

INTERACTION DESIGN



beyond human-computer interaction
6th Edition

Praise for *Interaction Design*

Having used the previous editions of *Interaction Design* for research and teaching, given the breadth and depth of its coverage of the related topics, my expectation for this new edition was very high. And it has been fully met! The content is timely, up-to-date, and enlightening with lucid explanations of complex theories and methods of IxD, which are vividly illustrated with contemporary and relevant examples. The writing style is conversational, eloquent, and highly accessible. This entices particularly newcomers of the field, who are enabled to grasp fundamental IxD frameworks with ease, efficiency, and pleasure. Apart from the core descriptions, the extras given, including activities, in-depth activities, and links to external videos, can be very useful for readers to dive deeper into the topics with hands-on practices. Particularly thought-provoking are the materials delineated in “Dilemma.” Amplifying the accolades for its predecessors, this sixth edition will continue enjoying the high prestige it well deserves.

*Effie Lai-Chong Law, PhD, Professor, Department of Computer Science,
Durham University, UK*

Interaction Design by Preece, Sharp, and Rogers has been the standard textbook for interaction design and HCI for many years. This sixth edition once again brilliantly balances theory with practice, essential tools with complexity, and academic rigor with readability. For students, practitioners, and academics, this book is the best starting point for a reflective, critical, and complete introduction to interaction design. Due to the online resources, many real-world examples, and references to academic literature and innovations in industry, this textbook continues to be the reference for the discipline of interaction design.

*Steven Houben, Assistant Professor in HCI, Eindhoven
University of Technology (TU/e), The Netherlands*

This is the perfect textbook for a wide range of user interface/user experience design courses. For an undergraduate, it provides a variety of compelling examples that illustrate best practice in interaction design. For a graduate student, it provides a foundational overview of advanced topics. This book is also essential for the professional who wants to know the state of the art in interaction design. I use this textbook and recommend it widely.

*Rosa I. Arriaga, PhD, School of Interactive Computing,
Georgia Institute of Technology, USA*

Interaction Design is an excellent textbook for general HCI courses that covers topics from the essential theoretical and methodological knowledge to the state-of-the-art practical knowledge in HCI and interaction design. This book provides a comprehensive understanding of interaction design, which goes beyond the traditional perspective of HCI through in-depth recognition of people and society. The sixth edition again maintains this book’s position as a must-have book for all HCI and interaction design students with much more updated topics and examples.

*Youn-kyung Lim, Department of Industrial Design, Korea Advanced
Institute of Science and Technology, South Korea*

Human-computer interaction (HCI) is a new field that has emerged and become increasingly common in Chinese universities in the last 20 years. *Interaction Design: Beyond Human-Computer Interaction* has been well-known and translated into Chinese for many years. It has been used as a major textbook or reference book for HCI-related courses for undergraduate and postgraduate students in computer science, design, communication, and industrial engineering in Chinese universities. I especially appreciate its focus on HCI design, instead of just focusing on the technological aspects of HCI. The students have benefited a lot from the body of knowledge and skill set of a user-centered design approach for developing products/services with good user experience in an industry context. The timely six revisions of the book in the past years have kept it always well updated to the newest developments in technology and application scenarios.

*Zhengjie Liu, Professor, School of Information Science & Technology, Dalian
Maritime University, China*

Interaction design is a practice that spans many domains. The authors acknowledge this by providing a tremendous amount of information across a wide spectrum of disciplines. This book has evolved from a simple textbook for HCI students to an encyclopedia of design practices, examples, discussions of related topics, suggestions for further reading, exercises, interviews with practitioners, and even a bit of interesting history here and there. I see it as one of the few sources effectively bridging the gulf between theory and practice. A copy has persistently occupied my desk since the first edition, and I regularly find myself revisiting various sections for inspiration on how to communicate the reasoning behind my own decisions to colleagues and peers.

*William R. Hazlewood, Principal Design Technologist,
Workday, Inc, USA*

Interaction Design has been one of the textbooks of reference at the University of Castilla – La Mancha (Spain) for several years. It covers the main topics in human-computer interaction offering a comprehensive equilibrium between theoretical and practical approaches to the discipline. The new chapter called “Interaction Design in Practice” and the remarkable updates in some chapters, with new case studies and examples, allow the user to explore the book from different perspectives and facilitate its use as a textbook in different subjects.

*Manuel Ortega, Professor, Computer Human Interaction
and Collaboration (CHICO) Group, University of Castilla –
La Mancha, Spain*

My students like this book a lot! It provides comprehensive coverage of the essential aspects of HCI/UX, which is key to the success of any software application. I also like many aspects of the book, particularly the examples and videos (some of which are provided as hyperlinks), because they not only help to illustrate the HCI/UX concepts and principles but also relate very well to readers. I highly recommend this book to anyone who wants to learn more about HCI/UX.

*Fiona Fui-Hoon Nah, Professor, Missouri University of Science
and Technology, USA*

While *Interaction Design* is my first recommendation for newcomers to the field of HCI, it is also my primary reference source for content preparation or study planning. The book addresses the topic from different perspectives, making reading a pleasure. This book brings current examples, which makes the knowledge more tangible, as well as links to videos and interviews with practitioners, thus taking the reader to practice in the real world. Very well grounded theoretically and with its hands-on approach to teaching practical techniques, *Interaction Design* is, for sure, the primary reference and textbook for practitioners and academics—students, researchers, or professors—whether new or experienced in the area. Always an up-to-date source, this is definitely my favorite textbook in the field!

*Tiago Silva da Silva, Professor Dr, Institute of Science
and Technology (ICT), Federal University of São Paulo
(UNIFESP), São José dos Campos – SP, Brazil*

Interaction Design continues to be the standard textbook in the field, and the newest edition is only more thorough. Seasoned practitioners will find it useful when they need a reference to best practices or to explain a concept to a colleague. Students can turn to *Interaction Design* for an easy-to-understand description of the basics or in-depth how-tos. From personas and disabilities to the design of UX organizations and working in Agile, if you’re going to pick one book to bring into the office, it should be this one.

*JoFish Kaye, Senior Director, Interaction Design & User Experience,
Elevance Health, USA*

Interaction Design continues to be my favorite textbook on HCI. I once even named an undergraduate and postgraduate program after it. In its sixth edition, it continues to capture the cumulative body of knowledge on human-centered computing and be the most updated and accessible work available. As always, it serves as a clear pointer to emerging trends in human-computer interaction and interactive technology design and use.

*Jesper Kjeldskov, Professor and Head of Department of Human-Centred Computing,
Monash University, Australia*

The latest edition of *Interaction Design* continues to be a valuable resource for both undergraduate and graduate educators looking for a comprehensive and designerly introduction to the field. I especially value the authors' introduction to data at scale, which is clear and thorough, including a timely discussion of ethical considerations. A great resource for shaping future practitioners who can go on to iterate practical and humane technology for our daily lives.

Katherine Isbister, Professor, Department of Computational Media at the University of California, Santa Cruz, USA

With the sixth edition of their *Interaction Design* book, Preece, Sharp, and Rogers have managed to capture a field that is changing fast—covering not only traditional desktop interfaces but also recent topics such as brain, smart, robotic, wearable, shareable, augmented reality, and somatic and multimodal interfaces. It is a tremendous achievement to cover the richness of the field while simultaneously delivering a pleasurable and informative reading experience with rich examples, design insights, and methods.

Kia Höök, Professor in Interaction Design, The Royal Institute of Technology, KTH, Sweden

I have been using *Interaction Design* as a textbook since its first edition for both my undergraduate and graduate introductory UX and HCI courses. This is a must-read, seminal book that provides a thorough coverage of the discipline of HCI and the practice of user-centered design. The sixth edition builds on the success and updates of the fifth edition and includes up-to-date content in a field that is rapidly changing and has gained importance in many industries and academic disciplines. This book will teach readers how thoughtful interaction design is the differentiating factor to building optimal designs and experiences. I always recommend *Interaction Design* to students and practitioners who want to gain a comprehensive overview of the fields of HCI and UX.

Olivier St-Cyr, Associate Professor, University of Toronto, Canada

The *Interaction Design* book helps me not only for teaching activities at my Interaction System class but also for HCI-related theses supervision. I really appreciate the authors regarding their efforts in maintaining the relevance and up-to-dateness of the book. For example, they put data at scale and ethical concerns in the new edition. A well-crafted “Activity” section in each chapter in the book is also available to support active and student-centered learning. Really love the book!

Harry Santoso, PhD, Faculty of Computer Science, University of Indonesia, Indonesia

Computers are ubiquitous and embedded in virtually every new device and system, ranging from the omnipresent cellphone to the complex web of sociotechnical systems that envelop most every sphere of personal and professional life. They connect our activities to ever-expanding information resources with previously unimaginable computational power. To ensure interface design respects human needs and augments our abilities is an intellectual challenge of singular importance. It not only involves complex theoretical and methodological issues of how to design effective representations and mechanisms of interaction but also confronts complex social, cultural, and political issues such as those of privacy, control of attention, and ownership of information. The sixth edition of *Interaction Design* continues to be the introductory book I recommend to my students and to anyone interested in this crucially important area.

Jim Hollan, Distinguished Professor of Cognitive Science, University of California, San Diego, USA

Get ready for an engaging and enlightening journey through the world of interaction design with *Interaction Design* by Preece, Sharp, and Rogers! This updated sixth edition is jam-packed with all the essential information you need to succeed in the field of interaction design, human-computer interaction, information design, web design, or ubiquitous computing. It's the ultimate guide for navigating the digital age, and it's always kept up-to-date with the latest developments in the field. Plus, the accompanying online resources are a lifesaver for both instructors and students. But don't just take my word for it—grab a copy of *Interaction Design* and see for yourself! And remember, good design is like a good joke: if you have to explain it, it's not that good. (But don't worry, this book does a great job of explaining it all!)

Johannes Schöning, Professor for Human-Computer Interaction at the University of St. Gallen, Switzerland

This sixth edition commands space on one's bookshelf as one of the must-have classics on interaction design. It offers an expansive view of the fields of interaction design and HCI, on topics ranging from design research to Agile development. This is an essential book for those new to and experienced in interaction design.

Jodi Forlizzi, Herbert A. Simon Professor in Computer Science and HCII, Human-Computer Interaction Institute, The School of Computer Science, CMU, USA

This book illuminates the interaction design field like no other. Interaction design is such a vast, multidisciplinary field that you might think it would be impossible to synthesize the most relevant knowledge in one book. This book does not only that but goes even further: it eloquently brings contemporary examples and diverse voices to make the knowledge concrete and actionable, so it is useful for students, researchers, and practitioners alike. This new edition includes invaluable discussions about the current challenges we now face with data at scale, embracing the ethical design concerns our society needs so much in this era.

Simone D.J. Barbosa, Professor of Computer Science, PUC-Rio, Brazil

Digital technology, mobile devices, and the Internet of Things continue to reach every crevice of human existence from space exploration of faraway planets to health applications such as wearable trackers and medical injectables. The ubiquity of this technology has advanced interaction design to a premier field of study bringing together contributions from computer science, behavioral psychology, science and technology studies, engineering, communication studies, and urban informatics. Guided by the wisdom and experience of these three longstanding thought leaders, this sixth edition offers students, researchers, developers, and design practitioners alike an accessible and comprehensive entry portal into interaction design scholarship and praxis with a thorough coverage of theoretical concepts, applied methods, and empirical cases.

Marcus Foth, PhD, Professor of Urban Informatics, School of Design, Queensland University of Technology Brisbane, Australia

Throughout my teaching of user experience and interaction design, the book by Rogers, Preece, and Sharp has been a cornerstone textbook for students. The authors bring together a wealth of knowledge of academic HCI with a deep understanding of industry practice to provide what must be the most comprehensive introduction to the key areas of interaction design and user experience work, now an established field of practice. As a UX teacher, I always put this book in the “essential reading” section for students. As an interaction design practitioner, I use many of the methods it describes.

Simon Attfield, Principal Human Factors Scientist, Trimetis and Visiting Associate Professor, Middlesex University, UK

Because of the many examples and explanations, this is of course the ideal book for all practitioners, but do not be deceived, because fundamental theory is also presented so that I quote the book very often in my scientific articles. So it is hardly surprising that I have been recommending this book to my students for many years, because it offers a sound theoretical basis as well as countless practical examples, making it an ideal textbook and reference work. It is unbelievable that the authors have managed to keep updating this comprehensive book for 20 years. For me personally, it is the only textbook on my UX top-five books list that I would take to a desert island.

Jörg Thomaschewski, Professor Dr, Faculty of Technology, University of Applied Sciences Emden/Leer, Germany

I got to learn about the field of HCI and interaction design when I came across the first edition of this book at the library in my junior year of college. As an HCI researcher and educator, I have been having the pleasure of introducing the subject to undergraduates and professional master's students using the previous editions. I thank the authors for their studious efforts to update and add new contents that are relevant for students, academics, and professionals to help them learn this ever-evolving field of HCI and interaction design in a delightful manner.

Eun Young Choi, Professor of Human-Computer Interaction, College of Information Studies, University of Maryland, USA

The *Interaction Design* book and its interactive website remain our number-one reference in capacitating generations of HCI students in Namibia. The release of the new edition once more demonstrates its versatile use, accounting for diverse readers. The conscientiously curated content of global and local case studies, accounting for newest trends, technologies, and critical perspectives, continues to encourage our students in the creation of meaningful and sustainable designs, while becoming reflective interaction designers upholding fundamental values of fairness, justice, and care.

Heike Winschiers-Theophilus, Professor, Faculty of Computing and Informatics, Polytechnic of Namibia, Africa

In its sixth edition, *Interaction Design* presents the cutting edge of human-computer interaction research and UX design, showcasing some of the rich history of the field that has produced the “modern classics” of interface design. Importantly, it does not shy away from current challenges such as the safeguarding of personal data in research, or the dilemmas of controversial topics such as activity tracking. The book’s pedagogical style invites critical thinking and considering the consequences of design choices, an important skill to develop for designers and researchers alike.

*Joel E. Fischer, Professor of Human-Computer Interaction,
Nottingham University, UK*

Nearly 20 years have passed since the release of the first edition of *Interaction Design*, with massive changes to technology and thus the science and practice of interaction design. The new edition combines the brilliance of the first book with the wisdom of the lessons learned in the meantime, and the excitement of new technological frontiers. Complex concepts are elegantly and beautifully explained, and the reader is left with little doubt as to how to put them into practice. The book is an excellent resource for those new to interaction design or as a guidebook or reference to practitioners.

Dana McKay, RMIT, Australia

This newest edition is, without competition and with its new additions, the most comprehensive and authoritative source in the field when it comes to modern interaction design. It is highly accessible, and it is a pleasure to read. The authors of this book have once again delivered what the field needs!

*Erik Stolterman, Professor of Human Computer Interaction,
Senior Executive Associate Dean, Indiana University, USA*

A sixth edition! It's a huge achievement to keep a textbook like this current, and I commend the authors for the work they put in to updating it regularly. *Interaction Design* has been my textbook of choice for generalist and introductory HCI courses ever since the first edition. It is well written, with great use of examples and supplementary resources. It is authoritative and has excellent coverage. Importantly, it is also an engaging read.

*Ann Blandford, Professor of Human-Computer Interaction, UCLIC,
University College London, UK*

This is the book that both a seasoned expert and an interaction design student want on their bookshelves. The substantially updated and streamlined sixth edition, with its interactive website, makes it a compelling textbook. The conversational writing style with anecdotes, cartoons, and examples make it very engaging. Given the pitfalls of AI, Chapter 10, which is focused on privacy and other ethical design concerns with AI, is a welcome addition to the Responsible AI literature.

*Shalini R. Urs, Professor, Founder and Chairperson,
MYRA School of Business, India*

The beauty of this books is that it helps both educator and student learn about what is new in interaction design, as well as provide easy access to the methods and knowledge that support good design practice. Bringing together design, technology, and people, it is perfect for guiding design students—who come with an aesthetic sensitivity and an understanding of visual communication—on practical techniques for crafting usable user-centered digital products and experiences. As the world opens up again, I eagerly anticipate this latest edition, to see where we have been and to think about where we might go.

*Jeni Paay, Professor of Interaction Design, Director
of Centre for Design Innovation, School of Design +
Architecture, Swinburne University of Technology, Australia*

This book is always my primary recommendation for newcomers to human-computer interaction. It addresses the subject from several perspectives: understanding of human behavior in context, the practices of interaction design and evaluation, and the implications of new technology. The new edition again shows dedication to keeping the content up-to-date, in particular with a newly revised chapter on opportunities and challenges of data at large scale.

*Robert Biddle, Professor of Human-Computer Interaction,
Carleton University, Ottawa, Canada*

The *Interaction Design* book has been helping different generations of graduate and undergraduate students discover the complexity and the beauty of designing digital technologies. Over two decades, the authors have been updating the content brilliantly, facing the challenge of including new concepts, approaches, and theories. Valuable pedagogic support, in the book and its website, as well as insightful interviews with experts, covering an immense interdisciplinary territory, deserve special praise, and so do the chapters dedicated to discussing ethics, privacy, and data collection.

*Clarisse Sieckenius de Souza, Professora Emérita,
Departamento de Informática, PUC-Rio, Brazil*

I have been a fan of the *Interaction Design* book since taking my first Human-Computer Interaction module during my undergraduate degree, and I now use it as a preferred resource for supporting teaching. The book expertly weaves together a thorough overview of the interaction design process and its foundational concepts, with compelling case studies of state-of-the art research and practice. In this way, the authors have created a resource that is clear and comprehensive, as well as a truly engaging and inspiring read.

Susan Lechelt, Lecturer in Design Informatics, University of Edinburgh, UK

When I started my career and decided that I wanted to work with the human side of technology, this textbook enlightened me to understand deeply what I had chosen, from the concepts to the ways of working, which brought me here to the tech world. Nowadays, in a developed market with great companies and challenges, we need even more people willing to develop a career with the same goal: improve human life through innovative technology. Therefore, I think this book's new edition is more than necessary, and I highly recommend it, in a professional or academic way, as the most complete textbook for designing human interaction, with contemporary cases and solid ground, theoretical and technical content, and important topics to reflect on, such as ethics and inclusion, but also as an inspiration to follow this path as I did.

Karla Cruz, International UX Research Sr Manager, DiDi, Brazil

This is at the top of my recommended reading list for undergraduate and master's students as well as professionals looking to change career paths. Core issues to interaction design are brought to life through compelling vignettes and contemporary case examples from leading experts. What has long been a comprehensive resource for interaction design now incorporates timely topics in computing, such as data at scale, artificial intelligence, and ethics, making it essential reading for anyone entering the field of interaction design.

Anne Marie Piper, Professor, University California, Dept. of Informatics, Irvine, USA

Designing quality human-computer interactions is crucial for all modern technological systems. As digital devices become smaller, faster, and smarter, the interaction challenges become ever more complex. Vast quantities of data are often accessed on handheld screens, or no screens at all through voice commands; and AI systems have interfaces that "bite back" with sophisticated dialogue structures. What are the best interaction metaphors for these technologies? What are the best tools for creating interfaces that are enjoyable and universally accessible? How do we ensure emerging technologies remain relevant and respectful of human values? In this book, you'll find detailed analysis of these questions and much more. It is a valuable resource for both the mature student and the reflective professional.

*Frank Vetere, Professor of Interaction Design,
University of Melbourne, Australia*

Interaction design is the craft of pleasing users by making technology do what they want in ways that make sense to them. The explosion of digital tech has been—not surprisingly—accompanied by an explosion in the need for trained professionals who can perform this craft. This book satisfies that need. It's a comprehensive study of the practice of interaction design, covering everything from understanding users to providing solutions that delight them. If this is your chosen field, you will refer to this book many times over during your career, and it will help you be a well-tempered practitioner.

*Alan Cooper, Author of *About Face*, "Father of Visual Basic," inventor of design personas*

The milieu of digital life surrounds us. However, how we choose to design and create our experiences and interactions with these emerging technologies remains a significant challenge. This book provides both a road-map of essential skills and methodologies to tackle these designs confidently as well as the critical deeper history, literature, and poetry of interaction design. You will return to this book throughout your career to operationalize, ground and inspire your creative practice of interaction design.

Eric Paulos, Professor, University of Berkeley, California, USA

INTERACTION DESIGN

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beyond human-computer interaction

Sixth Edition



WILEY

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About the Authors

The authors are senior academics with a background in teaching, researching, and consulting in the United Kingdom, United States, Canada, India, Australia, South Africa, and Europe. Having worked together on five previous editions of this book, as well as an earlier textbook on human-computer interaction, they bring considerable experience in curriculum development using a variety of media for online learning as well as face-to-face teaching. They have expertise in creating learning texts and websites that motivate and support learning for a range of students and collaborating with professionals. All three authors are specialists in interaction design and human-computer interaction (HCI). In addition, they bring skills from other disciplines; for instance, Yvonne Rogers started off as a cognitive scientist, Helen Sharp is a software engineer, and Jenny Preece works in information systems. Their complementary knowledge and skills enable them to cover the breadth of concepts in interaction design and HCI to produce an interdisciplinary text and website that will motivate readers.

Yvonne Rogers is the Director of the Interaction Centre at University College London, a Professor of Interaction Design, and a Deputy Head of the Department for Computer Science. She is internationally renowned for her work in HCI and ubiquitous computing and, in particular, for her pioneering approach to innovation and ubiquitous learning. Yvonne is widely published, and she is the author of two books: *Research in the Wild* (2017, co-authored with Paul Marshall, Morgan & Claypool) and *The Secrets of Creative People* (2014, Belmont Press). She is also a regular keynote speaker at computing and HCI conferences worldwide. Former positions include the Open University (2006–2011), the School of Informatics and Computing at Indiana University (2003–2006), and Sussex University (1992–2003). She has also been a visiting professor at UCSC, University of Cape Town, Melbourne University, Stanford, Apple, Queensland University, and UCSD. She has been elected as a Fellow of the Royal Society, the ACM, the British Computer Society, and the ACM’s CHI Academy. She was awarded the Royal Society Robin Milner Medal in 2022 for “outstanding European computer scientist,” and an MRC Suffrage and Science Award in 2020 for being one of the leading women in “mathematics and computing.” In 2022 she was awarded the ACM SIGCHI Lifetime Achievement Research Award, “presented to individuals for outstanding contributions to the study of human-computer interaction.”

Helen Sharp is a Professor of Software Engineering in the Faculty of Science, Technology, Engineering, and Mathematics at the Open University. Originally trained as a software engineer, it was watching the frustration of users and the clever “work-arounds” they developed that inspired her to investigate HCI, user-centered design, and the other related disciplines that now underpin the field of interaction design. She has been developing distance courses in interaction design, software engineering, and business agility since the 1980s. Her research focuses on the study of professional software practice and the effect of human and social aspects on software, the software development process, and software teams. In recent years,

ABOUT THE AUTHORS

Helen has led research projects in the areas of sociocultural factors in design, agile transformation, motivation and security, and socio-technical resilience, working closely with practitioners to support practical impact. She is active in both the software engineering and CHI communities, and she has had a long association with practitioner-related conferences. Helen is on the editorial board of several software engineering journals, and she is a regular invited speaker at academic and practitioner venues.

Jennifer Preece is Professor and Dean Emerita in the College of Information Studies—“Maryland’s iSchool”—at the University of Maryland. Jenny’s research focuses on the intersection of information, community, and technology. She is interested in community participation online and offline. She has researched ways to support empathy, patterns of online participation, reasons for not participating, and interaction in technology-supported communities. She was author of one of the first books on online communities—*Online Communities: Designing Usability, Supporting Sociability* (2000) published by John Wiley & Sons Ltd. Currently, Jenny focuses on how technology can be used in citizen science projects. Jenny’s particular interest is in technology design for data collection about the world’s flora and fauna at a time when many species are in rapid decline due to habitat loss, pollution, and climate change. Jenny is a member of the ACM’s CHI Academy, and she is Editor-in-Chief of the online, open-access journal *Citizen Science: Theory and Practice*. She is also on the Board of Directors of Vancouver’s Stanley Park Ecology Society.

Acknowledgments

Many people have helped us over the years in writing the six editions of this book. We have benefited from the advice and support of our many professional colleagues across the world and from our students, friends, and families. We would like to thank everyone who generously contributed their ideas and time to help make all of the editions of this book successful.

These include our colleagues and students at the College of Information Studies—“Maryland’s iSchool”—at University of Maryland, the Human-Computer Interaction Laboratory (HCIL), the Open University, and University College London. We would especially like to thank (in alphabetical first name order) all of the following individuals who have helped us over the years:

Alex Quinn, Alice Robbin, Alice Siempelkamp, Alina Goldman, Allison Druin, Ana Javornik, Anijo Mathew, Ann Blandford, Ann Jones, Anne Adams, Ben Bederson, Ben Shneiderman, Blaine Price, Carol Boston, Cathy Holloway, Clara Mancini, Clarisse Sieckenius de Souza, Connie Golsteijn, Dan Green, Dana Rotman, danah boyd, Debbie Stone, Derek Hansen, Duncan Brown, Edwin Blake, Eva Hornecker, Faith Young, Fiona Nah, Gill Clough, Godwin Egbeyi, Harry Brignull, Janet van der Linden, Jeff Rick, Jennifer Ferreira, Jennifer Golbeck, Jeremy Mayes, Joh Hunt, Johannes Schöning, Jon Bird, Jonathan Lazar, Judith Segal, Julia Galliers, Kent Norman, Laura Plonka, Leeann Brumby, Leon Reicherts, Mark Woodroffe, Michael Wood, Nadia Pantidi, Nick Dalton, Nicolai Marquardt, Paul Cairns, Paul Marshall, Philip “Fei” Wu, Rachael Bradley, Rafael Cronin, Richard Morris, Richie Hazlewood, Rob Jacob, Rose Johnson, Stefan Kreitmayer, Stephanie Wilson, Steve Hodges, Tamara Clegg, Tamara Lopez, Tammy Toscos, Tina Fuchs, Tom Hume, Tom Ventsias, Toni Robertson, and Youn-Kyung Lim.

In addition, we thank the many students, instructors, researchers, and practitioners who have contacted us over the years with stimulating comments, positive feedback, and provocative questions.

We are particularly grateful to Vikram Mehta, Nadia Pantidi, and Mara Balestrini for filming, editing, and compiling a series of on-the-spot “sound bites” videos, where they posed probing questions to the diverse set of attendees at CHI’11, CHI’14, and CHI’18, including a variety of CHI members from across the globe. The questions included asking about the future of interaction design and whether HCI has gone too wild. There are about 75 of these videos, which can be viewed on our website at www.id-book.com. We hope to add more in the coming years. We are also indebted to danah boyd, Harry Brignull, Leah Beuchley, Albrecht Schmidt, Jon Froehlich and Luciana Zaina for generously contributing in-depth, text-based interviews in the book, and also those who were interviewed in previous editions. We would like to thank Leon Reicherts, for being our webmaster for the fifth edition, and we welcome David Harper from Curious Fish as our new web designer for the sixth edition.

We thank the technical editor, Peter Stahl, for thoughtful critiques and suggestions on all the chapters in the sixth edition. Finally, we would like to thank our editor and the production team at Wiley who have been very supportive and encouraging throughout the process of developing this sixth edition: especially Vanessa Davies, Jim Minatel and Pete Gaughan, as well as all the others from Wiley who have helped with the editing and production process.

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What's Inside?

Welcome to the sixth edition of *Interaction Design: Beyond Human-Computer Interaction* and our interactive website at www.id-book.com. Building on the success of the previous editions, we have substantially updated and streamlined the material in all the chapters to provide a comprehensive introduction to the fast-growing and multidisciplinary field of interaction design. We have also added an epilogue where we discuss our views of future directions for the field. Rather than let the book expand, however, we have again made a conscious effort to keep it the same length.

Our textbook is aimed at undergraduate and graduate students from a range of backgrounds studying introductory classes in human-computer interaction, interaction design, information and communications technology, web design, software engineering, digital media, information systems, and information studies. It will also appeal to practitioners, designers, and researchers who want to discover what is new in the field or to learn about a specific design approach, method, interface, or topic. It is written in an accessible way and so will appeal to a general audience interested in design and technology.

It is called *Interaction Design: Beyond Human-Computer Interaction* because interaction design is concerned with a broader scope of issues, topics, and methods than was originally the scope of human-computer interaction (HCI)—although nowadays, the two increasingly align in scope and coverage of topics. Throughout the book, we have balanced coverage and discussion of foundational concepts with current, state-of-the-art research that builds on them. We include research in the field and beyond, both current and classic studies, sometimes dating back to when HCI emerged in the 1970s and '80s.

We define interaction design as follows:

Designing interactive products to support the way people communicate and interact in their everyday and working lives.

Interaction design requires an understanding of the capabilities and desires of people and the kinds of technology that are available. Interaction designers use this knowledge to discover requirements and to develop and manage them to produce a design. Our textbook provides an introduction to all of these areas. It teaches practical techniques to support all stages of design and development as well as discussing possible technologies and design alternatives.

The number of different types of interface and applications available to today's interaction designers continues to increase steadily, so our textbook, likewise, has been expanded to cover these new technologies. For example, we discuss and provide examples of brain, smart, robotic, wearable, shareable, augmented reality, and multimodal interfaces, as well as more traditional desktop, multimedia, and web-based interfaces. Interaction design in practice is changing fast, so we cover a range of processes, issues, and examples throughout the book.

The book has 16 chapters, and it includes discussion of the different design approaches in common use; how cognitive, social, and affective issues apply to interaction design; and

WHAT'S INSIDE?

how to gather, analyze, and present data for interaction design. A central theme is that design and evaluation are interwoven, highly iterative processes, with some roots in theory but that rely strongly on good practice to create usable products. The book has a hands-on orientation and explains how to carry out a variety of techniques used to design and evaluate the wide range of new applications coming onto the market. It has a strong pedagogical design and includes many activities (with detailed comments) and more complex, in-depth activities that can form the basis for student projects. There are also “Dilemmas,” which encourage readers to weigh the pros and cons of controversial issues. Each chapter contains links to videos and recommends additional readings for those who want to go further into a particular topic.

TASTERS

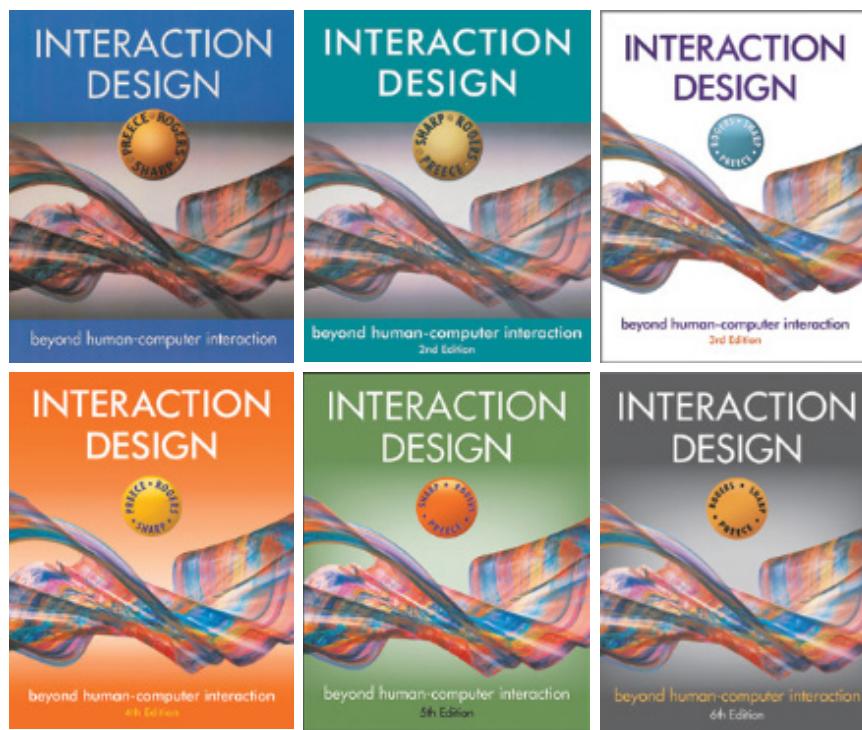
We address topics and questions about the what, why, and how of interaction design. These include the following:

- Why some interfaces are good and others are poor
- Whether people can really multitask
- How technology is transforming the way people communicate with one another
- How we can design products that support people’s lives
- How interfaces can be designed to change people’s behavior
- How to choose between the many different kinds of interactions that are now available (for example, talking, touching, and wearing)
- What it means to design accessible and inclusive interfaces
- Why carry out studies in the lab versus in the wild
- When to use qualitative and quantitative methods
- How to construct informed consent forms
- How the type of interview questions posed affects the conclusions that can be drawn from the answers given
- How to move from a set of scenarios and personas to initial low-fidelity prototypes
- What is design thinking and what is its relationship with interaction design
- How to visualize the results of data analysis effectively
- How to collect, analyze, and interpret data at scale
- Why do people do something different from what they say
- How to ensure the monitoring and recording of people’s activities is ethical
- What are Agile UX and Lean UX and how do they relate to interaction design
- How to collect and interpret analytics to compare different designs ■

The style of writing throughout the book is intended to be accessible to a range of readers. It is largely conversational in nature and includes anecdotes, cartoons, and examples. Many of the illustrations are intended to relate to readers’ own experiences. The book and the associated website are also intended to encourage readers to be active when reading and

to think about seminal issues. The goal is for readers to understand that much of interaction design requires consideration of the issues and that it is important to learn to weigh the pros and cons and be prepared to make trade-offs. There is rarely a right or wrong answer, although there is a world of difference between a good design and a poor design.

This book is accompanied by a website (www.id-book.com), which provides a variety of resources, including slides for each chapter, comments on chapter activities, and other resources written by researchers and designers. There are video interviews with a wide range of experts from the field, including professional interaction designers and university professors. We selected people to interview who cover different topics, and we deliberately selected a range of people, from gurus in the field to newly established researchers and professionals. Pointers to respected blogs, online tutorials, YouTube videos, and other useful materials are also provided.



INTERACTION DESIGN

Chapter 1

WHAT IS INTERACTION DESIGN?

1.1 Introduction

1.2 Good and Poor Design

1.3 Switching to Digital

1.4 What to Design

1.5 What Is Interaction Design?

1.6 People-Centered Design

1.7 Understanding People

1.8 Accessibility and Inclusiveness

1.9 Usability and User Experience Goals

Objectives

The main goals of this chapter are to accomplish the following:

- Explain the difference between good and poor interaction design.
- Consider the pros and cons of transforming activities to become digital.
- Describe what interaction design is and how it relates to human-computer interaction and other fields.
- Explain the relationship between the user experience and usability.
- Introduce what is meant by accessibility and inclusiveness in relation to human-computer interaction.
- Describe what and who is involved in the process of interaction design.
- Outline the different forms of guidance used in interaction design.
- Enable you to evaluate an interactive product and explain what is good and bad about it in terms of the goals and core principles of interaction design.

1.1 Introduction

How many interactive products are there in everyday use? Think for a minute about what you use in a typical day: a smartphone, tablet, smartwatch, laptop, remote control, coffee machine, printer, smoothie maker, e-reader, smart TV, alarm clock, electric toothbrush, radio, bathroom

1 WHAT IS INTERACTION DESIGN?

scales, fitness tracker, game console. Then think of which apps and social media you use...the list is endless. Now think for a minute about how usable they are. How many are actually easy, effortless, and enjoyable to use? Some, like a tablet, are a joy to use, where tapping an app and flicking through photos is simple, smooth, and enjoyable. Others, like buying a train ticket from a ticket machine that does not recognize your credit card after completing a number of steps and then makes you start again from scratch, can be very frustrating. Why is there a difference?

Many products that require users to interact with them, such as smartphones and fitness trackers, have been designed primarily with users' needs in mind. They are generally easy and enjoyable to use. Others have not necessarily been designed with the person in mind; rather, they have been engineered primarily as software systems to perform set functions. An example is setting the time of day on a stove, such as when setting it up or after a power failure, that requires a combination of button presses that are not obvious as to which ones to press together or separately. While they may work effectively, it can be at the expense of how easily they will be learned and remembered and therefore used in a real-world context.

Alan Cooper (2018), a well-known user experience guru, bemoans the fact that much of today's software suffers from the same interaction errors that were around 25 years ago. Why is this still the case, given that interaction design has been in existence for more than 30 years and given that there are far more designers now in industry than ever before? He points out how many interfaces of new products do not adhere to the interaction design principles validated in the 1990s. For example, he notes that many apps do not follow even the most basic of user experience design principles, such as offering an "undo" option. He exclaims that it is "inexplicable and unforgivable that these violations continue to resurface in new products today."

How can we rectify this situation so that the norm is that all new products are designed to provide good user experiences? To achieve this, we need to be able to understand how to reduce the negative aspects (such as frustration and annoyance) while enhancing the positive ones (for example, enjoyment and efficacy). This entails developing interactive products that are easy to learn, effective, and pleasurable to use from a user's perspective.

In this chapter, we begin by examining the basics of interaction design. We look at the difference between good and poor design, highlighting how products can differ radically in how usable and enjoyable they are. We consider what is gained and lost from transforming activities to be digital when previously they were done through using physical artifacts. We then describe what and who is involved in the process of interaction design. The user experience, which is a central concern of interaction design, is then introduced. Finally, we outline how to characterize this in terms of usability goals, user experience goals, and design principles. An in-depth activity is presented at the end of the chapter in which you have the opportunity to put into practice what you have read by evaluating the design of an interactive product.

BOX 1.1

What's in a name? User, people, human, or customer?

Several terms have been used to emphasize different aspects of what is being designed, including user interface design (UI), software design, user-centered design, human-centered design, people-centered design, product design, web design, user experience (UX) design, customer

context
of diff tools

design for people
vs for tech

why no change?

min neg
max pos

experience (CX) design, and interactive system design. Interaction design (IxD) is generally used as the overarching term to describe the field, including its methods, theories, and approaches. Since about 2010, UX design has been the most widely used term in industry to refer to the profession. However, the terms have been used interchangeably. Also, it depends on each company's ethos and brand.

As the field has matured, Don Norman (2018) has argued for using the more encompassing term *people-centered design* and referring to *people* instead of *users* where it seems more appropriate. Sometimes, continuing to use the term *user* makes sense, however, if it is specifically about how a technology is to be used for or by someone. Likewise, continuing to refer to *user's needs* and the *user experience* can be preferable when considering how to design a specific product. More generally, however, much of what interaction design is about is understanding and augmenting people. In this context, using the term *people* is better, because it is broader, being able to refer to a single person, a group of people, or even whole societies, which is appropriate when describing large social media systems. Here, in the new edition of our textbook, we have changed primarily to using *people-centered* design but have continued to use the term *user-centered* when referring specifically to using an interface.

Customer experience (CX), on the other hand, refers to all of the interactions someone has with a company's offering, including the overall experience, the probability they will continue to use it, and the likelihood they will recommend it to others. In this sense, the UX is part of the wider CX, but the CX covers other aspects that the UX has traditionally not covered (Lowden, 2014). ■

Video Don Norman explains why adopting a people-centered approach is the way forward: interaction-design.org/literature/topics/people-centered-design.

1.2 Good and Poor Design

A central concern of interaction design is to develop interactive products that are usable. By this we mean products that are generally easy to learn, effective to use, and provide an enjoyable experience for the intended people. A good place to start thinking about how to design usable interactive products is to compare examples of well-designed and poorly designed ones. Through identifying the specific weaknesses and strengths of different interactive products, we can begin to understand what it means for something to be usable or not. Here, we describe an example of a poorly designed product that has persisted over the years—the ubiquitous remote control—and contrast this with a well-designed example of the same product that performs the same function.

Every home entertainment system, be it the smart TV, streaming video player, home theater system, and so forth, comes with its own remote control. Each one is different in

usable?
effective
satisfying
easy to learn

1 WHAT IS INTERACTION DESIGN?

terms of how it looks and works. Many have been designed with a dizzying array of small, multicolored, and double-labeled buttons (one on the button and one above or below it) that often seem arbitrarily positioned in relation to one another. Many viewers, especially when sitting in their living rooms, find it difficult to locate the right buttons, even for the simplest of tasks, such as pausing or finding the main menu. It can be especially frustrating for those who need to put on their reading glasses each time to read the buttons. The remote control appears to have been put together very much as an afterthought.

In contrast, much effort and thought went into the design of the classic TiVo remote control with the viewer in mind (see Figure 1.1). TiVo is a digital video recorder that was originally developed to enable the viewer to record TV shows. The remote control was designed with large buttons that were clearly labeled and logically arranged, making them easy to locate and use in conjunction with the menu interface that appeared on the TV screen. In terms of its physical form, the remote device was designed to fit into the palm of a hand, having a peanut shape. It also has a playful look and feel about it: Colorful buttons and cartoon icons are used that are distinctive, making it easy to identify them.



Figure 1.1 The TiVo remote control

Source: business.tivo.com

How was it possible to create such a usable and appealing remote device where so many others have failed? The answer is simple: TiVo invested the time and effort to follow a people-centered design process. Specifically, TiVo's director of product design at the time involved

potential users in the design process, getting their feedback on everything from the feel of the device in the hand to where best to place the batteries, making them easy to replace but not prone to falling out. He and his design team also resisted the trap of “buttonitis” to which so many other remote controls have fallen victim; that is one where buttons breed like rabbits—a button for every new function. They did this by restricting the number of control buttons embedded in the device to the essential ones. Other functions were then represented as part of the menu options and dialog boxes displayed on the TV screen, which could then be selected via the core set of physical control buttons. The result was a highly usable and pleasing device that has received much praise and numerous design awards.

DILEMMA

What Is the Best Way to Interact with a Smart TV?

A challenge facing smart TV providers is how to enable people to interact with online content. Viewers can select a whole range of content via their TV screens, but it involves scrolling through lots of menus and screens. In many ways, the TV interface, which once consisted of simply choosing from among a few channels, has become more like a computer interface. This raises the question of whether the remote control is the best input device to use for someone who sits on a sofa or chair that is some distance from the TV screen. Smart TV developers have addressed this challenge in a number of ways.

An early approach was to provide an on-screen keyboard and numeric keypad that presented a grid of alphanumeric characters (see Figure 1.2a), which were selected by pressing a button repeatedly on a remote control. However, entering the name of a movie or an email address and password using this method can be painstakingly slow; it is also easy to overshoot and select the wrong letter or number when holding a button down on the remote to reach a target character. Other systems have tried alternatives, such as different arrangements of the alphanumeric characters on-screen; using the numeral keys with their telephone-style associated letters; and sliding a small, physical keyboard from the underside of the remote control. None of these has proven perfect.

More recent remote controls, such as those provided by Apple TV, incorporate a touchpad to enable swiping akin to the control commonly found on laptops. While this form of touch control expedites skipping through a set of letters displayed on a TV screen, it does not make it any easier to type in an email address and password. Each letter, number, or special character still has to be selected. Swiping is also prone to overshooting when aiming for a target letter, number, or character. Instead of providing a grid, the Apple TV interface displays two single lines of letters, numbers, and special characters to swipe across (see Figure 1.2b). While this can make it quicker for someone to reach a character, it is still tedious to select a sequence of characters in this way. For example, if you select a Y and the next letter is an A, you have to swipe all the way back to the beginning of the alphabet.

(Continued)

1 WHAT IS INTERACTION DESIGN?

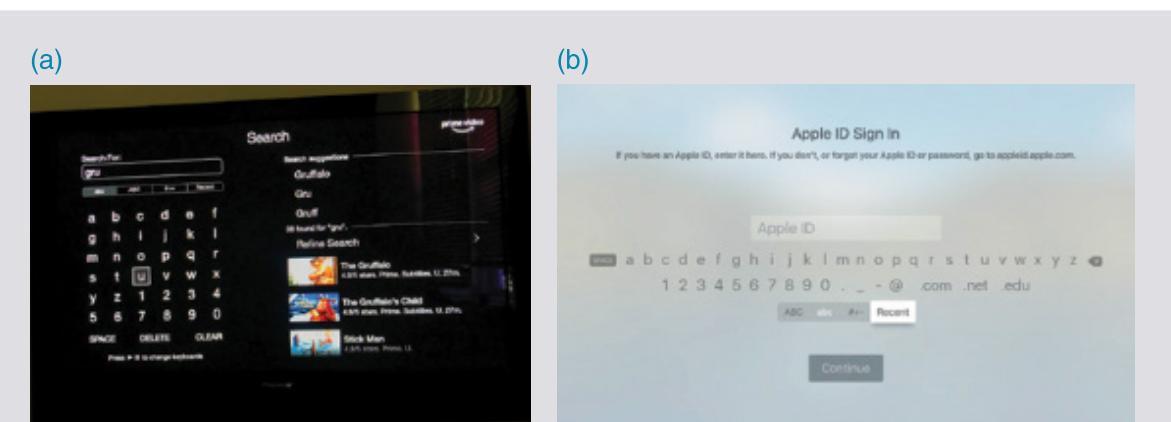


Figure 1.2 Typing on a TV screen (a) by selecting letters and numbers from a square matrix and (b) by swiping along a single line of letters and numbers

Source: (b) support.apple.com/en-us/HT200107

Might there be a better way to interact with a smart TV while sitting on the sofa? Fire-stick TV has pared down the number of buttons on its remote controllers to a core set of basic navigation ones (e.g., up, down) needed to interact with its streaming media players. An alternative is to use voice control. Most remote controls have a speech button that when pressed allows viewers to ask for movies by name or more generally by category, for instance, “What are the best sci-fi movies on Netflix?” Smart speakers, such as Amazon Echo, can also be connected to a smart TV via an HDMI port, and, similarly, a person can ask for something general or more specific, for example, “Alexa, play Big Bang Theory, Season 6, Episode 5, on the TV.” On recognizing the command, the Echo will switch on the TV, switch to the right HDMI channel, open Netflix, and begin streaming the specific episode. A recent survey found voice input is becoming ever more popular; one in five TV users now use voice input to find movies, shows, or videos; change the channels; change the volume; or turn the TV on or off (Roettgers, 2019). Some TV content, however, requires the viewer to say that they are older than a certain age by checking a box on the TV display. If the TV could ask the viewer and check that they are 18 or older, then that would be really smart! Also, if the TV needs the viewer to provide a password to access on-demand content, they won’t want to say it aloud, character by character, especially in front of others who might also be in the room with them. The use of biometrics, then, may be the answer. ■

1.3 Switching to Digital

Many activities that used to be done via a physical artifact have gone digital. Instead of walking up to a machine and buying a ticket or an ATM to withdraw cash, many of us now do such transactions digitally using an app on our smartphone or tablet. Mostly, this has made the tasks easier, quicker, and more convenient. An example is being able to pay for parking via a mobile phone app. Twentieth-century parking meters required drivers to insert coins to rent a parking

space, which meant drivers who didn't have the correct coins couldn't legally park. Now, instead of fumbling around trying to find the right change for the time wanted and slotting this into a physical meter, we can fill in an online form in advance with our details and then pay each time we want to park using a credit card or digital pay app. Our details can then be stored ready for the next time we need to pay for parking, meaning even fewer steps to complete subsequently (see Figure 1.3). It just needs us to type in the parking location number where we plan to park, and the rest is filled in for us by the app. Some apps will even notify us on our phone when the time we have paid for is nearly up, asking if we would like to add time. All we need to do is press a button from our phone. Not only does this form of digital prompting prevent us from risking a fine if we exceed the time limit, but it also provides more revenue for the parking company!

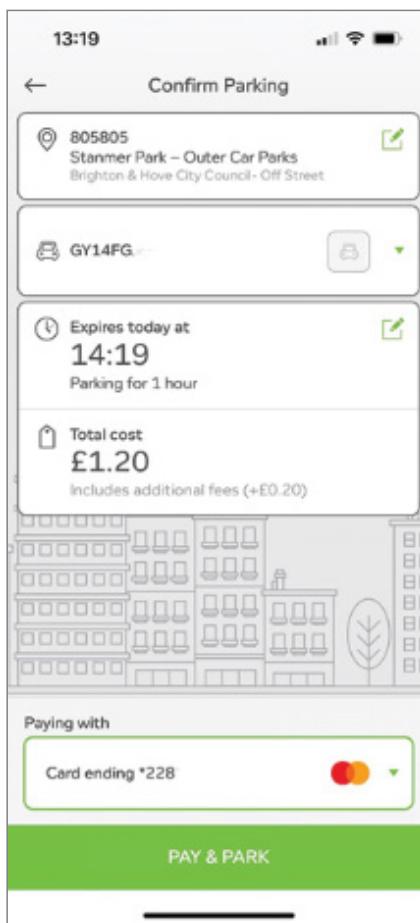


Figure 1.3 The form used for a parking app in the United Kingdom. It takes five seconds to complete and can be done while sitting in the car.

Many previous physical transactions have been digitalized like this. Other examples include buying tickets from an entertainment site (e.g., a movie, a concert, a play) or booking a ticket to go somewhere (e.g., a train, a bus, an airline). An added benefit is not having to wait in line before being able to buy a physical ticket. The customer can also check various

preferences for which kind of ticket they want, which can all be stored and accessed again at a later date. Furthermore, a QR or barcode is usually part of the digital ticket, making it easy to gain entrance through the ticket barrier by swiping their smartphone or watch across it. Another advantage of booking tickets online is having the option of choosing where to sit and, in some situations, ordering food or drinks in advance. Digital tickets can also be stored in digital wallets, which keep a record of all the digital tickets someone has bought.

There are, however, disadvantages of switching over to digital. First, it requires a person to possess a smartphone that is capable of downloading and storing the digital tickets. Second, some people still prefer to use older phones, which the apps won't work on, while others prefer to have paper-based tickets. Third, it can also be stressful and cumbersome to some people—especially if they do not have much battery power left on their phone or they need to fumble around trying to find their glasses to see the apps on their phone. There is of course the option of printing out a digital ticket onto paper, but that assumes someone has access to a printer. A further problem is if the person is entitled to a discount (e.g., student, senior, disabled), it may require them to show a card in person to the ticket collector, which can mean having to switch between apps, which can be cumbersome. People who are disabled using certain assistive technologies might be unable to use a digital ticket, which could lead to legal and ethical issues as well as emotional distress. Another disadvantage is that some people don't like to divulge their personal details online and would prefer to buy a ticket anonymously and pay by cash.

1.4 What to Design

Designing interactive products requires considering who is going to be using them, how they are going to be used, and when and where they are going to be used. Another key concern is to understand the kind of activities people are doing when interacting with these products. The appropriateness of different kinds of interfaces and arrangements of input and output devices depends on what kinds of activities are to be supported. For example, if the activity is to enable people to bank online, then an interface that is secure, trustworthy, and easy to navigate is essential. In addition, an interface that allows a customer to find out information about new services offered by their bank without it being intrusive would be useful.

There are many types of interfaces and interactive devices available now, including multitouch displays, speech-based systems, mobile devices, and wearables. There are also many ways of designing how people can interact with them, for instance, via the use of menus, commands, forms, icons, gestures, and so on. Ever more innovative everyday artifacts are being created using novel materials, such as e-textiles. Wearable glasses that look like fashionable shades have also started to appear, such as Snap Spectacles, that let the wearer experience augmented reality (see Figure 1.4).

The interfaces for everyday consumer items, such as cameras, microwave ovens, toasters, and washing machines, have become predominantly digitally-based. Self-checkouts at grocery stores and libraries have become the norm, where customers check out their own goods or books themselves, and at airports, where passengers check in their own luggage. More recently, smart supermarkets have appeared that do not require the shopper to even have to check out the goods they want to purchase. A sophisticated network of AI-enabled cameras in the ceiling, together with shelves embedded with weight sensors, can determine what a customer picks up and puts in their bag/pocket, billing them as soon as they leave the store.

The smarts are in how the computer vision, sensor fusion, and deep learning are combined to track customers and what they took from or replaced on a shelf. Amazon Go pioneered this type of store, with other supermarkets now testing their own versions.



Figure 1.4 The digital world overlaying the physical experienced when wearing Snap AR Spectacles

Source: www.techeblog.com/new-snapchat-spectacles-augmented-reality

The advent of the Internet of Things (IoT), where data is collected from sensors and travels via the Internet to other devices, has been embedded into several of our household products. For example, a popular household IoT-enabled product is home security, where people can keep an eye on their home from the data relayed to their smartphone via a combination of sensors placed in their home. These include motion detectors, glass breaking detectors, and smart object detectors. A video camera can be attached to someone's doorbell and relayed to a smartphone app so the owner can check up on who has rung it—even though they may be on vacation. Some home-based security cameras also use machine learning that recognizes whether an intruder is trying to break into the house through using facial recognition. Machine learning is also being used in a range of other home-based products, such as automated thermostats like the Nest, which optimizes the temperature settings for a household where the algorithms analyze its energy consumption over time.

A key question for interaction design is this: “How do you optimize a person’s interactions with a system, environment, or product so that they support their activities in effective, useful, usable, and pleasurable ways?” Another question that is of growing concern to interaction design is how safe and private is the data being collected? Many decisions need to be made based on an understanding of people including the following:

- Considering what people are good and bad at
- Considering what might help people with the way they currently do things
- Thinking through what might provide quality experiences

1 WHAT IS INTERACTION DESIGN?

- Considering a person's privacy concerns if data is being collected about them
- Listening to what people want and getting them involved in the design
- Using people-centered techniques during the design process

The aim of this book is to cover these aspects with the goal of showing you how to carry out interaction design. In particular, it focuses on how to identify a user's needs and the context of their activities. From this understanding, we move on to consider how to design usable, useful, safe, and pleasurable interactive products.

1.5 What Is Interaction Design?

By interaction design, we mean the following: designing interactive products to support the way people communicate and interact in their everyday and working lives. Put another way, it is about creating experiences that enhance and augment the way people work, communicate, and interact. More generally, Terry Winograd originally described it as "designing spaces for human communication and interaction" (1997, p. 160).

BOX 1.2

Is Interaction Design Beyond HCI?

We see the main difference between interaction design (ID) and human-computer interaction as one of scope. Historically, HCI had a narrow focus on the design and usability of computing systems, while ID was seen as being broader, concerned with the theory, research, and practice of designing user experiences for all manner of technologies, systems, and products. That is one of the reasons why we chose to call our book *Interaction Design: Beyond Human-Computer Interaction*, to reflect this wider range. ■

1.5.1 The Components of Interaction Design

We view interaction design as fundamental to many disciplines, fields, and approaches that are concerned with researching and designing computer-based systems for people. Figure 1.5 presents the core ones along with interdisciplinary fields that comprise one or more of these, such as cognitive ergonomics. It can be confusing to try to work out the differences between them as many overlap. The main differences between interaction design and the other approaches referred to in the figure come largely down to which methods, philosophies, and lenses they use to study, analyze, and design products. Another way they vary is in terms of the scope and problems they address. For example, information systems is concerned with the application of computing technology in domains such as business, health, and education, whereas ubiquitous computing is concerned with the design, development, and deployment of pervasive computing technologies (for example, IoT) and how they facilitate social interactions and human experiences.

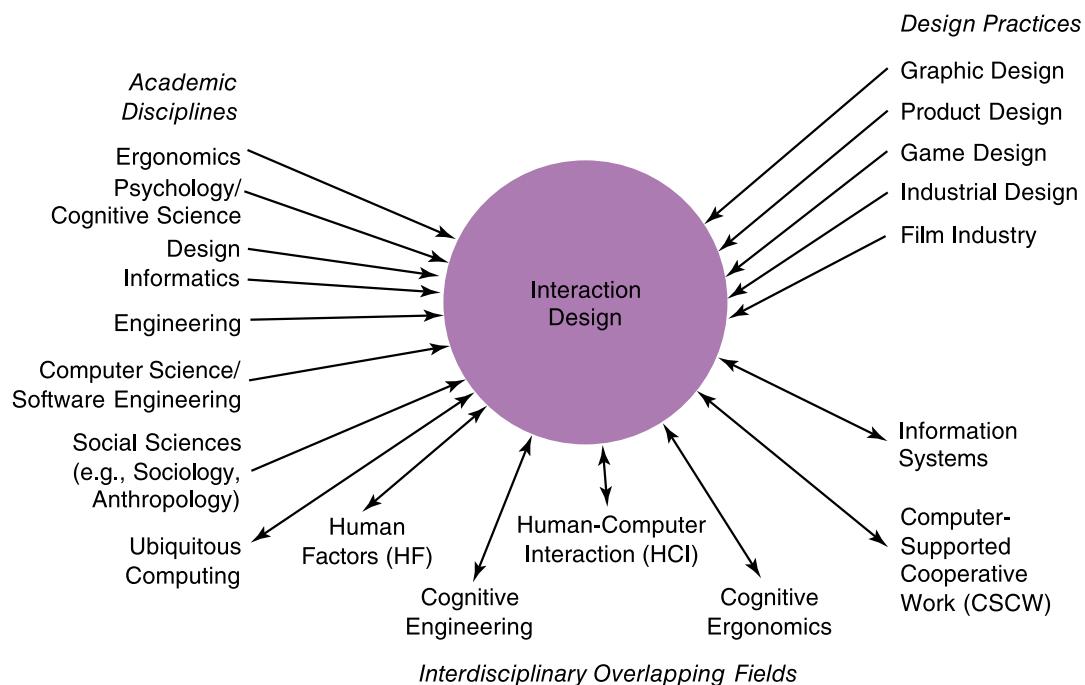


Figure 1.5 Relationship among contributing academic disciplines, design practices, and interdisciplinary overlapping fields concerned with interaction design (double-headed arrows mean overlapping)

ACTIVITY 1.1

Since we first created Figure 1.5, many other computer-related fields have emerged where the user is considered central. These include cybersecurity, digital humanities, data science, and digital healthcare. For some fields, there has also been a shift toward being more people-oriented, for example, human-centered AI. Would it make sense to add these, and, if so, how?

Comment

We could add a further section that identifies where interaction design has informed other fields, for example, those where software tools have been developed for scientists/researchers/clinicians to use as part of their methodology. These include the built environment, bioinformatics, medicine, marketing, computational biology, and computational design. We could also try to add a number of other fields and practices that have begun to inform interaction design, including behavioral economics, ethics, accessibility, and AI. Feminism, critical theory, queer theory, post-colonial and political activism have also come to the fore providing alternative lenses by which to examine and explore societal challenges within the scope of interaction design. However, rather than try to add all of these to the diagram—which would make it unwieldy—we have decided to keep it as is, comprising the core disciplines, practices, and overlapping fields. ■

1 WHAT IS INTERACTION DESIGN?

1.5.2 Who Is Involved in Interaction Design?

Figure 1.5 also shows that many people are involved in performing interaction design, ranging from social scientists to movie-makers. This is not surprising given that technology has become such a pervasive part of our lives. But it can all seem rather bewildering to the onlooker. How does the mix of players work together?

Designers need to know many different things about people, technologies, and the interactions among them to create effective experiences. At the least, they need to understand how people act and react to events and how they communicate and interact with each other. To be able to create engaging experiences, they also need to understand how emotions work, what is meant by aesthetics, desirability, and the role of narrative in human experience. They also need to understand the business side, technical side, manufacturing side, and marketing side. Recently, there has been more emphasis on understanding the ethical aspects, especially for technologies that are collecting ever-increasing amounts of personal data, such as smart speakers and personal healthcare devices. Questions raised include how do we ensure the new technology or product is safe, secure, perceived to be trustworthy and valued, and understandable by the general public?

Clearly, it is difficult for one person to be well versed in all of these diverse areas and also know how to apply the different forms of knowledge to the process of interaction design. Interaction design is ideally carried out by multidisciplinary teams, where the skill sets of engineers, designers, programmers, psychologists, anthropologists, sociologists, marketing people, artists, toy makers, product managers, and others are drawn upon. It is rarely the case, however, that a design team would have all of these professionals working together. Who to include in a team will depend on a number of factors, including a company's design philosophy, size, purpose, and product line.

One of the benefits of bringing together people with different backgrounds and training is the potential of many more ideas being generated, new methods developed, and more creative and original designs being produced. However, the downside is the costs involved. The more people there are with different backgrounds in a design team, the more difficult it can be to communicate and make progress with the designs being generated. Why? People with different backgrounds have different perspectives and ways of seeing and talking about the world. What one person values as important others may not even see (Kim, 1990). Similarly, a computer scientist's understanding of the term *representation* is often very different from that of a graphic designer, media specialist, or psychologist.

What this means in practice is that confusion, misunderstanding, and communication breakdowns can surface in a team. The various team members may have different ways of talking about design and may use the same terms to mean quite different things. Other problems can arise when a group of people who have not previously worked as a team are thrown together. For example, Aruna Balakrishnan et al. (2011) found that integration across different disciplines and expertise is difficult in many projects, especially when it comes to agreeing on and sharing tasks. The more disparate the team members—in terms of culture, background, and organizational structures—the more complex this is likely to be.

ACTIVITY 1.2

In practice, the makeup of a given design team depends on the kind of interactive product being built. Who do you think should be involved in developing:

- A public kiosk providing information about the exhibits available in a science museum?
- An interactive educational website to accompany a TV series?

Comment

Ideally, each team will have a number of different people with different skill sets. For example, the first interactive product would include the following individuals:

- Graphic and interaction designers, museum curators, educational advisers, software engineers, software designers, and ergonomists

The second project would include these types of individuals:

- TV producers, graphic and interaction designers, teachers, screenwriters, information architects, UX researchers, video experts, software engineers, and software designers

In addition, as both systems are being developed for use by the general public, representative users, such as school children and parents, should be involved.

In practice, design teams often end up being quite large, especially if they are working on a big project to meet a fixed deadline. For example, it is common to find teams of 15 or more people working on a new product like a health app. This means that a number of people from each area of expertise are likely to be working as part of the project team. ■

1.5.3 Interaction Design Consultancies

Interaction design is now widespread in product and services development. In particular, UX consultants and the computing industries have realized its pivotal role in successful interactive products. But it is not just IT companies that are realizing the benefits of having interaction designers. Financial services, retail, governments, marketing, video and film producers, and the public sector have realized its value, too. The presence or absence of good interaction design can make or break a company. Getting noticed in the highly competitive field of smartphone apps requires standing out. Being able to demonstrate that your product is easy, effective, and engaging to use is seen as central to this. Marketing departments focus on how the branding, the number of engagements, the customer return rate, and customer satisfaction are greatly affected by the usability of a website. Many now have their own toolkits for testing the different aspects of a website, for example, using A/B testing to determine the effect of different UI designs on metrics such as sales or the number of repeat visitors.

There are many interaction design consultancies now. These include established companies, such as Nielsen Norman Group and IDEO, and more recent ones that specialize in

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a particular area, such as job board software (for example, Madgex), digital media (e.g., Cogapp), or mobile design (such as CXpartners). Smaller consultancies, such as Bunnyfoot and Dovetailed, promote diversity, interdisciplinarity, and scientific research, having psychologists, researchers, interaction designers, usability, and customer experience specialists on board.

Many consultancies have impressive websites, providing case studies, tools, and blogs. For example, Holition publishes highly engaging case studies and tantalizing videos of their in-house research, intended for the wider community, with a focus on the implications for commercial and cultural aspects. This sharing of knowledge enables them to contribute to the discussion about the role of technology in human experience.

1.6 People-Centered Design

People-centered design involves understanding how people feel about a product and their pleasure and satisfaction when using it, looking at it, holding it, and opening or closing it. It includes their overall impression of how good it is to use, right down to the sensual effect small details have on them, such as how smoothly a switch rotates or the sound of a click and the touch of a button when pressing it. An important aspect is the quality of the experience someone has, be it a quick one, such as taking a photo; a leisurely one, such as playing with an interactive toy; or an integrated one, such as visiting a museum (Law et al., 2009). As Don Norman (2004) stressed earlier, “It is not enough that we build products that function, that are understandable and usable, we also need to build joy and excitement, pleasure and fun, and yes, beauty to people’s lives.”

ACTIVITY 1.3

The Classic iPod Phenomenon

Apple’s classic (and subsequent) generations of portable music players, called iPods, including the iPod Touch, Nano, and Shuffle, released during the early 2000s were a phenomenal success. They were very popular at the time. Then the smartphone came into being in 2007, which enabled music to be played on it. Playing music via a smartphone became the norm, superseding the need for a separate device. Apple stopped production of their last remaining iPod—the iPod Touch—in 2022. Why do you think the iPod was such a huge success when it came into being? What other products have since been received with so much acclaim?

Comment

Apple realized early on that successful interaction design involves creating interactive products that provide not just usable but also enjoyable experiences. The sleek appearance of the iPod music player (see Figure 1.6), its simplicity of use, its elegance in style, its distinct family of rainbow colors, a novel interaction style that many people discovered was a sheer pleasure

to learn and use, and the catchy naming of its product and content (iTunes, iPod), among many other design features, led to it becoming one of the greatest products of its kind and a must-have fashion item for teenagers, students, and adults alike. While there were many competing players on the market at the time—some with more powerful functionality, others that were cheaper and easier to use, or still others with bigger screens, more memory, and so forth—the quality of the overall experience paled in comparison to that provided by the iPod. In addition, Apple provided a whole ecosystem to accompany the iPod, including the iTunes store app where millions of licensed music tracks could be bought for less than a dollar each.



Figure 1.6 The iPod Nano

Source: Paul Sakuma / AP Photo

Apple has continued to design products that are both beautiful and usable, most notable are the iPad and the range of iPhones. It even designed what was at the time a completely new customer experience for buying technology in the form of the Apple Store, from how it draws people in and what they do when browsing, discovering, and purchasing goods in the store. There are no checkouts to pay for goods—just roaming Apple employees holding mobile devices that they interact with to make an order for a customer, take payment, and email them a receipt. Apple now has a new kind of retail space, akin to being more like a town square, where everyone is welcome, and various community activities take place weekly, like learning to code. ■

There are many aspects of the user experience that can be considered and many ways of taking them into account when designing interactive products. Of central importance are the usability, functionality, aesthetics, content, look and feel, and emotional appeal. In addition, Jack Carroll (2004) stresses other wide-reaching aspects, including fun, health, social capital (the social resources that develop and are maintained through social networks, shared values,

1 WHAT IS INTERACTION DESIGN?

goals, and norms), and cultural identity, such as age, ethnicity, race, disability, family status, occupation, and education.

Several researchers have attempted to describe the experiential aspect of people-centered design. Kasper Hornbæk and Morten Hertzum (2017) note how the user experience is often described in terms of the way that people perceive a product, such as whether a smartwatch is seen as sleek, cool, or chunky, and their emotional reaction to it, such as whether people have a positive experience when using it. Marc Hassenzahl, Michael Burmester, and Frank Keller (2021) reflect on the way the user experience has evolved over the last 20 years, noting how there has been a growing interest in designing for hedonic aspects in relation to well-being. By hedonic, it is meant how evocative and stimulating the interaction is to them. In addition to a person's perceptions of a product, John McCarthy and Peter Wright (2004) discuss the importance of someone's expectations and the way they make sense of their experiences when using technology. Their *Technology as Experience* framework accounts for the experience largely in terms of how it feels to someone. Kia Höök (2018) has extended the idea of the felt experience even further, proposing *Soma Design*, which considers how technology can make people more aware of the experience of their felt bodily sensations and movements.

How does one go about designing quality experiences for people? There is no secret sauce or magical formula that can be readily applied by interaction designers. However, there are numerous conceptual frameworks, tried and tested design methods, guidelines, and relevant research findings, which are described throughout the book.

1.7 Understanding People

A main reason for having a better understanding of people in the contexts in which they live, work, and learn is that it can help designers understand how to design interactive products that augment humans and match their needs at the time and place of use. A collaborative planning tool for a space mission, intended to be used by teams of scientists working in different parts of the world, will have quite different needs from one targeted at customer and sales agents, to be used in a furniture store to draw up kitchen layout plans. Understanding individual differences can also help designers appreciate that one size does not fit all; what works for one group of people may be totally inappropriate for another. For example, children have different expectations than adults about how they want to learn or play. They may find having interactive quizzes and cartoon characters helping them along to be highly motivating, whereas most adults find them annoying. Teenagers enjoy short videos such as the ones they watch and upload to TikTok and YouTube. Conversely, adults often like podcast discussions about topics, which children and teenagers may find boring. Just as everyday objects like clothes, food, and games are designed differently for children, teenagers, and adults, so too should interactive products be designed for different kinds of people.

Learning more about people and what they do can also reveal incorrect assumptions that designers may have about particular groups and what they need. For example, it is often assumed that because of deteriorating vision and dexterity, older people want things to be big—be it text or graphical elements appearing on a screen or the physical controls, like dials and switches, used to control devices. This may be true for some older people, but studies have shown that many people in their 70s, 80s, and older are perfectly capable of interacting with standard-size information and even small interfaces, for example, smartphones, just as well as those in their teens and 20s, even though, initially, some might think they will find it

difficult (Siek et al., 2005). It is increasingly the case that as people get older, they do not like to consider themselves as getting older, associated with lacking in cognitive and manual skills. Being aware of people's sensitivities, such as aging, is as important as knowing how to design for their capabilities (Johnson and Finn, 2017). In particular, while many older adults now feel comfortable with and use a range of technologies (for instance, email, online shopping, online games, or social media), they may resist adopting new technologies (Knowles et al, 2021). This is not because they don't perceive them as being useful to their lives but because they don't want to waste their time getting caught up by the distractions that digital life brings (Knowles and Hanson, 2018), for example, not wanting to be "glued to one's mobile phone" like younger generations.

Being aware of cultural differences is also an important concern for interaction design, particularly for products intended for a diverse range of groups from different countries. A seemingly trivial but important example of a cultural difference is the dates and times used in different countries. In the United States, for example, the date is written as month, day, year (05/21/23), whereas in other countries, it is written in the sequence of day, month, year (21/05/23). This can cause problems for designers when deciding on the format of online forms, especially if intended for global use. It is also a concern for products that have time as a function, such as operating systems, digital clocks, or car dashboards. To which cultural group do they give preference? How do they alert someone to the format that is set as default? This raises the question of how easily an interface designed for one group can be used and accepted by another. Why is it that certain products, like a fitness tracker, are universally accepted by people from all parts of the world, whereas websites are designed differently and reacted to differently by people from different cultures? How does the design and use of social media platforms differ across cultures, such as Weibo and Twitter? The former is used primarily in China by more than 500 million people, whereas the latter is used worldwide by more than 200 million people. A number of cross-cultural studies have been conducted showing significant differences in the microblogging behaviors across these two platforms. For example, a recent analysis by Shi Chen et al. (2021) during the COVID-19 pandemic found that Weibo users were more likely to focus on the disease itself and other health aspects, whereas Twitter users talked more about policy, politics, and other societal issues.

To understand more about people, we have included three chapters (Chapters 4–6) that explain in detail how people act and interact with one another, with information, and with various technologies, together with describing their abilities, emotions, needs, desires, and what causes them to get annoyed, frustrated, lose patience, and get bored. We draw upon relevant psychological theory and social science research. Such knowledge enables designers to determine which solutions to choose from the many design alternatives available and how to develop and test these further.

1.8 Accessibility and Inclusiveness

Accessibility refers to the extent to which an interactive product is accessible by as many people as possible. Companies like Google and Apple provide tools for their developers to promote this. The focus is on people with disabilities. For example, Android OS provides a range of tools for those with disabilities, such as hearing aid compatibility and a built-in screen reader, while Apple VoiceOver lets the person know what's happening on its devices

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so they can easily navigate and even know who is in a selfie just taken by listening to the phone. Inclusiveness means being fair, open, and equal to everyone. Inclusive design is an overarching approach where designers strive to make their products and services accommodate the widest possible number of people. An example is ensuring that smartphones are being designed for all and made available to everyone—regardless of their disability, education, age, or income.

The degree to which a person is considered to be disabled can change over time, for example decreasing as recovery from an accident progresses. In addition, the severity and impact of an impairment can vary over the course of a day or in different environmental conditions. Inability to use a product can result because technologies are often designed in such a way as to necessitate a certain type of interaction that is impossible for someone with a disability. Such an inability is viewed as the result of poor interaction design between a person and the technology, not the impairment alone. Accessibility, on the other hand, opens up experiences so that they are accessible to all. Technologies that are now mainstream once started out as solutions to accessibility challenges. For example, SMS was designed for hearing-impaired people before it became a mainstream technology. Furthermore, designing for accessibility inherently results in inclusive design for all.

Accessibility can be achieved in two ways: first, through the inclusive design of technology, and second, through the design of assistive technology. When designing for accessibility, it is essential to understand the types of impairments that can lead to disability as they come in many forms. They are often classified by the type of impairment, for example:

- Sensory impairment (such as loss of vision or hearing)
- Physical impairment (having loss of functions to one or more parts of the body, for example, after a stroke or spinal cord injury)
- Cognitive (for instance, learning impairment or loss of memory/cognitive function due to a condition such as Alzheimer's disease)

Within each type is a complex mix of people and capabilities. For example, a person might have only peripheral vision, be color blind, or have no light perception (and be registered blind). All are forms of visual impairment, and all require different design approaches. Color blindness can be overcome by an inclusive design approach. Designers can choose colors that will appear as separate colors to everyone. However, peripheral vision loss or complete blindness will often need an assistive technology to be designed.

Impairment can also be categorized as follows:

- Permanent (for example, long-term wheelchair user)
- Temporary (such as after an accident or illness)
- Situational (for instance, a noisy environment means a person can't hear)

The number of people living with permanent disability increases with age. Fewer than 20 percent of people are born with a disability, whereas 80 percent of people will have a disability once they reach 85. As people age, their functional abilities diminish. For example, as people get older, they find it more difficult to hear conversations in rooms with hard surfaces and lots of background noise.

People with permanent disabilities often use assistive technology in their everyday life, which they consider to be life-essential and an extension of their self (Holloway and Dawes, 2016). Examples include wheelchairs (people now refer to “wearing their wheels,” rather than “using a wheelchair”) and augmented and alternative communication aids. Much current HCI research into disability explores how new technologies, such as IoT, wearables, and virtual reality, can be used to improve upon existing assistive technologies. A recent approach is to consider disability interactions (DIX) that combines cross-disciplinary methods from HCI and disability studies to co-create new technologies, experiences, and ways of working with disabled people (Holloway and Barbareschi, 2022). There has also been a push toward designing accessible technology in the developing world (Stein and Lazar, 2022).

Aimee Mullens is an athlete, actor, and fashion model who has shown how prosthetics can be designed to move beyond being purely functional (and often ugly) to being desirable and highly fashionable. She became a bilateral amputee when her legs were amputated below the knee as a one-year-old. She has done much to blur the boundary between disabled and nondisabled people, and she uses fashion as a tool to achieve this. Several prosthetic companies now incorporate fashion design into their products, including striking leg covers that are affordable by all (see Figure 1.7).



Figure 1.7 Fashionable leg cover designed by Alleles Design Studio

Source: alleles.ca. Used courtesy of Alison Andersen

1.9 Usability and User Experience Goals

Part of the process of understanding people is to be clear about the primary objective of developing an interactive product for them. Is it to design an efficient system that will allow them to be highly productive in their work? Is it to design a learning tool that will be challenging and motivating? Or, is it something else? To help identify the objectives, we suggest classifying them in terms of usability and user experience goals. Traditionally, usability goals are concerned with meeting specific usability criteria, such as efficiency, whereas user experience goals are concerned with explicating the nature of the user experience, for instance, to be aesthetically pleasing. It is important to note, however, that the distinction between the two types of goals is not clear-cut since usability is often fundamental to the quality of the user experience and, conversely, aspects of the user experience, such as how it feels and looks, are inextricably linked with how usable the product is. We distinguish between them here to help clarify their roles but stress the importance of considering them together when designing for an experience. Also, historically HCI was concerned primarily with usability, but it has since become concerned with understanding, designing for, and evaluating a wider range of user experience aspects.

1.9.1 Usability Goals

Usability refers to ensuring that interactive products are easy to learn, effective to use, and enjoyable from the person's perspective. It involves optimizing the interactions people have with interactive products to enable them to carry out their activities at work, at school, and in their everyday lives. More specifically, usability is broken down into the following goals:

- Effective to use (effectiveness)
- Efficient to use (efficiency)
- Safe to use (safety)
- Having good utility (utility)
- Easy to learn (learnability)
- Easy to remember how to use (memorability)
- Enjoyable to use (satisfaction)

Usability goals are typically stated as questions. The purpose is to provide the interaction designer with a concrete means of assessing various aspects of an interactive product and the user experience. Through answering the questions, designers can be alerted very early on in the design process to potential design problems and conflicts that they might not have considered. However, simply asking "Is the system easy to learn?" is not going to be very helpful. Asking about the usability of a product in a more detailed way—for example, "How long will it take someone to figure out how to use the most basic functions for a new smartwatch; how much can they capitalize on from their prior experience; and how long would it take them to learn the whole set of functions?"—will elicit far more useful information.

The following are descriptions of the usability goals and a question for each one:

- (1) *Effectiveness* is a general goal, and it refers to how good a product is at doing what it is supposed to do.

Question: Is the product capable of allowing people to carry out their work efficiently, access the information that they need, or buy the goods that they want?

(2) *Efficiency* refers to the way a product supports people in carrying out their tasks. The example mentioned earlier of buying tickets online using stored personal details on the app is considered efficient. Once people have entered all of the necessary personal details in an online form to make a purchase, they can let the website/app save all of their personal details. Then, if they want to make another purchase at that site, they don't have to re-enter all of their personal details. A highly successful mechanism patented by Amazon is the one-click option, which requires people to click only a single button when they want to make another purchase.

Question: How many steps does it take to complete a task? How does storing a person's personal details make it more efficient?

(3) *Safety* involves protecting a person from dangerous conditions and undesirable situations. In relation to the first ergonomic aspect, it refers to the external conditions where people work. For example, where there are hazardous conditions—such as X-ray machines or toxic chemicals—operators should be able to interact with and control computer-based systems remotely. The second aspect refers to helping anyone in any kind of situation to avoid the dangers of carrying out unwanted actions accidentally. It also refers to the perceived fears that someone might have of the consequences of making errors and how this affects their behavior. Making interactive products safer in this sense involves (1) preventing the user from making serious errors by reducing the risk of wrong keys/buttons being mistakenly activated (an example is not placing the quit or delete-file command right next to the save command on a menu), and (2) providing people with various means of recovery should they make errors, such as an undo function. Safe interactive systems should engender confidence and give people the opportunity to explore the interface to try new operations (see Figure 1.8a). Another safety mechanism is confirming dialog boxes that give users another chance to consider their intentions (a well-known example is the appearance of a dialog box after issuing the command to delete everything in the trash, saying: "Are you sure you want to remove the items in the Trash permanently?") (see Figure 1.8b).

Question: What is the range of errors that are possible using the product, and what measures are there to permit someone to recover easily from them?

(4) *Utility* refers to the extent to which the product provides the right kind of functionality so that users can do what they need or want to do. An example of a product with high utility is an accounting software package that provides a powerful computational tool that accountants can use to work out tax returns. An example of a product with low utility is a software drawing tool that does not allow users to draw freehand but forces them to use a mouse to create their drawings, using only polygon shapes.

Question: Does the product provide an appropriate set of functions that will enable them to carry out all of their tasks in the way they want to do them?

(5) *Learnability* refers to how easy a product is to learn to use. Generally, people want to get started right away and become competent at carrying out basic tasks without too much effort. This is true for both interactive products intended for everyday use (for example, social media) and those used only infrequently (for instance, online tax forms). Learning may continue over the lifetime of someone's interaction with a product so that basic use eventually becomes mastery. To a certain extent, people are prepared to spend a longer time learning more complex systems that provide a wider range of functionality, such as web authoring tools. In these situations, pop-up tutorials

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can help by providing contextualized step-by-step material with hands-on exercises. A key concern is determining how much time someone is prepared to spend learning a product.

Question: Is it possible for someone to work out basic use of the product by exploring the interface and trying certain actions? How hard will it be to master the product in this way? Are additional learning tools needed?

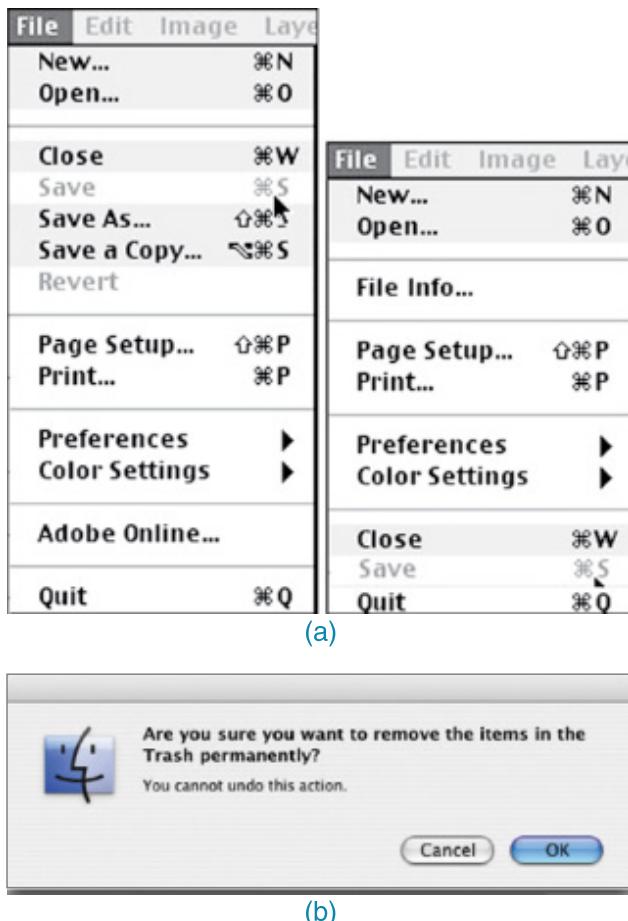


Figure 1.8 (a) A safe and unsafe menu. Which is which and why? (b) A warning dialog box on macOS

- (6) *Memorability* refers to how easy a product is to remember how to use, once learned. This is especially important for tasks and interactive products that are used infrequently. If someone hasn't used an operation for a few months or longer, they should be able to remember or at least rapidly be reminded how to use it. They shouldn't have to keep relearning how to carry out tasks. Unfortunately, this tends to happen when the operations required to be learned are obscure, illogical, or poorly sequenced. People need to be helped to remember how to do tasks. There are many ways of designing the interaction to support this. For example, users can be helped to remember the sequence of operations at different stages of a task through contextualized icons, meaningful command names, and menu options. Also, structuring options and icons so that they are placed in relevant categories of options—for example, placing all of the drawing tools in the same place on

the screen—can help a user remember where to look to find a particular tool at a given stage of a task.

Question: What types of interface support have been provided to help someone remember how to carry out tasks, especially for ones they use infrequently?

- (7) *Satisfaction* generally refers to how acceptable a product is when being used. It is most often used to measure a customer's experience. Various satisfaction scales have been developed for this purpose, for example, asking customers to give a score from 1–5 to indicate how satisfied they are after using a product. The most well-known one is called the Customer Satisfaction Score (CSAT).

Question: What are the mean, median, and mode values on the CSAT scale? What proportion of users say they are highly satisfied with the product? How many people are still satisfied after using the product for six months?

In addition to couching usability goals in terms of specific questions, they are turned into usability criteria. These are specific objectives that enable the usability of a product to be assessed in terms of how it can improve (or not improve) human performance. Examples of commonly used usability criteria are time to complete a task (efficiency), time to learn a task (learnability), and the number of errors made when carrying out a given task over time (memorability). These can provide quantitative indicators of the extent to which productivity has increased, or how work, training, or learning have been improved. They can be compared with target values to determine whether a product under development is usable enough to be released. However, they do not address the overall quality of the user experience, which is where user experience goals come into play,

good for
research
projects

1.9.2 User Experience Goals

A diversity of user experience goals have been articulated in interaction design, which covers a range of emotions and felt experiences. These include desirable and undesirable aspects, as shown in Table 1.1.

Desirable aspects		
Satisfying	Helpful	Fun
Enjoyable	Motivating	Provocative
Engaging	Challenging	Surprising
Pleasurable	Enhancing sociability	Rewarding
Exciting	Supporting creativity	Emotionally fulfilling
Entertaining	Cognitively stimulating	Experiencing flow
Undesirable aspects		
Boring	Unpleasant	Creepy
Frustrating	Patronizing	Intrusive
Making one feel guilty	Making one feel stupid	Invasive
Annoying	Cutesy	Deceptive
Childish	Gimmicky	Annoying

Table 1.1 Desirable and undesirable aspects of the user experience

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Many of these are subjective qualities and are concerned with how a system feels to someone. They differ from the more objective usability goals in that they are concerned with how people experience an interactive product from their perspective, rather than assessing how useful or productive a system is from its own perspective. Whereas the terms used to describe usability goals comprise a small distinct set, many more terms are used to describe the multifaceted nature of the user experience. They also overlap with what they are referring to. In so doing, they offer subtly different options for expressing the way an experience varies for the same activity over time, technology, and place. For example, we may describe listening to music in the shower as highly pleasurable but consider it more apt to describe listening to music in the car as enjoyable. Similarly, listening to music on a high-end powerful music system may invoke exciting and emotionally fulfilling feelings, while listening to it on a smartphone that has a shuffle mode may be serendipitously enjoyable, especially not knowing what tune is next. The process of selecting terms that best convey a person's feelings, state of being, emotions, sensations, and so forth when using or interacting with a product at a given time and place can help designers understand the multifaceted and changing nature of the user experience.

The concepts can be further defined in terms of elements that contribute to making a user experience pleasurable, fun, exciting, and so on. They include attention, pace, play, interactivity, conscious and unconscious control, style of narrative, and flow. The concept of flow (Csikszentmihalyi, 1997) continues to be popular in interaction design for informing the design of user experiences for websites, video games, and other interactive products. It refers to a state of intense emotional involvement that comes from being completely involved in an activity, like playing music, and where time flies. Instead of designing websites to cater to visitors who know what they want, they can be designed to induce a state of flow, leading the visitor to some unexpected place, where they become completely absorbed.

The quality of the user experience may also be affected by single actions performed at an interface. For example, people can get much pleasure from turning a knob that has the perfect level of gliding resistance; they may enjoy flicking their finger from the bottom of a smartphone screen to reveal a new menu, with the effect that it appears by magic, or enjoy the sound of trash being emptied from the trashcan on a screen. These one-off actions can be performed infrequently or several times a day—which the person never tires of doing. Dan Saffer (2014) has described these as *microinteractions* and argues that designing these moments of interaction at the interface—despite being small—can have a big impact on the user experience.

ACTIVITY 1.4

There are many aspects of the user experience listed in Table 1.1. Should you consider all of these when designing a product? What other ones might you include?

Comment

The two lists we have come up with are not meant to be exhaustive. There are likely to be more—both desirable and undesirable—as new products surface.

Not all usability and user experience goals will be relevant to the design and evaluation of an interactive product being developed. Some combinations will also be incompatible. For example, it may not be possible or desirable to design a process control system that is both safe and fun. Recognizing and understanding the nature of the relationship between usability and user experience goals is central to interaction design. It enables designers to become aware of the consequences of pursuing different combinations when designing products and highlighting potential trade-offs and conflicts. As suggested by Jack Carroll (2004), articulating the interactions of the various components of the user experience can lead to a deeper and more significant interpretation of the role of each component. ■

BOX 1.3

Beyond Usability: Designing to Persuade

Eric Schaffer (2009) argued that we should be focusing more on the user experience and less on usability. He pointed out how many websites are designed to persuade or influence rather than enable people to perform their tasks in an efficient manner. For example, many online shopping sites are in the business of selling services and products, where a core strategy is to entice people to buy what they might not have thought they needed. Online shopping experiences are increasingly about persuading people to buy rather than being designed to make shopping easy. This involves designing for persuasion, emotion, and trust, which may or may not be compatible with usability goals.

This entails determining what customers will do, whether it is to buy a product or renew a membership, and it involves encouraging, suggesting, or reminding them of things that they might like or need. Many online travel sites try to lure visitors to purchase additional items (such as hotels, insurance, car rental, car parking, or day trips) besides the flight they originally wanted to book, and they will add a list full of tempting graphics to the visitor's booking form, which then has to be scrolled through before being able to complete the transaction. These opportunities need to be designed to be eye-catching and enjoyable, in the same way that an array of products are attractively laid out in the aisles of a grocery store that one is required to walk past before reaching one's desired product.

Some online sites, however, have gone too far, for example, adding items to the customer's shopping basket (for example, insurance, special delivery, and care and handling) that the shopper has to deselect if not desired or start all over again. This sneaky add-on approach can often result in a negative experience. More generally, this deceptive approach is known as *dark patterns*, a term first coined by Harry Brignull (see darkpatterns.org). Shoppers often become annoyed if they notice decisions that add cost to their purchase have been made on their behalf without even being asked. For example, on clicking the unsubscribe button on the website of a car rental company, as indicated in Figure 1.9, the user is taken to another page where they have to uncheck additional boxes and then Update. They are then taken to

(Continued)

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yet another page where they are asked for their reason. The next screen says “Your email preferences have been updated. Do you need to hire a vehicle?” without letting the user know whether they have been unsubscribed from that mailing list.

Email preferences

y.rogers@ucl.ac.uk

Uncheck the emails you do not want to receive

Newsletters UK

NiftyCars Partners offers

About your rental

Update

* required fields

Email preferences

We'd love to get some feedback on why you're unsubscribing.

Emails were too frequent

Emails were not relevant

I am no longer interested in this content

I never signed up for newsletters from NiftyCars

Update

Figure 1.9 Dark pattern for a car rental company

Nudging people can be an acceptable mechanism to use at the interface if it is transparent and users are able to understand and feel comfortable with it. An example is encouraging people to exercise more through using emoji nudges, like badges and hands cheering. However, the use of nudging at the interface can also be insidious. Natasha Loma (2018) points out how it can take on the form of a dark pattern, encompassing “deception and dishonesty by design.” She mentions how many kinds of dark patterns are now used to deceive people. A well-known example that most of us have experienced is unsubscribing from a marketing

mailing list. Many sites go to great lengths to make it difficult for you to leave; you think you have unsubscribed, but then you discover that you need to type in your email address and click several more buttons to reaffirm that you really want to quit. Then, just when you think you are safe, they post a survey asking you to answer a few questions about why you want to leave. Similar to Harry Brignull, she argues that companies should adopt fair and ethical design where people have to opt in to any actions that benefit the company at the expense of their interests.

Another technique that is often used is asking users to rate products by clicking Like or 1–5 stars and adding comments about the product. These can then nudge others to buy a particular product. How many times have you chosen a product over another one, based on it having been mainly rated with five stars versus having more one-to-three star ratings? Do you think this practice is OK? ■

Video Watch Alita Joyce explain the difference between dark patterns and persuasive techniques: nngroup.com/videos/what-makes-a-dark-ui-pattern.

1.9.3 Design Principles

Design principles are used by interaction designers to aid their thinking when designing for the user experience. These are generalizable abstractions intended to orient designers toward thinking about different aspects of their designs. A well-known example is feedback: Products should be designed to provide adequate feedback about what has already been done so that users know what to do next in the interface. Another one that is important is *findability* (Morville, 2005). This refers to the degree to which a particular object is easy to discover or locate—be it navigating a website, moving through a building, or finding the delete image option on a digital camera. Related to this is the principle of *navigability*: Is it obvious what to do and where to go in an interface; are the menus structured in a way that allows a user to move smoothly through them to reach the option they want?

Design principles are derived from a mix of theory-based knowledge, experience, and common sense. They tend to be written in a prescriptive manner, suggesting to designers what to provide and what to avoid at the interface—if you like, the dos and don’ts of interaction design. More specifically, they are intended to help designers explain and improve their designs (Thimbleby, 1990). However, they are not intended to specify how to design an actual interface, for instance, telling the designer how to design a particular icon or how to structure a web portal, but to act more like triggers for designers, ensuring that they provide certain features in an interface.

Several design principles have been promoted. The best known are concerned with how to determine what people should see and do when carrying out their tasks using an interactive product. Here we briefly describe the most common ones: visibility, feedback, constraints, consistency, and affordance.

Visibility

Visibility refers to how an interface is designed to show what someone needs to do next to progress with their task. Don Norman (1988) describes the controls of a car to emphasize this point. The controls for different operations are clearly visible, such as indicators, headlights, horn, and hazard warning lights, indicating what can be done. The relationship between the way the controls have been positioned in the car and what they do made it easy for the driver to find the appropriate control for the task at hand. Newer electric cars, however, have been designed so that the controls are activated from a touchscreen next to the steering wheel. While easier to design and update from an engineering perspective, it can make it harder for the driver to know where to find them.

In contrast, when functions are out of sight, it makes them more difficult to find and to know how to use. For example, devices and environments that have become automated through the use of sensor technology (usually for hygiene and energy-saving reasons)—like faucets, elevators, and lights—can sometimes be more difficult for people to know how to control, especially how to activate or deactivate them. This can result in people getting caught short and frustrated. Figure 1.10 shows a sign that explains how to use the automatically controlled faucet for what is normally an everyday and well-learned activity. It also states that the faucets cannot be operated if wearing black clothing. It does not explain, however, what to do if you are wearing black clothing! Increasingly, highly visible controlling devices, such as knobs, buttons, and switches, which are intuitive to use, have been replaced by invisible and ambiguous activating zones where people have to guess where to move their hands, bodies, or feet—on, into, or in front of—to make them work.



Figure 1.10 A sign in the restrooms at the Cincinnati airport

Source: Yvonne Rogers

Feedback

Related to the concept of visibility is feedback. This is best illustrated by an analogy to what everyday life would be like without it. Imagine trying to play a guitar, slice bread using a knife, or write using a pen if none of the actions produced any effect for several seconds. There would be an unbearable delay before the music was produced, the bread was cut, or the words appeared on the paper, making it almost impossible for the person to continue with the next strum, cut, or stroke.

Feedback involves sending back information about what action has been done and what has been accomplished, allowing the person to continue with the activity. Various kinds of feedback are available for interaction design—audio, tactile, verbal, visual, and combinations of these. Deciding which combinations are appropriate for different types of activities and interactivities is central. Using feedback in the right way can also provide the necessary visibility for user interaction.

Constraints

The design concept of *constraining* refers to determining ways of restricting the kinds of user interaction that can take place at a given moment. There are various ways that this can be achieved. A common design practice in graphical user interfaces is to deactivate certain menu options by shading them gray, thereby restricting which actions are permissible at that stage of the activity (see Figure 1.11). One of the advantages of this form of constraining is that it prevents incorrect options being selected and thereby reduces the chance of making a mistake.

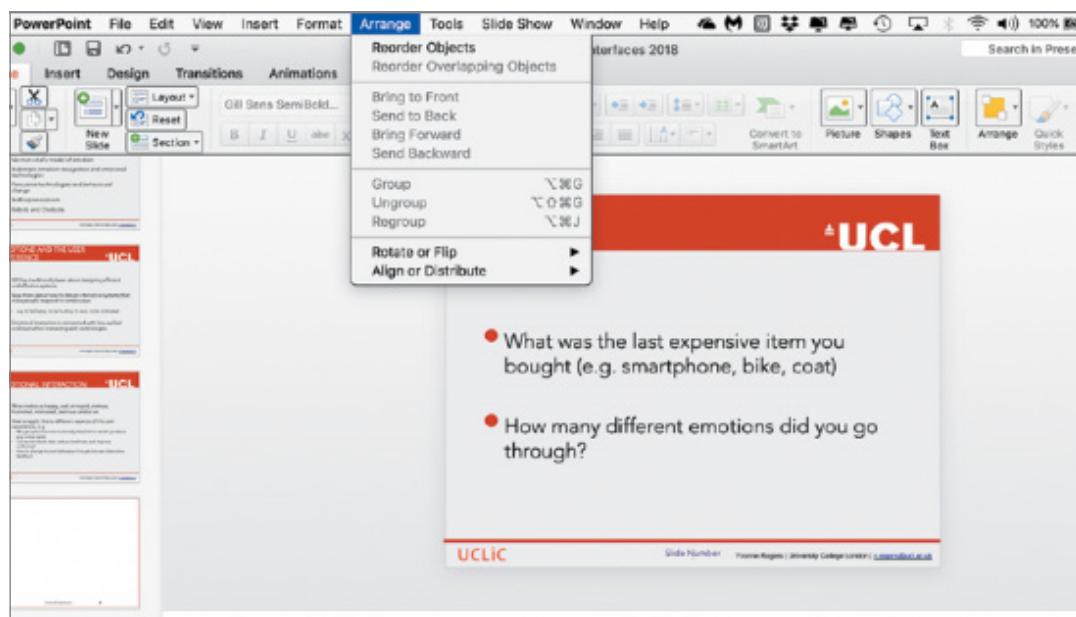


Figure 1.11 A menu showing restricted availability of options as an example of logical constraining. Gray text indicates deactivated options.

Source: Yvonne Rogers

The use of different kinds of graphical representations can also constrain a person's interpretation of a problem or information space. For example, flow chart diagrams show

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which objects are related to which, thereby constraining the way that the information can be perceived. The physical design of a device can also constrain how it is used; for example, most door locks are designed to allow keys to be inserted one way only.

Consistency

This refers to designing interfaces to have similar operations and use similar elements for achieving similar tasks. In particular, a consistent interface is one that follows rules, such as using the same operation to select all objects. For example, a consistent operation is using the same input action to highlight any graphical object on the interface, such as always clicking the left mouse button. Inconsistent interfaces, on the other hand, allow exceptions to a rule. An example is where certain graphical objects (for example, email messages presented in a table) can be highlighted only by using the right mouse button, while all other operations are highlighted using the left mouse button. The problem with this kind of inconsistency is that it is quite arbitrary, making it difficult for users to remember and making its use more prone to mistakes.

One of the benefits of consistent interfaces, therefore, is that they are easier to learn and use, requiring learning about a single mode of operation that is applicable to all objects. This principle works well for simple interfaces with limited operations, such as a portable radio with a small number of operations mapped onto separate buttons. Here, all that is needed is to learn what each button represents and select accordingly. However, it can be more problematic to apply the concept of consistency to more complex interfaces, especially when many different operations need to be designed. For example, consider how to design an interface for an application that offers hundreds of operations, such as a word-processing application. There is simply not enough space for a thousand buttons, each of which maps to an individual operation. Even if there were, it would be extremely difficult and time-consuming for someone to search through all of them to find the desired operation. A much more effective design solution is to create categories of commands that can be mapped into subsets of operations that can be displayed at the interface, for instance, via menus. This solution is both consistent and highly learnable.

Affordance

This is a term used to refer to an attribute of an object that allows people to know how to use it. For example, a mouse button invites pushing (in so doing, activating clicking) by the way it is physically constrained in its plastic shell. At a simple level, to afford means “to give a clue” (Norman, 1988). When the affordances of a physical object are perceptually obvious, it is easy to know how to interact with it. For example, a door handle affords pulling, a cup handle affords grasping, and a mouse button affords pushing. The term has since been much popularized in interaction design, being used to describe how interfaces should make it obvious as to what can be done when using them. For example, graphical elements like buttons, icons, links, and scrollbars are discussed with respect to how to make it appear obvious how they should be used: Icons should be designed to afford clicking, scrollbars to afford moving up and down, and buttons to afford pushing.

Don Norman (1999) suggests that there are two kinds of affordance: perceived and real. Physical objects are said to have real affordances, like grasping, that are perceptually obvious and do not have to be learned. In contrast, user interfaces that are screen-based are virtual and do not have these kinds of real affordances. Using this distinction, he argues that it does not make sense to try to design for real affordances at the interface, except when designing physical devices, like control consoles, where affordances like pulling and pressing are helpful in guiding the user to know what to do. Alternatively, screen-based interfaces are better conceptualized as perceived affordances, which are essentially learned conventions. However,

watching a one-year-old swiping smartphone screens, zooming in and out on images with their finger and thumb, and touching menu options suggests that kind of learning comes naturally.

ACTIVITY 1.5

One of the main design principles for website design is simplicity. Jakob Nielsen (1999) originally proposed that designers go through all of their design elements and remove them one by one. If a design works just as well without an element, then remove it. Do you think this is a good design principle these days? If you have your own website, try doing this and seeing what happens. At what point does the interaction break down?

Comment

Simplicity is certainly an important design principle. Many designers try to cram too much into a screenful of space, making it unwieldy for people to find the information in which they are interested. Removing design elements to see what can be discarded without affecting the overall function of the website can be a salutary lesson. Unnecessary icons, buttons, boxes, lines, graphics, shading, and text can be stripped, leaving a cleaner, crisper, and easier-to-navigate website. However, graphics, shading, coloring, branding and formatting can make a site aesthetically pleasing and enjoyable to use. Good interaction design involves getting the right balance between aesthetic appeal and the optimal amount and kind of information. ■

In-Depth Activity

This activity is intended for you to put into practice what you have studied in this chapter. Specifically, the objective is to enable you to define usability and user experience goals and to transform these and other design principles into specific questions to help evaluate an interactive product.

Find an everyday handheld device, for example, a remote control or smartwatch, and examine how it has been designed, paying particular attention to how a user is meant to interact with it.

1. From your first impressions, write down what is good and bad about the way the device works.
2. Give a description of the user experience resulting from interacting with it.
3. Outline some of the core microinteractions that are supported by it. Are they pleasurable, easy, and obvious?
4. Based on your reading of this chapter and any other material you have come across about interaction design, compile a set of usability and user experience goals that you think will be most relevant in evaluating the device. Decide which are the most important ones and explain why.
5. Translate each of your sets of usability and user experience goals into two or three specific questions. Then use them to assess how well your device fares.
6. Repeat steps (3) and (4), but this time use the design principles outlined in the chapter.
7. Finally, discuss possible improvements to the interface based on the answers obtained in steps (4) and (5).

Summary

In this chapter, we have looked at what interaction design is and its importance when developing apps, products, services, and systems. To begin, good and bad designs were contrasted for a device to illustrate how interaction design can make a difference. The pros and cons of transforming everyday activities into being digital was discussed. We described who and what is involved in interaction design and the need to understand accessibility and inclusiveness. We noted how there has been a shift toward embracing people-centered design in place of user-centered design and referring to *people* as a term of reference rather than the user where it seems more appropriate. We explained in detail what usability and user experience are, how they have been characterized, and how to operationalize them to assess the quality of a user experience resulting from interacting with an interactive product. A number of core design principles were also introduced that provide guidance for helping to inform the interaction design process.

Key Points

- Interaction design is concerned with designing interactive products to support the way people communicate and interact in their everyday and working lives.
- Interaction design is multidisciplinary, involving many inputs from wide-ranging disciplines and fields.
- There is a growing shift toward replacing the term *user-centered design* with *people-centered design*.
- Optimizing the interaction between people and interactive products requires consideration of a number of interdependent factors, including context of use, types of activity, design goals, accessibility, cultural differences, and user groups.
- Identifying and specifying relevant usability and user experience goals can help lead to the design of good interactive products.
- Design principles, such as feedback and simplicity, are useful heuristics for informing, analyzing, and evaluating aspects of an interactive product.

Further Reading

Here we recommend a few seminal readings on interaction design and the user experience (in alphabetical order).

COOPER, A., REIMANN, R., CRONIN, D. AND NOESSEL, C. (2014) *About Face: The Essentials of Interaction Design* (4th ed.). John Wiley & Sons Inc. This fourth edition of *About Face* provides an overview of what is involved in interaction design, and it is written in a personable style that appeals to practitioners and students alike.

GARRETT, J. J. (2010) *The Elements of User Experience: User-Centered Design for the Web and Beyond* (2nd ed.). New Riders Press. Even though this second edition is more than 10 years old, it is still highly relevant to the challenges facing interaction design today. It focuses on how to ask the right questions when designing for a human experience. It emphasizes the importance of understanding how products work on the outside, that is, when a person comes into contact with those products and tries to work with them. It also considers a business perspective.

HOLLOWAY, C. AND BARBARESCHI, G. (2022) *Disability Interactions: Creating Inclusive Innovations*. Morgan & Claypool Publishers. This lecture series book outlines a new approach to co-creating new technologies, experiences, and ways of working with disabled people, illustrated with many illuminating case studies written by those who have conducted the research.

LIDWELL, W., HOLDEN, K. AND BUTLER, J. (2010) *Revised and Updated: 125 Ways to Enhance Usability, Influence Perception, Increase Appeal, Make Better Design Decisions and Teach Through Design*. Rockport Publishers, Inc. This book presents classic design principles such as consistency, accessibility, and visibility in addition to some lesser-known ones, such as constancy, chunking, and symmetry. They are alphabetically ordered (for easy reference) with a diversity of examples to illustrate how they work and can be used.

NORMAN, D.A. (2013) *The Design of Everyday Things: Revised and Expanded Edition*. MIT Press. This book was first published in 1988 and became an international best seller, introducing the world of technology to the importance of design and psychology. It covers the design of everyday things, such as refrigerators and thermostats, providing much food for thought in relation to how to design interfaces. This latest edition is comprehensively revised showing how principles from psychology apply to a diversity of old and new technologies. The book is highly accessible with many illustrative examples.

SAFFER, D. (2014) *Microinteractions: Designing with Details*. O'Reilly. This highly accessible book provides many examples of the small things in interaction design that make a big difference between a pleasant experience and a nightmare one. Dan Saffer describes how to design them to be efficient, understandable, and enjoyable user actions. He goes into detail about their structure and the different kinds, including many examples with lots of illustrations. The book is a joy to dip into and enables you to understand right away why and how it is important to get the microinteractions right.

STEIN, M.A., and LAZAR, J. (2022) *Accessible Technology and the Developing World*. Oxford University Press. This book is concerned with accessible technology in the developing world. It sits at the intersection of human-computer interaction, policy, law, and development, and is concerned primarily with the accessibility innovations taking place in the Global South and the need to ensure that technology and legal infrastructures in the Global South that are currently being built do not present barriers to people with disabilities.

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Source: Harry Brignull

Harry Brignull is a design director and a user experience expert. He has a PhD in cognitive science, and his work involves helping companies deliver better experiences for users by blending research and interaction design. In his work, Harry has consulted for companies including Spotify, Smart Pension, The Telegraph, British Airways, Vodafone, and many others. In his spare time, Harry runs darkpatterns.org and is an expert witness—campaigning against deceptive design and working on class action lawsuits and other legal cases to help stamp it out.

What are the characteristics of a good interaction designer?

I think of interaction design, user experience design, service design, and user research as a combined group of disciplines that are tricky to tease apart. Every company has slightly different terminology, processes, and approaches. I'll let you into a secret, though. They're all making it up as they go along. When you see a company portraying its design and research publicly, they're showing you a fictionalized

INTERVIEW with Harry Brignull

view of it for recruitment and marketing purposes. The reality of the work is usually very different. Research and design are naturally messy. There's a lot of waste, false assumptions, and blind alleys you have to go down before you can define and understand a problem well enough to solve it. Accepting that is a key part of being good at your job. Don't be reluctant to change your mind or throw things away.

A good interaction designer has skills that work like expanding foam. You need to fill the gaps and glue together all the work from your team members. If you don't have a writer present, you need to be able to step up and do it yourself. If you don't have a researcher, you'll need to step up and do that too sometimes. The same goes for developing prototypes, planning the user journeys, and so on. You'll soon learn to become used to working outside of your comfort zone and relish the new challenges that each project brings. A lot of your work also involves helping people understand your perspective regarding user needs, problem definition, and the strategy you're trying to use to solve the problem.

You can't expect all of your stakeholders to understand the basics of interaction design—you'll need to teach them on the job.

How has interaction design changed in the past few years?

If I think back to the early days of my career around 2000–2005, there was a lot of techno-optimism with the rise of the web, smartphones, and social media. They all seemed such wonderful enabling things. Most of us didn't realize that there would be downsides too, nor that it would become our jobs to fight against those downsides.

If we think specifically about interaction design practice in industry, what's changed most is how much employers now understand the relationship between design decisions and profit. If you make the sign-up journey easier, revenue goes up. Great—everyone's happy! But what about hiding pricing information until the last step? Everyone hates that—apart from the business owners and shareholders, who like the extra revenue it delivers.

Don't believe me? In 2020, some researchers worked with a large-ticket sales website to look at the effect of hidden fees versus upfront fees ("Price Salience and Product Choice" by Blake et al., 2020). The experiment included several million users. It's the largest test of dark patterns that's ever been published.

The users who weren't shown the ticket fees up front spent about 21 percent more money and were 14 percent more likely to complete a purchase. That is a huge impact. Imagine if you ran a business, and you could press a button to get your customers to spend 21 percent more. This is what we're up against as interaction designers. In some companies, it will be seen as your job to enable cold, hard profit

seeking at any cost. Be careful where you end up working—over the years it will change who you are.

What projects are you working on now?

I'm currently head of UX at a fintech startup called Smart Pension in London. Pensions pose a really fascinating user-centered design challenge. Consumers hate thinking about pensions, but they desperately need them. In a recent research session, one of the participants said something that really stuck with me: "Planning your pension is like planning for your own funeral." Humans are pretty terrible at long-term planning over multiple decades. Nobody likes to think about their own mortality. But this is exactly what you need to do if you want to have a happy retirement.

I really like working in finance because it's a regulated environment. This is something that most people moan about, but hear me out—a lot of the regulations are about protecting end users from unscrupulous service providers. Our regulatory compliance officers spend their time thinking about user needs and stopping misleading or confusing design. That's like an interaction designer, but with added clout because if the business doesn't listen to them, they're at risk of getting fined! Take my advice, make friends with your compliance team if you have one. They're on your side.

"Master Trust" pension schemes also have a board of trustees. They have a number of responsibilities, but part of their job is to make sure the scheme members (i.e., the end users) get looked after properly. Lots of the things that my team designs have to get approved by the trustees and the compliance officers before they go live. It slows things down a bit, but in finance you

(Continued)

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really don't want to "move fast and break things." It's a bit like healthcare. These are people's lives we're talking about. I sometimes wonder if we should have similar structures in tech and social media.

What would you say are the biggest challenges facing you and other consultants doing interaction design these days?

A career in interaction design is one of continual education and training. The biggest challenge is to keep this going. Even if you feel that you're at the peak of your skills, the technology landscape will be shifting under your feet, and you need to keep an eye on what's coming next so you don't get left behind. In fact, things move so quickly in interaction design that by the time you read this interview, it will already be dated.

If you ever find yourself in a "comfortable" role doing the same thing every day, then beware—you're doing yourself a disservice. Get out there, stretch yourself,

and make sure you spend some time every week outside your comfort zone.

If you're asked to evaluate a prototype service or product and you discover it is really bad, how do you break the news?

It depends what your goal is. If you want to just deliver the bad news and leave, then by all means be totally brutal and don't pull any punches. But if you want to build a relationship with the client, you're going to need to help them work out how to move forward.

Remember, when you deliver bad news to a client, you're basically explaining to them that they're in a bad place and it's their fault. It can be quite embarrassing and depressing. It can drive stakeholders apart when really you need to bring them together and give them a shared vision to work toward. Discovering bad design is an opportunity for improvement. Always pair the bad news with a recommendation of what to do next. ■

NOTE

We use the term *interactive products* generically to refer to all classes of interactive systems, technologies, environments, tools, applications, services, and devices.