

Conclusion

Throughout the pages it has been possible to verify the past, present and future of those areas that we consider fundamental for qualitative web engineering in the third millennium. Each of the works presented forms a compass rose for all those who have got lost with the siren song from the depths of the web. The correct and democratizing initial process of the 20th century Internet has been almost totally distorted, with the rise of the social networks, in the 21st century. For example, a trivial and fun idea, a priori, such as generating a virtual community among young students, through the dissemination of their photographs, some personal data, sentimental issues, etc., today has become an entire international corporation, which is included in the triad of world-wide billionaires. That is, together with one of the main software companies (a pioneer in operating systems for personal computers), and the largest representative of electronic commerce and potential manager of the Internet of Things (IoT). Simply put, we are referring to Facebook, Microsoft, and Amazon.

Social media applications are using and updating all the evolutionary components and attributes of computing, such as: interface design, algorithms for compression and decompression of multimedia files. And free access to databases through the different operating systems for the latest generation mobile telephony, the viewing with high definition of real and virtual images in 2D / 3D, among many other resources, which continue to draw the attention of millions of users and software developers, all over the planet. The only problem is the distorted quantification of the communication quality that the large pioneering multinationals in the ICT (Information and Communication Technology) sector try to emulate.

Many universities and their corresponding R&D (Research and Development) laboratories have become mere mercantilist agents, leaving aside the epistemological principles of science and the social and development value of education, from the theoretical and practical point of view. In this sense, it is enough to consider the cult of visual narcissism and the statistics derived from publications in online databases, subsidized directly and indirectly by the taxpayers, through taxes in the EU and UK, to name a geographical area. Some examples are: the cult of Hirsch's index (H-index), Egghe's index (G-index), I10-index (H-10), etc., in Google Scholar and the Web of Science, the counter in the databases university institutions based in Germany, USA, etc.: Digital Bibliography and Library Project (DBLP), the ordered list (descending order) of the supposed main experts or scientists of a nation (www.guide2research.com), among many other escamotages (retractions), some derived from manipulation of information on the web. The common denominator can be summed up in the prevailing slavery in certain research teams in the formal sciences, the incorrect algorithms that do not differentiate between counters and accumulators, the statistics rigged in advance, the press offices related to the same individuals or experts, the persuaders dynamics, influencers of social networks, the loss of power of the traditional media (basically, press, radio, and TV) within fully aligned real and / or virtual communities, among other components.

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The purpose is to show and raise awareness, in the face of the potential social damage of criminals or digital criminals.

The main objective is to generate false realities on the Internet such as fake news that negatively affect the real fabric of production, education, health, etc., of local and global communities, with the need to resort to fact checking, for example. They are very easy to detect through simple heuristic evaluation techniques and methods. Their results put us in front of groups of individuals (Garduñians) or persuasive agents whose mission is to create mirages of reality; generate immutable systems and structures on the web, over time; slow down the solution of the technological gap among the members of the community, and enhance a “glocal” (global + local) social gap (many of these investigations, experiments, etc., are aimed at solving questions thousands of kilometers away, which are indisputably alien to the dwellers of the community, who fund such research). An example are international events (workshops, congresses, symposiums, webinars, etc.) among friends from R&D projects, related to web engineering, information retrieval, advanced visual interfaces, etc. This is briefly the context observed and verified, since the beginning of the democratizing process of the Internet. Consequently, quality on the web remains the great unfinished business in the 21st century, especially in the quantic-nanotechnological-self-sufficient era.

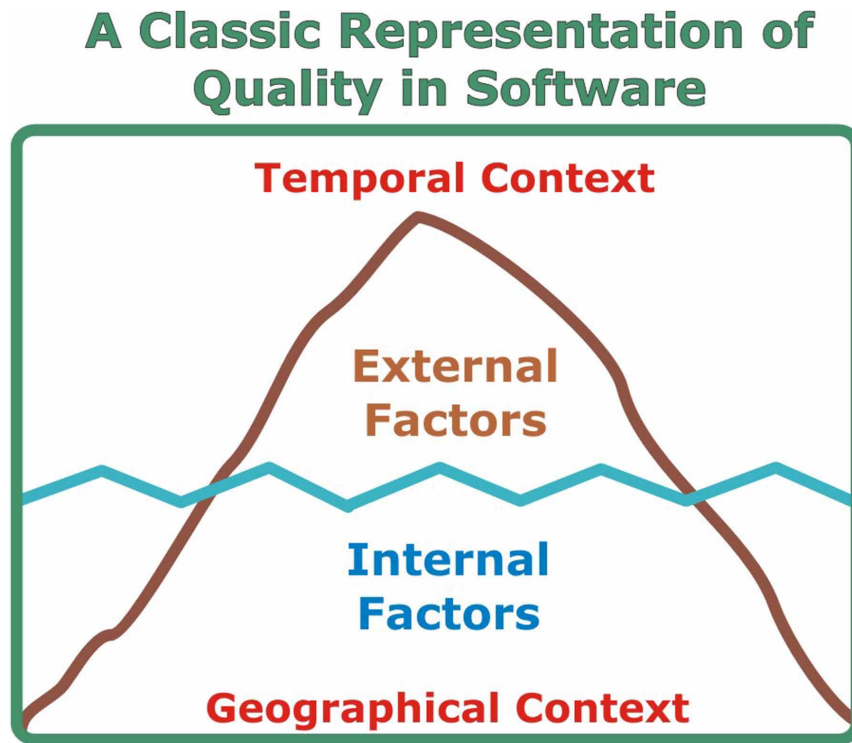
One of the traditional ways of addressing the issue of software quality components in an interactive system is through the use of the notion of the iceberg, with the classic division into internal factors (mode of access to online data, organization of content, etc.) and external factors (use of fonts, colors, illustrations, etc. in the interfaces; ease in obtaining high communication between different types of end users, etc.). To these factors must be added the temporal context, the spatial context, and the human or social factor. The latter is the case of group formation. The human or social factor, depending on behavior, generates a new factor, which can encompass the entire structure or architecture of the system. It is the “G” factor (G = Garduña), which reduces the quality of operation of all computerized systems and their connections (internet, intranet, extranet and ethernet).

The iceberg of the web, currently and graphically, is usually divided into three large areas or sectors: World Wide Web or *surface*, *deep* and *dark*. On the *surface* is the part that is visible and accessible to all end users since it does not require any password, such as websites, Wikipedia, search engines (Ask, Bing, Google, Naver, etc.), e-commerce (Amazon, Alibaba, eBay, etc.), the various social networking applications (LinkedIn, Facebook, Flickr, Instagram, Pinterest, etc., which at the beginning did not require the use of passwords), among others. In the area called *deep*, its existence is verified but it is not freely accessible as it is necessary to enter a password (as currently required by some social media applications). Some examples related to citizens are information academy, medical records, criminal records, financial reports, business intranets, etc.

The *dark* area is made up of portals that use public networks but that require special software or browser to access them and are not found in the main online search engines, in order to guarantee anonymity. In this area, the main users are financial, political, religious among other individuals, who in isolation or in groups, legal and illegal, manage the glocal power of finance, religion, politics, education, health, etc. However, in our days, in that iceberg it is necessary to represent the G factor inside. It acts as a kind of elevator that goes up and down, through the three main areas of the iceberg: surface, deep and dark.

This elevator represents a set of central forces that move freely and immune, influencing each of the systematic and structural aspects of the web. In other words, these forces occupy the central part of the web and expand without limits, throughout the network, changing the spherical shape of the Internet, which traditionally simulated the globe, to an ellipsoid torus. Since the end of the 20th century, these forces have drilled or pierced the sphere, from the two poles, generating a vertical internal space, with

Figure 1. Classic representation of quality in software and all its derivations, including web engineering



an elliptical hyperboloid geometric shape. This new way of representing the real web has its epicenter at the poles of the former sphere, which ideally represented the global village of the communication defined by McLuhan, the worldwide web by Tim Berners-Lee, etc.

This change in shape is a consequence of the spread of high-resolution screens (basically, the latest generation mobile telephony), the rise of social networks and the concentration of information in databases (mainly, search engines). Three elements that are almost essential for daily life, inside and outside the city. Schematically, the dark area gradually absorbs the deep area, and vice versa. This abnormal phenomenon is directly related to an eternal dilemma for humanity in the face of new information and communication technologies, which in Latin is usually summarized with the rhetorical question: “*Quis custodiet ipsos custodes?*” (Who will watch the watchmen?) From the Roman poet Juvenal in his Satires (Satire VI, lines 347–348). The answer is *nobody*.

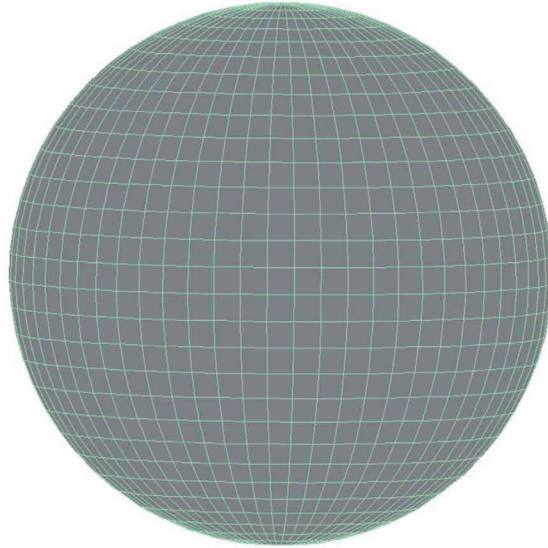
Such a statement can be seen in the collection of examples in the annexes, which in a tragicomic way is summarized in the following comic figure. It is an image that synthesizes the free growth of the negative or anomalous human factor in the new technologies; the loss of the epistemology of the sciences related to computer and systems engineering, software and all its derivations; the infinite expansion of the limits of human-computer interaction, web engineering, information retrieval, etc., from the agents of the formal sciences, such as mathematics and physics, to name a couple of examples.

Now, not everything in computing is human-computer interaction, web engineering, information retrieval, etc. In the same way, not all human knowledge is digitized or found on the Internet. Currently and in this context, end users are in a state of total helplessness. They are only allowed to have the three

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Figure 2. The web, the global village, etc. in the collective imagination of humanity. Sphere with nodes and links that interrelate all human beings, artificial intelligence and the various technological components connected to the network.

An Ideal Representation of the WWW and Global Village

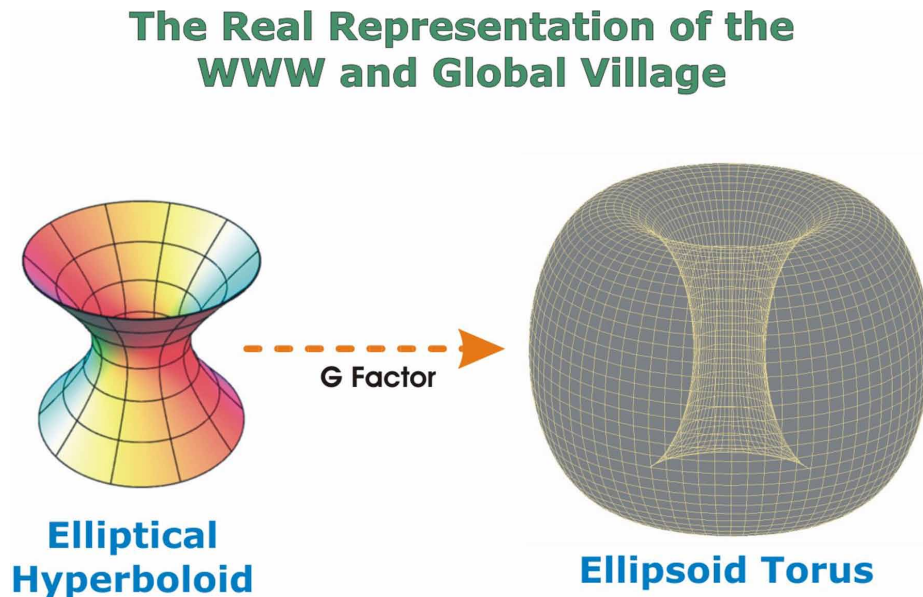


positions of Mafalda (www.quino.com.ar) in figure 5. These positions represent a direct and immutable reference to the ancient culture of the Far East, but today applicable to the rest of the planet.

However, the present research work does not intend to change the world or implement a new international “general data protection regulation”, in the face of an unalterable reality that lasts for millennia. The pedagogical intention is to draw attention to the loss of quality in the multimedia contents of interactive communications, for example, since little by little, the origins of the Internet have been distorted. A fact that can cause irreversible damage in future generations, such as: the inability to work independently, the development of free will, the promotion of creative capacity, the motivation towards scientific knowledge, the ability to perform mental calculations, the interest in serious reading, among many other skills and experiences, innate or acquired by the human being. Exceptionally, the positive aspects of graphic arts creativity have been maintained from interactive multimedia to mixed reality, both in design and in content, moving away from commercial clichés such as: “human emotions”, “user friendly”, “user experience”, “cognitive neuroscience”, “accessibility”, “gamification”, “collaborative learning”, etc.

Now, isolating itself from these human factors and focusing on the technical aspect of web engineering, the future can be represented as a horizontal line with a positive angular coefficient that represents growth in constant evolution, with revolutionary peaks, coming from the hardware. The acronym IoE (Internet of Everything) together with artificial intelligence and quantum computing will mark a new milestone on the Internet. It is the voluntary or programmed connection of “everything”, through the smartphone, such as NFC (Near Field Communication). However, new lines of research aim to overcome

Figure 3. Deformation of the web in the face of negative human factors



audiovisual and tactile contact to communicate through the brain, as are numerous studies carried out within neurology and the brain-computer interface (BCI).

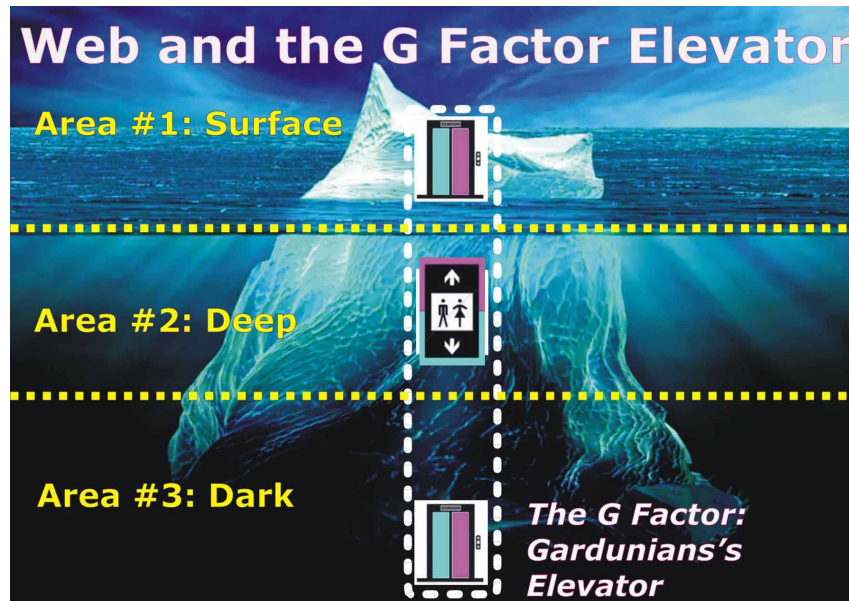
Some studies that undoubtedly move away from the science fiction of visualizing in 3D, the dreams of the subconscious of people, artificial intelligence, supercomputers, etc. such as HAL 9000 (Heuristically Programmed Algorithmic Computer) from the novel (and film) “2001: A Space Odyssey” (Arthur C. Clarke). Science fiction and comics continue to be an inspiring source for creativity in audiovisual arts, 3D animation, innovative design, etc. Therefore, the roles of Web Architect, Web Designer, Web Master, Web community, etc., will remain valid and in persistent progression. The main objective of all of them is to get away from the standardization or automation in the creation of portals or websites, through the corporations that control the storage of information, through search engines. If the latter were to happen, it would entail the loss of wealth derived from the identity and idiosyncrasy of each of the online portals.

In the development of applications for the web, quality attributes (coherence, efficiency, flexibility, robustness, readability, portability, etc.) coming from software engineering, continue to be essential to improve applications related to interfaces, databases, dynamic information media, etc. Therefore, programming languages such as Java, JavaScript, Python, C, C ++, PHP, Swift, Visual Basic .Net, SQL, among others, will continue to be essential in the evolution of web engineering.

However, in this process of continuity we should focus on the technical aspects of programming, leaving aside: the elaboration of models, metamodels, approaches, ontologies, taxonomies, methodological guidelines, paradigms, protocols, platforms, semantics or other types of works, which usually only remain in the realization of a state of the art, bibliography review or update (many without considering the space-time-technological context of the time), or a work-in-progress, etc. All of them will be left unfinished in the end. That is, from the point of view of the epistemology of the sciences, they are a set of sketches, written according to the style guides of computing, HCI, UX, artificial intelligence, etc., but that only serve to increase the counter of the total publications of their authors and / or co-authors in

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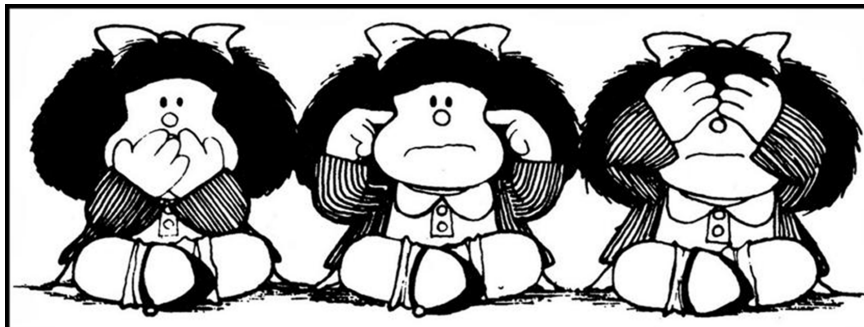
Figure 4. Gardunians's elevator that goes up and down, through the web iceberg



online databases (basically German, American and Dutch), since they do not provide reliable or 100% verified results, as well as new visions, challenges or horizons in the long term, in the central aspects of web engineering, multimedia, augmented reality, mixed reality, recommender systems, etc.

Besides, many individuals at the top of those lists, alone or autonomously, are not able to configure a server, a firewall, program in Assembler, C, Delphi, Java, JavaScript, PHP, SQL, etc., or use applications for multimedia publishing (Corel Draw, Dreamweaver), computer graphics and animation (Rhino, Maya, Lumion 3D Rendering, SolidWorks, etc.), audiovisual editing (Adobe Premiere Pro, Lightworks, Avidemux, etc.) and a long etc. Although they belong to the group of European lifelong civil servants, such as full professors, associate professors, etc., of masters, doctorates, post-doctorates, etc. This is

Figure 5. An international comic character such as Mafalda, perfectly illustrates with his various positions the state of the art of the user in front of the large Internet corporations and their main online applications, culturally linking with the three wise monkeys from the Far East



the reason why in countless university study centers they promote inter / trans / multi / intra / extra / ... disciplinarity among their students of the new technologies.

Before concluding, our eternal gratitude goes to all those who are no longer with us due to the Covid-19 pandemic: Prof. Dr. Kim H. Veltman. Once again, thank you very much for your life teachings, all the help received and the good times we have shared.

Without forgetting or ever forgiving sadism and all the injustices that you have suffered, directly and indirectly, for more than a quarter of a century, in the completion of a doctorate “walking for a long decade”, at various Spanish universities and “without a real guide in Spain or any European tutoring”. Interestingly, many of those European PhD pseudo-tutors, who only like to appear in the acknowledgments section in student research papers, belong to the field of mathematics and computer science, for example.

In a quarter of a century, its metamorphosis from the field of formal sciences (mathematics or physics) towards human-computer interaction, UX, design, etc. has been seen, not only in the educational field, but also related to medicine. The reason for the anomaly is the intrusion and destruction of the social sciences, coupled with intellectual comfort. That is, to avoid the questions that involve using neurons to solve basic questions or not, related to the field of study itself. Some examples are the analysis of the complexity of algorithms, quantum computing, the development of algorithms for computer security, etc., or trying to find the solution to the main problems of the millennium: Riemann hypothesis, P versus NP problem, Birch and Swinnerton-Dyer conjecture, Hodge conjecture, Navier-Stokes equation, Yang-Mills theory, and Poincaré conjecture –www.bbc.com. Through HCI, UX, Web Engineering, etc., and the network derived from the G Factor, is an easy way to increase publications and see the counters increase rapidly in Hirsch’s index (H-index), Egghe’s index (G-index), I10-index (H-10), **index** Impact, etc., in Google Scholar, Web of Science, Mendeley, etc.

With the passing of time, keeping up dignity, freedom and resistance to the G Factor, together exceptional professionals (i.e., prof. Dr. Kim H. Veltman), this germ has transformed all dysfunctions into a single function: to form a team of excellence of human beings in the new technologies, distributed in the four cardinal points of the planet. All of them make up the vital “kernel” of our activities, in a modest and honest way, as has been the compilation and realization of this book of research.

Across the time of preparing this compilation of research works we have lost the company and guidance of wise professors such as Enrico Bianco, Mario Bunge, Jennifer Brown, Andrea Carminati, Tomás Maldonado, Teresa Marinovic, Luca Paganelli, Ana Pérez, Marcela Ríos, Federico Rodríguez, Marta Romero, Lucia Serra, Mark Thompson, Kim Veltman and Laura Zamora. Some of them have left us prematurely due to the coronavirus. We want to thank all of them infinitely for their kindness in transmitting their wisdom. In addition, the sign of healthy and true friendship, in the unforgettable moments shared for decades. Our gratitude from the soul and the mind, to all of them for their teachings and samples of kindness received.

We close these pages, with the following set of famous quotes, hoping that they can guide and motivate you in everyday life: “*The two most important days in your life are the day you are born and the day you find out why*” (Mark Twain); “*Logic will get you from A to Z; Imagination will get you everywhere*” (Albert Einstein); “*If you obey all the rules you will miss the fun*” (Katherine Hepburn); “*The best and most beautiful things in the world cannot be seen or even touched. They must be felt with the heart*” (Helen Keller); “*You cannot shake hands with a clenched fist*” (Indira Gandhi); “*To improve is to change; to be perfect is to change often*” (Winston Churchill); and “*You may never know what results come of your actions, but if you do nothing, there will be no results*” (Mahatma Gandhi).