

Credibility On-Line: Quality Metrics for Evaluation

Francisco V. Cipolla Ficarra^{1,2}, Ernesto Vivas², and Joaquim Romo²

HCI Lab. – F&F Multimedia Communic@tions Corp.

¹ ALAIPO: Asociación Latina de Interacción Persona-Ordenador

² AINCI: Asociación Internacional de la Comunicación Interactiva

Via Pascoli, S. 15 – CP 7, 24121 Bergamo, Italy

ficarra@alaipo.com, webmaster@ainci.com

Abstract. We present the results of the assessment of credibility of Information Technology and Communications professionals through the application of a set of heuristic techniques which make it possible to analyze different on-line websites where their curricular data reside. The aim of the current research work is to determine the quality of the public and private institutions through the veracity of the on-line content. We also present a set of binary metrics of quality, credibility and veracity of on-line information, called DECROL (Destroy CRedibility On-Line). These metrics are the result of the comparison of professionals or pseudo professionals in 50 public and private institutions in Spain and Italy.

Keywords: Veracity, Information, Assessment, Content, Multimedia, Education, Semiotics, Linguistics.

1 Introduction

In the new millennium, and with the international diffusion of interactive multimedia systems, we are voyaging through an era of communicability [1]. Communicability entails quality. Quality in interactive software, the same as the notion of beauty in art or design, is very easy to detect when it is absent. Quality requires a set of methods, techniques, metrics and specialized staff to exist in the software of multimedia systems [2], [3], [4], [5]. The study of communicability in the design of multimedia systems will enhance the ability to communicate with other people and with new technologies. The foremost goal is to improve the interaction with new technologies, in order to obtain a better diffusion of qualitative information, aimed primarily at widening scientific knowledge, education, training, professional activities (services and/or production) [6], the well being of human beings, and of the environment, regardless of the place where they happen to be on our planet. Inter-disciplinary studies that involve comparison, exchange of methods and exchange of opinions can be positive when they go beyond the sum or juxtaposition of discoveries, for example. The

prime degree of cooperation lies in trans-disciplinary studies. For example, trans-disciplinary studies would propose concepts and theories common to different social sciences. Nevertheless, it is in dual-disciplinary studies that we can reach the best results in the field of communication. That is, it would consist of sharing methods, and interpreting aspects and historical experiences of two different disciplines. Consequently, the intersection between computer science and communicability can be very positive to increase the quality of communication between a user and a multimedia systems [7], [8]. Without any doubt, the veracity of the on-line content in multimedia systems is a subject of great importance because many businesses and private citizens resort to specialized enterprises for the services known as 'keyposition' — the position of the portal in Google, Yahoo, Lycos, etc. That is to say, to try to be in the first pages of the research engines. Usually, these are users who do not have training in computers or do not have the time, and hire external services. Therefore, money can be saved through these statistics, since it makes it possible to find out easily and quickly when we are dealing with real professionals or not, and also those public and/or private institutions on whose services can be trusted. The notion of content veracity in multimedia systems in our work is directly related to the public image of the institutions. There is a tendency to polish the public image through Web 2.0 instruments, for example by inserting the number of employees in the current or preceding institution. This tendency to quantify the quality of information in many works of social communication has demonstrated during years that it has a boomerang effect [9]. That is to say, straight away there is a manipulation towards the user, however, with the navigation into the contents of the interactive system through time, the user discovers that much of the data is incorrect. Sometimes, depending on the kind of users, such as inexperienced ones, detecting deliberately created misinformation triggers a rejection of the whole website, and even to other websites belonging to the same category as the visited one.

In the current work we will start with the metrics concept of software engineering and placing the environment of the current research work exactly in the context of the entities and quality attributes. Then the first cases of lack of credibility will be presented which have been detected through the convergence of linguistics and semiotics [10], in the industrial and educative context. The composition of each one of the attributes will be defined and the first heuristic assessment table in the communicability context to eradicate the lack of credibility in the on-line contents.

2 Metrics and Measure: Social Sciences and Software Engineering

The metrics have been elaborated through concepts stemming from semiotics, communicability, the quality of software, usability engineering and human-computer interaction. Through the intersection of these areas of scientific knowledge it is easy to detect those cases in which pseudo professionals resort to 2.0 websites to falsely expand their knowledge and/or professional experience. A table has been made of

these instruments of free access which are used to damage the credibility of the on-line information.

The universe of study has been made up of 500 subjects, and 10% of them have been randomly chosen, that is to say, we have worked with a sample of 50 websites. Later on, a table has been created wherein all the resources stemming from the Web 2.0 generation are inserted, which enable these people to occupy the initial posts inside research engines: Google, Yahoo, Lycos, etc. A way to distinguish the notions of metrics and measures in the software is the one presented by Fenton, N. [11]. The metrics characterize numerically the "simple" attributes such as length, number of options, number of operators (for the programs), or the number of located problems, cost and time (for the processes). The measures are "functions" of metrics that be used, assess or predict the more "complex" attributes such as cost or quality.

2.1 The Measurement Process: Entities and Attributes

With regard to the process of measurement in the engineering of the software, Fenton [11] states the following formal definition: measurement is a process in which numbers or symbols are assigned to the attributes of the entities of the real world, to describe them accurately, in accordance with rules that have been clearly defined. Measurement assigns numbers or symbols of those attributes of the entities with the purpose of describing them. Starting from such entities, a first classification for measurement can be made –also called generically metrics in software engineering [11]. These measurements of the physical world make up two types of categories of the measures to be used:

- Direct measures. These are those measures that in order to determine the dimension of a program it can be seen the space that occupies the feasible program in megabytes.
- Indirect measurements. Through these measures the quality of a programmer's work can be assessed by the percentage of failures detected in the summing-up.

The direct measure of an attribute is that measure that does not depend on the measurement of any other attribute. Whereas the indirect measurement of an attribute is that measure which includes the of one or more other attributes. In general terms there are different types to measure in regard to the goals to be achieved, that is to say, focused on the object or in the effects on the object [11], [12], [13]. For instance, the purpose of a measurement in software engineering can be: the process, the product, the language, the methods and the tools. It can also be considered the intention of whoever carries out the measurement which can be: passive (one simply seeks the understanding of the object) or active (when one wants to predict, control and improve the object).

Making a summary of the different kinds of measurements with regard to the goals to be achieved the following classification is obtained:

- Direct and indirect;
- Process and product;
- Objective and subjective.

The objective measurements are those in which two people can reach the same result considering the object in an independent way, for instance to count the lines of the code of a program. Subjective measurements are recorded on the basis of subjective assessments. For instance, the experience of a person for the management of projects. The objective measurements turn out to be easier to automate than the subjective ones [14]. As with other products, the software also has implicitly an elaboration process. The method developed for heuristic assessment can be applied in different stages; the production, with the purpose of maintaining and raising the quality of the interactive multimedia.

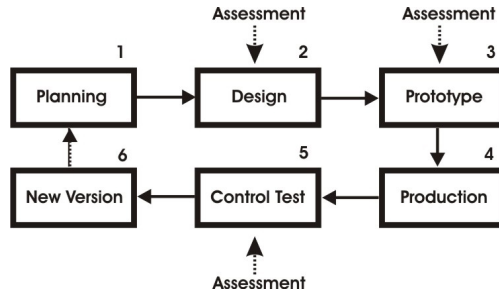


Fig. 1. The quality in the production stage

Among the internal and external attributes there is a bi-directional relationship that affects the quality of the software [15], [16], [17], [18]. However, it is necessary to eradicate certain axioms that relate to the internal and external attributes but are false in the multimedia environment, such as: the external qualities are those that have a greater importance in relation to the internal concerning the final product; a good internal structure yields as a result a good external quality [11]; the bigger the financial resources, the better the final quality and vice versa [19].

3 Veracity versus Parochialism

Every time that we talk about semiotics, directly or indirectly, we mean linguistics [20]. The founder of that discipline, Ferdinand de Saussure, in his work “Course in General Linguistics” maintains an interesting point of view regarding the assessment of the language that he refers to as “parochialism” [21]. Here it is necessary to bear in mind the orography of the territory where this discipline originated, i.e. the Alps, in whose mountains the towns as well as their dialects develop around the churches, according to Saussure's linguistic treatise. Remarkably, in the analysis universe on-line of multimedia systems in the same geographical area, that is to say, the geographical centre of the Alps, we find that the credibility of information lessens with increasing parochialism. The origin of this problem lies on what is known in software engineering as human factors, and also in the social sciences, the capital factor for that who becomes an information source (emitter) and focuses the attention of the receptor (a kind of showman or showwoman). It is a classical phenomenon in the

anchormen of news reports, for instance [22]. If we make an intersection between both factors we have on the Internet false information about the people (training and professional experience) with a clear propaganda or publicity purpose. In the zone from which Saussure spoke there was a union, that is to say, the sale of politicians as if they were business products. A way to detect them is the momentum of the community websites of Web 2.0: Facebook or Linkdin. There is a trend by the star user to be considered as a professional and quickly establish links with his friends or acquaintances. The purpose is also to reach the highest visibility level within the search engines. However, there is the boomerang effect because of the falsity of the information stored by the actual user of the Internet and social computing [23].

The boomerang effect for the star user is achieved through the current quality metrics of the truthful and transparent on-line information: DECROL (Destroy CRedibility On-Line). Through these it is easy to detect how the president of a textile business located in the Alps (Bergamo, Italy) introduces himself in some interviews on-line as an engineer. In Google-map or in the industrial association of the province where the industrial seat of that industry is located he promotes himself as a PhD, that is to say, a higher level than a graduate or an engineer, when he is actually a geologist. If the star character lies in the academic data that he has compiled on-line, the rest of the information on other similar websites such as Facebook, LinkedIn, YouTube or other similar is also false. These are the false results that are obtained with DECROL, which analysis starts with academic information.

3.1 Information On-Line: Opacity and Falsity

It is also necessary to carry out an anchoring operation with the notion of masters degrees, especially in the context of the European Union [24]. A masters degree can be carried out inside a university, which entails having already completed an undergraduate degree or technical engineering training in the case of informatics, for example, to attend for two years courses with a mandatory attendance of 70% of the lessons, and to succeed in the final exams to obtain the title of master. However, in many public and private Italian, French, Spanish and Portuguese universities, etc., there is no final exam.

The transference of technology between the universities and the private sector is very important [6], [24]. However, serious education university incoherences have been detected. In the south of Europe, some industrial executives together with university professors, set in motion college masters courses for employees to attend. However, these are students who possess only a level of secondary education or even incomplete studies. All of this happens under the label of masters inside the transfer of technology and/or knowledge between university and industry or vice versa. Remarkably, at the end of their attendance of such courses, they will have achieved a European college masters degree. In contrast, in the public universities of Latin America, not only the masters students, but also the PhD students, have the obligation of sitting final examinations of the subjects they have taken, as well as the thesis. Therefore, the value of titling differs from one country to another, although there is the tendency to regard them as the same within the borders of the European

Union. Consequently, those who in Italy possess BA, BS and/or masters are actually graduates with a yearly specialization course, without passing any exam whatsoever.

Others, in contrast, who do not have a university training, but who carry out the function of head of the staff in the same textile business and/or industrial union, are more concerned about the number of employees they have had along their working career and the connections this individual has with others. Of course there is no authentic information about the continuous changes in the firms where this alleged head of staff works, which may well be for economic reasons e.g. a better salary or because he/she performs organising or managing from his office towards the rest of his colleagues (these two situations of human or inhuman factors are currently not considered by our metrics). In both cases, we see how the star user always seeks to quickly impress the potential readers of the information; one through the text and the other through the numbers. Now, a third example may come from another European mountain area such as the Pyrenees. A person who gets two degrees, because the subjects are akin in both, for instance history and anthropology or journalism and law. Later on, he quits the PhD course in audiovisual taking the credits system by subjects to a master and they finally get a PhD in telecommunications, with the credits obtained in the masters course and making his final thesis in a private university. Simultaneously, he/she presents on-line substantial work experience in private firms. Here there is a third option of false information on-line: textual and numeric.

In the three cases, the textual information is present. However, numeric information can sum up quickly the information for one user, especially if we are talking about percentages or the total number of employees. An important way to boost numeric information and make it more appealing in hypermedia systems is by resorting to graphics [25]. Now, in all these cases we see how the educative orientation of the virtual community in Facebook, LinkedIn, etc., has been destroyed, when the private or business interests have access. If we make a diachronic analysis from the origin of the name, there is a reference to the bulletin that the administration of many universities and high schools delivers to first year students, with the purpose of helping them to get to know each other better. Today, due to the parochialism, this has become an indicator of the reliability as to the truthfulness of the content. in the information. This is not 100% because of the negative influence of the industrial and business sector compared with the transparent and objective information of the academic environment in its origins.

4 Textual Contents: Analysis

When we talk about the veracity and credibility of the information in the on-line and off-line multimedia/hypermedia systems, there are intrinsic aspects of design stemming from the environment of the audiovisual media that are transferred automatically to the hypermedia contents, for example, typography, textual and visual information, etc. [26], [27]. One of them is the lack of credibility of the images in the face of the momentum of the graphic computer programs aimed at the self-editing of photographs and other illustrations [28]. Consequently, the value of the veracity of a

photography is lower than it was at the time of the origin of personal computers, for instance. The reason lies in the possibility of modifying each one of the pixels that comprise it. There is also the possibility of virtually recreating all the bidimensional and tridimensional environments with computers, thereby obtaining identical or superior results to the photography of those real environments. Therefore, in the context of audiovisual media applied to the multimedia systems, the written word usually has a greater veracity than a vectorial or bimap image. In a certain sense, there is a return to the origins of the person-computer interaction, that is, the hypertexts.

For instance, with regard to the same user, in Naymez –Next Level Networking (www.naymz.com), we find the following sentences: (in brackets the people who allegedly send these messages): "Incredible, even a professor can have sense of humour, aside from being a competent professional" (student); "Professor XYZ is an excellent instructor and has allowed me to (something missing) wonders of informatics and ponder the positive aspects of the technology" (baby sister) and "Professor XYZ is a good teacher and excellent team director" (business man). Following the semiotic notions and carrying out an inverse discursive semiotics analysis, as Eliseo Veron maintains [29], we can detect that in reality this is a person who does not have a long teaching experience, does not enjoy popularity and has serious problems in the place where he works, since he is not regarded as a leader. He/She may be the latter de facto, apparently, but he has been imposed by the authorities of that teaching centre and does not correspond to the democratic process of staff selection. These same conclusions can be reached by following the referential links to other Web 2.0 websites: www.youtube.com, www.geocities.com and www.linkedin.com.

By analyzing other members of the group we find an analogous situation in the website "vote the teacher" (www.votailprof.it) where anonymous students amazingly devote themselves to give the highest marks to the professor, writing in sentences which are similar to those above. Here we see how Saussure's notions about the parochialism related to linguistics and semiotics [21] in order to detect the null credibility on-line in the university context. The automatic elimination of those members who have falsified information on-line, for instance, degrees, professional training, etc. or the inclusion of some digital stamp that indicates that there is untrue information.

Annex #1: Information and Manipulation (Veracity = 0)

Dos jóvenes españoles sacan partido de Google Earth

Panoramio.com permite compartir fotografías e incorporarlas en el sistema de imágenes vía satélite

EFE - Madrid - 11/12/2006

★★★★ 233 votos | Vota    



El portal de internet Google Earth, que ofrece vistas del mundo tomadas desde satélites, ha incluido en su servicio las imágenes de Panoramio.com, un proyecto creado por dos jóvenes españoles que permite compartir fotografías y situarlas en el mapa.

These may be some of the alternatives available to get back on-line credibility in these kind of websites. It shouldn't be possible by the author to remove this stamp, that is to say, the author or star (showman/showwoman) of the on-line information. These metrics have made it clear that the pressure groups of the information and news sectors have settled down in the Internet. The digital newspapers are also evidence of this. Sometimes, the news which is closest to the interests of these power groups surpasses in reader numbers the news from the front page of the papers. For instance, information technological news in the digital version of "El País" (two lines) as compared to the news on the coverage of the paper version (see Annex #1). This alleged reading record was reached in only 4 hours (233 punctuation –very interesting). These are illegal actions, manipulative of the real interest of the virtual readers, and they enjoy the unanimity that the Internet gives, when it comes to international law of digital information on-line [30].

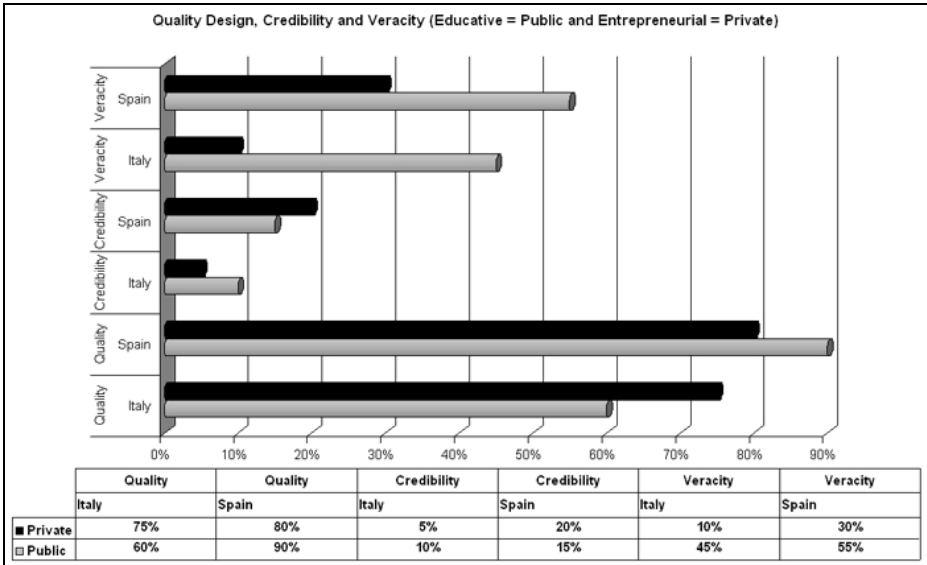
5 Educative-Entrepreneurial Credibility: A Heuristic Assessment

Next we present the first metrics of binary presence [1] for the heuristic assessment of the quality desing, credibility and veracity at the on-line educative-entrepreneurial credibility (in Annex #2 the results):

Table 1. Metrics of binary presence –DECROL (Destroy CRedibility On-Line)

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- In how many search engines does the subject or entity of study appear?
 - Are there real pictures or drawings of the individual?
 - It inserts photographs when he/she laughs sarcastically?
 - Is he/she registered in one or more virtual communities?
 - Is there contradictory information on-line regarding titling, for instance engineer instead of degree holder, or PhD instead of degree holder?
 - Is the inclusion of comments anonymous or not?
 - Is there a CV with the official European format on-line of the analyzed person?
 - Are there friendship or family ties among the different links?
 - Does he/she use more than one language for on-line promotion?
 - Are the areas of interrogative interest more than 12?
 - Does he/she use in the first place the number of employees under his command or professional training?
 - Does he/she use the possessive adjective to refer to his/her collaborators as if they were objects?
 - Has he/she completed any fast track master or PhD?
 - Does he/she constantly change his/her Website?
 - Does he/she attack other colleagues by copying the research issues or the obtained results?
 - Does he/she carry out simultaneously works in the public and private sector?
 - Does he/she send authoritarian messages in the personal websites on-line?
 - Does he/she use the red color to send threatening messages to the students?
 - Does he/she try to sell himself/herself through puff and self-flattering?
 - Does he/she depict himself/herself as a work victim, with an exaggerated number of exams made without recognizing the work of your co-workers?
 - In the publications the acknowledgments because of the made projects or written books surpass a total of 30 people?
 - Does he/she you report about other issues, excluding hobbies, for instance, tastes in fashion, music, foods, travels, etc?
 - Does he/she have inserted a statistics system of all those who enter your web?
-

Annex #2: Results of the Heuristic Evaluation –Quality Design, Veracity and Credibility On-Line



6 Conclusions

The metrics developed in the current work make it clear that the virtual communities generated from the free access college programs in the Web 2.0 have non-credible contents, which are scarcely transparent and seriously endanger the future development of the Internet. The textual information in the analyzed examples is false in 89% of the studied cases. It strikes one's attention that this information, with almost null transparency, stems from the industrial and college environment. In the case of the university there are references to the steady teaching staff in the colleges, and in the industrial case to the managers of the holdings of great international companies. A way to regain the veracity of the textual information is to accompany it with images information such as can be academic certificates. Another way consists in the semiotic analysis when applied to specific speech fields, in order to detect all the fallacies of the emitter of the on-line message, in this case of the web sites.

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References

1. Cipolla-Ficarra, F.: Communication evaluation in multimedia: metrics and methodology. In: Proc. Human-Computer International, LEA, Mahwah, vol. 3, pp. 567–571 (2001)
2. Nielsen, J.: The Importance of Being Beautiful. *IEEE Software* 13, 92–94 (1996)
3. Dromey, G.: Cornering the Chimera. *IEEE Software* 13, 33–43 (1996)
4. Jeyaraj, A., Sauter, V.: An Empirical Investigation of the Effectiveness of Systems Modeling and Verification Tools. *Communications of the ACM* 50(6), 63–68 (2007)
5. Pfleeger, S.: Software Metrics: Progress after 25 Years? *IEEE Software* 25(6), 32–34 (2008)
6. Zittrain, J.: The End of the Generative Internet. *Communications of the ACM* 52, 18–20 (2009)
7. Cipolla-Ficarra, F.: An Evaluation of Meaning and Content Quality in Hypermedia. In: CD-ROM Proc. HCI International, Las Vegas (2005)
8. Cipolla-Ficarra, F.: Homepage and Communications: Quality Metrics. In: Proc. Eight International Conference on Distributed Multimedia Systems, KSI, San Francisco, pp. 202–209 (2002)
9. Ander-egg, E.: *Techniques of Social Investigation*, 21th edn. Hvmantas, Buenos Aires (1986)
10. Cobby, P.: *Introducing Semiotics*. Totem Books, Cambridge (2001)
11. Fenton, N.: *Software Metrics: A Rigorous Approach*. Chapman & Hall, Cambridge (1997)
12. Potts, C.: Software-Engineering Research Revisited. *IEEE Software* 10, 19–28 (1993)
13. Davis, A.: Fifteen Principles of Software Engineering. *IEEE Software* 11, 94–101 (1994)
14. Carey, D.: Is Software Quality Intrinsic, Subjective, or Relational? *Software Engineering Notes* 21, 74–75 (1996)
15. Ghezzi, C., Mandrioli, D., Jazayeri, M.: *Fundamentals of Software Engineering*. Prentice Hall, New Jersey (2003)
16. Pressman, R.: *Software Engineering –A Practitioner’s Approach*. McGraw-Hill, New York (2005)
17. Kit, E.: *Software Testing in the Real World –Improving the Process*. Addison Wesley, New York (1995)
18. Nielsen, J.: *Usability Engineering*. Academic Press, London (1993)
19. Cipolla-Ficarra, F.: Evaluation of Multimedia Components. In: Proc. IEEE Multimedia Conference on Multimedia Computing Systems, Ottawa, pp. 557–564 (1997)
20. Holdcroft, D.: *Saussure –Signs, System & Arbitrariness*. Cambridge University Press, Cambridge (1991)
21. Saussure, F.: *Curso de Lingüística General*. Losada, Buenos Aires (1982)
22. Aranguren, J.: *La comunicación humana*. Tecnos, Madrid (1986)
23. Zeng, D., Wang, F., Carley, K.: Social Computing. *IEEE Intelligent Systems* 22, 20–21 (2007)
24. Lamborghini, et al.: *European Information Technology Observatory*. EITO, Frankfurt (2001)
25. Tufte, E.: *The Visual Display of Quantitative Information*. Graphics Press, Connecticut (2004)
26. Kahn, P., Lenk, K.: Principles of Typography for User Interface Design. *Interactions* 6, 15–29 (1998)
27. Wroblewski, L.: Web-Conscious Content Experiences. *Interactions* 15, 64–67 (2008)
28. Debray, R.: *Vie et mort de l’image*. Gallimard, Paris (1995)
29. Veron, E.: *La semiosis social*. Gedisa, Buenos Aires (1987)
30. Boyle, J.: *Shamans, Software, and Spleens –Law and the Construction of the Information Society*. Harvard University Press, Cambridge (1997)