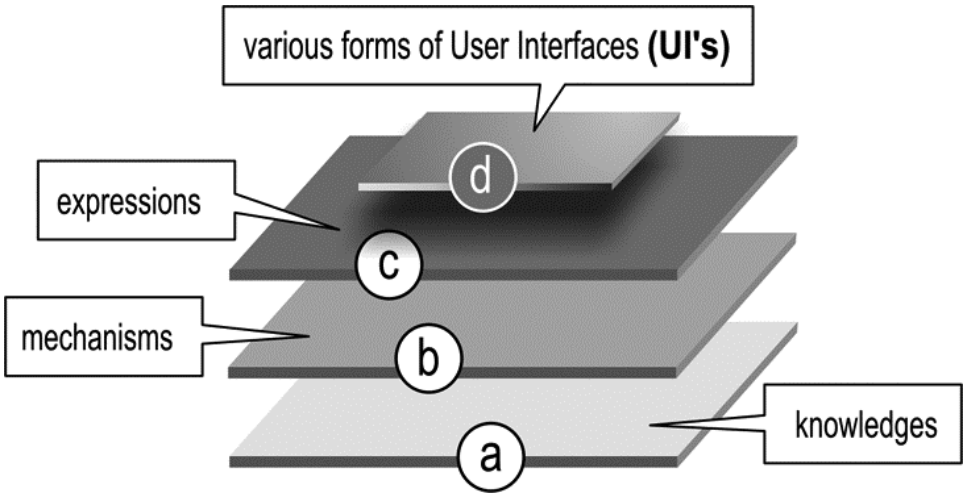

Fig. 1: Schematic representation of the knowledge fields involved, during the process of a Cultural Information System production. Starting from below, at level (*a*) specialities which analyse and organise the negotiated subject are found, at level (*b*) specialities which deal with structure and management techniques of the produced information are found, and finally, at level (*c*) specialities which render the given subject of negotiation based on representation models are found. At the top, level (*d*), consisting of the cooperative relations of the specialities, comprises all possible forms of user interfaces

In more detail, starting from below we can distinguish:

Level (*a*), consisting of theoretic models, scientific methods and practices analysing and organising cultural data (e.g. through museology practices),

Level (*b*), consisting of theoretic models, scientific methods and practices structuring and applying the knowledge that level (*a*) produced to management systems (e.g. through applied informatics practices) and finally,

Level (*c*), consisting of theoretic models, scientific methods and practices expressing (rendering) the subject of negotiation based on representation models (e.g. through graphic information design practices).

Figure 2 presents an indicative sample of specialities [4] which can cover the three above-mentioned levels (*a, b, c*), attempting to classify "in stratified layers" the various scientific fields dealing (or potentially dealing) with cultural content.

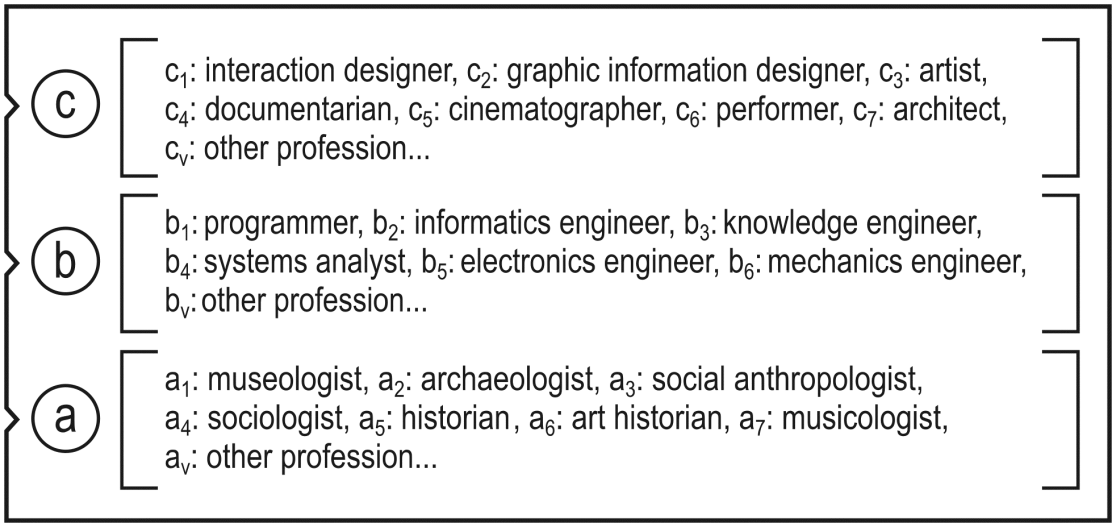

Fig. 2: Indicative sample of scientific specialities classified in groups according to the knowledge field

Various cooperative relations can be presented in each case of group cooperation, either individually within each level (*a*), (*b*), (*c*) as for example:

$(a_1 + a_2 + a_7)$ for level (*a*),

$(b_1 + b_5 + b_6)$ for level (*b*),

$(c_7 + c_2 + c_3)$ for level (*c*),

or, in stratified layers, that is, in a combinative multilevel form,

as for example:

[(*a*) + (*b*)], [(*a*) + (*c*)], or

[(*a*) + (*b*) + (*c*)],

which based on the previous cases, could be further analysed within each level,

as for example:

$[(a_6 + a_2) + (b_1 + b_2)]$, $[(a_3 + a_1) + (c_3 + c_4)]$, or

$[(a_1 + a_5) + (b_1 + b_5 + b_6) + (c_1 + c_2 + c_v)]$, etc.

In an attempt of a better schematic presentation of the possible cases of cooperative relations of specialities from levels (*a*), (*b*) and (*c*), we could imagine the production process of a Cultural Information System as it is presented in figure 3.

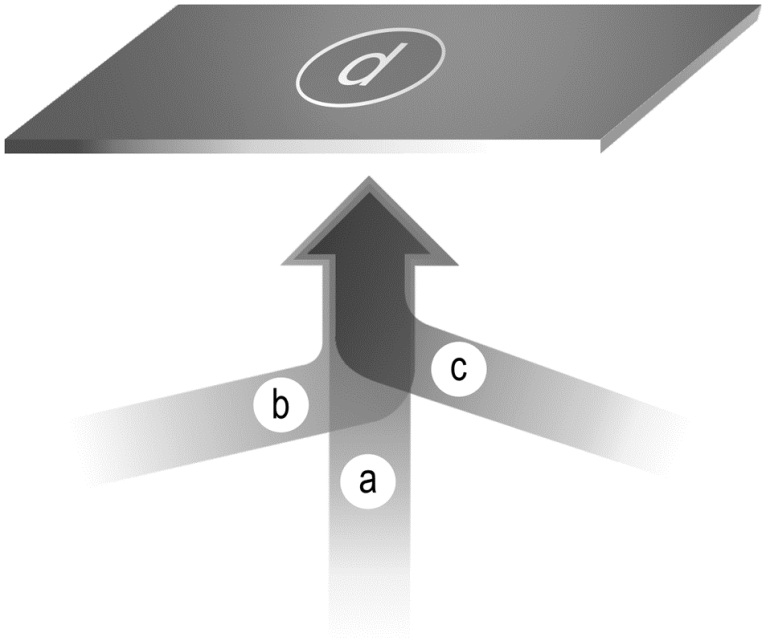

Fig. 3: Studying the production process of a Cultural Information System, cases of cooperative relations can be presented either within an individual level as for example only at level (*a*), or in a multilevel form such as in cases (*a*) + (*b*), (*a*) + (*c*), (*b*) + (*c*), (*a*) + (*b*) + (*c*). At level (*d*), according to each case, the respective user interfaces are presented (rendered)

As it is shown in figure 3, a Cultural Information System can be formed either individually [5] based on each level, or in combination based on multilevel formations.

As a result of each cooperative relation, level (*d*) is formed containing every possible form of User Interfaces that could be shaped by the specialities from the fields involved. According to parameters, concerning the amplitude of the knowledge fields as well as the numerous specialities involved, every cooperative relation can provide a broad spectrum of forms of user interfaces which therefore obtain characteristic attributes and interpretative practices that could be found in physical, virtual or combined environments.

IV. Possible Modes of User Interfaces that could be Formed During the Production Processes of a Cultural Information System

In figure 4, possible forms of user interfaces which could provide cooperative relations of specialities are presented [6].

Fig. 4: Possible modes of user interfaces that a Cultural Information System could form

The phenomenon of user interface polymorphy, which is apparent in this figure, is a result of the manifold cooperative relations of specialities, in quality [7] as well as quantity level. Therefore, in a first consideration, according to each cooperative relation we could find:

- **Physical User Interfaces**, that is, forms of user interfaces characterised by a "more natural approach" concerning the interpretative process. For example, the profession of a museum guide treats every subject at issue in a more direct and friendly way, in the form of human expression, using representation models and communication practices found everyday in familiar social environments.
- **Performative User Interfaces**, that is, forms of user interfaces which could be developed through performance practices (performances). For example, we could consider the case of a cultural presentation in the form of an event performed by an actor/performer using performance practices, such as pantomime.
- **Traditional Media User Interfaces**, that is, forms of user interfaces met everyday when we interact with "traditional" communication media.

We could give as an example the communication strategy of a cultural organisation (e.g. a Museum), which uses promotion practices in the form of printed media such as periodicals, books, maps, etc. or in the form of television and radio productions, documentaries, film productions etc., for its promotion needs.

- **Graphical User Interfaces**, that is, forms of user interfaces met everyday when we interact with computer systems, where the communication between man and machine is performed with the extensive use of symbolic representations in the form of icons, objects, labels, menus, windows, etc., providing a graphical way to represent the operating systemic environment.

  We could refer, for example, to communication approaches of cultural organisations in the form of websites, multimedia applications in CD / DVD form, information systems for collection management, etc.

- **Virtual Reality User Interfaces**, that is, forms of user interfaces met when we interact with computer systems that simulate virtual reality environments with the use of specialised practices and peripherals. We could refer, for example, to a respective production of a cultural organisation where someone, through the experience of immersion into a virtual environment, can interact with archaeological sites, buildings, 3-dimensional forms of objects through simulation, etc.

- **Tangible User Interfaces**, that is, forms of user interfaces met when we interact with computer systems where the digital information is presented through natural forms and shapes in the form of graspable objects and augmented surfaces. We could refer, for example to the case of a “tangible” interactive exhibit presenting easily and accessibly the cultural content with which it deals addressing to users, regardless of their age or knowledge background.

- **Customizable User Interfaces,** that is, cases of forms of user interfaces that provide the possibility of parameterization concerning the modes of interaction with multimedia content. Based on parameterization concerning sensorial approaches, presentation and interaction techniques, the forms of Customizable User Interfaces have the ability to be altered according to each given design problem / strategy. For example, we could cite the case of an interactive exhibit capable of conveying the content concerned through a realistic simulation of a game (e.g. hopscotch) that is played in the neighbourhoods in the traditional manner and that could thus reach a greater number of users (target groups) independently of age and education.
- **Other User Interfaces**, that is, types of user interfaces, which are not covered by the previous categories. The category of "other user interfaces" could comprise special cases of user interfaces where the subjects to be negotiated are investigated through rather unusual promotion strategies, using sensorial approaches that are not often applied. We could refer, for example to the case of "promotion" of various traditional products in form of savory dishes during an agro - tourism festival, the cases of the sensorial approaches based on taste and scent which could subsidiarily or even primarily support the whole strategy, could also be studied.
- **Mixed User Interfaces**, that is, forms of user interfaces that could be created by combinations of the above-mentioned cases constituting in that way mixed interaction environments. We could refer, for example to a promotion strategy of a cultural organization based on design approaches from the field of exhibition design where various representation and storytelling methods are found individually or in combination. In this case, the combinative use of analogue and digital media compose a uniform mixed meta-environment of interaction.

Based on the above-mentioned classification, potential forms of user interfaces can be found in all communication media and consequently create interaction areas in physical, virtual or mixed environments, providing in that way multimodal interpretative approaches.

V. Defining Cultural Information Interaction Design

Nathan Shedroff in his article "Information Interaction Design: A Unified Field Theory of Design" expressed a theory on *Information Interaction Design*, dealing with the ways of organizing and presenting data and information.

According to Shedroff, Information Interaction Design is the intersection of three design fields: Information Design, Interaction Design, and Sensorial Design (Shedroff, 1999, p.p. 268-270). Through changing design criteria, depending on the given design problem, Information Interaction Design can provide design solutions emphasizing either to Information Design practices, to Interaction Design practices or to Sensorial Design practices. Regardless of the design strategy and the selection of the main application field (depending on each case) the intersection of practices by the three above-mentioned fields, can combinatively develop content representation methods as well as content interaction modes in all communicational means, in physical or digital form or even as compound ones (ibid, p.p. 270-272).

If we apply the above theory of Information Interaction Design in the case of cultural content negotiation, the interdisciplinary field based on which Cultural Information Systems are developed and due to its attribute of holding individual and combined typical features of each field involved, provides, according to each cooperative formation, relative representation methods, as well as interaction modes.

Based on the fact that each knowledge field involved treats content according to its

proper information, interaction and sensorial design practices, *Cultural Information Interaction Design*, in an interdisciplinary framework, could be defined as the interpretative tool with which each group of specialities elaborates the information to be negotiated and presents it through different forms of user interfaces.

The representation practices of a Cultural Information System - which for the purposes of this paper will be called *Cultural Representation Practices* (CUREP Practices) - are established according to technical material and theoretic infrastructure, based on which these practices are designed. These infrastructures - which for the purposes of this paper will be called *Interaction Platforms* - are found in every case of design of communication practices and hold the typical features of the selected communication media and channels, regarding *both* structure techniques and presentation practices.

Consequently, in each Cultural Representation Practice, the formed user interfaces hold typical characteristics of each Interaction Platform used for their presentation. Under this prism, User Interfaces provided by different Interaction Platforms but constituting a unified Cultural Representation Practice, hold, individually and in combination, the typical features of all the selected communication media.

Cultural Information Interaction Design based on theoretic approaches and practices of all the knowledge fields involved, which form each Cultural Information System, can present a broad spectrum of User Interfaces, due to the parameterizability, which would be then characterized by multiformity.

The reason of multiformity is that, depending on each cooperative relation, each user interface formed, “renders” the negotiation content using the respective representation models, means of expression and interaction modes provided in each case by the knowledge fields involved.

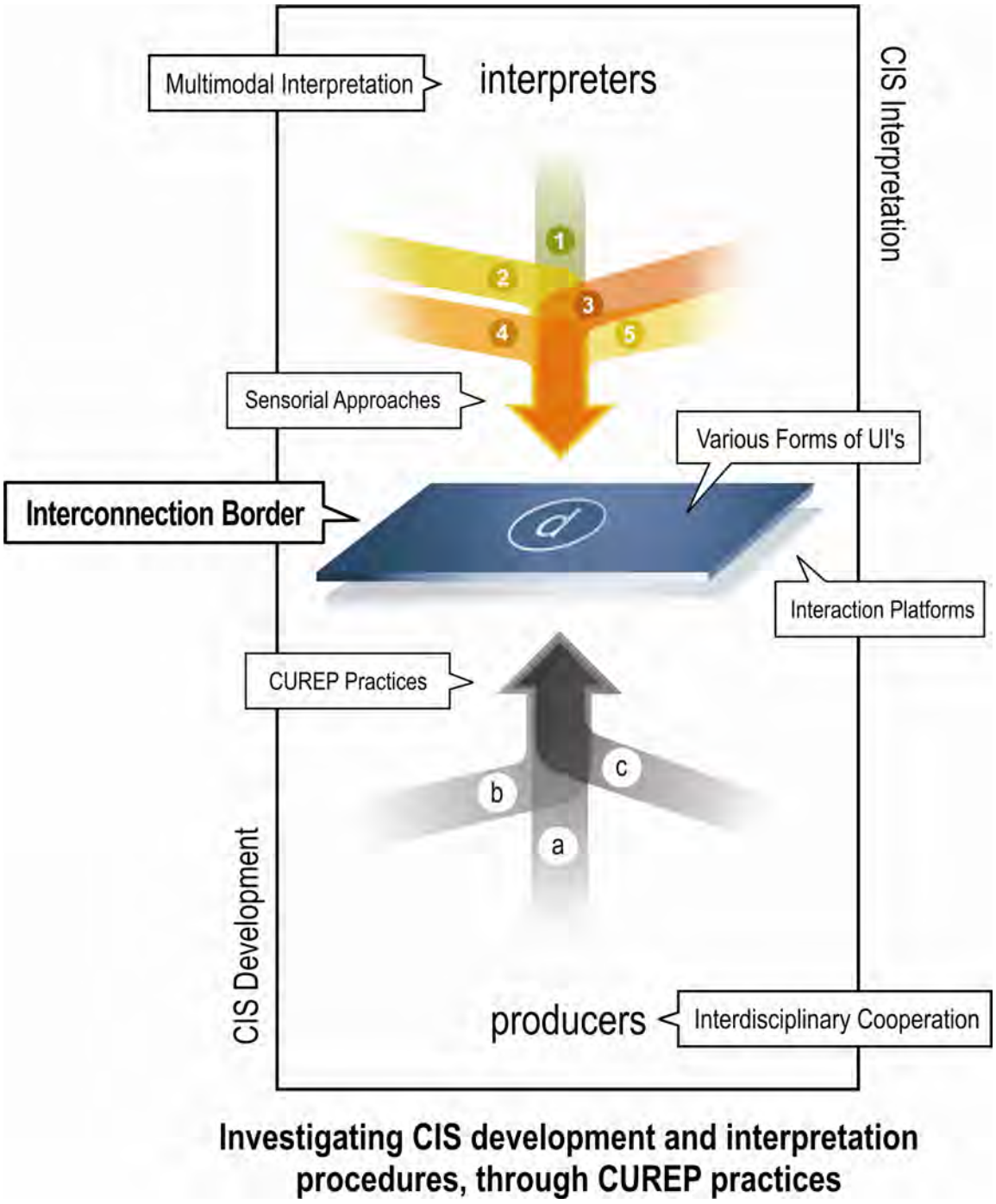

Fig. 5: Studying the production processes of Cultural Information Systems (CIS) from the producers' aspect, during each interdisciplinary cooperation of levels (*a*), (*b*) and (*c*), respective representation practices (CUREP Practices) are formed. According to each *Interaction Platform* used by each representation practice, many and different forms of user interfaces (UI's) are created. As a result, multimodal interpretation approaches are presented, from the interpreters' part, based on parameters concerning sensorial approaches, where: (1), (2), (3), (4), and (5) is vision, hearing, touch, scent and taste, respectively. The Interconnection Border created by these processes, due to its attribute to consist of a set of user interfaces of each representation practice, ideally simulates at a great extent the original target / idea

Under this interdisciplinary aspect, the major typical characteristic of Cultural Information Interaction Design is therefore parameterizability, that is, interchanging design criteria regarding the methods of representation, as well as interaction design, and the information intake process design with the use of scenarios of multimodal sensorial approaches.

Returning to the phenomenon of multiformity concerning the rendering of user interface, due to the parameterised factors in each content representation, the subjects at issue are represented in different way and medium and in different place and time.

Within this framework, potential forms of user interfaces can be found in all communication media and consequently create interaction areas in physical, virtual or mixed environments, providing in that way multimodal interpretative approaches. Combining different user interface formations by different media and environments, a unified content negotiation border is composed and formed, which for the purposes of this paper will be called *Interconnection Border*, containing all possible formations of user interfaces. The Interconnection Border, holding individually and in combination, the typical characteristics of each formed user interface, simulates at great extent, the original target idea to be negotiated.

From this regard, the best application example of Cultural Information Interaction Design is found within the framework of representation practices based on contemporary exhibition design, where various representation methods are gathered together constituting a uniform cultural meta-environment.

VI. Exploring new forms of Cultural Representation

Up until today, during a product production, the design team created a final product / artifact with a given material essence using the existent technology. Each

technological framework predetermined the final material essence / form of the product as well as of its presentation mode / medium.

In our days, practices from the fields of information technology as well as from the field of microcontroller engineering introduce new expression possibilities to the broader field of design.

The intersection of the above fields, change radically the interaction landscape using computer systems, not only providing the possibility of physical ways of approaching the given information, but also suggesting new rules of storytelling / interpretation.

With the introduction of new methodologies of interaction with Cultural Information Systems through (re)presentation practices based on contemporary exhibition design, such as with the combinative use of interactive exhibits and classic "traditional" methods of exhibition design, the design team redefines its role.

The *product*, the *interpreter*, the *producer* and the *medium* tend to change meaning and role, even among them. In the "dictionary" of the design team, terms such as *naturalness*, *experimentation* and *experience* begin to replace those of *discipline*, *limitation* and *predetermined use*.

In its evolutionary course, user interface design through the "invisibility" of computer systems (Weiser 1991; Weiser & Brown, 1995; Buxton 1996; Ishii & Ullmer, 1997; Ishii et al., 1998), outstrips the strict limits of the *Human / Computer Interaction* relation, and the *Human / Information Interaction* relation, (re)appears in the design landscape (Winograd 1997; Shedroff, 1999, 2001; Dourish, 1999, 2001a, 2001b; Ishii 2004; Jacucci, 2004).

In the research fields of Cultural Heritage management, the *Human / Information Interaction* relation that could be metonymized under the framework of cultural content negotiation, as: *Human / Cultural Information Interaction*, brings to

investigation new modes of information structure management in the broader research field, suggesting new ways of knowledge formation and consequently new interpretation tools of awareness (Sparacino et al., 1999; Sparacino, Davenport and Pentland, 2000; Ciolfi & Bannon, 2002; Hull, Reid and Kidd, 2002; Ciolfi, 2004; Hornecker & Bruns, 2004; Rawat, 2004; Sparacino, 2004; Haque, 2004; Fano, Mazzone, Toccafondi and Torsi, 2005; Halloran, Hornecker and Fitzpatrick, 2005; Lehn, Heath and Hindmarsh, 2005).

The combinative use of various communication media within the framework of a promotion strategy with methods from the field of the exhibition design - which could be defined as the field with the most complex design properties, since it can encompass practices and theoretic backgrounds from a greater number of relative fields - may constitute the ideal "model" regarding the cognitive process, due to the interchange of information negotiation modes (Belcher, 1992, p.p. 37-43; Dean, 1995, p.p. 25-31).

The intersection of practices from the above field with practices from the fields of information technology and microcontroller engineering, assigns a transformative dynamic. Present-day technology is such that parameterized customizable user interfaces can be designed at low cost and easily produced without any particular specialist knowledge of programming and electronics. Iindicative methodological approaches are cited in research works of: (Nam & Gill, 2000; Borchers & Ballagas, 2002; Greenberg & Boyle, 2002; Barragán, 2004; Dow, MacIntyre, Gandy and Bolter, 2004; Klemmer, Li, Lin and Landay, 2004; O'Sullivan & Igoe, 2004, Yim & Nam, 2004; Lee et al., 2004; Hartmann, Klemmer and Mehta, 2005).

Applying representation models from the exhibition design field in combination with practices from the fields of information technology and microcontroller engineering

each group of specialities involved in the process of a cultural product's production is able to:

- Combine communication methods offered by the traditional media with those of the contemporary digital media,
- Create dynamic mixed environments, providing multimodal interpretation approaches,
- Introduce familiar social environments through the integration of performance practices,
- Transform architectural spaces into spaces of "experiences" comprising different representation models,
- Negotiate the subjects at issue with a more experiential approach through the use of interactive exhibits,
- Explore promotion strategies using sensorial approaches that are not often applied due to technological / other constraints.

With such a methodological approach of cultural content promotion, the cooperative relations of specialities involved in the process of producing a cultural product, could reach the classification of possible forms of user interfaces presented in section IV, and ideally simulate to a great extent the original target / idea.

Using mixed interaction environments which consisted of traditional and contemporary - technologically enhanced - forms of communication media and in particular, forms of customizable user interfaces according to each given design problem / strategy, the design team has the ability to create methodological "tools" for the promotion of cultural information, within the framework of diversiform "cultural representation" methods and practices (Papageorgiou, Pehlivanides and Bubaris, 2005). Having the possibility of experimentation as regards methods of interaction

and based on multi-sensorial approaches, the design team is able to simulate processes encountered on a daily basis in familiar social environments. Under this prism, Cultural Information Systems go beyond the "typical" practices of user interface design by approaching alternative interaction scenarios. As a result, each given subject matter under negotiation exceeds the narrow bounds of conventional media, suggesting new ways of interpretative approaches, introducing new methods for the (re)presentation and promotion of cultural content.

VII. Conclusion

This article has introduced a theoretic model concerning the various forms of interfaces encountered in a Cultural Information System based on parameters regarding the composition of the specialties participating in the production process.

Examining design strategies for cultural promotion we observe that cases of formation and provision of interfaces are gathered together not only through practices of the specialities concerned with the design, such as design practices of printed media design, multimedia design, exhibition design, etc., but also in combination with any practice dealing with management, presentation and promotion of cultural content, such as, for example, practices from the fields of performance, sociology, social anthropology, museum pedagogy, informatics, cognitive psychology etc. Through an interdisciplinary framework various methods of negotiating the given subject matter are presented, resulting in the provision, according to circumstances, of many and varied forms of interfaces.

Investigating the production process of a Cultural Information System, with changing design criteria concerning both representation and interaction design models, as well as the design of information intake processes through multi-sensorial approaches, the

best application example of this model is ideally found in the promotion of contemporary exhibition design, where various representation methods and practices are gathered together constituting a uniform cultural post-environment.

The particular nature of the design field concerned, as regards the ability of each given team of scientists to design and subsequently negotiate a wide spectrum of interfaces, makes it an interesting, and at the same time still unexplored, design field where experimental approaches of representation models can be examined in both physical and digital as well as in combined interaction environments.

Footnotes

[1] In the Concise Oxford English Dictionary (Soanes & Stevenson, 2004), the definition of the term user interface is cited as: "*The means by which the user and a computer system interact, in particular the use of input devices and software*".

[2] Under a broader scope, user interfaces are found just in the first moments that man began to schematize ideas through symbolic representations. Cases of information system management through user interfaces can be found in prehistoric and posterior findings of various forms, from the aspect of their function. Researchers from different scientific disciplines support that examples of representation models presented in forms of tools, decorative objects, mural representations, specially demarcated spaces (such as sacred places, temples) etc., metaphorically interconnected meanings and functions, creating in this way interaction environments between information or information systems. Classifying and recalling series of meanings through metaphors (which might have the form of illustrations, artefacts, sound recordings, patterns through kinaesthetics, etc.) the user of each information system could negotiate, using the relative interpretative approaches, useful information and perform series of actions (Eliade, 1961; Leroi-Gourhan, 1985; Botscharow, 1990; Thomas, 1992; Jean, 1998). Studying structures of such cases but also posterior systems, it is concluded that human behaviour has been shaped (and continues to be shaped) through the schematisation, constitution and management of symbols, having as a result the inevitably evolutionary practice of way of thinking through symbolic structures.

[3] In order to better understand the meaning of communal space, we could, for example, consider the form of this article as the interface, in which the author, on the one hand, negotiates the issues of the article schematizing them in structured sequences of alphabetical code, and the reader, on the other hand, who decodes to knowledge any approach of the issues through interpretative processes, come into contact. If we studied the form of this article by comparing the interfaces it uses based on two identical versions of it, in printed and digital form, it could be noticed that while the form (layout) of the article would remain the same, the user interfaces might present differences during the interpretative process, due to the parameters concerning the potentials and weaknesses of each medium of presentation (O'Hara & Sellen, 1997; Murphy, 2000). Another possible interface approach, that this article could use, would be for example the case of presenting the content through recitation by the author as lecturer in a conference area. Under these circumstances, the content which is arranged according to the representation practices of the "author - lecturer", would create a relative negotiation boundary/reference area of the subjects at issue, which at this time would be approached by an audience. We could go on with numerous hypothetical scenarios of (re)arrangement of the content of this article. In any case, the interpretative approaches of the final recipients, in function with the given representation practices, would create, each time,

respective negotiation boundary / reference area, which would hold typical characteristics from both sides.

[4] Representative examples of specialities dealing with issues of Cultural Heritage could be the interdisciplinary staff of institutions dealing with management, design and promotion of cultural content. For example, in Greece the specialities represented at the Department of Cultural Technology and Communication of the University of the Aegean in the year 2005 include social anthropologists, archaeologists, environmental scientists, art historians, museologists, theatrologists, filmmakers, graphic designers, 3-D graphic designers, interaction designers, programmers of multimedia applications, mechanical engineers, as well as scientists from wider knowledge fields of information technology, communication and human sciences (Culturaltec / people, 2005).

[5] We could assume that a Cultural Information System could be formed even in an individual single-level basis, “borrowing” (to a certain extent) practices and theoretic models from the other levels. Although single-level data negotiation would form some kind of information systems, it is obvious that multilevel approach is more complex due to specialisation and therefore more appropriate.

[6] As it is examined in section II, typical features of the congruent social institutions, cultural standpoints and technological backgrounds applied are distinguished in each given User Interface of the possible cases of cooperative relations of specialities involved in the production process of a Cultural Information System. Based on this approach, the classification of possible user interfaces presented in this section does not intend to encompass / analyse all the possible formations of user interfaces, which is theoretically and practically impossible, but to introduce the reader to a process of discovering any possible type of user interfaces that may be formed based on the parameterization factor, during the creation of the diversiform cooperative relations that may be found in each case of collaboration of the groups of specialities involved, as well as during the negotiation stages of the subjects at issue through this interdisciplinary framework. Under this prism, possible approaches concerning the presentation of different forms of user interface that a cultural product may hold can be met in a wide spectrum of communication practices. Therefore, although the terms “presentation” and “image” usually refer to representation models found in visual communication applications, possible approaches concerning the presentation of user interfaces that a cultural product may form can be found in physical, virtual as well as mixed interaction environments, covering the totality of the senses. See ongoing research on taxonomy models concerning media and sensorial approaches in: Mitchell, (2005) "Media Taxonomy Models"; Shedroff, (2005) "A Taxonomy of Senses".

[7] The term *quality* has the meaning of the integration of the suitable speciality that can offer a solution to the given design problem.

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