DO

HANDBOOK OF HUMAN-COMPUTER INTERACTION

Second, Completely Revised Edition

Technische Universität Darmstadt
FACHBEREICH INFORMATIK
BIBLIOTHEK
Inventar-Nr.: M07-00131
Sachgebiete: Methodologie
Standort: 1.0/Hela

Edited by

MARTIN G. HELANDER
Linköping Institute of Technology
Linköping, Sweden

THOMAS K. LANDAUER
University of Colorado at Boulder
Boulder, Colorado
U.S.A.

PRASAD V. PRABHU
Human Factors Laboratory
Eastman Kodak Company
Rochester, New York
U.S.A.

GMD-Bereich Darmstadt
29800832
DSH
Bibliothek

1997
ELSEVIER
AMSTERDAM – LAUSANNE – NEW YORK – OXFORD – SHANNON – TOKYO

CONTENTS

I Issues, Theories, Models and Methods in HCI 1

1 Human–Computer Interaction: Background and Issues 3
Raymond S. Nickerson and Thomas K. Landauer

2 Information Visualization 33
James D. Hollan, Benjamin B. Bederson, and Jonathan I. Helfman

3 Mental Models and User Models 49
Robert B. Allen

4 Model-Based Optimization of Display Systems 65
Misha Pavel and Albert J. Ahumada, Jr.

5 Task Analysis, Task Allocation and Supervisory Control 87
Thomas B. Sheridan

6 Models of Graphical Perception 107
Gerald Lee Lohse

7 Using Natural Language Interfaces 137
William C. Ogden and Philip Bernick

8 Virtual Environments as Human-Computer Interfaces 163
Stephen R. Ellis, Durand R. Begault, and Elizabeth M. Wenzel

9 Behavioral Research Methods in Human–Computer Interaction 203
Thomas K. Landauer

II Design and Development of Software Systems 229

10 How To Design Usable Systems 231
John D. Gould, Stephen J. Boies, and Jacob Ukelson

11 Participatory Practices in the Software Lifecycle 255
Michael J. Muller, Jean Hallewell Haslwanter, and Tom Dayton

12 Design for Quality-in-use: Human-Computer Interaction Meets Information Systems Development 299
Pelle Ehn and Jonas Löwgren

13 Ecological Information Systems and Support of Learning: Coupling Work Domain Information to User Characteristics 315
Annelise Mark Pejtersen and Jens Rasmussen

14 The Role of Task Analysis in the Design of Software 347
Robin Jeffries

15 The Use of Ethnographic Methods in Design and Evaluation 361
Bonnie A. Nardi

16 What do Prototypes Prototype? 367
Stephanie Houde and Charles Hill

17 Scenario-Based Design 383
John M. Carroll

18 International Ergonomic HCI Standards 407
Ahmet Çakir and Wolfgang Dzida

III User Interface Design **421**

19 Graphical User Interfaces 423
Aaron Marcus

20 The Role of Metaphors in User Interface Design 441
Dennis C. Neale and John M. Carroll

21 Direct Manipulation and Other Lessons 463
David M. Frohlich

22 Human Error and User-Interface Design 489
Prasad V. Prabhu and Girish V. Prabhu

23 Screen Design 503
Thomas S. Tullis

24 Design of Menus 533
Kenneth R. Paap and Nancy J. Cooke

25 Color and Human-Computer Interaction 573
David L. Post

26 How Not to Have to Navigate Through Too Many Displays 617
David D. Woods and Jennifer C. Watts

IV Evaluation of HCI **651**

27 The Usability Engineering Framework for Product Design and Evaluation 653
Dennis Wixon and Chauncey Wilson

28 User-Centered Software Evaluation Methodologies 689
John Karat

29 Usability Inspection Methods 705
Robert A. Virzi

30 Cognitive Walkthroughs 717
Clayton Lewis and Cathleen Wharton

31 A Guide to GOMS Model Usability Evaluation using NGOMSL 733
David Kieras

32 Cost-Justifying Usability Engineering in the Software Life Cycle 767
Clare-Marie Karat

V Individual Differences and Training **779**

33 From Novice to Expert 781
Richard E. Mayer

34 Computer Technology and the Older Adult 797
Sara J. Czaja

35 Human Computer Interfaces for People with Disabilities 813
Alan F. Newell and Peter Gregor

36 Computer-Based Instruction 825
Ray E. Eberts

37 Intelligent Tutoring Systems 849
Albert T. Corbett, Kenneth R. Koedinger, and John R. Anderson

VI Multimedia, Video and Voice **875**

38 Hypertext and its Implications for the Internet 877
Pawan R. Vora and Martin G. Helander

39 Multimedia Interaction 915
John A. Waterworth and Mark H. Chignell

40 A Practical Guide to Working with Edited Video 947
Wendy A. Kellogg, Rachel K.E. Bellamy, and Mary Van Deusen

41 Desktop Video Conferencing: A Systems Approach 979
Jonathan K. Kies, Robert C. Williges, and Beverly H. Williges

42 Auditory Interfaces 1003
William W. Gaver

43 Design Issues for Interfaces using Voice Input 1043
Candace Kamm and Martin Helander

44 Applying Speech Synthesis to User Interfaces 1061
Murray F. Spiegel and Lynn Streeter

45 Designing Voice Menu Applications for Telephones 1085
Monica A. Marics and George Engelbeck

VII Programming, Intelligent Interface Design and Knowledge-Based Systems **1103**

46 Expertise and Instruction in Software Development 1105
Mary Beth Rosson and John M. Carroll

47 End-User Programming 1127
Michael Eisenberg

48 Interactive Software Architecture 1147
Dan R. Olsen Jr.

49 User Aspects Of Knowledge-Based Systems 1159
Yvonne Wærn and Sture Hägglund

50 Paradigms for Intelligent Interface Design 1177
Emilie M. Roth, Jane T. Malin, and Debra L. Schreckenghost

51 Knowledge Elicitation for the Design of Software Agents 1203
Guy A. Boy

52 Decision Support Systems: Integrating Decision Aiding And Decision Training 1235
Wayne W. Zachary and Joan M. Ryder

53 Human Computer Interaction Applications for Intelligent Transportation Systems 1259
Thomas A. Dingus, Andrew W. Gellatly, and Stephen J. Reinach

VIII Input Devices and Design of Work Stations **1283**

54 Keys and Keyboards 1285
James R. Lewis, Kathleen M. Potosnak, and Regis L. Magyar

55 Pointing Devices 1317
Joel S. Greenstein

56 Ergonomics of CAD Systems 1349
Holger Luczak and Johannes Springer

57 Design of the Computer Workstation 1395
Karl H. E. Kroemer

58 Work-related Disorders and the Operation of Computer VDT's 1415
Mats Hagberg and David Rempel

IX CSCW and Organizational Issues in HCI **1431**

59 Research on Computer Supported Cooperative Work 1433
Gary M. Olson and Judith S. Olson

60 Organizational Issues in Development and Implementation of Interactive Systems 1457
Jonathan Grudin and M. Lynne Markus

61 Understanding the Organisational Ramifications of Implementing Information Technology Systems 1475
Ken Eason

62 Psychosocial Aspects of Computerized Office Work 1497
Michael J. Smith and Frank T. Conway

Author Index **1519**

Subject Index **1551**