Preface

Human-Computer Interaction now occurs in every discipline, making it uniquely multi-disciplinary. Whilst we embrace this ubiquity, this pervasiveness of our discipline has led to its neglect. Despite the longevity of interest and the plethora of research activity in the field of Human-Computer Interaction, any cursory glance at the available applications suggests that the field has not progressed since Doug Engelbart was a graduate student.

That which constitutes the space we have routinely assigned as “the interface” has undergone a revolutionary change not seen since Gutenberg’s press in the 1440s. Humans now interact with computers in ways never before imagined. It is this “imagined” space that we aim to explore. This book will range across a variety of emergent and innovative approaches, yet always with the active participation of the human element as the still point of the relationship between the human user and the digital realms with which they interact.

This book aims to address the main issues of interest within the culture and design of interaction between humans and computers at the interface. In particular, this book will emphasize emergent and innovative aspects of design, development, and implementation of interfaces for interactivity between humans and the technologies they routinely use.

In addition, this book aims to explore and discuss innovative studies of technology and its application in the implementation of interactivity in interface design and development and welcomes significant research in Interactivity and the Human Computer Interface (IHCI). This book aims to address a range of approaches including, but not limited to, the conceptual, technological, and design issues related to these developments.

This book is mainly intended to support an academic audience (academics, university teachers, researchers, and post-graduate students – both Master and Doctorate levels). In addition, this book will be of benefit to public and private institutions, HCI developers and researchers, HCI enterprise managers, professionals related to Information Systems and ICT sectors, and those who seek to reach an audience/user via media or technology.

The chapters were divided into seven sections for the purpose of structure and organization: “Users’ Needs and Expectations,” “Design Approaches,” “Technological Approaches,” “Methodological Approaches,” “Supporting Learning,” “Reflection,” and “The Future.”

The initial section, concerning users’ needs and expectations is composed of nine chapters and explores a broad range of issues, such as global access, users with disabilities, and user experience.

Chapter 1, which introduces this section, “Intercultural User Interface Design,” by Heimgärtner, explores the importance of culture in Human-Computer Interaction (HCI) design. It begins by providing a historical depiction of the role of culture in HCI design and then proceeds to analyse the current research
being conducted in this area and the panoply of issues that it raises and unveils. The chapter concludes its argument by combining the outcomes of empirical studies with culture-centred design recommendations to forecast the consequences and trends of intercultural user design research.

“Icon Metaphors for Global Cultures.” Chapter 2, authored by Bezuayehu, Stilan, and Peesapati, aims to scrutinise the multiple cultural consequences of interpretation and misinterpretation of icons by users around the world. It highlights the challenges of icon design, particularly in icons that are to be used globally and in situations where designers and users have different cultural contexts. The surveys and focus groups conducted by the authors concluded that, contrary to initial beliefs, there seems to be a more tolerant global scrutiny of iconic and graphical imagery.

“Improving Interaction with TV-Based Applications through Adaptive Multimodal Fission,” Chapter 3, authored by Costa and Duarte, depicts the design and application of an adaptive multimodal fission component integrated in the multimodal GUIDE framework, which has the ability to adapt any HTML-based application’s UI to the needs of individual users. The empirical research of this proposition involved over 50 participants and intends to be an important element to surmount interaction difficulties by the elderly and the impaired.

“Developing Emotion-Libras 2.0: An Instrument to Measure the Emotional Quality of Deaf Persons while using Technology.” Chapter 4, by Prietch and Filgueiras, addresses the challenge of the assessment of emotional quality of deaf users when they interact with technology. In this chapter, the authors present the procedure for the creation and perfection of Emotion-Libras, a tool for assessment of the emotional quality of people with hearing impairments when interacting with technology.

“Enhancing the Acquisition of Social Story through the Interactivity of Multimedia.” Chapter 5, by Mandasari and Bee Theng, aims to develop a learning instrument for use by children with Autism Spectrum Disorders (ASD) that can assist in motivating them to learn in more independent ways by combining learning with the interests of the children. The authors use the interactivity of multimedia as a means to present an interactive pedagogical resource for the acquisition of social story by children with ASD.

“Players’ Experience in a Sport Geocaching Game.” Chapter 6, authored by Ihamäki and Luimula, analyses the multiplayer outdoor sports game, Geocaching. Specifically, this analysis presents a brief overview of the geocaching sports game, its role in popular adventure game design, and an analysis of the underlying players’ experiences and enjoyment as a structure to be used in game design. The authors carried out a case study involving 52 Finnish geocachers who participated in an Internet survey.

“Seamless Interfacing: Situation Awareness through Action Recognition and Spatio-Temporal Reasoning.” Chapter 7, by Puls and Wörn, attends to the need for intuitive human-machine interaction for the purpose of assisting seamless human-robot cooperation. The authors present a system in an industrial environment that combines information about human posture, location, and executed actions to capture situation awareness. In order to identify and envisage the human location, this chapter presents an approach based on potential functions.

“Studying Natural Interaction in Multimodal, Multi-Surface, Multiuser Scenarios,” Chapter 8, by Duarte, Ribeiro, and Nunes, introduces two studies on how people interact with systems that support gesture and speech in different interaction surfaces. One of the studies concerns the support of touching and the other study relates to the support of pointing. The authors identify, in this chapter, the naturally occurring commands for these modalities and surfaces and demonstrate how surfaces were used and the modalities that were applied.

The chapter that concludes the first section, Chapter 9, is titled “Reporting a User Study on a Visual Editor to Compose Rules in Active Documents” and is authored by Cabitza and Gesso. It addresses the importance of visual languages in domain-specific rule definition by users with no IT proficiency. The
authors describe an experimental user study conducted to assess the possibility of the positive impact of the adoption of visual language in potential users of an electronic medical record and delineate their own document-related local rules.

This next section, Section 2, concerns different design approaches.

“The Gamification Experience: UXD with a Gamification Background,” Chapter 10, by Marache-Francisco and Brangier, presents a depiction of Gamification, the employment of game features in non-recreational settings. The authors propose a definition of the concept of Gamification that accounts for multiple and varied elements of the Human-Computer Interaction design area. They further analyse the notion of Gamification from the point of view of future research and ethical understandings.

“Experience Prototyping: Gathering Rich Understandings to Guide Design,” Chapter 11, by Keane and Nisi, explores Experience Prototyping as a valuable research instrument for capturing people’s stories related to physical places. The authors present the Experience Prototyping methodology employed to collect data in the research project conducted. Furthermore, they discuss the benefits that this method conveys to a user-centred process and how it facilitates an understanding of the rapport between spatial narrative and place.

Section 3 presents technological approaches.

“Strategy to Support the Memorization of Iconic Passwords,” Chapter 12, by Ávila, Menezes, and Melo Braga, explores the employment of iconic passwords in authentication solutions for the use of smartphones as payment appliances. The authors intend to reach a compromise between security and usability by using memorization methods that are based on human memory abilities. Their proposition was assessed with users and compared with previous research.

“Location-Based Data Visualization Tool for Tuberculosis and Dengue: A Case Study in Malaysia,” Chapter 13, by Goh, Chen, and Chow, intends to develop the prototype for an instrument of disease data visualisation on Google maps to assist Malaysian physicians and health centres to have a more clear and timely notion of where cases of diseases are located. The authors argue that this tool can be an asset in terms of following disease spreading patterns, helping with the isolation of diseases, and mobilising resources to the affected areas.

The chapters concerning methodological approaches were joined together in Section 4.

“ETdAnalyser: A Model-Based Architecture for Ergonomic Decision Intervention,” Chapter 14, authored by Loureiro, Leão, Costa, Teixeira, and Arezes, discusses the Ergonomic Tridimensional Analysis (ETdA). ETdA is an innovative ergonomic method that enables the identification and description of numerous ergonomic settings characterized by common areas where consumers are subject to similar tasks as those normally carried out by professionals. The authors propose a software program, named ETdAnalyser, in order to provide ergonomists and analysts with a swift and straightforward technique for the collection and analysis of data.

“Design of Formal Languages and Interfaces: ‘Formal’ Does Not Mean ‘unreadable’,” Chapter 15, by Spichkova, offers a preliminary discussion to work that is aimed at applying the achievements of engineering psychology to the field of formal methods, with a particular emphasis on the specification stage of a system’s development process. The author intends to demonstrate that formal languages and interfaces can benefit from some improvement in terms of their usability and comprehension.

“Anticipation Dialogue Method in Participatory Design,” Chapter 16, by Laarni and Aaltonen, develops a method within participatory design settings that is based on dialogic communication between distinct stakeholders. This method, the Anticipation Design Dialogue, was developed to facilitate the process of information systems’ design in terms of its need to incorporate both theory- and practice-
driven approaches. The authors employ this method, arguing that the design process can highly benefit from an efficient communication between the different actors in play, such as designers and researchers.

“Hand Gesture Recognition as Means for Mobile Human Computer Interaction in Adverse Working Environments,” Chapter 17, by Ziegler, Döring, Pfeffer, and Urbas, focuses on the design, application, and assessment of mobile information systems with hand gesture recognition as tools for human computer interaction. The authors present and test with a case study a framework for the design of proficient and trustworthy user interfaces based on hand gestures.

“The Axiomatic Usability Evaluation Method,” Chapter 18, authored by Guo, proposes an innovative usability evaluation method. The axiomatic evaluation method described by the author is based on the axiomatic design theory, and it contemplates three elements of a product: customers, functionality, and control. The empirical study the author conducted with 60 participants uncovered several advantages and disadvantages of this method.

This following section, Section 5, is dedicated to supporting learning.

“Promoting Human-Computer Interaction and Usability Guidelines and Principles through Reflective Journal Assessment,” Chapter 19, authored by Issa and Isaias, intends to explore the challenges and opportunities of the promotion of Human-Computer Interaction (HCI) and usability guidelines and precepts via reflective journal assessment. To achieve this goal, the authors collected data from formal and informal feedback of 64 Information Systems students enrolled in Australian and Portuguese higher education and an online survey.

“The Impact of Visual Complexity on Children’s Learning Websites in Relation to Aesthetic Preference and Learning Motivation,” Chapter 20, authored by Wang and Bowerman, examines the relationship between complexity, aesthetics, and learning motivation in Websites dedicated to children’s learning. The authors conducted a study with 132 children aged 11 to 12 years old, where they were randomly divided in three groups and asked to use homepages with different levels of visual complexity: low, moderate, and high. The findings revealed a correlation between the children’s aesthetics preferences and their learning motivation.

“Adapting Chatterbot Interaction for Use in Children’s Education,” Chapter 21, by Jacob Junior, da Mata, Santana, Francês, Costa, and Barros, is dedicated to the use of Chatterbots in children’s learning. The authors conducted a study on the technology of Chatterbots and identify some of the modifications that have been employed for the proficient use of this technology for children. They underline the importance of moving away from conventional methods of interaction and investing in the implementation of affective computing models.

“A Framework for Designing Interactive Digital Learning Environments for Young People,” Chapter 22, by Tiradentes Souto, proposes a descriptive framework for the design of interactive digital learning settings for young people. This framework intends to explore and compare different digital learning environments and is based on three core elements: learning, user interaction, and visual. The authors argue that the proposed framework has potential value in terms of guiding design and assisting the understanding of interfaces’ features and the type of interaction users have with them.

The penultimate section of this publication, Section 6, is titled “Reflection.”

“The Conceptual Pond: A Persuasive Tool for Quantifiable Qualitative Assessment,” Chapter 23, by Sørensen and Sørensen, presents and discusses a pilot study of “The Conceptual Pond” persuasive application. The authors debate the core issues of this system, the employment of semantic fields, user’s autonomy vs. default features, graphical interfaces, the design of persuasive technology, and the prospective epistemological value of “The Conceptual Pond.”
This last section, Section 7, is about the future and looking forward in Human-Computer Interaction research.

“Playful Interfaces for Scientific Image Data: A Case for Storytelling,” Chapter 24, by Kallergi and Verbeek, concludes this book. This chapter presents, explores, and applies storytelling with scientific images as a valuable illustration of playful interaction with scientific images. The authors substantiate their argument with a review of utilitarian utilization of storytelling with images and the data collected from a case study they conducted on a storytelling game.

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