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

Part 2: A case study of a cultural promotion strategy based on practices from the Exhibition Design field in combination with the use of Customizable User Interfaces

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Abstract

This article presents a case study of a cultural promotion strategy, based on practices from the Exhibition Design field, in combination with the use of Customizable User Interfaces. It concerns a multimedia exhibition under the title: «Ermou Street: Symbolic, Historical, Economical and Social Centre of Mytilene», presented in the city of Mytilene, Lesvos, for two years. The project was the result of academic and research procedures of the department of Cultural Technology and Communication, of the University of the Aegean, Greece. The presentation of Ermou street, aimed at a systematic approach of economical, social and symbolic centre of diachronic public life at the city of Mytilene, as case study of promotion of the broader cultural assets of the island of Lesvos, 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 exhibition design was focused on the design of interactive exhibits with a sensorial emphasis on tangibility, proposing in that way novel forms of cultural representation practices.

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

Zusammenfassung

Dieser Artikel präsentiert eine Fallstudie zu einer Kulturförderungsstrategie auf der Grundlage von Verfahren aus dem Bereich der Ausstellungs-Konzeption in Kombination mit der Verwendung von anpassbaren Benutzeroberflächen. Konkret geht es dabei um eine Multimedia-Ausstellung mit dem Titel: „Die Ermou-Straße: das symbolische, historische, wirtschaftliche und gesellschaftliche Zentrum von Mytilene“, die zwei Jahre in der Stadt Mytilene auf der Insel Lesvos gezeigt wurde. Das Projekt war das Ergebnis akademischer Studien und Forschungsverfahren der Abteilung für Kulturtechnologie und Kommunikation der Ägäis-Universität, Griechenland. Die Präsentation der Ermou-Straße verfolgte einen systematischen Ansatz an ein wirtschaftliches, gesellschaftliches und symbolisches Zentrum eines diachronischen öffentlichen Lebens in der Stadt Mytilene und diente dabei als eine Art Fallstudie für die Förderung der Kulturgüter der Insel Lesvos im weiteren Sinne. Zum Einsatz kamen dabei gemischte Interaktions-Umgebungen, die aus traditionellen und zeitgemäßen - technologisch unterstützten - Formen an Kommunikationsmedien und insbesondere Formen an Benutzeroberflächen, die sich je nach dem jeweils gegebenen Konzipierungsproblem /

Strategie anpassen ließen, bestanden. Im Mittelpunkt des Ausstellungskonzepts stand die Gestaltung interaktiver Exponate, wobei, was die sinnliche Wahrnehmung betrifft, insbesondere auf Berührbarkeit geachtet wurde, womit neuartige Formen kultureller Repräsentationspraktiken vorgeschlagen werden.

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

Résumé

Cet article présente une étude de stratégie de promotion culturelle, basée sur les pratiques du domaine de Conception d'Expositions, en combinaison avec l'utilisation d'Interfaces Utilisateur Parametrisables. Le projet présenté concerne une exposition multimodale intitulée: « Rue Ermou: Centre Symbolique, Historique, Economique et Social de Mytilène » qui a eu lieu à Mytilène, Lesvos durant deux années. Ce projet est le résultat d'un travail de recherche académique au Département des Technologies Culturelles et de la Communication, à l'Université de l'Egée, Grèce. La présentation de la Rue Ermou avait comme but le suivi d'une approche d'analyse systématique du centre économique, social et symbolique de la vie publique de Mytilène à travers le temps, sous la forme d'une étude de promotion de toute l'étendue de biens culturels de l'île de Lesvos, faisant usage d'environnements interactifs mixtes consistant de formes traditionnelles et contemporaines – technologiquement augmentées – de medias et, en particulier, de formes d'interfaces utilisateur parametrisables en fonction du problème de conception et de la stratégie donnés. La conception de l'exposition s'est concentrée sur la création d'objets interactifs accentuant la tangibilité et proposant de ce fait une nouvelle forme de pratiques de représentation culturelle.

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

I. Introduction

Through representation practices from contemporary exhibition design and within an interdisciplinary framework of content negotiation, the meaning "*User Interface*" is redefined, introducing cases of specialized forms of cultural (re)presentation to the design field, since the variety and complexity of the media and representation models provide the possibility of exploring new forms of communication and interaction modes.

This article presents an example of cultural information interaction design, based on practices from the exhibition design field in combination with the use of customizable user interfaces [1] and concerns a multimedia exhibition under the title: «Ermou Street: Symbolic, Historical, Economical and Social Centre of Mytilene».

The representation models of this cultural promotion strategy were the result of interdisciplinary cooperation from the fields of social sciences, applied information technology and interaction design constituting in that way an transdisciplinary content negotiation framework. The exhibition was presented in the city of Mytilene, Lesvos, for two years and it was the result of academic and research procedures of the department of Cultural Technology and Communication, of the University of the Aegean. The presentation of Ermou street, aimed at a systematic approach of economical, social and symbolic centre of diachronic public life at the city of Mytilene, as a case study of promotion of the broader cultural assets of the island of Lesvos, 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 content of the presented interactive applications was selected

and organized with qualitative research methods following a two year research project on the social history and the material culture of Lesvos and Mytilene.

Within this framework, the whole presentation model encompassed interactive exhibits, photographic material, lectures, video projections and documental presentations in the form of slideshow, combined with a structured "narrative" scenario.

II. Exhibition's Overview

1. The thematic fields of the exhibition

Fig. 1: Part of the photographic material of digital and analogue content used in various applications of the multimedia exhibition of "Ermou Street". Picture 1.1: Aspect of Ermou street at noon, Picture 1.2: Traditional grocer's shop in Ermou street, Picture 1.3: Example of architecture at a vertical alley to Ermou street, Picture 1.4: Restored Turkish baths (Hamam) in Ermou street, at the area of old market

The exhibition concerned issues of the social history and material culture of Ermou street, focusing on the following thematic fields: 1) The architectural identity of Ermou street and the pertinent social web, combined with the changes in social life

during the 20th century, 2) The experiential experience of the inhabitants regarding economical and social life in the past, as well as in the modern reality, 3) Biographical narratives of practitioners representing key points in the historical development of the local market, 4) The contemporary sound environment (soundscape) formed by everyday activities, 5) A twenty-four-hour visual representation of the urban setting.

2. Topographic Diagram with the content interaction areas

For the presentation of the above-mentioned thematic fields, the design strategy of specially arranged interaction "areas" was implemented, through which the visitor could have access to different approaches of the content.

In figure 2, the topographic diagram of the exhibition is presented with alphabetical definition (from A to G) of the content interaction areas.

At the main exhibition area, the exhibition design strategy was focused on the design of interactive exhibits with a sensorial emphasis on tangibility, proposing in that way novel forms of cultural representation practices. The combination of the use of "traditional" and contemporary representation techniques created a dynamic mixed environment, providing in this way a multisensorial content negotiation possibility and consequently, multimodal interpretative approaches.

The architectural arrangement of space itself where the exhibition took place, in combination with each representation model, transformed the area to a unified User Interface that contained separate interaction areas in key points. Having as main feature the multiformity concerning the content presentation, due to the use of different media and ways of presentation, each area provided a different interaction experience (Ciolfi, 2004). The interchange of content negotiation method depending on the area, created in total a unified interaction meta-environment, composed by various representation models.

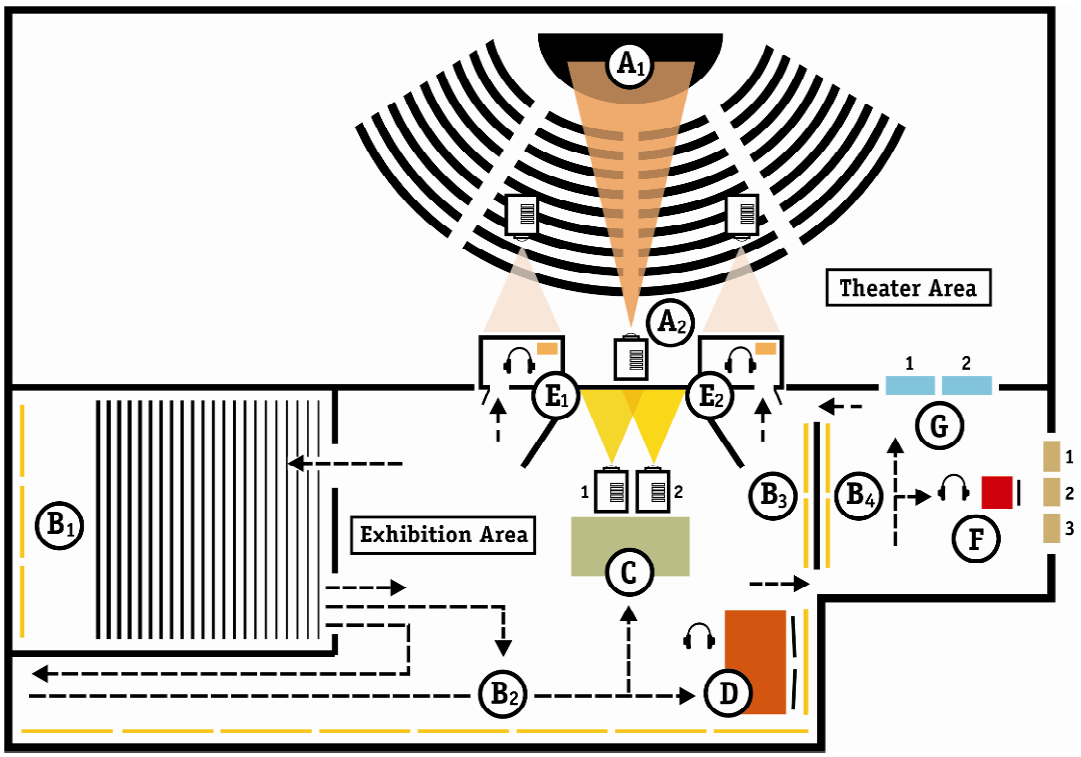

Fig. 2: Topographical diagram of the exhibition with the alphabetically defined (from **A** to **G,** starting from **A**) areas of content interaction: // Main theatre area: 1.) Area (A): [consisting of key points A_1 and A_2]. Introductory presentation of the subject through a series of lectures by invited lecturers and simultaneous projection of documents. // Exhibition area: 2.) Area (B): [consisting of key points B_1, B_2, B_3 and B_4]. Key points with information material presentation in poster form. 3.) Area (C): Interactive exhibit presenting information about the architectural identity of Ermou street, as well as the neighbouring sites. 4.) Area (D): Interactive exhibit presenting the socioeconomic framework of Ermou street through a series of inhabitants' and practitioners' narratives. 5.) Area (E): Interactive exhibit presenting biographical narratives of practitioners of Ermou street, concerning obsolete, surviving or evolving professions of today. 6.) Area (F): Information presentation in video form / Simultaneous video projection of the activities taking place in the morning (video 1) and at night (video 2) in Ermou street. 7.) Area (G): [consisting of key points G_1 and G_2]: Interactive exhibits presenting the soundscape of Ermou street during four time periods (morning, afternoon, evening and night)

3. Description of the Diverse Interaction Areas

Starting from the main Theater Area (Area A, consisting of key points A_1 and A_2), visitors of the exhibition, treated as audience, were originally introduced to the social economical and cultural framework of Ermou street, through a series of lectures by invited lecturers, with simultaneous projection of documents (figure 3.1). Proceeding to the specially arranged Exhibition Area, the visitors had access to historical photographic documents as well as contemporary photographic material (figure 3.2)

Fig. 3: Photographic material from the diverse interaction areas

Area A: Series of lectures by invited lecturers and simultaneous projection of documents. **Area B:** Photographic material (historical photographic documents and contemporary photographic material) in poster presentation form at the main exhibition area

in poster form (Area B, consisting of key points $B_1 \rightarrow B_4$), negotiating through time issues of the architectural identity and socio-historical evolution of Ermou street.

In this interaction area the large scale projected photographic material presented the negotiated issues in a predefined order. Visitors could be navigated in a natural way (by walking) to the presented information material and discuss with each other or with the representatives of the exhibition organizers issues of the presented approaches (figure 3.3).

Fig. 4: Photographic material from the diverse interaction areas

Area C: Interactive exhibit presenting information about the architectural identity of Ermou street, as well as the neighbouring sites

In the centre of the exhibition area, the public had access to an interactive exhibit (Area C), which presented information material in photograph and text form about the architectural identity of Ermou street, as well as the neighbouring sites. Visitors interacted with the exhibit with the use of a specially arranged user interface, which focused on Tangible User Interface techniques. Placing a symbolic artifact in the form of a compass to certain points of a table map (figure 4), they activated the projection

of visual information (image and text) corresponding to the respective street points. In the next interactive exhibit (Area D), which was also based on Tangible User Interface techniques, they interacted with the information material moving, like in the previous case, a symbolic object on a table map (figure 5), activating points corresponding to inhabitants' and traders' narratives about economical and social life of the past as well as of the contemporary reality. In this exhibit the relative information were conveyed at the same time in oral speech and written text.

Fig. 5: Photographic material from the diverse interaction areas

Area D: Interactive exhibit presenting the socioeconomic framework of Ermou street through a series of inhabitants' and practitioners' narratives

Further on, visitors had access to an interactive exhibit (Area E). There, they could be navigated to key points of the historical evolution of Ermou street (figure 6) where three biographical narratives were presented regarding obsolete (blacksmith), surviving (tailor) or evolving today (bookseller) professions, by activating a moving cursor. The relative information was conveyed audibly (oral narrative) and visually (portrait of the practitioner in his working place and photographs of the tools and equipment of his work).

Fig. 6: Photographic material from the diverse interaction areas

Area E: Interactive exhibit presenting biographical narratives of practitioners of Ermou street, concerning obsolete, surviving or evolving professions of today

In the next area (Area F), visitors could watch two parallel video projections presenting Ermou street in a twenty-four-hour basis from selected fixed points-of-view and the activities taking place in the morning and at night in this street (figures 7.1 & 7.2). Finally (Area G consisting of key points G_1 and G_2), visitors were acquainted with contemporary sound environment (soundscape) of everyday activities in Ermou street. Two identical interactive exhibits were installed in specially arranged rooms, where visitors listened to typical symbolic sounds from modern social life of Ermou street, by tuning the receiver of a radio of the ‘50s on certain spots - “radio

stations" (figure 7.3). In each radio tuning by the visitor, the movement of the radio "needle" was simulated by a multimedia application, which projected relevant photographs of the selected street point in combination with the respective sound extracts (figure 7.4).

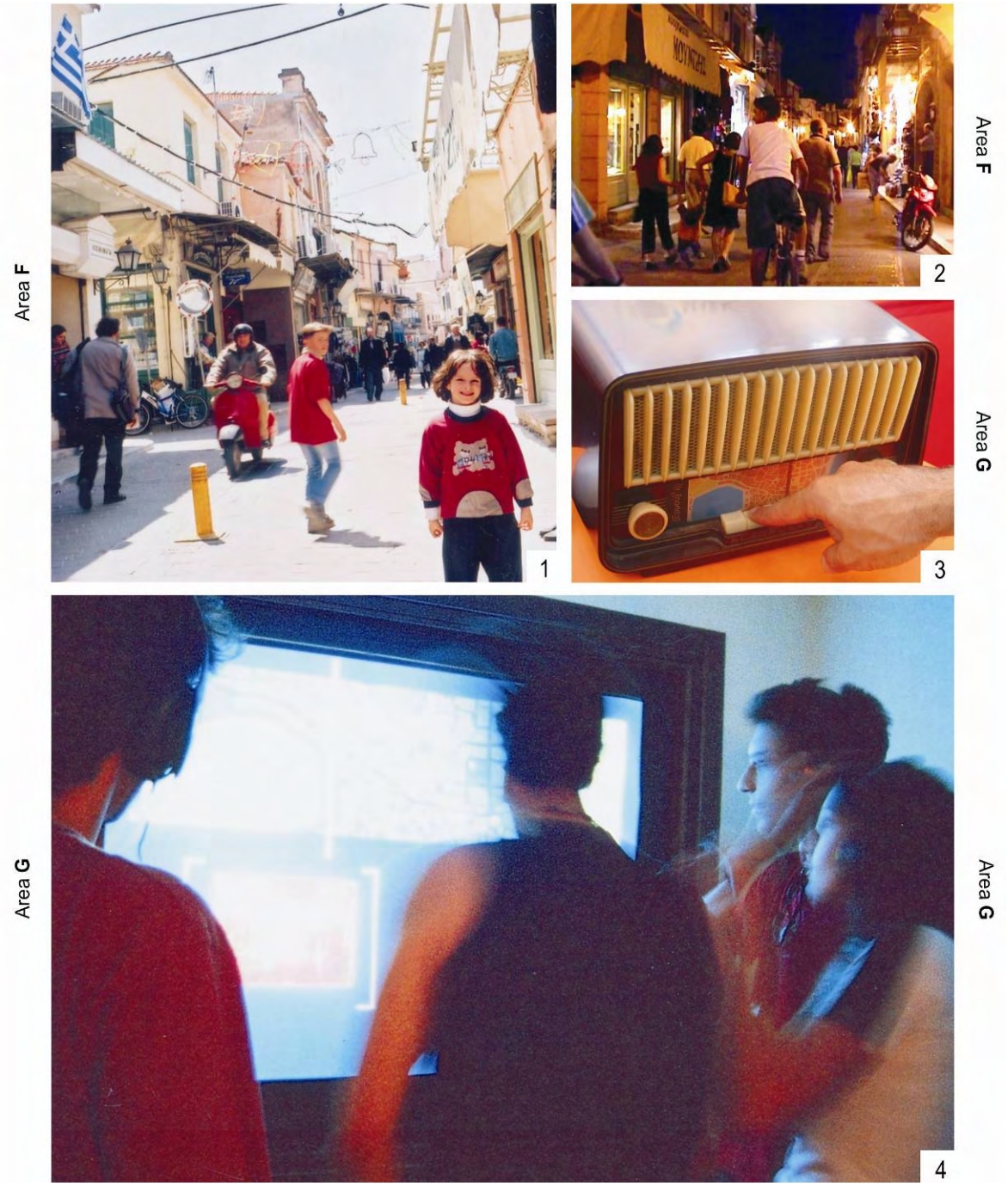

Fig. 7: Photographic material from the diverse interaction areas

Area F: Information presentation in video form / Simultaneous video projection of the activities taking place in the morning and at night in Ermou street. **Area G:** Two identical interactive exhibits presenting the soundscape of Ermou street during four time periods (morning, afternoon, evening and night)

III. Designing Interaction Platforms for Mixed Interactive Environments

Aiming at approaching target groups not familiar with the use of computer systems, during the stage of design, the customizability regarding the use of digital and analogue media as well as the ability of providing multimodal sensorial approaches was considered necessary. For this purpose, a methodology of user interface and interaction platform design was developed, so that the implementation of various forms of interactive applications could be easily and directly presented, as well as the ability of fast scenario interchange could be provided. The main objective of the methodology of designing interaction platforms followed in the multimedia exhibition «Ermou Street: Symbolic, Historical, Economical and Social Centre of Mytilene» was the easy access to the negotiated information material from both sides: from the interpreters' part during the interpretation process, as well as from the producers' part during the production process. In particular, from the part of final recipients / interpreters, the desirable outcome was the successful presentation of the information material to the various groups of visitors regardless of age / knowledge background / special - general interests, through simple and understandable ways of interaction (Mintz, 1998). For that purpose, as discussed in the previous section, we were focused on the use of Tangible User Interfaces, which have the characteristic feature of easy perception of the processes / interaction modes (Ullmer & Ishii, 2000; Milekic, 2002; Fishkin, 2004; Hornecker, 2004), as well as on the use of "everyday objects", which from a semiological point of view, referred to the form of navigation / interaction with the content, constituting a user friendly environment concerning the cognitive process through the familiarity of the symbols they represented. The sense of "familiarity" did not only emerge through the external form of the objects, but also through the participating relevant cultural context of that moment. The use of familiar objects as

"interaction tanks" is designated through the times by researchers and artists, suggesting different forms of expression and usability, depending on the technological and social-cultural framework they use, on the negotiated content, and on the target group of final interpreters in each presentation practice (research works from different knowledge fields are indicatively cited: Iwai, 1995; Ishii et al., 1998; Wisneski, Orbanes and Ishii, 1998; Gellersen, Beigl and Krull, 1999; Rozin, 1999; Ishii, Mazalek and Lee, 2001; Ciolfi & Bannon, 2002; Noessel, Tester and Genz 2002; Antifakos & Schiele, 2003; Nilsson, Johansson and Håkansson, 2003; Lu, 2003; Coti, Voltnoi and Charitos, 2003; Walker, 2003; Woodward, Honkamaa, Jäppinen and Pyökkimies, 2004; Ryokai, Marti and Ishii, 2004; Brazil & Fernström, 2004; Gardner, 2004; Rawat, 2004; Zheng, Adam and Woodcock, 2005). On the occasion of the "Ermou Street" multimedia exhibition, the "artefacts of daily use" that were chosen as an interface between user and information system were a remodified compass inside a specially constructed wooden case (figures 8.1 & 9), a three-position selector (figure 8.2) placed on a specially shaped pedestal also made of wood, a remodified radio from the 1950's (a detail of which is shown in figure 8.3), and two different-sized symbolic artefacts, again made of wood, that served as navigation tools for the area D application shown in figures 10.1 (first approach, 2003) and 10.2 (final version of the interactive application, 2004). These artefacts, through their familiar symbolism, semiotically prime the user to navigate / interact with the content thus constituting learning environments that are easy to navigate and understand.

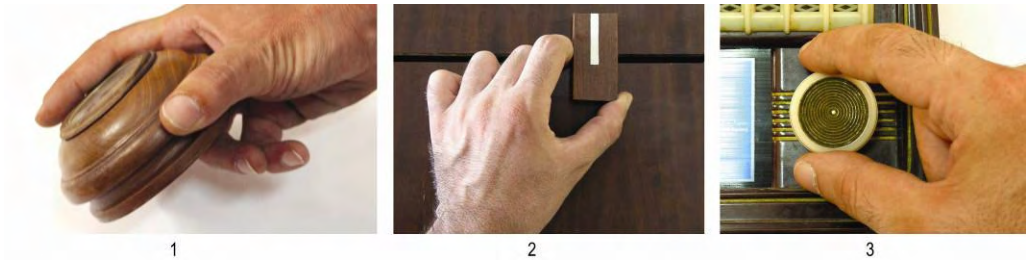

Fig. 8: Use of familiar artefacts and actions as interfaces between user and informational material

Fig. 9: The user interface of Area C application. Moving a symbolic artefact (compass) on the numerated points, the user was informed about the architectural identity of Ermou street and the pertinent social web, from the 19th to the 20th century

Fig. 10: An early version of the area D application realized in 2003, and its final form in 2004. The change of the application's data in 2004, led to the redesigning of the symbolic artifact (small cylindrical token) as well as of the user interface

Fig. 11: The applications' interfaces based on the geographical representation of Ermou street and surrounding area

With the aforementioned artefacts as navigation tools, users interacted with the content of each application, based on a uniform – common interface, namely a cartographic representation of the area (figure 11).

More specifically, through that common framework of negotiation, every application displayed each individual node of interaction using symbolic representations, through which the user received useful information.

As regards production, during the overall design of the exhibition, the first matter that needed to be addressed was how to organize the data that we had collected (photographical material, historical reports in text form, audio excerpts, interviews etc.) and, in a second phase, what methods should be used to interconnect the digitally processed informational material with the interaction platforms of each application (both hardware and software). At this stage, we would like to point out that the implementation of the applications of the exhibition took the form of lessons during

which students came into contact, for the first time, with representation practices based on the creation of combined environments (i.e. interconnecting physical and virtual spaces by using special encoders), requiring very little programming knowledge and with different research approaches as regards cultural content management methods.

IV. Towards a Common Language for Cultural Content Negotiation

Due to the heterogeneity of the research team, a simple method for coding / decoding the informational material had to be found, both during the data collection and classification process and, in the later phases of design of the corresponding interfaces of each given application, in combination with the corresponding programming procedures for the creation of the combined environments.

The best scenario for collaboration would be for each team member to be able to manage the informational material in such a way that it could be easily understood by all the other researchers involved. Ideally, the best case would be the use of widely accepted and understandable “symbolisms” derived from the lexicon of an everyday language, such as symbolic elements in the form of letters of the alphabet, numbers, words or even phrases, which would dramatically simplify every stage of the production process by simulating processes encountered in the fields of social / humanistic sciences, thus constituting a more anthropocentric methodological approach of interdisciplinary collaboration in all phases of the design.

For example, the team members who would handle the data classification could interpret a group of aggregated data translating it into a commonly understood meaning. They could characterize that group by representing it by a widely understood symbol e.g. the symbol [1] as a “symbolic concept {1}”. Subsequently,

those members involved in designing the corresponding user interface on the basis of the *notation* of that concept could express it as a "graphical point {1}", while those handling the interaction design could in the same way convert the information from the two preceding processes to "sign action {1}".

Within the framework of such a methodological approach, based on the use of commonly understood methods of representation, by employing understandable symbols, we could imagine the whole formation process of the informational material to be as shown in figure 12.

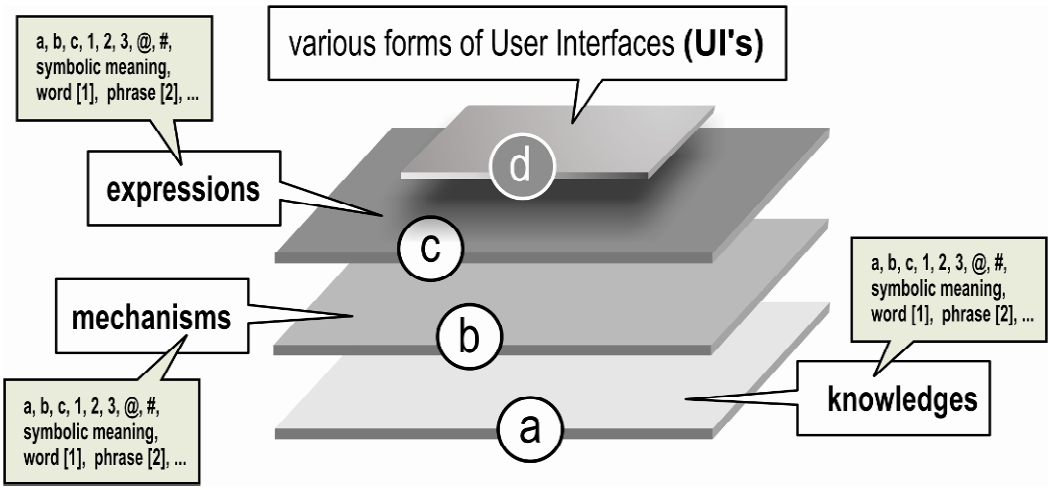

Fig. 12: Schematic representation of the formation process of the informational material of the "Ermou Street" multimedia exhibition through a methodological approach based on the use of commonly accepted and understood "symbolisms" derived from the lexicon of an everyday language, such as letters of the alphabet, numbers, words, phrases, symbols

As seen in the figure, the three levels (*a, b, c*), which represent the participant researchers' cognitive fields per category (see Part 1, section III) through a commonly understood language of collaboration, would make it possible to present the negotiated subjects at issue with a more anthropocentric approach, independently of the field concerned. In the practical application of this theoretic model, on the occasion of the "Ermou Street" multimedia exhibition, levels (*a*) and (*c*) were closer to the aforementioned approach, both regarding organization and expression of the relative cultural data as "notations" in textual form in the case of level (*a*), and

regarding provision of the informational material as “symbolisms”, in the form of graphical symbolic representations, in the case of level (*c*).

In respect of level (*b*), namely that of the management team for the informational material produced, a similar communication framework had to be implemented (through the application of the relative software and hardware), so that the procedures of interconnection of physical and virtual environments that the team would apply, would be, as far as possible, more accessible to the other researchers.

In this context, an encoder [2] has been chosen, capable of translating the external stimuli that it received from the application sensors into an understandable form: letters and numbers, or in the form of single characters, as well as sequentially, i.e. in the form of words and even phrases (figure 13).

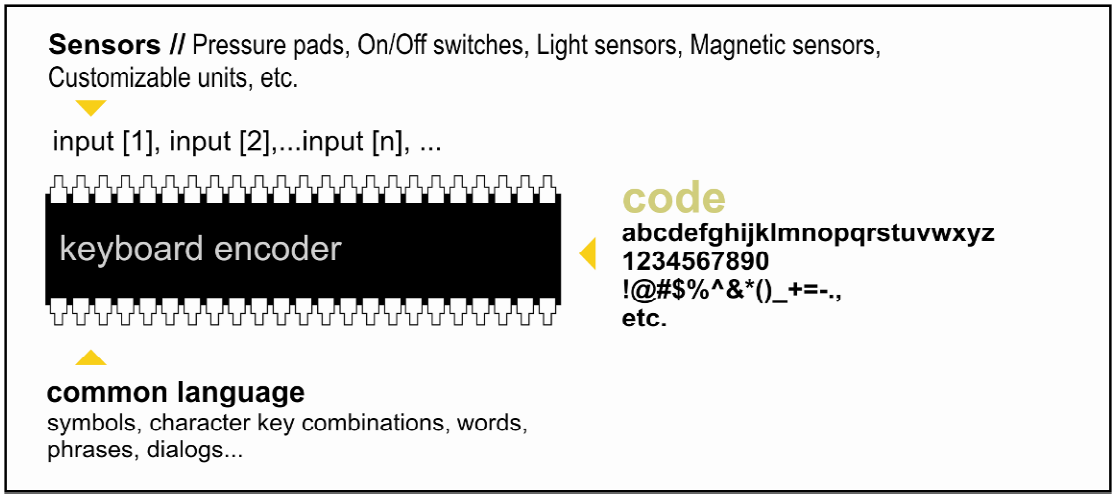

Fig. 13: By applying the capabilities of an encoder that can translate the signal received from its input units into the form of characters the design team can create a meta-language formed from a commonly understood syntax on the basis of which it can easily interconnect physical and virtual spaces

Particular types of encoders can easily be programmed so that when they receive a signal from an input source to which a sensor is connected, they can send to the computer system managing the informational material commands such as: “input {1} is active”, “input {5} is inactive” “go to the {Interviews} thematic field”, “the user selected the thematic field {Main_Area}”, or in a simpler way, namely in alphabetical

form, such as in the form of single characters: “A”, “B”, “5”, symbols: “+”, “?”, “@”, and combinations of characters: “B+5”, “B+1”, “B-1” etc.

Having such a “dialogue” privilege with the systemic environment, the design team can negotiate matters of interconnection of physical and virtual environments without the mediation of difficult programming procedures. For example, through a library of readily simplified interactive commands (in the form of behaviours) with parameterizable selections that can be realized in the Macromedia Director multimedia authoring tool, each design team can develop a common and direct language of dialogue with the fields of informational material that is capable of being understood by all the research fields involved. Figure 14 shows an example of use of the encoder in question, where the design team, using a system of coordinates (Bertin, 2001, p.6), can represent each geographical point / data set defined by the coordinates, through different forms of multimedia content.

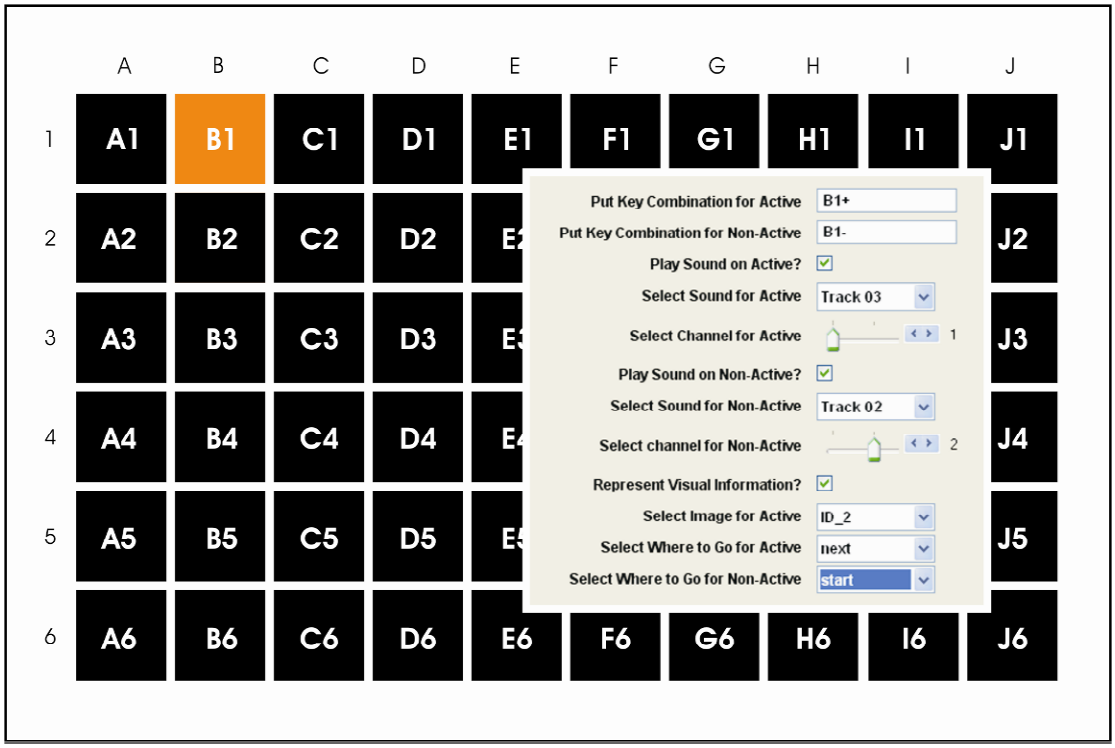

Fig. 14: Example of interconnection of physical and virtual space based on a matrix system, through the Macromedia Director authoring tool. Encoding the stimuli of the natural environment to alphanumerical form, the designers’ team can handle multimedia content through specially customized set of actions, in the form of behaviours

V. Interconnecting physical and virtual environments

1.1 A prototyping method for the design of Customizable Tangible User Interfaces

The methodological approach described in the previous section, constituted the main axis for the design and implementation of the interactive applications of the multimedia exhibition “Ermou Street”. In particular, for the two (applications of area C and D) of the total of four interactive applications, two identical interaction platforms were created in the form of a table map with dimensions 1.7 X 1 X 0.75 m, where there was the ability of arranging an array of sensors to a grid, based on a system of coordinates. For the implementation of the applications of the areas E and G, a similar methodological approach was followed concerning the encoding mode of the information material that will be further discussed.

Using a design program such as CorelDraw to design the background for a User Interface, based on a matrix system, the design team can construct diversiform interaction platforms for prototyping cases of interconnection between physical and virtual environments.

By printing the background to the desired dimensions of the application and installing a grid of sensors below the points defined by the coordinates of the “space” (namely A1, B1, C1, …D3,…etc.), the design team is able to physically manage multimedia content as regards sensorial approaches. By programming the encoder inputs so that they transmit to the computer system, during the activation / deactivation of the sensors, their relative places in “space” (figure 15) in a textual form, such as “B1+” for the activation of point {B1} and “B1-” for its deactivation, each “signal” received from the sensors can be used for interconnecting the physical environment to the virtual environment, by using a combination of both of their dynamics: the *physicalness of interaction* offered by the physical space and the *multimedia*

capability of the negotiation of the subject matter at issue offered by the virtual space. Thus, the activation / deactivation of each sensor (geographical point) through physical methods of interaction can manage multimedia content such as audio excerpts, photographic documents, text, typographic elements, animation, etc.

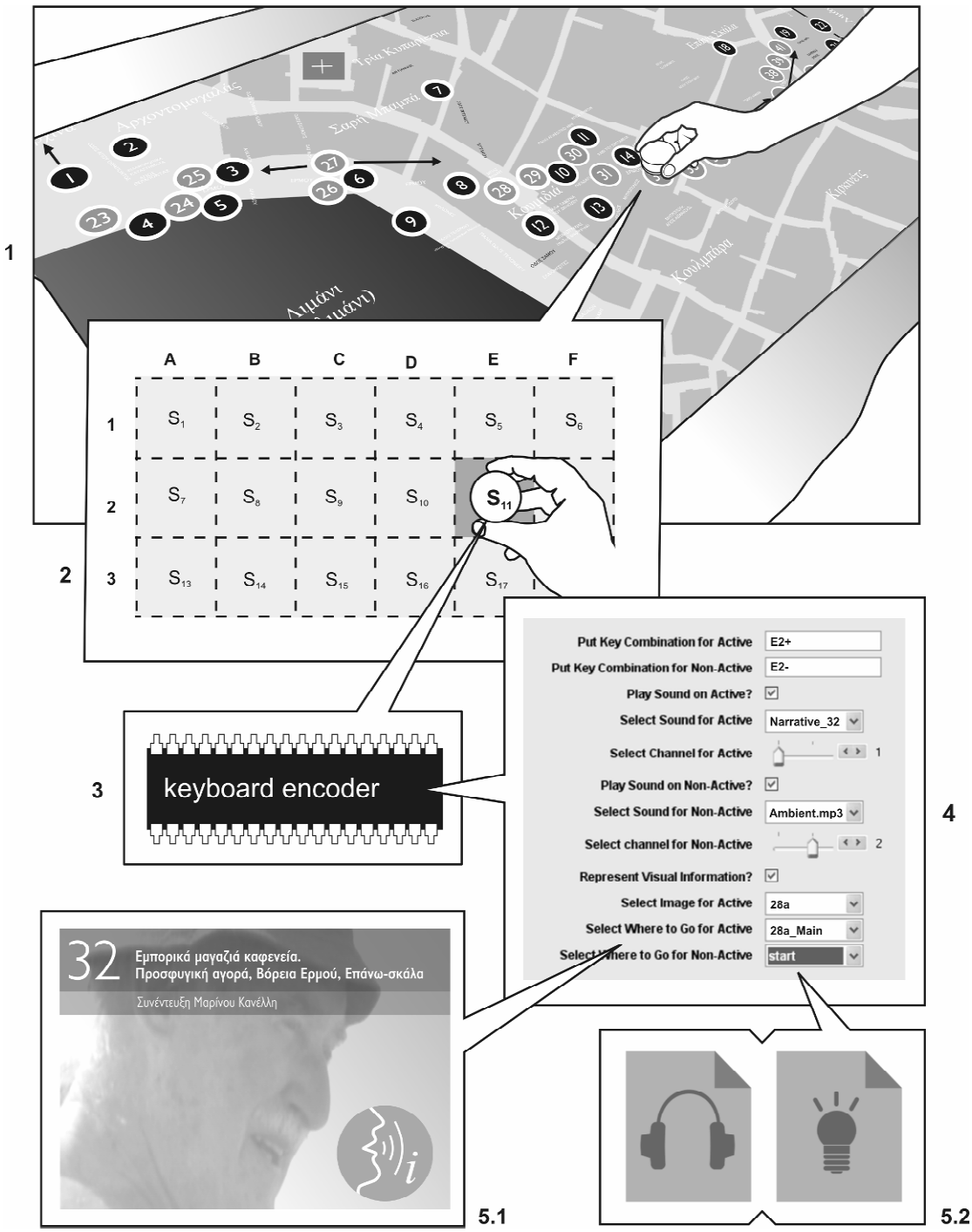

Fig. 15: With an interaction platform designed in order to provide the possibility of disposing an array of sensors based on a system of coordinates, the production team of Cultural Information Systems can be experimented with natural forms of content approach

The possibility of simple and rapidly elaborated forms of interaction with cultural content, based on combinative use, holding the typical features provided by specialized systems of tangible user interfaces, renders this methodological approach of customizable user interface design an interesting tool of experimentation, where each group of experts can develop original multimedia applications emphasizing the possibilities provided by the unexplored field of sensorial design. The design group can modify (figure 16) or even change the user interface at any time, as well as apply a different interaction strategy using a different type of sensors.

Fig. 16: A swappable user interface: the user interface of the area D application, ready to be modified on the interaction platform. The set of sensors is distinguished at the background of the platform, which are located at the interaction spots of the application

1.1.1 The Area D application

Figures 17 to 19 show a series of photographs illustrating the methodological approach adopted, leading to the realization of the area D application relating to the narrations of inhabitants and trades people of Ermou street. During the initial stages of negotiation of the original material, the topographical diagram of Ermou street and the

surrounding area were defined by a system of coordinates, and printed in large scale thus constituting a starting point for discussion and ideas for further shaping of the informational material. The material was classified and organized on the basis of numerical and colour-coded symbols, using blue for interviews from the past and red for interviews of the present (figure 17.1). The same method of representation was also used in the final design of the interface which, in addition, facilitated navigation of the content. (figure 17.2). During the digitisation stages of the raw material, the thematic fields of each point were formed and organized on the basis of the reference point on the map where, in addition to the numerical symbol that represented each point, the research team also had the coordinates in each case as a reference point.

For example, sound excerpt number "9" relating to: "The coffee-houses of Ermou in the area of the new market" was delimited by coordinates "C" and "6" so it could also be represented as point "C6".

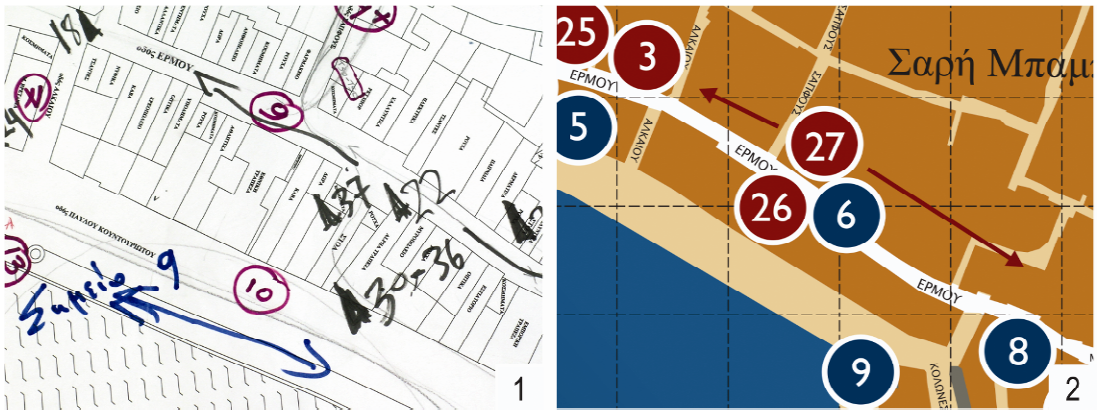

Fig. 17: The original stage of categorization of the information material on the left, and the final form of the user interface of the area C application on the right

Based on these parameters, namely A) naming of the sound excerpt, B) its numeration in relation to the other sound excerpts and C) its coordinates in the space, sensors were placed at every relative point of the interface regarding an interview.

According to the coordinates of the topographical diagram, each sensor was positioned on the other side of the interface, directly below each relative point of

interaction (figure 18.1). Each sensor was custom-built (figure 18.2) and connected through a specially manufactured control panel (figure 18.3) to the corresponding input unit of the encoder (figure 18.4), which had been pre-programmed to transmit the point of each given geographical area whenever it received a signal.

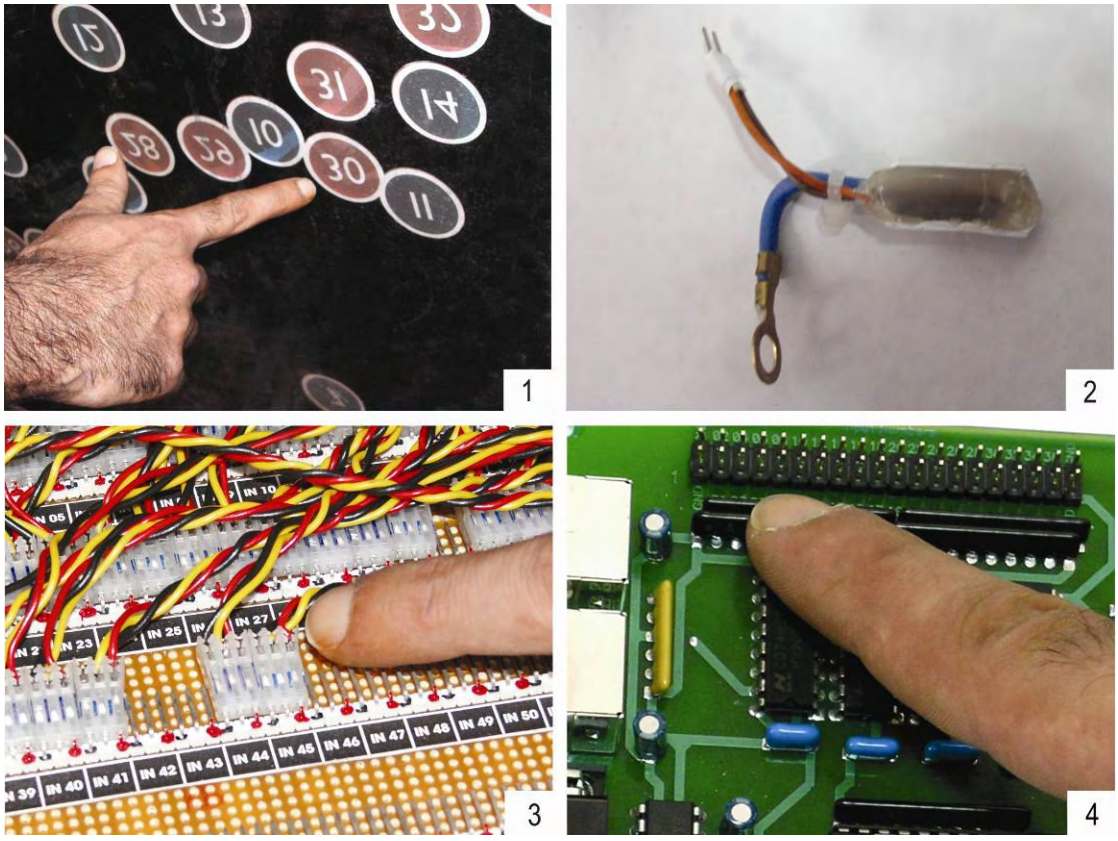

Fig. 18: The application's sensors were arranged beneath the user interface in a way that they could be easily moved if needed. The interconnection of each sensor with the encoder was made through a specially manufactured control panel

These sensors were automatically activated in the proximity of a magnetic field. Activation of each thematic field of the application that comprised sound excerpts, as well as the related accompanying elements in the form of images, text and animation, was achieved through a magnet placed inside the symbolic artefact (in the form of a small cylindrical token) by which the user navigated (figure 19.1). In this way, by placing the symbolic artefact on some reference point in the application, the user could obtain information on the corresponding thematic field (figure 19.2).

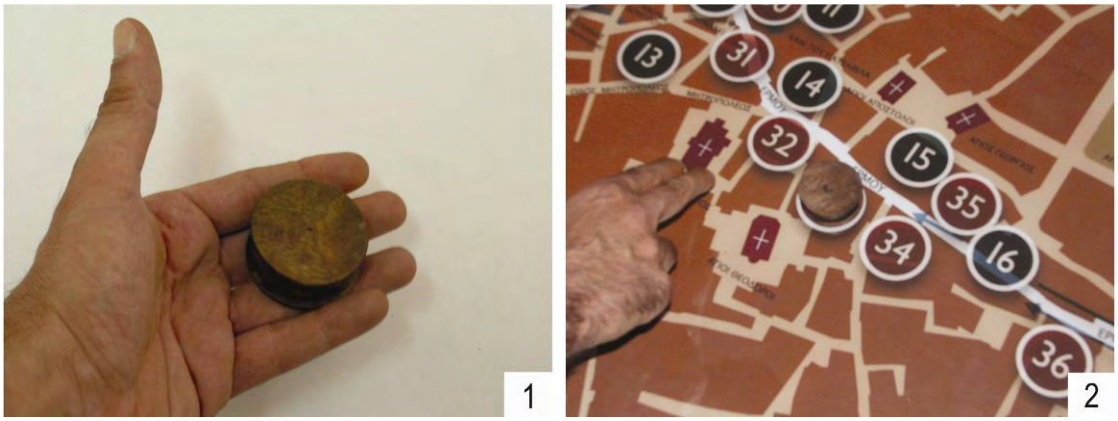

Fig. 19: The stimulus by the external environment was transmitted to the multimedia application trough the magnetic field of a magnet located inside the symbolic artefact with which the user interacted

1.1.2 The Area C application

With a relevant information design and similar interaction platform, the application of area C followed the same methodological approach. The user interface of this application, besides digitally presented information, held the additional property of providing visual indications on the interaction surface through a series of special low temperature lamps located exactly beneath each interaction spot, thereby indicating the areas with which the user interacted. The purpose of this practice was the creation of a pattern according to which the user was guided to select each thematic field.

The negotiated information material of the application of area C was concerned with the architectural identity of Ermou street and the pertinent urban web, and was categorized in 8 thematic units. The user selected each thematic unit using a symbolic object (compass) and browsed through the presented information material with the help of a specially formed manual control.

The categorization of the information material followed the categorization of the previous application, which was based on coordinates, while the encoding of the thematic units was preferably presented with numeric values, owing to their small number.

That is, value {1} for thematic unit 1, {2} for thematic unit 2 etc. According to this encoding, a relevant behaviour was created in Macromedia Director authoring tool where, depending on the application's indication held by the encoder, {1}, {2}, {3}...{8}, it presented the respective thematic unit.

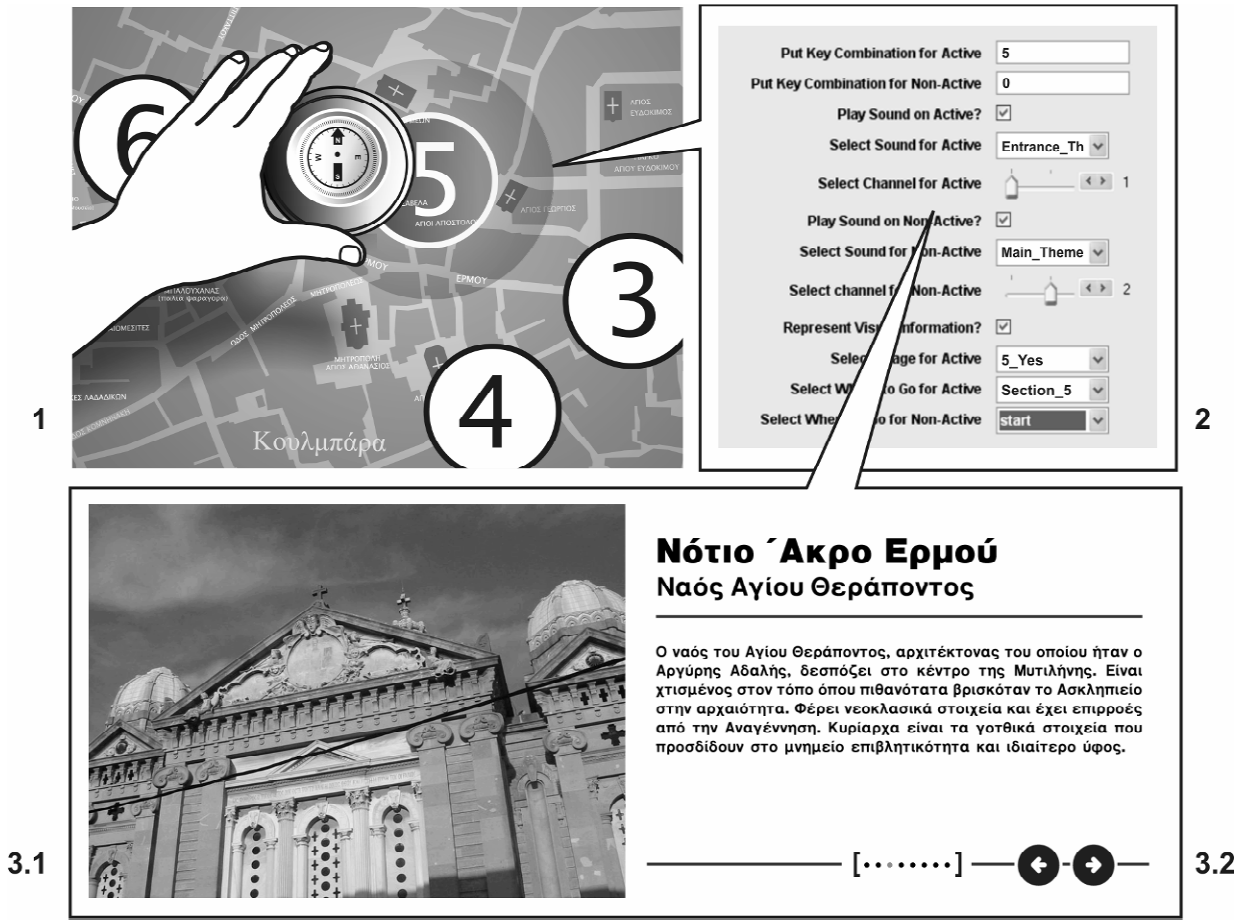

Fig. 20: The information material of the application of area C was presented through simultaneous projections by two data projectors. Complementary, an illuminated indication on the application's user interface informed the user to which thematic unit he/she was, thereby indicating the areas with which he/she could interact

1.1.3 The Area E application

For the application of area E, presenting three biographical references concerning obsolete (blacksmith), surviving (tailor) and evolving today (bookseller) professions, the activation of each spot (figure 21.1) was transmitted by the encoder as a phrase, instead of using coordinates, since the interaction spots were just three. Similar to the

previous case, a relevant behaviour was created in Macromedia Director where, based on the above parameters, the designers' team was able to interconnect the information material with physical forms of interaction.

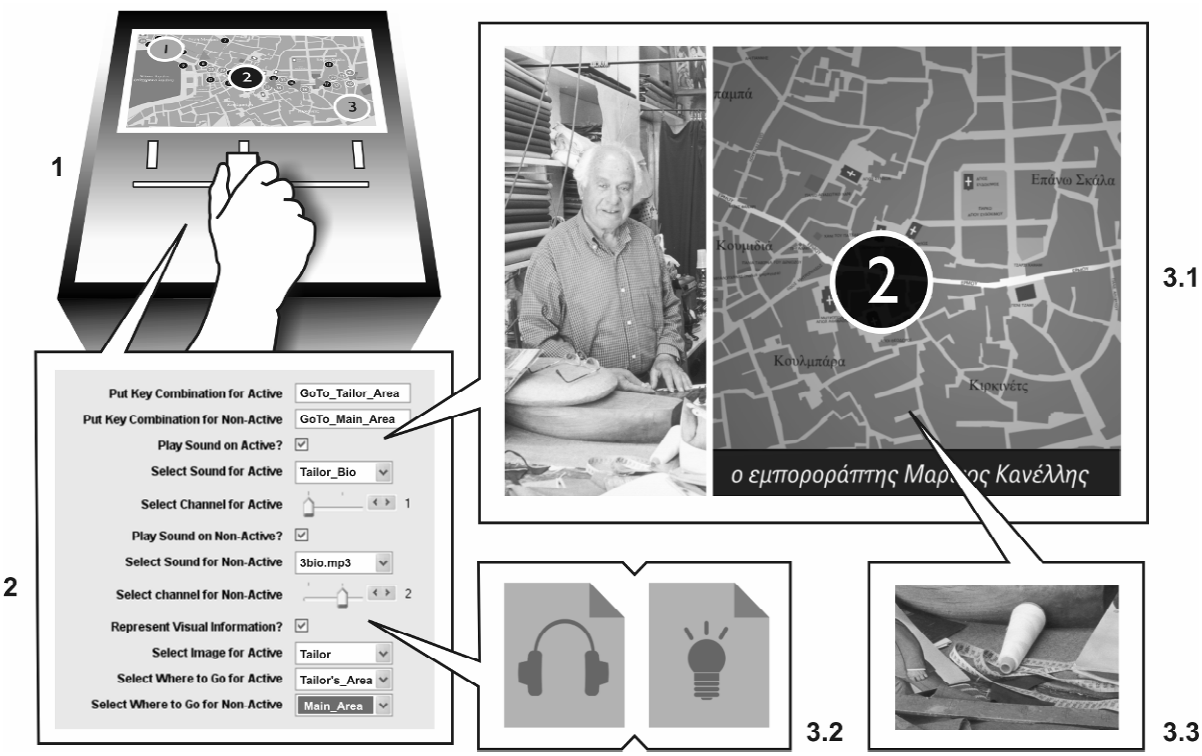

Fig. 21: The mode of interaction with the application of area E was achieved by three contact switches located at the backside of the moving cursor. According to the selection, a specially arranged area was illuminated corresponding to the figure of the practitioner at his working place with his tools and equipment of his work

In this particular application, the relative information was transmitted audibly (oral narrative) as well as visually in a specially arranged monitor in front of the interactive exhibit, in combination with the lighting of the selected practitioner's real-sized portrait at his working place with his equipment (also see figure 6).

1.1.4 The Area G application

Finally, for the application of area G concerning the sound environment (soundscape) of Ermou street, contact switches were used as in the previous case - essentially the

original band selection switches of the radio unit (figure 22.3) - as well as a spinner located inside the unit, controlled by moving the right knob of the radio (figure 22.4).

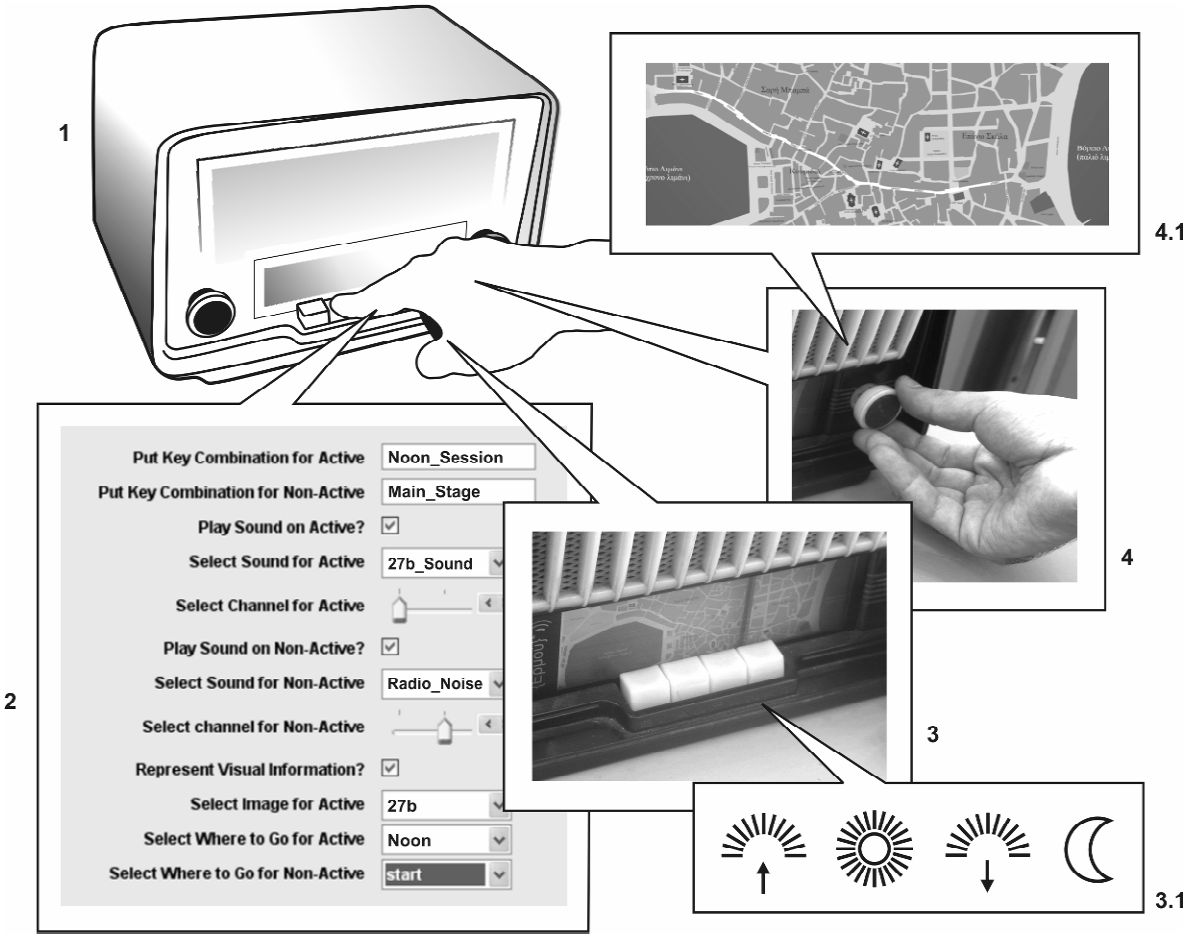

Fig. 22: The mode of interaction with the application of area G, was achieved through the four modified original band selection switches, as well as through a spinner located inside the unit and controlled by moving the right knob of the radio, so that the scanning of the bands, which in this case corresponded to sound extracts (soundscape) of Ermou street, could be simulated digitally

Therefore, when the user interacted with the device, apart from the visual indication received by the radio dial, which presented the topographic diagram of Ermou street, a mouse encoder incorporated to the used encoder sent to the information system the relative position of the needle in digital form, at the same time.

During the elaboration of the application, the categorization of the sound data that constituted the soundscape of Ermou street was made according to the system of

coordinates used in the applications of areas C and D, thereby providing reference points for the inspection of possible errors or omissions.

From a broader perspective, the methodological approach followed in the previous sections makes it possible to develop interactive customizable applications, independently of a platform of systemic environments and multimedia composition software, since it uses simple alphabetic structures.

VI. Summative Evaluation Results

During the multimedia exhibition «Ermou Street: Symbolic, Historical, Economical and Social Centre of Mytilene», structured questionnaires were distributed to the visitors within a framework of summative evaluation. The main objective of the evaluation was the collection of information concerning the exhibition's impact on the visitors, and the extraction of conclusions for the improvement of prospective applications.

The number of visitors who participated in this research was 212, with the 61% covering the age group of 18 to 30 (figure 23.1), and the 79% being inhabitants of Mytilene (figure 23.2). The majority of the visitors in a proportion of 54% were computer literate. The questionnaire was elaborated according to the following axes: A) General Impressions, B) Usability, C) Overall Presentation D), Emotional Aspects, E) Interactivity and F) Pedagogical Aspects.

Visitors were asked to evaluate which application was the most agreeable and what aspects of the exhibition impressed them the most.

Figure 23.3 presents that 53% of the visitors found the application that presented the Soundscape of Ermou street (area G) the most interesting, while 12% preferred the application that presented information about the architectural identity of Ermou street (area C). Both applications used ordinary objects of everyday life as representation

models, thereby creating "familiar" interactive environments. The user friendliness of the two above-mentioned applications was also evaluated positively by the visitors in a percentage of 46% for the application of area G and 23% for the application of area C (figure 23.4).

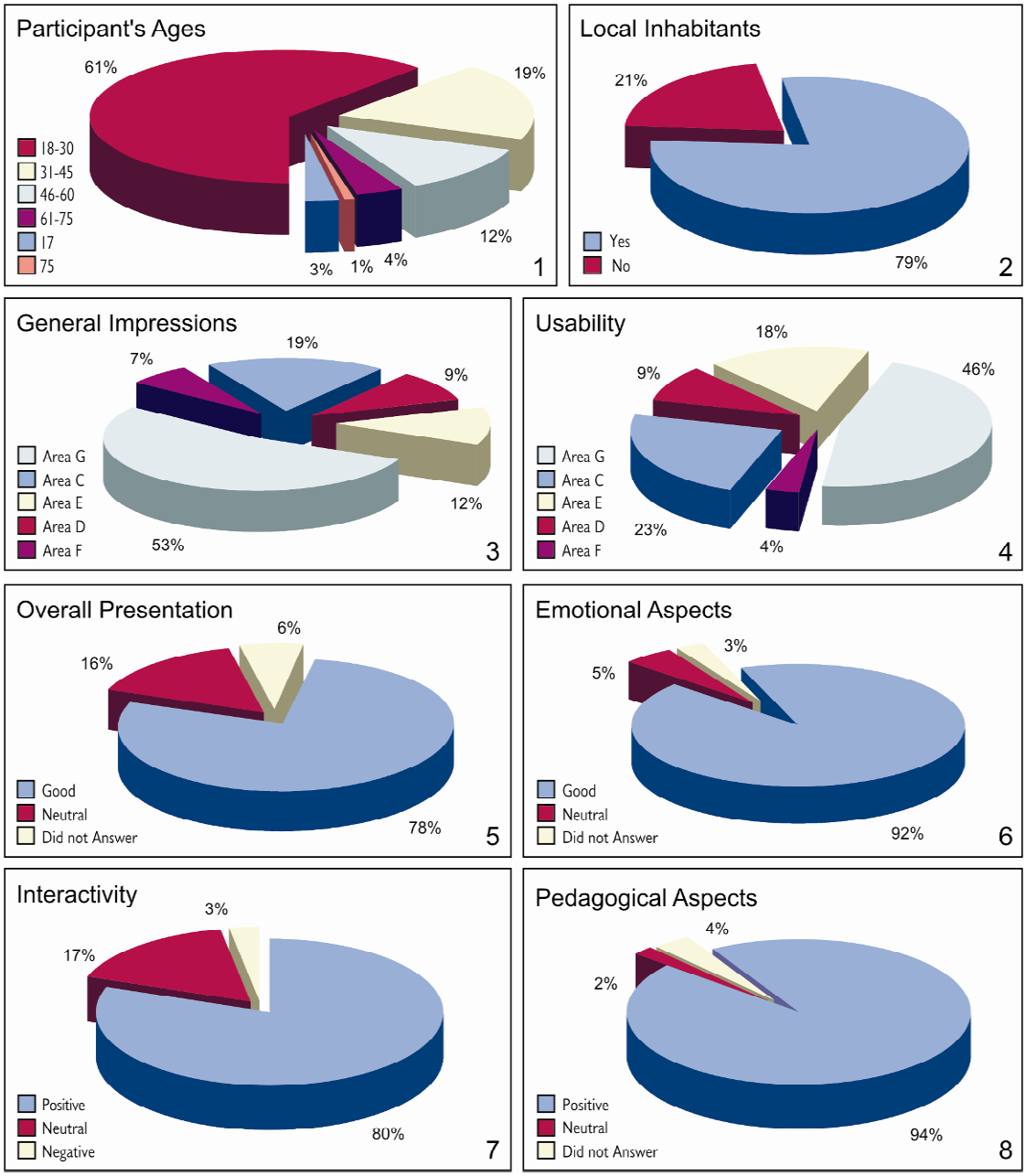

Fig. 23: Results from the visitors' summative evaluation process

A significant percentage of visitors (18%) favoured the application that presented the socioeconomic framework of Ermou street through a series of inhabitants' and practitioners' narratives (area D), while the presentation of the information material

through the video exhibit (area F) did not appeal as much to the users (4%), possibly owing to the linearity of the medium used.

Figure 23.5 presents the positive response of the visitors (78%) to this particular method of presentation of the information material with the use of customizable user interfaces in the form of interactive exhibits.

The visitors' emotional reaction to this type of presentation is pictured in figure 23.6. Positive emotions were stimulated (joy, surprise, recollections, curiosity, emotion) in 92% of the visitors, while just 5% had neutral emotions (lack of interest, indifferent attitude).

The interaction between visitors and information material of the exhibition was examined according to the following factors: customizability, sensorial approach and user interface. The overall visitor reaction was positive (80%) while only a small percentage was left unsatisfied (3%), (figure 23.7).

Finally, as shown in figure 23.8, the majority of the visitors (94%) recognized that the applications stimulated their interest and encouraged an active, inquiring and creative approach to knowledge, thereby leading to the conclusion that such practices of Cultural Information Interaction Design could also be used in an educational environment (e.g. school); a fact that is worth further investigation.

Additionally, within this framework of summative evaluation, a questionnaire with "open - ended" questions was distributed to the students who participated to the planning and designing stages of the exhibition. The qualitative analysis of the answers revealed new aspects regarding design approaches, provided interesting comments concerning this exhibition, and presented students' opinions regarding the cultural content representation practices used.

The following comment is cited indicatively: «...*Exhibition design as a representation model better promotes the cultural content compared to other individual communication practices. This happens because it can stimulate more senses than, for example, in the case of interaction with a CD-Rom. Furthermore, it provides the possibility of a more intense interactivity with the user and attracts his / her interest, as well as his/her curiosity. The user better assimilates what is presented, since he/she comes into contact with something unprecedented for him/her. Finally, the «symbolisms» presented in an exhibition are stronger, since an interpersonal relation is established between the user and the exhibits, which, for a certain time period, acquire an ontological essence for him / her*…».

VII. CONCLUSION

This article presented a case study of Cultural Information Interaction Design within the framework of a cultural promotion strategy concerning the representation of Ermou street, the major commercial street of the city of Mytilene, in the island of Lesvos, Greece.

The whole strategy was focused on practices from the exhibition design field in combination with the use of Customizable User Interfaces in the form of interactive exhibits which created in total, a unified interaction meta-environment, composed by various representation models.

Based on the delimitation of common negotiation boundaries using the application of a common language and emphasizing sensorial design, the heterogeneous team of scientists could collaborate and research new methods of interaction characterized by more anthropogenic approaches at all stages of production process.

Following multi-sensorial approaches that simulated processes encountered on a daily basis in familiar social environments and with the combination of analogue and digital technologies, the multimedia exhibition «Ermou Street: Symbolic, Historical, Economical and Social Centre of Mytilene» suggested the exploration of novel forms of interpretation with simple and understandable ways of interaction of the information material addressed to all users, regardless of their knowledge background and level of familiarity with the information technologies.

Under this prism, Cultural Information Interaction Design is explored within the framework of the contemporary exhibition design field applying the advantage of parameterization, concerning both representation and interaction design models, as well as the design of information intake processes through sensorial approaches, thereby providing the possibility for each given subject matter under negotiation to exceed the narrow bounds of conventional media, suggesting new ways of interpretative approaches and introducing new horizons for the promotion and presentation of Cultural Heritage.

Footnotes

[1] As it is described in Part 1, section V, the Customizable User Interfaces could be defined as the forms of User Interfaces that provide physical ways of interaction with multimedia content with the use of everyday-life objects / practices. Based on parameterization concerning sensorial approaches and presentation techniques, the forms of Customizable User Interfaces have the ability to be altered according to each given design problem / strategy. The Customizable User Interfaces cover the need of producers, who design the diverse representation practices of Cultural Information Systems, to apply solutions according to the design problem or strategy, using various communication media and promotion tools, depending on the different forms of cultural content. Present-day technology is such that parameterized interfaces can be designed at low cost and easily produced without any particular specialist knowledge of programming and electronics. Indicative examples and toolkits are cited in research work 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).

[2] For the implementation of the applications of the exhibition, a keyboard encoder developed by Hagstrom Electronics (http://www.hagstromelectronics.com/products/ke72.html) was used. This particular encoder has 72 inputs as well as 3 outputs, with the capability of encoding / decoding the signals in the form of alphabetic code. Additionally, it integrates a mouse simulator (Track Ball signal conversion to PS/2 mouse protocol), thereby providing further possibilities concerning the

implementation of applications, using this property. No particular knowledge of electronics is required for the application of various sensors at the encoder inputs, thus making it a particularly interesting experimental tool for prototyping, as regards the interface of physical and virtual environments.

Acknowledgments:

The applications presented at the "Ermou Street" multimedia exhibition, as well as the planning of the exhibition were accomplished by the third-year students of "Cultural Representation & New Technologies" in the academic years 2002-2003 and 2003-2004, of the Department of Cultural Technology and Communication of the University of the Aegean, in the context of the «Cultural Representation I» course. The entire process was supervised by Dimitris Papageorgiou, Assistant Professor (General supervision, compilation and organisation of information material), George Pehlivanides, Adjunct Teacher (Cultural information interaction design), Nikos Boubaris, Lecturer (Soundscape supervision) and Thomas Mavrofides, Adjunct Teacher (Application programming). The exhibition would not have been possible without the assistance of: Nikolaou Vangelis (Ermou street Photographs), Giorgos Tataris (Digital Background of the topographic map of Ermou street), Lenio Myrivili, Adjunct Teacher (Organization of student groups for guided tours of the exhibition), Alexandros Spathis, (Technical support, audiovisual systems), Panayiotis Kargas, (Technical support, computer operating systems), as well as all those who contributed in their own way to the realization of the project.

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