Preface

Quality is an attribute that increases over time in users who interact daily with interactive systems. The quality is usually associated with the notion of beauty. That is, something that people like and that is easier to detect in its absence than in its presence, because it is currently considered as something implicit and essential in the software of the new millennium.

If these people interact with other people through interactive systems, they require not only speed and precision in the interaction process but also a qualitative communication with multiple addresses between users (grouped or isolated), traditional computing devices, latest generation hardware, etc.

In the generation of interactive systems, software engineering plays an essential role in including, evaluating, increasing and maintaining quality levels so that the associated hardware works in the best possible way. That's the reason why the professionals of the social sciences were included in this domain since the '90s. At that time, the main theorists of software engineering expressed the need to include sociologists, psychologists, pedagogues, among others, in the programming of the computer systems. However, with the boom and democratization of the hypertext, multimedia and hypermedia systems and hardware, together with the democratization of the Internet, other, broader needs were generated in software engineering, from the design, evaluation, tuning, production, etc. of interactive systems in augmented / mixed / virtual / extended reality, etc.

The new interactive systems began to incorporate texts, video, audio, computer animations, etc. In other words, it was necessary to meet the growing demand of users with dynamic media rather than static media, such as text, photographs, drawings, etc. Dynamic media where the notion of quality was not always present in commercial interactive systems and with international distribution, for programming reasons, as for example, synchronizing audio with moving images. As the multimedia information supports were evolving in storage capacity (CD-Rom, CD-Interactive, DVD, HD-DVD, etc.), access to information, development of new algorithms in indexing the records of the databases, etc., went from the usability of the systems to the communicability in the interaction.

It is in communicability, that is, the quality of interactive communication, where software engineering has its greatest challenge for the coming years, especially for new generations of users of interactive systems. At the end of the 20th century and the beginning of the 21st century, the foundations were laid for generating a new expert in communicability, with the purpose of enhancing software programming of new interactive devices (hardware), ranging from multimedia mobile telephony, the microinformatics, to interactive robotic systems that use artificial intelligence.

In this wide range of rapidly evolving hardware, the software must accelerate its development, so as not to be left behind for reasons of poor quality or programming failures of the systems that allow the operation of new hardware. A quality whose presence the end user senses from the interfaces down to

the timing of the answers and precision of the operations carried out with the computers, irrespective of the device that he/she is using, whether or not it is connected to the network, whether it has artificial intelligence or not, among many other aspects related to information and communication technologies.

The timing of the development of the software has been reduced by the constant advances of hardware, which make the hardware go ahead of the software. The inclusion of experts in communicability in the software industry has allowed to speed up the timeframes in the commercialization of new technological products worldwide. However, this constant evolution of the software in face of the hardware revolution opens up a host of new horizons to maintain and increase the quality of the interactive systems, following a set of standardized norms and rules for the production of interactive software. Currently, we can see some efforts towards this goal, but they are still partial solutions, incomplete and flawed from the theoretical as well as practical point of view, if the quality of the interactive design is analyzed down to the training of the professionals in order to generate systems that are efficient, reliable and user-friendly, cutting-edge.

Reliability, efficiency and acceptability are some of the attributes of the traditional software applications, and therefore, of the interactive systems. In the process of generating new software for new interactive systems, the fundamental stages such as requirements, design, development, verification, validation, and production, properly speaking, are maintained. In each of them, the human factor and social factors are present. That is, it is necessary for the software developer to understand that his/her responsibilities extend to the whole of society. This is another area where there are gaps, both theoretical and practical, with regard to the context for which the quality of products and services must be developed, maintained and increased, as well as oriented towards new interactive systems.

In this sense, in our days, it is easy to detect an endless number of professionals in the formal sciences, such as physicists, mathematicians, industrial engineers, etc. who strive to understand the psychological, sociological, anthropological, etc., aspects of the potential users of the multimedia systems in mobile telephony, for the ergonomic development of new electronic devices linked to information technology and telecommunications, and also to offer them high quality services in the interrelationships between people and computing devices.

In short, what is intended is that software engineering can offer the potential users of interactive systems high quality services, with reduced costs and with reduced production times to the maximum. It is a triadic relation nonexistent at present, if one considers the communicability or the stages necessary to generate innovative software, taking into account the real context of the users. There is no style guide such as the steps to follow to develop an intercultural interface for the operating systems of the late twentieth century, in keeping with the principles derived from the notion of usability in the software.

Nor is there a set of theoretical and/or practical works that can constitute a kind of model with regard to the dynamic and static medias of the modern interactive systems. We continue to use a group of experts or professionals from the formal sciences and factual sciences to solve the classic problems of interactive design flaws, belonging to the exclusive field of usability, and software engineering of the ‘90s. In other words, there is no evolution but rather an involution from the point of view of interactive design, for example.

In the ‘90s, with the rise of the notion of software quality, especially with the dissemination of offline interactive systems, there was a growing need to incorporate social science professionals in the software industry. Subsequently, with the democratization of the internet and the transfer of audiovisual content to the network in the transition from the old to the new millennium, there was a need to incor-

porate computer technicians in the context of the social sciences, especially those oriented towards the digitized information online.

Until then, interactive systems were programmed, evaluated and produced by interdisciplinary teams, where quality was evaluated, without an accurate methodology or style guide, especially in the context of the commercial interactive systems for education, entertainment, public information, etc. One proof of this assertion is to be found in the style guides for programming the interfaces of those applications that worked with two of the main personal computers of that time: those compatible with IBM/PC, that is, Windows, and Apple computers, in other words, Macintosh Operating System (MacOS). In both cases, there were some interface designers who tried to generate a synergy between those components that were common between the two.

Now, when we talk about interfaces and information architecture, they are important components of software quality, and they are directly and indirectly related to the notion of beauty, but the latter depends on other components of the software, particularly, in the field of the interactive systems. In this regards, it is possible to mention, among others, the types of access to the databases, the programming language used, the compatibility of the different operating systems, and the ideal data processor for the best functioning of the interactive applications.

That is to say, the presentation of the information in the interface, that the new generations of users of interactive systems or generation Z consider intrinsic for the quality in the interaction, in reality is only one among the group of components of the different categories that make up the interactive application, from the moment of conception of the system until the verification of its correct functioning.

In this sense, there is no reference to the possibility of carefully dividing and analyzing the quality of the software, from the perspectives of interactive design, for example, covering, navigation through content, the structure of interactive information in database, the synchronization of dynamic and static media, the compatibility of multimedia content, among the various devices of last generation, among other categories.

Nor is there a set of works that can serve as references for future lines of education and research, concentrating human and financial resources towards progressive sectors, in the short, medium and long term. Moreover, there is no vademecum or guide of technologies related to communication and interactive information, which focuses the attention of students and future professional on the constant inventions and discoveries of those components related to hardware, in order to increase the quality of the software.

Simultaneously, there is no ideal model of knowledge that should be gathered by future experts in the software quality of interactive systems, given the existing chaos in the field of design, evaluation and fine-tuning of systems, with professionals who lack the necessary theoretical bases, since many of them come from areas of knowledge unrelated to the academic training in computer science, software engineering and systems, multimedia engineering, telecommunications engineering, to mention some disciplines related to the programming of interactive systems of last generation.

Our intention is to generate a first guideline to be consulted and considered at the moment that the subject of the quality of the software and human factors applied to the interactive systems is approached. The selection of works that are included has a theoretical-practical vision and excludes the chaos coming from the use of the notion of interdisciplinarity with commercial, pseudo-educational purposes that lack scientific foundations. Simultaneously, the present work aims to correct the aspects that distort the dissemination of progressive scientific knowledge in the interactive applications, in light of of the constant revaluation of notions overcome by the passage of time, in the field of software engineering.

This objective implies an in-depth selection of those technologies, current and future, that will continue to establish milestones in the constant democratic evolution of information societies. That is, there is a review of the past and present of information and communication technologies, with a projection towards the future, indicating the paths to be followed by the current and future generations of teachers, researchers, software producers, etc. Furthermore, the quality of the software is analyzed, from the design phases to the use, irrespective of whether the objective of the end users is leisure (e.g., videogames), information (the map of the main touristic places of a city, the schedules of public transport services, etc.) or education (consultations of online books of a digital library, downloads of practical exercises in computer science, electronic, chemistry, languages, geometry, etc.).

This establishes a first set of links between the basic components of software quality and interactive systems, which will be immutable in the coming years, and which serve as a guideline in R&D projects, transfer of knowledge between universities and industry, creation of new companies, demand for new professionals, implementation of new masters, generation of continuing education courses, etc.

The main ideal contexts/professionals are: students, professors, researchers, programmers, analysists of systems, computer engineering, interactive designers, managers of software quality, human-social factors experts and evaluators of interactive systems. Besides, professionals working in education management, R&D projects, management in the field of software industry (e.g., design, evaluation, programming, users satisfaction, system and software engineering, usability engineering, web engineering, etc.), among others interested in locating trends in software quality oriented to interactive systems.

Many of the chapters have been presented orally and compiled in the following international conferences, symposiums and workshops (2018-2020): Advances in New Technologies, Interactive Interfaces and Communicability (ADNTIIC), Communicability, Computer Graphics and Innovative Design for Interactive Systems (CCGIDIS), Evolution of the Sciences, Informatics, Human Integration and Scientific Education (ESIHISE), Horizons for Information Architecture, Security and Cloud Intelligent Technology (HIASCIT), Human-Computer Interaction, High Education, Augmented Reality and Technologies (HCIHEART), Human-Computer Interaction, Telecommunications, Informatics and Scientific Information (HCITISI), Human-Computer Interaction, Tourism and Cultural Heritage (HCITOCH), Multimedia, Scientific Information and Visualization for Information Systems and Metrics (MSIVISM), Quantum Information Technologies Applied to Nature and Society (QUITANS), Research and Development in Imaging, Nanotechnology, Industrial Design and Robotics (RDINIDR), and Software and Emerging Technologies for Education, Culture, Entertainment, and Commerce (SETECEC). Some presentations whose times range between 45 and 75 minutes, depending on the type of work to be presented. That is, the authors have to fully explain the works developed, both from a theoretical and a practical point of view. Consequently, these are unplanned international events for the fleeting mini-presentations of their authors, following the commercial model, of door-to-door sellers of goods and / or services. Now, a brief description found in each of the chapters:

Chapter 1. The first chapter, "Software and Innovation: Discovering Invisible High-Quality Factors", describes those fundamental elements that from the origins of the Internet have been shaping new academic and work areas, such as web engineering. Focusing on the point of view of software and design, it examines how in the educational and scientific field the exact limits of the disciplines have been expanded, until practically eliminating the pre-existing borders that respected the epistemology of the sciences, when referring to the current HCI and UX. There is also research on the evolution of software, interactive systems, the emergence of new professions related to the web, and their future, where the role of university training centers is highlighted. Finally, Francisco V. Cipolla Ficarra presents each

of the components inside and outside the network have been transforming the democratic or horizontal principles that the Internet had in the '90s is disclosed in detail, until the appearance of authoritarian or vertical structures in the new millennium.

Chapter 2. The authors of the research work "Quality and Web Software Engineering Advances" are Francisco V. Cipolla Ficarra, Alejandra Quiroga and Miguel Cipolla Ficarra. They have focused on presenting the invisible factors that enhance or slow down the software industry, oriented to the development of interactive systems, in the most varied supports of digital information, from the end of the 20th century to the present day. The study begins by highlighting the importance of language, as a natural communicative process of the human being, until it reaches the languages of computers. The diachronic vision in time allows to establish parallels and projections towards the future, especially within internal, external, temporal, geographical, human and social factors, which directly and indirectly affect the quality of software and innovation. There is constantly a call for attention to the distorted elements of software that affect the evolution or revolution of hardware, such as the example of inversion of the communicative pyramid, belonging to the model established by Lasswel and Shannon, or the notion of linguistic ambiguity. Finally, the myths and realities are summarized, focused on the new professionals in the software sector and all its derivations, within the context of ICTs.

Chapter 3. In this research, "Masters of Imagination: From Hierarchies to Connected Swarms", Jaap van Till, TheConnectivist, describes crucial drivers and incentives behind the recent huge success of Internet and ICT. Imagine Covid lockdowns without them. And he shows the directions in which use of those technologies can lead economy and society. Cooperation of diverse & unique people and new 'Digital Democracy. Early days Internet was 'sold' to managers a way to share expensive computer centers of universities, while in reality it was used on a massive scale for email and cooperation between scientists. More recently Internet & ICT is misused for mass advertising consumer stuff and propaganda & election influencing. Jaap shows however that this misuse is only based on the first of five network effects. Communication and Cooperation between people are more powerful in the sense that instead of 'value extraction' for the few, they are resulting in 'value creation' for all participants and synergy. This chapter is hopeful, but we must go through huge transitions in mindsets and new priorities. ICT and Internet use will shift to handling of images and patterns and will require imagination. Some extraordinary people, immune to propaganda, who can lead the way in those transitions are described. And the successor to AI.

Chapter 4. The author of this chapter, "The Universal Knowledge Machine", is Alan S. Radley (scientific director of the Kim Veltman Institute of Perspective). He has examined a technical prescription for a Universal Knowledge Machine (UKM) – or World-Brain – the same being a proposed global media system with the capability to encapsulate/organise/index – and provide userfriendly access to – all human knowledge. This key topic encapsulates several widely-felt end-user needs of great interest currently for the educational context such as how ubiquitous mobile technologies can be employed to build/access a collective knowledge repository – a vast 'living 'memory bank – for everything known. Accordingly, we present a review of all those research, commercial and didactic resources linked to concepts of the 'World-Brain' technology to boost or foster learning in the classrooms (and also in wider real-world contexts(s)). An interesting historic vision of current and past attempts to build a 'World-Brain' has been included by the authors. Said vision(s) can quickly place the reader in context with respect to the evolution of the 'World-Brain' and Internet technologies that have been used with didactical purposes in the classrooms of high schools and universities (to mention two examples in the last several decades).

There is also a bibliography which may be looked up by those interested in widening the 'WorldBrain' concepts that the author present's in the chapter.

Chapter 5. The authors of the work "Experiences With Computer Architecture Remote Laboratories" are Pablo Godoy, Osvaldo Marianetti and Carlos García Garino. They have used remote and nomadic laboratories to teach and research issues related with computer architectures and networks at Universidad Nacional de Cuyo and Universidad de Mendoza during several years. Four architectures have been used to build the remote laboratories presented in this chapter: remote procedure calls, IoT platforms, VPNs and remote desktops. The chapter begins with an introduction to remote and nomadic laboratories. Advantages and disadvantages of this tool against simulations and experiments over real equipment are discussed. After, block diagrams, advantages, disadvantages, problems, and usage experiences of the remote laboratories deployed by the authors are presented. These remote laboratories are based on Raspberry Pi computers and Arduino microcontrollers, both technologies widely known by computer and electronic researchers and students. Bibliography which may be looked up by those interested in further knowledge about these architectures and implementation details are provided. Finally, two promising future research directions are presented.

Chapter 6. Under the title of "The Method and Tools Development for Web-Cameras Color Correction in Binocular Vision Systems", its authors Konstantin Dergachov, Leonid Krasnov, Olexander Cheliadin, and Olexander Plakhotnyi present us a complete research about the fundamental and primary possibilities of using an adaptation principle in application for organizing the close-loop life circuit of autonomous fly vehicles. They have focused on the Stereoscopic Vision Systems; Video Stream Images, Color Correction, Web-Cameras Stereo-System; Joint Rectification and Color Balance of the Left and Right Chambers. The main areas of the chapter are: Theoretical framework; Construction of a separate camera color correction algorithms; Essence of the proposed color correction method; Calibration and rectification of web cameras stereo pair; Efficiency assessment of the used color correction algorithm; Laboratory stand and stereo vision research program: Experimental research and main results; Conclusions and Future research directions. The excellent figures enrich each one of the different sections. In this research we can see that the good quality and convenience of the procedure for calibrating the stereopair cameras and the rectification of channel images provides high accuracy of distance measurement and the construction of maps of the depth of the scene. This creates prerequisites for solving a wide range of applied tasks in the field of mobile robots navigation, 3D scene reconstruction, pattern recognition, etc., taking into account the volumetric characteristics of objects.

Chapter 7. The author of the chapter "A Communication Model Based on Fractal Geometry for Internet of Things" is Sergio A. Salinas. He presents a communication model based on fractal geometry for IoT applications. Communication systems will play a fundamental role in the development of IoT scenarios where a large number of devices will constantly exchange information to perform in some cases critical tasks. The work describes a decentralized model where any node is able to be located based on its identification in the system. Besides, this work describes a new model and define the equations to measure the performance of unicast and broadcast services. Some main concepts defined by the author are: Fractal Geometry (it is a geometry structure composed of unlimited number of nested substructures with the same shape); Broadcast Service (it is an algorithm to send a message from one node to all other nodes in a communication network); Unicast Service (it is an algorithm to send a message from one node to another node in a communication network); Scalable Communication System (it is an infrastructure capable to include a growing number of nodes without affecting significantly the quality of communication services); Smart City (it is an urban area where different cyber-physical

systems interact to provide services to citizens based on the Internet of Thing infrastructure); Smart Grid (it is a electrical networks managed by cyber-physical systems supported by the Internet of Things infrastructure), among many other words.

Chapter 8. The author of the chapter called "The Science of Smart Things" is Alan S. Radley –scientific director of the Kim Veltman Institute of Perspective. He has examined a theoretical prescription for a new Science of Smart Things – whereby it is claimed that within 20-30 years, over 1 billion Things will be connected to the Internet. Henceforth provided is a foundational framework for the entire field of: the Internet of Things (IoT); and by means of logical, integrated and holistic perspective(s) –combined with use of the scientific method. However the IoT has come to mean more than just connected Things –but rather relates to Things that are imbued– at the same time, with useful abilities surrounding the concept of 'Smartness' and/or with what are named here as 'Situated and Distributed Intelligence(s)'. Accordingly, the author examines key aspects of how to embed intelligence in the environment –both in a moving and also in a stationary sense– and hence the developed theory is of great interest currently for educational context(s) such as the use of ubiquitous mobile technologies by people going about their daily business in a wide range of contexts. The work presents a review of all those didactic resources linked to the IoT to boost or foster learning both inside and outside of the classrooms. In parallel, the author has developed n comprehensive series of tests with the goal of verifying the impact of the discussed IoT Framework for ubiquitous mobile technologies in the classrooms. An interesting summed-up historic vision of the IoT has been included by the author.

Chapter 9. In this chapter, "Autonomous Communication Model for Internet of Things", a new communication model is presented by Sergio A. Salinas to create an autonomous communication area that can be implemented in different domains of IoT as a smart city or industrial zone. It is a representation of a communication structure where nodes can exchange messages autonomously independently of the Internet infrastructure, and IoT is a communication infrastructure based on the Internet to connect heterogeneous devices utilized by cyber physical systems to assist diverse human activities. The new model enables access to a message exchange service between two nodes. A Cartesian plane is defined where the nodes' position depends on their geographical positioning information. The positioning data in the plane makes it possible to create a communication path between two nodes. The exchange of messages is done through a selective routing algorithm that uses a mark value to select the nodes that define a communication route. The main areas of the research are dynamic routing algorithm, ranking of neighboring nodes, analysis of operational feasibility and analysis of communication routes. Although the results obtained are preliminary, they provide evidence on the feasibility of creating a communication system independent of the Internet that can operate in certain cities in emergency scenarios.

Chapter 10. In the research work "The Analytic Hierarchy Process as a Method for the Selection of Resources in the Cloud", the authors –Hugo R. Haurech and David L. la Red Martinez, have examined a paradigm that is constantly evolving and therefore of great interest to organizations, such as the use of ubiquitous technologies and how the resources that are part of them can be selected. The work presents a review of the main aspects of cloud computing, which highlights the models that offer services and that can be accessed with any device and from anywhere. In addition, they have presented the technology that, among others, is considered of major importance for cloud computing to achieve elasticity and scalability. Those services, resources and now providers are part of the analysis to determine which best fit an activity. Accordingly, they have intensively developed a selection method based on weight assignments and equations as an alternative for decision making and selection, known as the Hierarchical Analytical Process. A real case of resource selection has been developed with the objective of knowing

the alternatives of providers and infrastructure resources, in order to understand the procedure of the model. The authors have paid attention to present the details of the use of this model so that it can be taken as an example for readers. It also includes the bibliography that was part of the chapter and that can be consulted by interested parties to expand the concepts that the authors have presented.

Chapter 11. The research titled "Exploring Antecedents to Adopt Mobile Augmented Reality Applications: A Uses and Gratifications Approach" has been developed by the following authors: Irem Eren Erdogmus, Pelin Serefhan Doganay, and Görkem Vural. The work explored the user motivations to employ mobile augmented reality applications against the hindrance of perceived risks, and tried to understand user acceptance and willingness to use this technology, and possible marketing-related outcomes. Some main keywords of the research work are: Augmented Reality; Virtual Reality; Uses and Gratifications; Technology Acceptance Model; Perceived Ease of Use; Perceived Usefullness; Brand Loyalty; In-depth Interview; and Focus Group Interview. The authors highlighted the importance of AR applications for the future of consumer-brand relationships. Besides, the relevant research showed that information-providing, practical and enjoyable experience should be blended together to provide a usefull AR application, that will create a difference for the brands, and lead to positive consumer reactions. Finally, in a didactic way the authors present tables to demonstrate the transcendence of the heuristic evaluation (profiles and interviews) as well as the obtained results.

Chapter 12. The chapter "Students in Socially Vulnerable Contexts: Discovering Their Entrepreneurial Potential" is a research carried out to assess the entrepreneurial potential of students who attend the Job Training Institute from Cuatro Vientos Educational Center (*Instituto de Capacitación Laboral del Centro Educativo Cuatro Vientos*, in Spanish), where those who participate in its activities are prepared for a quick insertion into the world of work. A survey was developed by Silvia V. Poncio, Daniel Tedini, Veronica Castañeira, Diego E. Marzorati, and Eric H. Roth (authors) that based on an adaptation of the resource used by the Association for Training, Research and Development of Entrepreneurship (AFIDE –*Asociación para la Formación, Investigación y Desarrollo del Emprendimiento*, in Spanish), in the research project for the Entrepreneurial Potential of Latin American Undergraduates (PEUL –*Potencial Emprendedor de los Universitarios de Latinoamérica*, in Spanish). Despite growing up in contexts of vulnerability and in times of uncertainty, it was identified that most of these young people belonging to the "Millennials" and "Z" generations would like to have their own business or entrepreneurship as a future opportunity for employment. Furthermore, in coincidence with the characterization found for these generations, all of them present skills indicating that they have entrepreneurial potential, which can facilitate an improvement in their quality of life, reduce the possibility of economic and social vulnerability and develop tools and attitudes to meet the demands of the society.

Chapter 13. "The Language of Cinema Fosters the Development of Soft Skills for Inclusion and Interdisciplinary Learning" is a chapter that presents research on an Italian education project implemented with immigrant students. The authors are Annamaria Poli and Daniela Tamburini. This research proposes an educational experience characterized by an interactive approach among different disciplines. The film was used in multiple ways as a tool and/or resource for the teaching-learning process focused on developing school inclusion students (cinema is present in Italian educational and school settings to a very limited extent). The primary objective of the authors were to incorporate the cinema into the construction of an interdisciplinary teaching/learning process, while seeking to integrate theory and praxis within a collaborative professional development and research model. In other words, the virtuous relationship to be established between cinema and vocational secondary education also underpinned our project from a pedagogical viewpoint, especially in terms of identifying connections between the

aesthetic dimension characterizing film and the educational/didactic dimension of schooling. The use of cinema has allowed the design of activities for an interactive learning and teaching system in which digital technologies have played a decisive role. The project activities were designed in keeping with European Union recommendations on core competences for ongoing learning.

Chapter 14. The work "Comparative Analysis of ACO Algorithms for the Solution of the Travelling Salesman Problem" presents the results that were reached during the research process and the authors are Gloria L. Quispe, Maria F. Rodríguez, and José D. Ontiveros. Yes, variants of the original ACO algorithms have been proposed, some of them being more successful than others. Ant colony-based optimization is a relatively young methodology compared to other stories such as evolutionary computing, taboo search, or simulated annealing. But it has been shown that these algorithms are quite flexible and efficient. For this reason, the objective was to analyze the algorithms based on ant colonies applied to the problem of the Commercial Traveler. To achieve this objective, the information related to these algorithms was collected and analyzed, to then compare their characteristics and understand the operation of each one of them, as well as evaluate the efficiency of each one with respect to the traveling salesman problem, it was tested with three instances of problems from the TSPLIB library, obtaining solutions very close to the optimum. So the authors of this work have come to conclude as future contributions: Analyze the operation of other algorithms based on ant colonies and identify characteristics that can be incorporated into the proposed algorithm; Apply other techniques of Artificial Intelligence regarding the proposed algorithm, and Identify problems from different areas that can be treated as optimization problems to apply algorithms based on ant colonies for their resolution.

Chapter 15. The authors of the work titled "A Survey on the Techniques to Improve the Visibility of Geospatial Resources on the Web" are Saif Ansari, Piyush Kumar Shukla, Rajeev Pandey, and Rohit Agrawal. They present a state-of-the-art about Geospatial resources on the web. The study starts with the detailed definition of the terminologies in the research (e.g., Search Engine Optimization Techniques for increasing the discoverability of websites; SKOS, Ontologies and Thesauri; Web Map Services; Folksonomy, Logsonomy and Semantic annotations; Georesource Crawler and GSE) until the comparison of various methods that have been employed for increasing the discoverability of geographical resources. Furthermore, throughout the work the authors explain in a gradual and thorough way each one of the presented concepts: spatial data, geospatial metadata, spatial data infrastructure (sdis), geo portals, geospatial data discoverability, surface web, deep web, search engine optimization, etc. In this chapter, they can appreciate that requirement for geospatial data is increasing but the availability of geospatial resources is limited to geo communities. Comparion tables are explained in the literature review to promote future lines of research.

Chapter 16. The authors of the chapter "Developing M-Learning and Augmented Reality Multi-Platform Applications" are Susana I. Herrera, Paola D. Budan, Federico Rosenzvaig, Javier Najar Ruiz, María I. Morales, Marilena del Valle Maldonado, and Carlos A. Sánchez. They examined the problem of the development of multi-platform mobile applications that uses augmented reality. In this complex problem many aspects are involved: Multi-platform software development frameworks; Hardware access libraries; 3D objects repositories access libraries; Image-rendering libraries; 3D objects characteristics for AR, among others. A general conceptual model that makes it easy to consider all the components that participate in this type of applications was produced. This model provides a map that shows which are the main elements to be considered while developing multi-platforms mobile applications with AR. To give an example of how to instantiate that general model into a concrete model, an m-learning practice for Linear Algebra was designed using MADE-mlearn and a multi-platform mobile app, AlgeRA,

was developed. Also shows the characteristics of the 3D model created for AlgeRA. The findings are considered useful for software engineering practitioners developing these types of applications, mainly in the field of education.

Chapter 17. "Results of the Research in the Comparison and Analysis of Historical Artifacts' Photographic Images Catalogued in Online Databases: The Case of a Roman Stele From Ravenna" is the title of the work submitted by its author: Marco Tedaldi. It is a valid example of a study of cultural heritage with modest technological resources but with an exceptional use of the technique of direct observation, traditionally used in the social sciences, usability engineering, human-computer communication, etc. A technique that can be a source of important discoveries as is the case analyzed. This indicates the high professionalism of the analyst who uses it, since he previously has extensive theoretical knowledge of the subject analyzed and has the necessary technological instruments to verify the hypotheses, which he formulated at the beginning of the study. In this heuristic work, the importance of the analysis of the images stored in the databases is highlighted, as well as the value of digital photography. The author explains in a detailed way, in each of the sections, the steps that he has followed for the magnificent discovery that Marco Tedaldi has made in the archaeological field of Roman culture. In short, archeology continues to be a constant source of inspiration for future research, thanks to the development of new technologies but coupled with the high professionalism of cultural heritage researchers, as can be seen in this chapter.

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