Modeling Human Behavior With Integrated Cognitive Architectures Comparison Evaluation And Validation Author Kevin A Gluck Aug 2005

This edited textbook is a fully updated and expanded version of the highly successful first edition of Human Factors in Aviation. Written for the widespread aviation community - students, engineers, scientists, pilots, managers, government personnel, etc., HFA offers a comprehensive overview of the topic, taking readers from the general to the specific, first covering broad issues, then the more specific topics of pilot performance, human factors in aircraft design, and vehicles and systems. The new editors offer essential breath of experience on aviation human factors from multiple perspectives (i.e. scientific research, regulation, funding agencies, technology, and implementation) as well as knowledge about the science. The contributors are experts in their fields. Topics carried over from the first edition are fully updated, several by new authors who are now at the fore of the field. New material - which represents 50% of the volume - focuses on the challenges facing aviation specialists today. One of the most significant developments in

this decade has been NextGen, the Federal Aviation Administration's plan to modernize national airspace and to address the impact of air traffic growth by increasing airspace capacity and efficiency while simultaneously improving safety, environmental impacts and user access. NextGen issues are covered in full. Other new topics include: High Reliability Organizational Perspective, Situation Awareness & Workload in Aviation, Human Error Analysis, Human-System Risk Management, LOSA, NOSS and Unmanned Aircraft System. Comprehensive text with up-to-date synthesis of primary source material that does not need to be supplemented New edition thoroughly updated with 50% new material and full coverage of NexGen and other modern issues Instructor website with test bank and image collection makes this the only text offering ancillary support Liberal use of case examples exposes readers to real-world examples of dangers and solutions

A groundbreaking look at how technology with a human touch is revolutionizing government and industry Human Systems Integration (HSI) is very attractive as a new integrating discipline designed to help move business and engineering cultures toward a more people-technology orientation. Over the past decade, the United States and foreign governments have developed a wide range of tools, techniques, and technologies aimed at integrating human factors

into engineering systems in order to achieve important cost and performance benefits that otherwise would not have been accomplished. In order for this new discipline to be effective, however, a cultural change is needed that must start with organizational leadership. Handbook of Human Systems Integration outlines the principles and methods that can be used to help integrate people, technology, and organizations with a common objective toward designing, developing, and operating systems effectively and efficiently. Handbook of Human Systems Integration is broad in scope, covering both public and commercial processes as they interface with systems engineering processes. Emphasizing the importance of management and organization concepts as well as the technical uniqueness of HSI, Handbook of Human Systems Integration features: * More than ninety contributors, technical advisors, and reviewers from government, industry, and academia * Comprehensive coverage of the most recent HSI developments, particularly in presenting the cutting-edge tools, techniques, and methodologies utilized by each of the HSI domains * Chapters representing the governments and industries of the United Kingdom and Canada * Contributions from three services of the Department of Defense along with the Federal Aviation Administration and the National Academy of Sciences * Many chapters covering both

military and nonmilitary applications * Concepts widely used by government contractors both in the United States and abroad This book will be of special interest to HSI practitioners, systems engineers, and managers, as well as government and industry decision-makers who must weigh the recommendations of all multidisciplines contributing to systems performance, safety, and costs in order to make sound systems acquisition decisions. Integrated analysis of economic and ecological indicators is necessary in order to achieve sustainable development.

This book constitutes the refereed proceedings of the 13th European Workshop on Computer Performance Engineering, EPEW 2016, held in Chios, Greece, in October 2016. The 14 papers presented together with 2 invited talks in this volume were carefully reviewed and selected from 25 submissions. The papers presented at the workshop reflect the diversity of modern performance engineering, with topics ranging from the analysis of queueing networks and stochastic processes, to performance analysis of computer systems and networks, and even modeling of human behavior. Today's military missions have shifted away from fighting nation states using conventional weapons toward combating insurgents and terrorist networks in a battlespace in which the attitudes and behaviors of civilian noncombatants may be the primary effects

of military actions. To support these new missions, the military services are increasingly interested in using models of the behavior of humans, as individuals and in groups of various kinds and sizes. Behavioral Modeling and Simulation reviews relevant individual, organizational, and societal (IOS) modeling research programs, evaluates the strengths and weaknesses of the programs and their methodologies, determines which have the greatest potential for military use, and provides guidance for the design of a research program to effectively foster the development of IOS models useful to the military. This book will be of interest to model developers, operational military users of the models and their managers, and government personnel making funding decisions regarding model development. This volume describes frontiers in social-behavioral modeling for contexts as diverse as national security, health, and on-line social gaming. Recent scientific and technological advances have created exciting opportunities for such improvements. However, the book also identifies crucial scientific, ethical, and cultural challenges to be met if social-behavioral modeling is to achieve its potential. Doing so will require new methods, data sources, and technology. The volume discusses these, including those needed to achieve and maintain high standards of ethics and privacy. The result should be a new generation of modeling that will advance science and, separately,

aid decision-making on major social and security-related subjects despite the myriad uncertainties and complexities of social phenomena. Intended to be relatively comprehensive in scope, the volume balances theory-driven, data-driven, and hybrid approaches. The latter may be rapidly iterative, as when artificial-intelligence methods are coupled with theory-driven insights to build models that are sound, comprehensible and usable in new situations. With the intent of being a milestone document that sketches a research agenda for the next decade, the volume draws on the wisdom, ideas and suggestions of many noted researchers who draw in turn from anthropology, communications, complexity science, computer science, defense planning, economics, engineering, health systems, medicine, neuroscience, physics, political science, psychology, public policy and sociology. In brief, the volume discusses: Cutting-edge challenges and opportunities in modeling for social and behavioral science Special requirements for achieving high standards of privacy and ethics New approaches for developing theory while exploiting both empirical and computational data Issues of reproducibility, communication, explanation, and validation Special requirements for models intended to inform decision making about complex social systems
Measure twice, cut once. Although applicable to all areas of human factors research, the old adage is

especially relevant to simulation and training. As a tool, simulation is an aid to the imagination, however, if incorrectly or inadequately used, it can lead to inaccurate outcomes that not only limit the possibilities but potentially cause harm. A comprehensive overview of the topic from a human factor perspective, Human Factors in Simulation and Training not only reflects the state-of-the art but also integrates the literature on simulation into a cohesive resource. The editors have collected chapters on a wide variety of topics, beginning with theory and application in areas ranging from traditional training to augmented reality to virtual reality. This coverage includes surface ships, submarines, naval aviation, commercial aviation, space, and medicine. The theory based section focuses on human factors aspects of simulation and training ranging from the history of simulators and training devices, to future trends in simulation from both a civilian and military perspective. The chapters expand on concepts regarding simulator usage particularly with respect to the validity and functionality of simulators as training devices. They contain in depth discussions of specific issues including fidelity, interfaces and control devices, transfer of training, simulator sickness, effects of motion in simulated systems, and virtual reality. As more, and more sophisticated, simulation tools and training technologies become available, a complete understanding of how to use

them appropriately will be even more crucial. Elucidating theory and application, the book addresses numerous issues and concepts pertaining to human factors in simulation and training, making this volume an important addition to the bookshelf of any human factors professional.

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In April 1991 BusinessWeek ran a cover story entitled, "I Can't Work This ?#!!@ Thing," about the difficulties many people have with consumer products, such as cell phones and VCRs. More than 15 years later,

the situation is much the sameâ€"-but at a very different level of scale. The disconnect between people and technology has had society-wide consequences in the large-scale system accidents from major human error, such as those at Three Mile Island and in Chernobyl. To prevent both the individually annoying and nationally significant consequences, human capabilities and needs must be considered early and throughout system design and development. One challenge for such consideration has been providing the background and data needed for the seamless integration of humans into the design process from various perspectives: human factors engineering, manpower, personnel, training, safety and health, and, in the military, habitability and survivability. This collection of development activities has come to be called human-system integration (HSI). Human-System Integration in the System Development Process reviews in detail more than 20 categories of HSI methods to provide invaluable guidance and information for system designers and developers.

Fatigue is a recognized problem in many facets of the human enterprise. It is not confined to any one area of activity but enters all situations in which humans have to perform for extended intervals of time. Most problematic are the circumstances in which obligatory action is continuous and the results of failure are evidently serious or even catastrophic. Therefore, the modern media especially highlights fatigue-related failures in industries such as transportation, materials processing and healthcare. It can be, and indeed is, no coincidence that most of the spectacular failures in process control that

have resulted in the world's largest industrial accidents have occurred in the small hours of the morning when the circadian rhythm is lowest and operator fatigue itself peaks. While there have been legislative efforts made at state, federal and international levels to regulate working hours of employees, the appropriate implementation of such legislation is still a long way off. The Handbook of Operator Fatigue provides a comprehensive account of the subject to serve as the definitive reference work for researchers, students and practitioners alike. The volume features 30 chapters written by experts from around the world to address each important facet of fatigue, including: the scale of the fatigue problem (Section I), the nature of fatigue (Section II), how to assess fatigue (Section III), the impact of fatigue on health (Section IV), fatigue in the workplace (Section V), the neurological basis of fatigue (VI), sleep disorders (VII), and the design of countermeasures to fatigue (VIII). Here is the first of a four-volume set that constitutes the refereed proceedings of the 12th International Conference on Human-Computer Interaction, HCII 2007, held in Beijing, China, jointly with eight other thematically similar conferences. It covers interaction design: theoretical issues, methods, techniques and practice; usability and evaluation methods and tools; understanding users and contexts of use; and models and patterns in HCI.

This single resource for the fire safety community distills the most relevant and useful science and research into a consensus-based guide whose key factors and considerations impact the response and behavior of

occupants of a building during a fire event. The Second Edition of SFPE's Engineering Guide: Human Behavior in Fire provides a common introduction to this field for the broad fire safety community: fire protection engineers/fire safety engineers, human behavior scientists/researchers, design professionals, and code authorities. The public benefits from consistent understanding of the factors that influence the responses and behaviors of people when threatened by fire and the application of reliable methodologies to evaluate and estimate human response in buildings and structures. This Guide also aims to lessen the uncertainties in the "people components" of fire safety and allow for more refined analysis with less reliance on arbitrary safety factors. As with fire science in general, our knowledge of human behavior in fire is growing, but is still characterized by uncertainties that are traceable to both limitation in the science and unfamiliarity by the user communities. The concepts for development of evacuation scenarios for performance-based designs and the technical methods to estimate evacuation response are reviewed with consideration to the limitation and uncertainty of the methods. This Guide identifies both quantitative and qualitative information that constitutes important consideration prior to developing safety factors, exercising engineering judgment, and using evacuation models in the practical design of buildings and evacuation procedures. Besides updating material in the First Edition, this revision includes new information on: Incapacitating Effects of Fire Effluent & Toxicity Analysis Methods Occupant

Behavior Scnearios Movement Models and Behavioral Models Egress Model Selection, Verification, and Validation Estimation of Uncertainty and Use of Safety Factors Enhancing Human Response to Emergencies & Notification of Messaging The prediction of human behavior during a fire emergency is one of the most challenging areas of fire protection engineering. Yet, understanding and considering human factors is essential to designing effective evacuation systems, ensuring safety during a fire and related emergency events, and accurately reconstructing a fire.

This volume presents a set of coherent, cross-referenced perspectives on incorporating the spatial representation and analytical power of GIS with agent-based modelling of evolutionary and non-linear processes and phenomena. Many recent advances in software algorithms for incorporating geographic data in modeling social and ecological behaviors, and successes in applying such algorithms, had not been adequately reported in the literature. This book seeks to serve as the standard guide to this broad area.

Effective use of driving simulators requires considerable technical and methodological skill along with considerable background knowledge. Acquiring the requisite knowledge and skills can be extraordinarily time consuming, yet there has been no single convenient and comprehensive source of information on the driving simulation research being conducted around the world. A how-to-do-it resource for researchers and professionals, Handbook of Driving Simulation for Engineering, Medicine, and Psychology brings together discussions of

technical issues in driving simulation with broad areas in which driving simulation is now playing a role. The chapters explore technical considerations, methodological issues, special and impaired populations, evaluation of in-vehicle and nomadic devices, and infrastructure evaluations. It examines hardware and software selection, visual database and scenario development, independent subject variables and dependent vehicle, environmental, and psychological variables, statistical and biostatistical analysis, different types of drivers, existing and future key-in vehicle devises, and validation of research. A compilation of the research from more than 100 of the world's top thinkers and practitioners, the book covers basic and advanced technical topics and provides a comprehensive review of the issues related to driving simulation. It describes literally hundreds of different simulation scenarios, provides color photographs of those scenarios, and makes available select videos of the scenarios on an accompanying web site, all of which should prove essential for seasoned researchers and for individuals new to driving simulation.

Over the past 40 years, there has been a growing trend toward the utilization of teams for accomplishing work in organizations. Project teams, self-managed work teams and top management teams, among others have become a regular element in the corporation or military. This volume is intended to provide an overview of the current state of the art research on team effectiveness. The field of cognitive modeling has progressed beyond modeling cognition in the context of simple laboratory

tasks and begun to attack the problem of modeling it in more complex, realistic environments, such as those studied by researchers in the field of human factors. The problems that the cognitive modeling community is tackling focus on modeling certain problems of communication and control that arise when integrating with the external environment factors such as implicit and explicit knowledge, emotion, cognition, and the cognitive system. These problems must be solved in order to produce integrated cognitive models of moderately complex tasks. Architectures of cognition in these tasks focus on the control of a central system, which includes control of the central processor itself, initiation of functional processes, such as visual search and memory retrieval, and harvesting the results of these functional processes. Because the control of the central system is conceptually different from the internal control required by individual functional processes, a complete architecture of cognition must incorporate two types of theories of control: Type 1 theories of the structure, functionality, and operation of the controller, and type 2 theories of the internal control of functional processes, including how and what they communicate to the controller. This book presents the current state of the art for both types of theories, as well as contrasts among current approaches to human-performance models. It will be an important resource for professional and student researchers in cognitive science, cognitive-engineering, and human-factors. Contributors: Kevin A. Gluck, Jerry T. Ball, Michael A. Krusmark, Richard W. Pew, Chris R. Sims, Vladislav D. Veksler, John R. Anderson, Ron Sun,

Nicholas L. Cassimatis, Randy J. Brou, Andrew D. Egerton, Stephanie M. Doane, Christopher W. Myers, Hansjörg Neth, Jeremy M Wolfe, Marc Pomplun, Ronald A. Rensink, Hansjörg Neth, Chris R. Sims, Peter M. Todd, Lael J. Schooler, Wai-Tat Fu, Michael C. Mozer, Sachiko Kinoshita, Michael Shettel, Alex Kirlik, Vladislav D. Veksler, Michael J. Schoelles, Jerome R. Busemeyer, Eric Dimperio, Ryan K. Jessup, Jonathan Gratch, Stacy Marsella, Glenn Gunzelmann, Kevin A. Gluck, Scott Price, Hans P. A. Van Dongen, David F. Dinges, Frank E. Ritter, Andrew L. Reifers, Laura Cousino Klein, Michael J. Schoelles, Eva Hudlicka, Hansjörg Neth, Christopher W. Myers, Dana Ballard, Nathan Sprague, Laurence T. Maloney, Julia Trommershäuser, Michael S. Landy, A. Hornof, Michael J. Schoelles, David Kieras, Dario D. Salvucci, Niels Taatgen, Erik M. Altmann, Richard A. Carlson, Andrew Howes, Richard L. Lewis, Alonso Vera, Richard P. Cooper, and Michael D. Byrne This two volume set (LNCS 8025-8026) constitutes the refereed proceedings of the Fourth International Conference on Digital Human Modeling and Applications in Health, Safety, Ergonomics and Risk Management, formerly International Conference on Digital Human Modeling, DHM 2013, held as part of the 15th International Conference on Human-Computer Interaction, HCII 2013, held in Las Vegas, USA in July 2013, jointly with 12 other thematically similar conferences. The total of 1666 papers and 303 posters presented at the HCII 2013 conferences was carefully reviewed and selected from 5210 submissions. These papers address the latest research and development efforts and highlight the human aspects of design and use of computing systems. The papers accepted for presentation thoroughly

cover the entire field of Human-Computer Interaction, addressing major advances in knowledge and effective use of computers in a variety of application areas. This two-volume set contains 91 papers. The papers in this volume focus on the following topics: driving and aviation safety, human factors and digital human modeling in healthcare, and safety of the human environment.

The first encyclopedia in the field, the International Encyclopedia of Ergonomics and Human Factors provides a comprehensive and authoritative compendium of current knowledge on ergonomics and human factors. It gives specific information on concepts and tools unique to ergonomics. About 500 entries, published in three volumes and on CD-ROM, are pre

This special issue of Cognitive Science honors the research and mentorship contributions of Dr. John R. Anderson, the 2004 David E. Rumelhart Prize recipient whose research has provided the field of cognitive psychology with comprehensive and integrative theories, and has had a practical impact on educational practice in the classroom and on student achievement in learning mathematics. The David E. Rumelhart Prize is awarded annually to an individual or collaborative team making a significant contemporary contribution to the formal analysis of human cognition. For three decades, Dr. Anderson has been engaged in a vigorous research program with the goal of developing a computational theory of mind. The diverse articles in this issue feature work by Dr. Anderson's students, colleagues, and collaborators, illustrating that it is possible to impact education with rigorous stimulation of human cognition.

"This book covers a multitude of newly developed hardware and software technology advancements in urban and spatial planning and architecture, drawing on the most current research and studies of field practitioners who offer solutions

and recommendations for further growth, specifically in urban and spatial developments"--

The challenge of creating a real-life computational equivalent of the human mind requires that we better understand at a computational level how natural intelligent systems develop their cognitive and learning functions. In recent years, biologically inspired cognitive architectures have emerged as a powerful new approach toward gaining this kind of understanding (here "biologically inspired" is understood broadly as "brain-mind inspired"). Still, despite impressive successes and growing interest in BICA, wide gaps separate different approaches from each other and from solutions found in biology. Modern scientific societies pursue related yet separate goals, while the mission of the BICA Society consists in the integration of many efforts in addressing the above challenge. Therefore, the BICA Society shall bring together researchers from disjointed fields and communities who devote their efforts to solving the same challenge, despite that they may "speak different languages". This will be achieved by promoting and facilitating the transdisciplinary study of cognitive architectures, and in the long-term perspective – creating one unifying widespread framework for the human-level cognitive architectures and their implementations. This book is a proceedings of the Third Annual Meeting of the BICA Society, which was hold in Palermo-Italy from October 31 to November 2, 2012. The book describes recent advances and new challenges around the theme of understanding how to create general-purpose humanlike artificial intelligence using inspirations from studies of the brain and the mind.

Improvements in safety in the air and in space can be achieved through better ergonomics, better work environments, and other efforts of traditional avionic psychology that directly affect human behaviors and

performance. Not limited to just the aerospace field, this book discusses adaptive probabilistic predictive modeling in human-in-the-loop situations and gets you familiar with a new, powerful, flexible, and effective approach to making outcomes from missions successful and safe. Covers the concepts, which are adaptable across other disciplines, and methodology for evaluating the likelihood of a successful outcome of an extraordinary situation Considers human performance and equipment/instrumentation reliability, as well as other possible sources of uncertainty Presents probabilistic assessment of an aerospace mission outcome Provides the most effective, physically meaningful, and cost-effective planning of an aerospace mission Offers how to organize and provide the most effective training of personnel The trusted handbook?now in a new edition This newly revised handbook presents a multifaceted view of systems engineering from process and systems management perspectives. It begins with a comprehensive introduction to the subject and provides a brief overview of the thirty-four chapters that follow. This introductory chapter is intended to serve as a "field guide" that indicates why, when, and how to use the material that follows in the handbook. Topical coverage includes: systems engineering life cycles and management; risk management; discovering system requirements; configuration management; cost management; total quality management; reliability, maintainability, and availability; concurrent engineering; standards in systems engineering; system architectures; systems design; systems integration; systematic measurements; human supervisory control; managing organizational and individual decision-making; systems reengineering; project planning; human systems integration; information technology and knowledge management; and more. The handbook is written and edited for systems engineers in industry and government, and to

serve as a university reference handbook in systems engineering and management courses. By focusing on systems engineering processes and systems management, the editors have produced a long-lasting handbook that will make a difference in the design of systems of all types that are large in scale and/or scope.

This book describes new theories and applications of artificial neural networks, with a special focus on addressing problems in neuroscience, biology and biophysics and cognitive research. It covers a wide range of methods and technologies, including deep neural networks, large-scale neural models, brain–computer interface, signal processing methods, as well as models of perception, studies on emotion recognition, self-organization and many more. The book includes both selected and invited papers presented at the XX International Conference on Neuroinformatics, held in Moscow, Russia on October 8–12, 2018.

This thesis is concerned with the development of interactive systems for smart environments. One of the characteristic of smart environments is the need to support different interaction paradigms at runtime. On the one hand interaction is performed explicitly: the user performs an action in order to interact with the system (e.g., pressing a button to adjust the light). On the other hand actions of the user are interpreted by the smart environment, even though they have not been performed primarily to interact with the system: implicit interactions (e.g., walking to the speaker's desk to give a talk). A smart environment tries to infer those interactions to assist the user in her work (e.g., display slides at the projection canvas). Both interaction paradigms originate from different research fields and are currently treated

independently although implicit and explicit interaction mutually influence each other and occur interleaved. The thesis introduces a task modeling language in order to cope with the given requirements of smart environments which can be used to perform interaction development for smart environments in a model-based fashion for both interaction paradigms.

The objective of this Workshop is to confront models, methods and tools developed within the projects with the ongoing research worldwide and to provide an environment for fruitful exchange of ideas. The main topics are: 1. Advanced human models in transportation. 2. Human Errors and Risk Assessment in design processes of assistance systems. 3. Methods and tools to prevent erroneous behaviour to mitigate its consequences. The Workshop will consist of 10 keynote lectures as well as approximately 28 peer reviewed papers.

This book is a definitive reference source for the growing, increasingly more important, and interdisciplinary field of computational cognitive modeling, that is, computational psychology. It combines breadth of coverage with definitive statements by leading scientists in this field. Research in computational cognitive modeling explores the essence of cognition and various cognitive functionalities through developing detailed, process-based understanding by specifying computational mechanisms, structures, and processes. Given the complexity of the human mind and its manifestation in behavioral flexibility, process-based computational models may be necessary to explicate

and elucidate the intricate details of the mind. The key to understanding cognitive processes is often in fine details. Computational models provide algorithmic specificity: detailed, exactly specified, and carefully thought-out steps, arranged in precise yet flexible sequences. These models provide both conceptual clarity and precision at the same time. This book substantiates this approach through overviews and many examples.

Individuals with disabilities often have difficulty accomplishing tasks, living independently, and utilizing information technologies; simple aspects of daily life taken for granted by non-disabled individuals. Assistive Technologies: Concepts, Methodologies, Tools, and Applications presents a comprehensive collection of research, developments, and knowledge on technologies that enable disabled individuals to function effectively and accomplish otherwise impossible tasks. These volumes serve as a crucial reference source for experts in fields as diverse as healthcare, information science, education, engineering, and human-computer interaction, with applications bridging multiple disciplines.

This book presents the theory of threaded cognition, a theory that aims to explain the multitasking mind. The theory states that multitasking behavior can be expressed as cognitive threads-independent streams of thought that weave through the mind's processing resources to produce multitasking behavior, and sometimes experience conflicts to produce multitasking interference. Grounded in the ACT-R cognitive architecture, threaded cognition incorporates computational representations and mechanisms used to

simulate and predict multitasking behavior and performance.

This Open Access proceedings present a good overview of the current research landscape of industrial robots. The objective of MHI Colloquium is a successful networking at academic and management level. Thereby the colloquium is focussing on a high level academic exchange to distribute the obtained research results, determine synergetic effects and trends, connect the actors personally and in conclusion strengthen the research field as well as the MHI community. Additionally there is the possibility to become acquainted with the organizing institute. Primary audience are members of the scientific association for assembly, handling and industrial robots (WG MHI).

Resulting from the need for greater realism in models of human and organizational behavior in military simulations, there has been increased interest in research on integrative models of human performance, both within the cognitive science community generally, and within the defense and aerospace industries in particular. This book documents accomplishments and lessons learned in a multi-year project to examine the ability of a range of integrated cognitive modeling architectures to explain and predict human behavior in a common task environment that requires multi-tasking and concept learning. This unique project, called the Agent-Based Modeling and Behavior Representation (AMBR) Model Comparison, involved a series of human performance model evaluations in which the processes and performance levels of computational cognitive

models were compared to each other and to human operators performing the identical tasks. In addition to quantitative data comparing the performance of the models and real human performance, the book also presents a qualitatively oriented discussion of the practical and scientific considerations that arise in the course of attempting this kind of model development and validation effort. The primary audiences for this book are people in academia, industry, and the military who are interested in explaining and predicting complex human behavior using computational cognitive modeling approaches. The book should be of particular interest to individuals in any sector working in Psychology, Cognitive Science, Artificial Intelligence, Industrial Engineering, System Engineering, Human Factors, Ergonomics and Operations Research. Any technically or scientifically oriented professional or student should find the material fully accessible without extensive mathematical background.

The rapid introduction of sophisticated computers, services, telecommunications systems, and manufacturing systems has caused a major shift in the way people use and work with technology. It is not surprising that computer-aided modeling has emerged as a promising method for ensuring products meet the requirements of the consumer. The Handbook of Digital Human Modeling provides comprehensive coverage of the theory, tools, and methods to effectively achieve this objective. The 56 chapters in this book, written by 113 contributing authorities from Canada, China, France, Germany, the Netherlands, Poland, Sweden, Taiwan,

UK, and the US, provide a wealth of international knowledge and guidelines. They cover applications in advanced manufacturing, aerospace, automotive, data visualization and simulation, defense and military systems, design for impaired mobility, healthcare and medicine, information systems, and product design. The text elucidates tools to help evaluate product and work design while reducing the need for physical prototyping. Additional software and demonstration materials on the CRC Press web site include a never-before-released 220-page step-by-step UGS-Siemens JackTM help manual developed at Purdue University. The current gap between capability to correctly predict outcomes and set expectation for new and existing products and processes affects human-system performance, market acceptance, product safety, and satisfaction at work. The handbook provides the fundamental concepts and tools for digital human modeling and simulation with a focus on its foundations in human factors and ergonomics. The tools identified and made available in this handbook help reduce the need for physical prototyping. They enable engineers to quantify acceptability and risk in design in terms of the human factors and ergonomics. This volume is concerned with digital human modeling. The utility of this area of research is to aid the design of systems that are benefitted from reducing the need for physical prototyping and incorporating ergonomics and human factors earlier in design processes. Digital human models are representations of some aspects of a human that

can be inserted into simulations or virtual environments to facilitate prediction of safety, satisfaction, usability and performance. These representations may consider the physical, physiological, cognitive, behavioral or emotional aspects. They are typically represented by some visualization with the math and science computed in the background. Explicitly, the book covers the following subject areas: I. Applications II. Mobility and Universal Access III. Physical and Physiological Aspects IV. Product and Process Design V. Motion Analysis VI. Cognitive Aspects VII. Human Response and Behavioral Aspects VIII. Novel Systems Approaches This book is of special value to those researchers and practitioners involved in various aspects of product, process and system design worldwide. Engineers, ergonomists and human factors specialists will see a broad spectrum of applications for this research, especially in the automotive and manufacturing industries, military, aerospace and service industries such as healthcare. Seven other titles in the Advances in Human Factors and Ergonomics Series are: Advances in Human Factors and Ergonomics in Healthcare Advances in Cross-Cultural Decision Making Advances in Cognitive Ergonomics Advances in Occupational, Social and Organizational Ergonomics Advances in Human Factors, Ergonomics and Safety in Manufacturing

and Service Industries Advances in Ergonomics Modeling & Usability Evaluation Advances in Neuroergonomics and Human Factors of Special Populations

"This book presents the proceedings of the First International Conference on Biologically Inspired Cognitive Architectures (BICA 2010), which is also the First Annual Meeting of the BICA Society. A cognitive architecture is a computational framework for the design of intelligent, even conscious, agents. It may draw inspiration from many sources, such as pure mathematics, physics or abstract theories of cognition. A biologically inspired cognitive architecture (BICA) is one which incorporates formal mechanisms from computational models of human and animal cognition, which currently provide the only physical examples with the robustness, flexibility, scalability and consciousness that artificial intelligence aspires to achieve. The BICA approach has several different goals: the broad aim of creating intelligent software systems without focusing on any one area of application; attempting to accurately simulate human behavior or gain an understanding of how the human mind works, either for purely scientific reasons or for applications in a variety of domains; understanding how the brain works at a neuronal and sub-neuronal level; or designing artificial systems which can perform the cognitive tasks important to practical applications in human

society, and which at present only humans are capable of. The papers presented in this volume reflect the cross-disciplinarity and integrative nature of the BICA approach and will be of interest to anyone developing their own approach to cognitive architectures. Many insights can be found here for inspiration or to import into one's own architecture, directly or in modified form."--Publisher description. This book constitutes the proceedings of the 6th International Conference on Social Computing, Behavioral-Cultural Modeling and Prediction, SBP 2013, held in Washington, DC, USA in April 2013. The total of 57 contributions, which consists of papers and posters, included in this volume was carefully reviewed and selected from 137 submissions. This conference is strongly committed to multidisciplinarity, consistent with recent trends in computational social science and related fields. The topics covered are: behavioral science, health sciences, military science and information science. There are also many papers that provide methodological innovation as well as new domain-specific findings.

Simulations are widely used in the military for training personnel, analyzing proposed equipment, and rehearsing missions, and these simulations need realistic models of human behavior. This book draws together a wide variety of theoretical and applied research in human behavior modeling that

can be considered for use in those simulations. It covers behavior at the individual, unit, and command level. At the individual soldier level, the topics covered include attention, learning, memory, decisionmaking, perception, situation awareness, and planning. At the unit level, the focus is on command and control. The book provides short-, medium-, and long-term goals for research and development of more realistic models of human behavior.

Based on the six-year NASA Aviation Safety and Security Program Human Performance Modeling project, a collaboration of five teams from industry and academia, Human Performance Modeling in Aviation chronicles the results of modeling NASA-supplied data on two aviation flight deck problems: pilot surface operations taxi errors, and approach and landing with synthetic vision systems. The book provides a deep understanding of the aviation problems and "what-if" system redesigns of flight deck technologies and procedures. Five modeling teams describe how they applied their models to these two problems and discuss the results in terms of the specific problems addressed, the modeling challenges faced, and the modeling solutions developed to address complex, real-world situations. The book then compares the five modeling tools used, shedding light on the unique approach that each brings to bear on two qualitatively different

problems. It includes a "virtual roundtable discussion" that poses questions to each of the five teams and offers take-home lessons and insights into the modeling process and its complexities. The modeling teams also explore the issue of model validation and the approach that they adopted. Concluding with a summary of how modeling fits into the system design and evaluation process, the text covers state-of-the-art advances in human performance modeling for complex systems. Critical for modeling aviation-domain tasks, these modeling capabilities can also be applied to other complex-system domains such as process control, medical applications, surface transportation, and military command and control, which share similar human-system interaction issues.

The main goal of this text is to introduce the systems approach to disasters management community as an alternative approach that can provide support for interdisciplinary activities involved in the management of disasters. The systems approach draws on the fields of operations research and economics to create skills in solving complex management problems. The text is organized into four parts. Part I provides an introductory discussion of disaster management including an overview of the main terms used. Part II is devoted to the introduction of systems theory, mathematical formalization and classification of methods. The

material presented in this section should be of practical relevance during the process of selecting an appropriate tool for the solution of a problem. Part III is technical in nature, providing a simulation approach and a detailed description of system dynamics simulation. This section details two areas of application: flood evacuation simulation, and disaster risk assessment. Part IV ends with a chapter covering steps to improve disaster management. Finally parts of the book can be used as a tool for specialized short courses for practitioners. For example a course on 'System analysis for emergency management optimization' could be based on Chapters 3, 4 and parts of Chapter 6. Included in the book is a CD with three computer programs Vensim PLE, LINPRO, and COMPRO. Vensim PLE (Personal Learning Edition) is state-of-the-art simulation software used for the implementation of system dynamics simulation. The other two programs are: LINPRO, a linear programming optimization tool; and COMPRO, for the implementation of the multi-objective analysis tool of compromise programming.

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