Digital communication and sites architecture: a semiotic-linguistic approach. Guidelines for Web Design[1]

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The debate on the quality of sites and portals in the Web includes a number of issues which we have subsumed under the twofold notion of *knowledge architecture* and *communication architecture*[3]. Other general principles with different and overlapping implications are summed up by notions such as *accessibility* and/or *usability*. Guidelines for Web design are proposed by the WCAG (*Web Content Accessibility Guidelines*) of the W3C (*World Wide Web Consortium*).

In software development, the philosophy of *universal design* heavily relies on two approaches to content and interface design: design must be user and usage centered. In other words, it must take into strict consideration addressees, aims, tasks and contexts of interaction.

1. A theoretical frame work

In a communicative semiological-linguistic perspective we are bound to apply knowledge we possess about linguistic theories of human communication to web design. Psychological, sociolinguistic, ethnographic, pragmalinguistic specifications in the framework of a semiological linguistic definition of communication rules allow for suitable solutions[4]. So far, only a few of the theoretical perspectives inherent in the sciences of language have been used in software modelling.

Let us first recall the classical UCD approach by Constantine and Lockwood and others[5]. In their definition, *usage/user centered design* corresponds to a successive modelling where modelling stands for an abstract representation of what we may call *virtual variables* of online interaction, in specific domains and environments. The possibility of interacting for different purposes by users implies the knowledge of their roles and tasks in specific contexts.

Therefore Constantine and Lockwood propose a design framework through five models:

1. *role* model — the relationships between users and the system;
2. *task* model — the structure of tasks that users will need to accomplish;

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[3] For an overall introduction to a theory of digital communication see E. ZUANELLI, Comun*icazione digitale. Un approccio semiologico-linguistico*, Rome, Colombo, 2009

[4] An integrated approach to communication from the perspective of the sciences of language is in E. ZUANELLI, *La competenza comunicativa. Precondizioni, conoscenze e regole per la comunicazione*, Turin, Boringhieri, 1981

[5] L. CONSTANTINE and L.A.D. LOCKWOOD, *Software for use: A practical guide to the models and methods of usage-centered design*, New York, ACM Press, 1999

3. *content* model — the tools and materials to be supplied by the user interface;
4. *operational* model — the operational context in which the system is to be deployed;
5. *implementation* model — the visual design of the user interface and description[6].

To exemplify, in a site referring to an online pizza house the customer's role needs to be articulated and specified so as to proceed to the task related to the pizza order, the payment and the "physical release" of the pizza.

Graphically summed up, we can visualize the various constraints for identifying the customer's role and performing the task successfully.
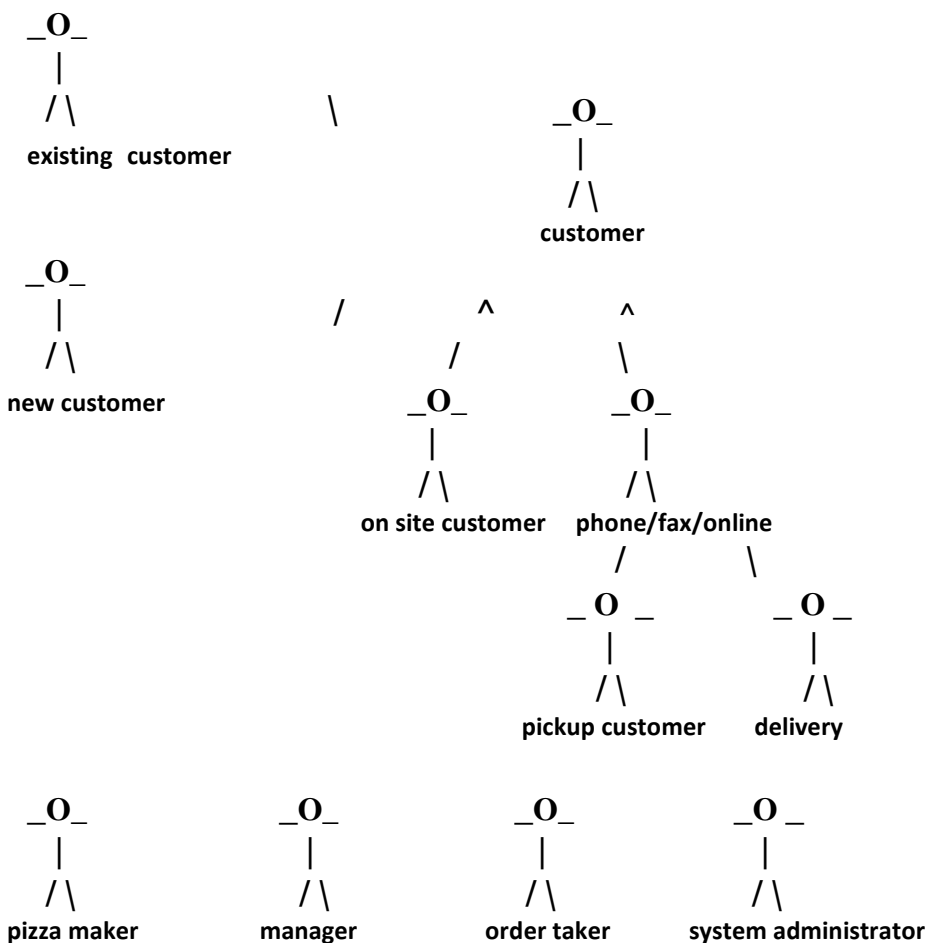
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_O_
 |
 /\                  \                  _O_
existing  customer                       |
                                         /\
                                      customer

_O_
 |                    /         ^          ^
 /\                  /           \
new customer                    _O_        _O_
                                 |          |
                                 /\         /\
                        on site customer  phone/fax/online
                                               /        \
                                            _ O _      _ O _
                                             |          |
                                             /\         /\
                                         pickup customer  delivery


_O_              _O_              _O_              _O_
 |                |                |                |
 /\               /\               /\               /\
pizza maker     manager        order taker    system administrator
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Figure 1 – Role map of a pizza customer[7].

The options lead to different online task performances which can be expected as related to different customer's types. As for the payment task the system will allow for different specifications to be developed as options in content and interface design.

Successive modelling will integrate virtual routes for virtual interaction in software design. The overall pattern of modelling looks this way.
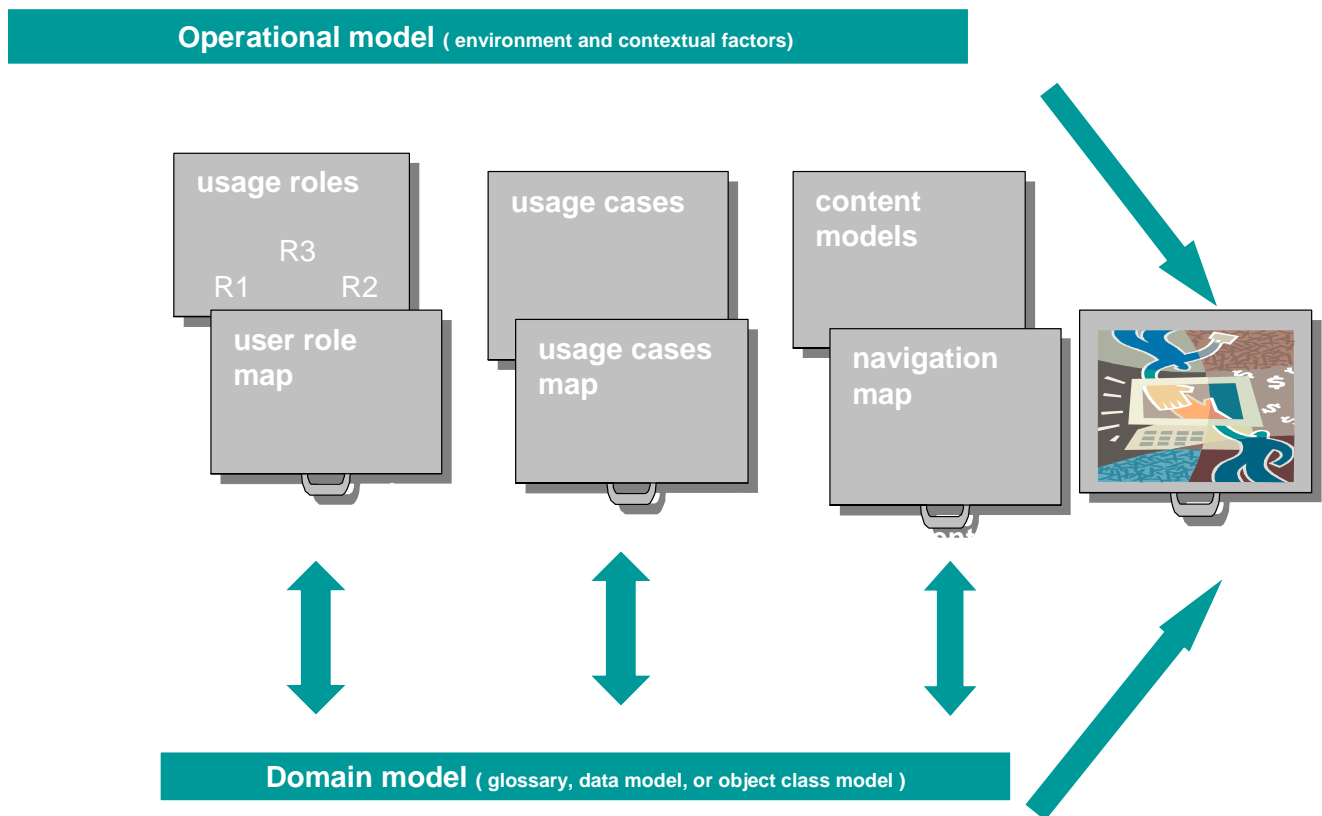

Figure 2 - UCD modelling according to Constantine & Lockwood, 1999

According to a renewed interest in *visual communication* and *semiotics* as applied to interface design, the above approach is not enough. We need an understanding of the information supplied by *visual metaphors* and *verbal cues* in the iconic-textual rendering of the dialogue-interaction.

1.1. Sites architecture, GUI and types of Internet design

A first look at icons as present in graphical user interfaces (GUI), informs us of two basic things. First, icons and words define both the **context of interactions** and the **actions suggested for interaction to the users**. The context is often rendered through a visual linguistic metaphor as we shall see later on.

Second, graphical interfaces use different functional typologies of visual information: graphs, icons, colors, space, etc. with the implication that "concrete", better said "figurative" icons, as well as already known visual information are better understood than "abstract" or new ones[8].

Let us try to make a guess at these icons:

We easily recognize the first icon as a potential "balloon", traditionally used in cartoons and "comments" in electronic interaction, whilst the second icon is an *emoticon*, a widespread sign in electronic conversation to express a positive happy mood. The two other icons refer to conventional Internet functions/buttons, the first one being the traditional icon for the home page of a site (site, "home", not "house") the second one being the conventional icon for information in physical world as well as in virtual contexts.

But, what should be the meaning of this image?

Unless linguistically defined there is no chance of guessing. It is the *polysemy* of images in Barthes' analysis[9]. The problem of interpretation faces us. Therefore we need to apply to *semiotics* in order to find answers.

Before coming to this, let us introduce the overall theme of Internet *digital communication* that includes the semiotic-communicative approach to Internet in an interdisciplinary way.

Digital communication can be defined as communication mediated by electronic means and products (HW, SW, sites, portals, etc.). In this discussion, we have restricted the meaning to web communication. The knowledge of computer programs is basically needed in order to face Internet navigation. Cognitive implications include the intuitive realization of the visual context of interaction in *graphical user interface* (GUI), the desktop metaphor in computer interaction, together with the metaphorical actions of moving, memorizing, deleting files, etc.

Other related knowledge confronts us with conventional icons for opening or closing a program, a file, etc. When we come to web design, however, we face the development of multiple contexts of interaction and a more complex multidisciplinary modeling process.

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[8] A validation of this is in J. Ferreira, *Semiotic explorations*…

[9] R. Barthes, "Réthorique de l'image", in *Communications*, 4, 1964, pp. 40-50

In a pragmalinguistic perspective we have defined a site as a *digital text* composed of two interrelated elements: *electronic texts* referring to files contained in the site and *"informatic" text/macroacts*[10] defined as functional containers of electronic texts*,* whose general and specific functions can be basically of three types:

- *Informative functions*, such as the textual/multimedia representation of concepts, facts, notions, etc. need a verbal factual, descriptive or narrative textuality.
- *Operative functions* assume the possibility of the user to manipulate contents of sites in different ways: downloading, copying, sending files, etc.
- *Transactional functions* have to do with the virtual activities in virtual domains: online buying and selling in ecommerce; teaching and learning in e-learning; playing and gambling in virtual playing sites; performing administrative procedures in e-government, etc.

Sites content, therefore, can be defined as the elaboration of digital information for multiple purposes and interactions. So far, for the pragmatic approach to an informatic text/macroact.

A different approach is needed for *electronic texts*, a notion that refers to textual / linguistic / multimedia components of a site: the verbal structure of news, informative texts, descriptions, forms, horoscopes, etc.

The preliminary assumption, therefore, is that Internet digital communication deals with contents, i.e. *electronic texts*, and functional containers that we have called *informatic texts/macroacts*. The interconnection between the two makes up a *digital text*.

An informatic text/macroact is the functional component that governs electronic texts or files. Information needed for this purpose includes different typologies of signs and an *integrated digital grammar* made up of words and sentences, on one side, and graphical-iconic components on the other which realize cues for focalization and navigation into areas through menus, buttons, links.

The study of digital signs includes, therefore, words, icons, colors, space and all their complex intersection in a *sincretic visual dialogue* that can be referred to as *semiotics of Internet design.*

Before coming to this, let us put a basic question: is there an Internet science? And if so, how many levels of analysis and study does it require? The modelling of content and functions of a website from the perspective of the sciences of language is certainly one of these levels and it requires an interdisciplinary approach.

In an overall representation of **design and modelling,** web design consists in six basic components[11]:

- cognitive design
- content design
- interaction design
- navigation design

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[10] See E. Zuanelli, *Comunicazione digitale*...

[11] A full-fledged introduction to the complexity of design is in M.E.S. Morris and R.J. Hinrichs, *Web Page Design*, Mountain View, California, Sun Microsystems, 1996

- graphical design
- experiential design

Cognitive design corresponds to:

- **ease of perception and comprehension** of information in site templates: text, colour, space, functional graphics for areas, menus, buttons, clear metalanguage for content and so on through visual communication;
- **ease of memorization** refers to the articulation of content into few and coherent chunks of information (knowledge architecture) to be memorized and /or learnt;
- **information retrieval** assumes the possibility of information retrieval and use of information through few meaningful links, clear labelling and metalinguistic information;
- **procedural application of information** implies the cognitive representation of clear interaction procedures, instructions and hints.

Content design implies:

- the definition of **topics and subtopics** to be worked on in the representation of the site content;
- the decision on **functions/services/applets** to be offered to the user: what will the navigator find; what will he do in the site, etc.;
- at what level will he find the information/ service etc. he looks for (**how many levels and clicks**);
- how will **electronic texts** be written: readable, essential, short texts, lists, schemes;
- **web writing,** namely the way different typologies of texts are written in a natural language adapted to a computer use;
- choice of **fonts, types, lettering, font size,** etc.;
- i**nstructions language** for interactive purposes;
- use of clear, **conventional icons**.

Interaction design questions on:

- modelling **macroact/digital texts**: functions, areas, labelling, metalanguage, procedural instructions;
- site architecture: **hierarchical, relational, linear;**
- layout of "dialogue" interaction: **words and icons.**

Navigation design includes:

- mapping of **virtual routes** in the site;
- connection among **levels of structure;**
- **contextualization of user** in each page and at each level;
- **breadcrumb paths** or similar devices to know the localization in navigation.

Graphical design implies:

- a **semiological approach** to interface design;
- **editing graphics:** conventional rules for writing and communication in a visual mode;
- **functional graphics**: intentional use of graphical information for interaction purposes;
- **allusive graphics**: essential creative graphical aesthetics when needed.

The success of multiple integrated design techniques will then be confronted with the user's experience and the testing of his reactions.

The list of design items, as we can see, imposes a multidisciplinary configuration of competences and skills in web design and computer science modelling that we have placed under the overall label of *communicative digital competence*[12].

Having to do with a specific domain we can put a core question. The question is why a university web site? What is the use, what is the purpose, what are the functions, whom does it address to?

Before coming to a specific checklist for analysis of university websites let us discuss briefly the main issues in the perspective of the semiotics of interface design[13].

1.2. Visual communication in interface design: iconic /conceptual metaphors and syntax

Charles Sanders Peirce (1839-1914), the American philosopher, logician, and scientist coined the term "semiotics".

"Peirce declared that anything can be a sign — words, images, odours, objects, ... *anything* — so long as someone, in some situation, interprets it as standing for something other than itself. In other words, by themselves, these tokens have no meaning; they are given meaning (and thereby become signs) only when they are interpreted as such.

Of Peirce's ideas, the most relevant to UID are his model of the sign (the semiotic triad), and his system of classification of signs based on how they convey meaning"[14].

Peirce'semiotics:

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[12] We can consider communicative digital competence as a semiotic technological extension of communicative competence. See E. ZUANELLI, *La competenza comunicativa…*

[13] Besides J. FERREIRA, *The semiotics*…, see J. FERREIRA, J. NOBLE and R.BIDDLE, "The semiotics of user centered design", in www.mcs.vuw.ac.nz/~jennifer/chapter-iwos 2005.pdf

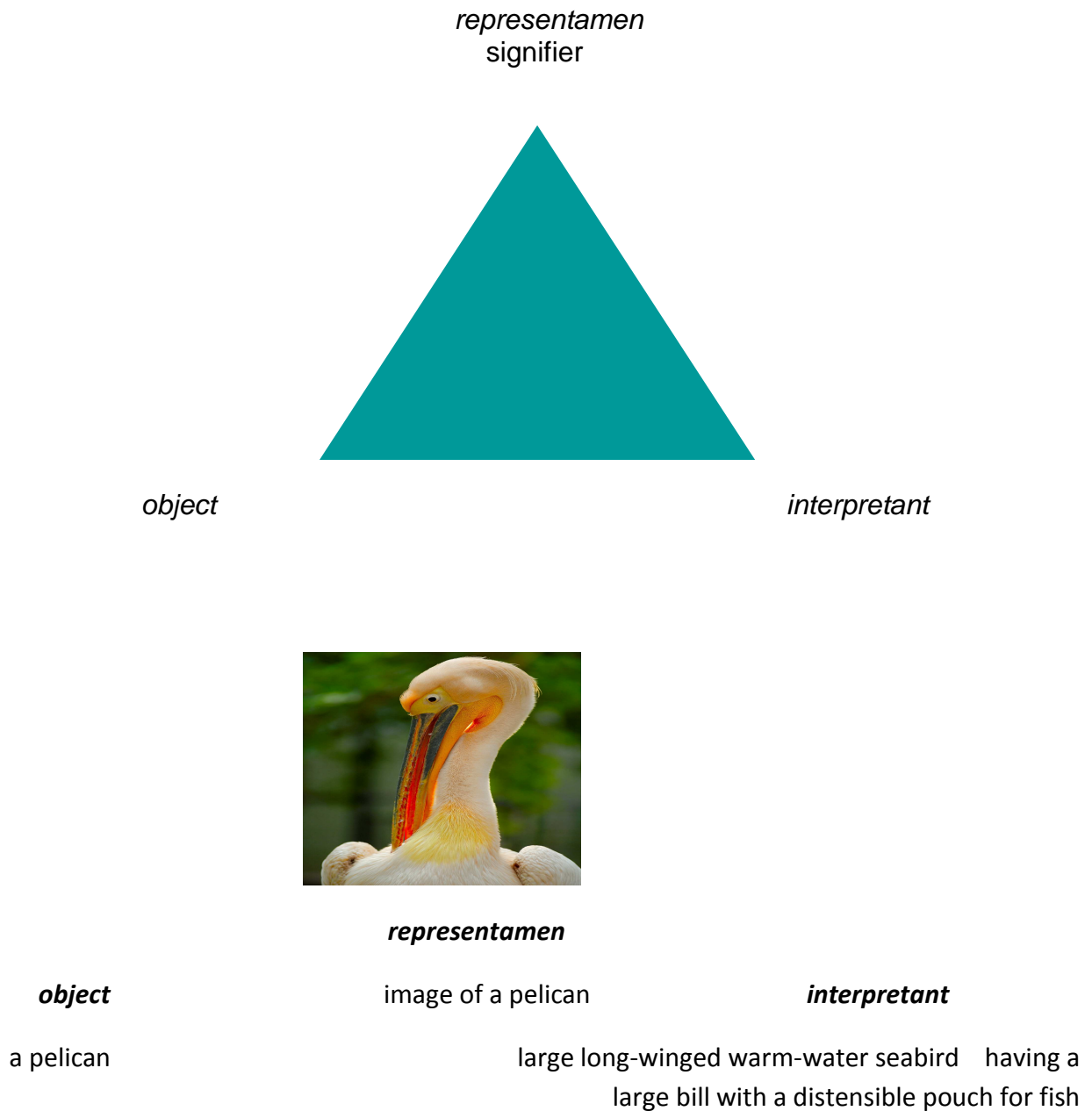[14] See analysis by Dana DAHLSTROM and Vinu SOMAYAWAJI, Dept. Computer Science & Engineering, Univ. of California, San Diego, 2004 in http://cseweb.ucsd.edu/~ddahlstr/cse271/index.php

the sign

representamen
signifier

object   interpretant

representamen

object   image of a pelican   *interpretant*

a pelican   large long-winged warm-water seabird   having a
                                             large bill with a distensible pouch for fish

Figure 3 - The semiotic triad in Charles Sanders Peirce

Let us proceed with definitions in Peirce as proposed within the engineering approach[15] .

«An *icon* is a *sign* in which the *representamen* is perceived as resembling (i.e., having some of the qualitiesof) the object». In Peirce's words, such a sign «refers to the Object that it denotes merely

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[15] *Ibidem*

by virtue of characters of its own ... such as a lead-pencil streak as representing a geometrical line. A *diagrammatic icon* is defined as a type of icon that preserves the geometric properties of the object; in this sense, the resemblance is not necessarily based on their similarity in appearance, but on the relationships between their parts».

The trashcan "icon" would be better described as being a diagrammatic icon.

An *index* is a sign in which the *representamen* is in some way (i.e., physically or causally) directly connected to the object. Unlike an icon, an index has no significant resemblance to the object. Instead, there exists a law-like relationship between the representamen x and the object y:

if x, there always or usually is a y (it is for this reason that unedited photographs and video —which are indexical of the effect of light on the film—are often admissible as evidence.

For example, the trashcan "icon" is indexical of the process of deletion; similarly, a diskette "icon" is indexical of the process of saving. The "Blue Screen of Death" is indexical of the computer having crashed. Also, a person's username and password are together indexical of that person (and hence can be used for authentication)".

We can comment on this interpretation by hinting at the fact that analysis is somewhat more complex having to do with a multiple application of the rhetorical tropes of metaphor-metonymy. Indexes have a metonymic implication such as cause-effect (if fire then smoke, or, better: smoke is the result of some kind of combustion, etc.). If a trashcan is given in a physical world, then there is the possibility of wastage: in a virtual world, an icon for wastage means deletion. In this case, as evident however, we face a triple "metaphorical-metonymic" process: the verbal trashcan is represented through a visual sign, an icon; the icon is the container for waste paper and is therefore in a metonymic relation with it; in a virtual world as represented by the icon, wasting virtual paper corresponds to deleting it. Finally, no action is iconically represented but only the object/ container where wastage is bound to be thrown, namely the icon of the thrashcan: therefore we need a further metonymy consisting of the relation between the icon-object (thrashcan) and the action (deleting).

A *symbol* is a sign in which the relationship between the *representamen* and the object is arbitrary or conventional (i.e., it must be learnt). According to Peirce, such a sign «is constituted as a sign merely or mainly by the fact that it is used and understood as such. For example, language is generally considered to be symbolic. Logos (such as AOL's Running Man) are symbolic of the

corresponding company. Also, using colours (red, yellow, and green) to represent the quality of connection (poor, fair, and excellent respectively) in a network status "icon" is symbolic».

This last statement may be debatable on account of a possible mismatching use of colours, in a vertical or horizontal presentation, since their co-presence is likely associated with the previous physical experience of traffic light signs by users. As we shall hold, the use of single or combined icons is a matter of *syntactic visual structure* based on language syntax**.** In order to continue our introduction to the use of semiotic notions in computer interfaces we can recall the analysis of the relation image-word by the famous European semiologist Roland Barthes.

1.3. Visual representation and communication

According to Barthes' analysis as reported by Legrady[16]:

- usually, the image conveys meaning, but not necessarily;
- an image may also convey a secondary message: mood, a feeling, (emotional values);
- representation can be:
  a) *literal* or *denotative*: a precise description of a situation;
  b) *connotative*: 2nd level meaning, sub-text, inferred information;
  c) *metaphoric*: symbolic representation where a thing is presented as something else;
  d) *specialized*: image cannot tell us its meaning, outside information needed;
  e) *abstract*: not coded to convey literal information, but may impact in other ways.

What are the elements of an image?

Figure 4 – The Panzani ad.

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[16] "MAT 256 Visual Design through Algorithms", in *Visual Syntax & Semiotics*, Winter 2006, Media Arts and Technology. Graduate Program, UC Santa Barbara, www.mat.ucsb.edu/~g.legrady/.../06w256/256_week6_VisSyntax.ppt

Barthes' rhetoric of this image contains three layers of messages:

1) a coded iconic message (cultural information):
- a set of colors with specific references;
- inventory, a complete system;
- spatial referent, point of view;
- stylistic: connotes cultural identity.

2) a non-coded iconic message:
- if photographic: literal rather then symbolic.

3) a linguistic message:
- captions, labels, explanations, film dialogue, comic strip balloon: (can images escape text?)

So much for a synthesis of analysis criteria in visual information as summed up by Legrady. What we need to stress is the dependence of an iconic message by words. Images are polysemic and only language can disambiguate the specific meaning ascribed to an image. Anchorage17 of icons to words is needed to be sure of their meaning according to Barthes.

As we shall see now, the metaphoric/metonymic implications in abstract and concrete electronic icons, together with conventional values of icons in a given context, allow for an interpretation that depends on verbal interpretation.

1.4.The multiple metaphor and the iconic syntax

Let us assume that the transposition of meaning where two words or phrases belonging to different domains are associated, without an apparent relation as is the case with metaphors, is not so arbitrary since semantic elements, *semes*, pertaining one definition may be present in the meaning of the other verbal referent linked through the metaphor. If so, the distinction between a metaphor and a metonymy is debatable.

A second assumption comes from the decisive role of verbal language in assigning a specific meaning to an image, whatever it is: icon, index, symbol.

The third assumption concerns the operational use of visual signs in graphical UID.

The following examples give an idea of how an image-icon, be it single or combined, can be turned into an electronic sign

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[17] See R. BARTHES, *Eléments de sémiologie*, Paris, Editions du Seuil, 1964

The conventional value associated with a basic concrete icon such as a "lens" in a computer display has to be defined: therefore, a lens (which is the tool by which you can see or amplify the view of something in a physical world) implies the twofold process from the verbal concept associated with the tool and the operative metonymic implication annexed to the icon, having to do with the action.

When we use *compound icons*[18] such as "cart", namely the container for the action of buying something in a virtual department store, superimposed on a graphic round geometrical shape, allusive of the Web, or else an electronic mail (the symbol @ over an envelope) we produce a new iconic-verbal concept through a multiple metaphorical process: a *intersemiotic translation*[19], from words to images, as well as a syntagmatic visual elaboration; finally a metonymic extension having to do with the operational value of the icons.

As I have argued, in the compound process, the visual syntax[20] may produce new visual compound entities according to Dormann.

Figure 5 – Single and compound concrete icons: Lens and Cart.

The case is different with other compound icons endowed with a syntagmatic value as is the case with "web resources", where the juxtaposed images, a world and a computer display, stand for a propositional relation.

Figure 6 – Web resources.

The compound icon, in this case as in the previous ones, implies an action: that of accessing content resources. The typology of compound icons as presented by Dormann[21], *superimposition, conjunction, concatenation, juxtaposition* and the related icons modification produce always an

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[18] Cfr. E. ZUANELLI, *Comunicazione digitale*…

[19] The notion is discussed in R. JAKOBSON, "Aspetti linguistici della traduzione", in ID., *Saggi di linguistica generale*, Milan, Feltrinelli, 1966 (L. HEILMANN ed.)

[20] See E. ZUANELLI, Comunicazione digitale…

[21] C. DORMANN, "Self-explaining icons", in *Digital creativity*, vol.5, no. 2, July 1994, pp. 81-85

"iconic compound". However, if we analyse icons and their combination in a linguistic framework, we can further realize that the underlying syntax corresponds to a different typology of verbal structures.

"open file" "word file" "web search"

Figure 7 – Types of verbal structures in compound icons.

The first compound icon represents a syntactical framework where the geometrical sign of an "arrow" stands for the action and the image of the "file" is the object of the action. In the second example, the compound sign contains an ellypsis of the verb whereas the third example is a syntagmatic structure "search in the web ", linguistically connotated according to the English syntax, modificator and word, which would not be plausible for the Italian syntax where this kind of modifications need a preposition. As a preliminary conclusion, if we do not refer to status icons or system icons, having to do with the localization of context information, single or compound icons imply a sintactical structure based on a linguistic pattern. We have proposed a typology of such patterns based on the type of metaphoric-metonymic implications in the following scheme.

TYPE 1	**Single concrete icon**: FILE	**object** for action(metonymy)	**verb ellypsis** (open)	**(V) O**
TYPE 2	**Single concrete icon**: CUT	**tool** for action (metonymy)	**object ellypsis** (file)	**V (O)**
TYPE 3	**Single abstract conventional icon** UNDO	**symbol** for action (metonymy)	**object ellypsis** (file)	**V (O)**
TYPE 4	**abstract icon** for action SEND and **iconic concrete compound** (new concept) EMAIL	**visual metaphor** for envelope and **conventional symbol for email** (@), a new concept which is the object of the action	**verb + object** (no ellypsis)	**VO**
TYPE 5	**identical concrete icons** (duplication): COPY	**iconic compound** for action and object	**verb + object** (no ellypsis)	**VO**
TYPE 6	**abstract icon + concrete icon** (vertical and directional orientation) OPEN	**graphic symbol** for action (the arrow) + **object** of the action(file)	**verb + object** (no ellypsis)	**V O**

Figure 8 – Typology of sintactic iconic structures (Zuanelli 2009[22])

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[22] See E. ZUANELLI, *Comunicazione digitale…*

As a conclusion on the use of icons in interface design we can hint at the adoption of the approach to metaphors as developed by Lakoff and Johnson[23]. Conceptual metaphors are daily experiences in words we use. The typology of verbal metaphors as elaborated by Lakoff and Johnson was applied to the analysis of an *interface environment* as in the case below, where the visual component of Microsoft Project Gallery was interpreted according to conceptual metaphors inherent in the verbal/physical idea of a"gallery"[24].

As a comment to this approach we may say that the analysis does not start from images. It starts from verbal referents as transposed into the visual interface. Once again, language and its metaphorical translation into visual rendering allows for interpretation.
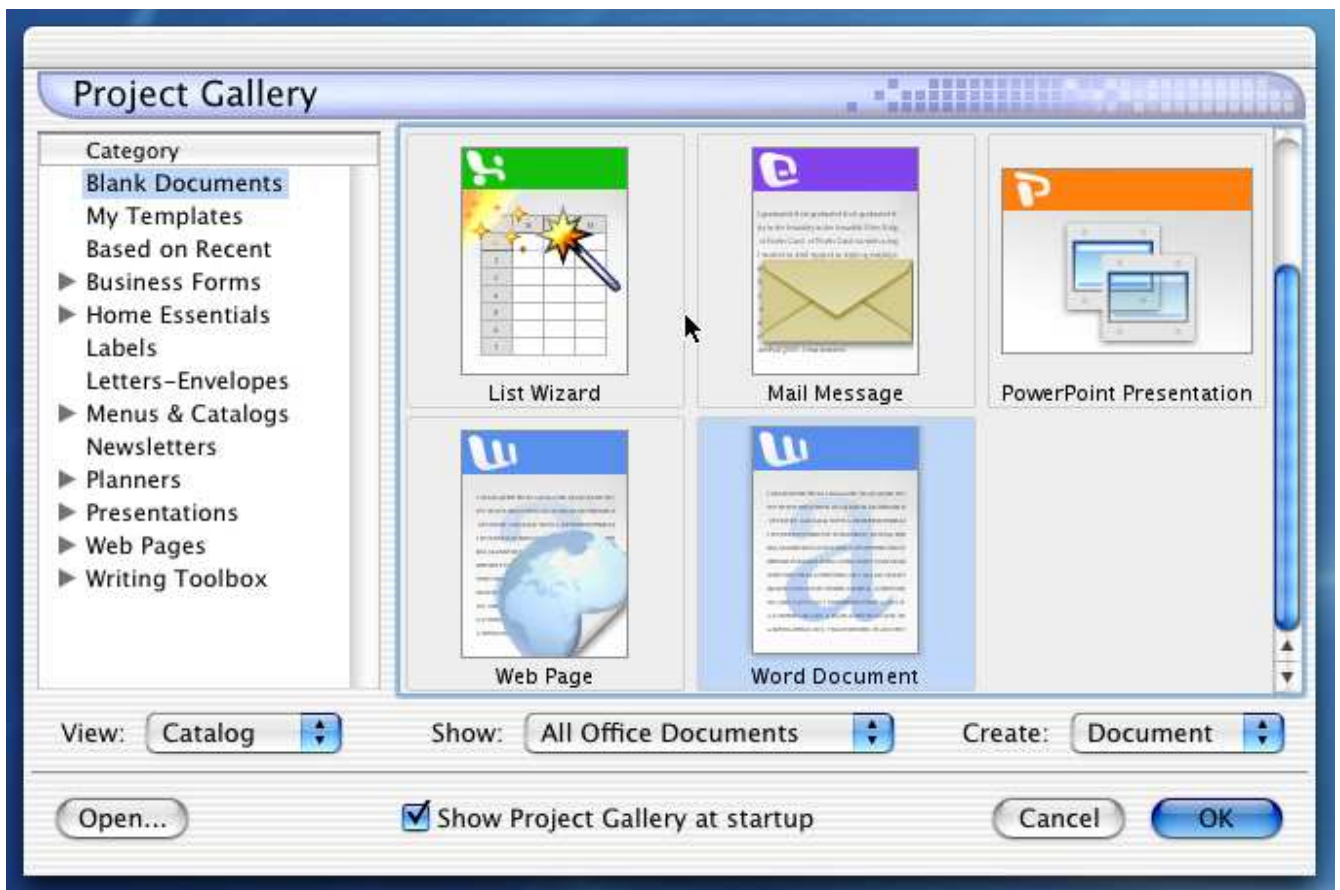

Figure 9 – Microsoft Project Gallery as analysed by Barr, Khaled, Noble, Biddle.

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[23] G. LAKOFF and M. JOHNSON., *Metaphors We Live By*, Chicago, University of Chicago Press, 1980

[24] P. BARR, R. KHALED, J. NOBLE and R. BIDDLE, "A Taxonomic Analysis of User-Interface Metaphors in the Microsoft Office Project Gallery", http://crpit.com/confpapers/CRPITV40Barr.pdf

2. Other visual components

In the analysis of visual communication in interface design, a quick mention goes to the symbolic use of colours and their readability. If we assign a functional value to colours in the organization of area/sections of home pages, for instance, we are forced to keep the value consistent throughout the site. This principle applies to any visual information to which we apply a conventional interpretation as we have seen for icons.

A different role in the use of colours lies in the optimization of contrast between background and writing colours, including the ease of focalization of other visual signs. Here is an example of bad contrast, where buttons are identified with difficulty.

Figure 10 – Bad contrast.

The following scheme compares examples of bad readability.

Figure 11 – Bad readability[25]

The notion of readability of colours is discussed in W3C Guidelines[26]**.** However the guideline below has been criticized: «The brightness difference and colour difference shown above lead to the suggested algorithm for good text color visibility in the W3C Web Content Accessibility Guidelines».

Colour visibility can be determined according to the following algorithm:

Two colours provide good colour visibility if the brightness difference and the color difference between the two colours are greater than a set range.

- *Colour brightness* is determined by the following formula: ((Red value X 299) + (Green value X 587) + (Blue value X 114)) / 1000 Note: This algorithm is taken from a formula for converting RGB values to YIQ values. This brightness value gives a perceived brightness for a colour.

- *Colour difference* is determined by the following formula: (maximum (Red value 1, Red value 2) - minimum (Red value 1, Red value 2)) + (maximum (Green value 1, Green value 2) - minimum (Green value 1, Green value 2)) + (maximum (Blue value 1, Blue value 2) - minimum (Blue value 1, Blue value 2))

- The range for colour brightness difference is *125*. The range for colour difference is 500. Brightness differences less than 125 and colour differences less than 500 are supposed to

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[25] http://www.devlounge.net/wp-content/uploads/2010/01/readability-study-02.png

26 See colour issues and reported debate in www.hgrebdes.com/colour/.../colourvisibility.html

be not good, though actually, the W3C algorithm is a suggested algorithm that is 'still open to change".

Here are specific comments on the algorithm. There are essentially three things wrong with the W3C guideline:

1. Readability of coloured text/background pairs is influenced by text size. If the font is bigger, the readability of text improves. This is not covered in the W3C guidelines.

2. The 'colour difference' requirement means that background or text with a colour value between 256 and 499 should be out of range for readability. That is not right.

3. 'Brightness difference' requires a different readability break point for light text on a dark background than it does for dark text on a light background".

As we can see research and debate are on the ground and the need for testing is evident.

We shall finally proceed to sum up a list of check points as tools for the analysis of sites. The items refer to the above presentation of theoretical criteria underlying interface web design.

3. A checklist for analysis of usability in Internet communication

In order to appreciate these synthetic guidelines we must go back to the types of web design criteria rapidly presented here.

The first block for analysis concerns the site name bar. The bar should contain the institutional logo, the explicit name, the synthetic definition of its functions and no acronyms in order to identify it explicitly.

The facilitation for focalization of areas in the site is connected with the page organization where neither horizontal nor vertical scrolling should be provided. In particular, vertical scrolling causes the de-contextualization of the user and the impossibility of an overall memorization of contents. The page should also contain an institutional colophon needed to identify the institution.

Analysis 1: general parameters

- **site name bar**
    - site name
    - site goals/functions
    - institutional logo

- no acronyms
- **page/template organization**
    - no vertical scrolling
    - no horizontal scrolling
- **institutional colophon**

If we proceed to an architectural analysis according to cognitive and content design we should count the number of menus, according to graphical and textual criteria. The overabundant number of menus and links is generally responsible for bad orientation and focalization of information, needed in order to select content and navigate. The coherence of editing graphics, font, size, characters has to be checked together with icons, colours and texts. Logical semantic coherence has to do with content organization as reflected by the labelling of areas and captions needed in order to foresee content of areas/sections of menus correctly.

Number and functions of colours as well require definition. If colours identify areas, their use should be perceivable at any level. The number of colours, moreover, should be limited.

Finally, contrasting background and writing colours needs a proper check of readability.

Analysis 2: page/template organization

- number of menus
- graphical/textual criteria: orientation and focalization for navigation
- editing graphics: font, size, characters
- logical-semantic menus coherence
- areas labelling and captions
- number of colors
- functions of colors
- contrasting text and background

A third level of analysis concerns the typology of texts (informative, operative, narrative, etc.) and their pertinence according to the goals of the site. Quantity of information must be kept under control as well as quality of information.

Sites are often filled with useless unreadable content. The language of instructions in forms and for navigation needs logical and procedural coherence for interactivity purposes.

Analysis 3: functional editing of electronic texts/content

- texts typology
- quantity of information (strokes number)
- quality of information
- functionality of information
- texts readability
- content interactivity

A final overall check concerns the presence of online services. Informative services do not coincide with information. The added value of information lies in its purpose for specific "clients". As an example, normative information cannot be proposed with the publishing of the norm or its reformulation. It has to be elaborated and simplified in operative schemes or guides that offer synthetic comprehension of procedures, obligations, actions.

More interesting is the presence of online transactional services such as enrolment, payment and all interactions transferred from a physical to a virtual environment.

Analysis 4: informative, operative, transactional, relational services

- are there any in the web site?
- how are they structured?
- how are they accessible?
- Information from general to specific
- captions/guidelines to online services (descriptions, instructions, forms)
- online help

The preliminary checklist for analysis ends here and can be applied to university web sites and sites in general. What is implied here is the development of new professional profiles made up of interdisciplinary skills and knowledge that we have labelled as *digital communicative competence*, a new frontier for on line communication.