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AIR TRAFFIC CONTROL:  
HUMAN PERFORMANCE  
FACTORS

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# [Book] Air Traffic Control: Human Performance Factors

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**Air Traffic Control: Human Performance Factors**-Anne R. Isaac 2017-03-02 From the Foreword by Captain Daniel Maurino, ICAO: '...Air Traffic Control...will remain a technology-intensive system. People (controllers) must harmoniously interact with technology to contribute to achieve the aviation system's goals of safe and efficient transportation of passengers and cargo...This book...considers human error and human factors from a contemporary and operational perspective and discusses the parts as well as the whole...I hope you enjoy reading it as much as I did.' The motivation for writing this book comes from the author's long standing belief that the needs of Air Traffic Service personnel are inadequately represented in the aviation literature. There are few references to air traffic control in many of the books written for pilots and about pilots and this is also observed at the main international conferences. In line with the ICAO syllabus for human factors training for air traffic controllers, the book covers the main issues in air traffic control, with regard to human performance: physiology including stress, fatigue and shift work problems; psychology with emphasis on human error and its management, social psychology including issues of communication and working in teams, the environment including ergonomic principles and working with new technologies and hardware and software issues including the development of documentation and procedures and a study of the changes brought about by advanced technologies. Throughout the text there are actual examples taken from the air traffic control environment to illustrate the issues discussed. A full bibliography is included for those who want to read beyond these issues. It has been written for all in air traffic services, from ab initio to the boardroom; it is important that the men and women in senior management positions have some knowledge and awareness of the fundamental problems that limit and enhance human performance.

**Human Factors Impacts in Air Traffic Management**-Barry Kirwan 2005 This book provides case studies including training methods, human error, team resource management, situation assessment, terminal automation replacement systems, collaborative decision-making to improve the effectiveness of traffic-flow management and the role of human factors in ATM. It outlines how human factors study evolved, what it entailed, how it was resourced and how results have contributed to operational performance.

**Human Factors In Air Traffic Control**-V. D. Hopkin 1995-09-05 This text discusses the skills and abilities that air-traffic controllers need. Its approach is international as air-traffic control practices throughout the world have to be mutually compatible and agreed. The book aims to include every kind of

**Human Factors in Air Traffic Control**-Mark W. Smolensky 1998-04 The study of human factors has progressed greatly in the past 10 years, particularly with regard to the literature available in applied areas. The authors of this text focus on the most important aspects of this literature--the increasing concern over the deregulation of airlines and the increase in aviation accidents. The book covers general system safety, human perception, information processing, and cognitive load capacity during air traffic control performance, as well as team coordination, selection and training of personnel, work station and software design, and communication issues.

**Cognitive Engineering and Safety Organization in Air Traffic Management**-Tom Kontogiannis 2017-10-17

This book covers the Air Traffic Management (ATM) environment and the controller-crew interactions. The International Civil Aviation Organization (ICAO) regulations and organizational procedures are also presented in a succinct manner so that novel and experienced aviation practitioners appreciate how safety organization affects their cognitive performance. The book distills theoretical knowledge about human cognition and presents real examples and case studies to help readers understand how air traffic controllers make sense of difficult situations, make decisions under time pressure, detect and correct their errors, and adapt their performance to complex situations.

**Human Performance in Air Traffic Control System and Its Impact on Safety**-Saleh Hashbool Al-Ghamdi 2010

**Human Performance in Air Traffic Control**-Tamsyn Edwards 2013

**Flight to the Future**-National Research Council 1997-02-28 Despite the strong safety record of the national airspace system, serious disruptions occasionally occur, often as a result of outdated or failed equipment. Under these circumstances, safety relies on the skills of the controllers and pilots and on reducing the number of aircraft in the air. The current and growing pressures to increase the capacity to handle a greater number of flights has led to a call for faster and more powerful equipment and for equipment that can take over some of the tasks now being performed by humans. Increasing the role of automation in air traffic control may provide a more efficient system, but will human controllers be able to effectively take over when problems occur? This comprehensive volume provides a baseline of knowledge about the capabilities and limitations of humans relative to the variety of functions performed in air traffic control. It focuses on balancing safety with the expeditious flow of air traffic, identifying lessons from past air accidents. The book discusses The function of the national airspace system and the procedures for hiring, training, and evaluating controllers. Decisionmaking, memory, alertness, vigilance, sleep patterns during shift work, communication, and other factors in controllers' performance. Research on automation and human factors in air traffic control and incorporation of findings into the system. The Federal Aviation Administration's management of the air traffic control system and its dual mandate to promote safety and the development of air commerce. This book also offers recommendations for evaluation the human role in automated air traffic control systems and for managing the introduction of automation into current facilities and operations. It will be of interest to anyone concerned about air safety--policymakers, regulators, air traffic managers and controllers, airline officials, and passenger advocates.

**Human Performance Modeling in Aviation**-David C. Foyle 2007-12-07 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 Future of Air Traffic Control**-National Research Council 1998-01-26 Automation in air traffic control may increase efficiency, but it also raises questions about adequate human control over automated systems. Following on the panel's first volume on air traffic control automation, *Flight to the Future* (NRC, 1997), this book focuses on the interaction of pilots and air traffic controllers, with a growing network of automated functions in the airspace system. The panel offers recommendations for development of human-centered automation, addressing key areas such as providing levels of automation that are appropriate to levels of risk, examining procedures for recovery from emergencies, free flight versus ground-based authority, and more. The book explores ways in which technology can build on human strengths and compensate for human vulnerabilities, minimizing both mistrust of automation and complacency about its abilities. The panel presents an overview of emerging technologies and trends toward automation within the national airspace system—in areas such as global positioning and other aspects of surveillance, flight information provided to pilots and controllers, collision avoidance, strategic long-term planning, and systems for training and maintenance. The book examines how to achieve better integration of research and development, including the importance of user involvement in air traffic control. It also discusses how to harmonize the wide range of functions in the national airspace system, with a detailed review of the free flight initiative.

**Handbook of Aviation Human Factors**-John A. Wise 2016-04-19 A complete examination of issues and concepts relating to human factors in simulation, this book covers theory and application in space, ships, submarines, naval aviation, and commercial aviation. The authors examine issues of simulation and their effect on the validity and functionality of simulators as a training device. The chapters contain in d

**Advances in Human Aspects of Aviation**-Steven J. Landry 2012-07-11 Since the very earliest years of aviation, it was clear that human factors were critical to the success and safety of the system. As aviation has matured, the system has become extremely complex. Bringing together the most recent human factors work in the aviation domain, *Advances in Human Aspects of Aviation* covers the design of aircrafts for the comfort and well being of the passenger. The book discusses strategies and guidelines for maximizing comfort, the design of aircrafts including cockpit design, and the training and work schedules for flight attendants and pilots. It is becoming increasingly important to view problems not as isolated issues that can be extracted from the system environment, but as embedded issues that can only be understood as a part of an overall system. In keeping with a system that is vast in its scope and reach, the chapters in this book cover a wide range of topics, including: Interface and operations issues from the perspectives of pilots and air traffic controllers, respectively. Specific human performance issues, studied from within the context of the air transportation system Issues related to automation and the delineation of function between automation and human within the current and future system The U.S. air traffic modernization effort, called NextGen Diverse modeling perspectives and methods Safety and ethics as driving factors for change Cognition and work overload Empirical research and evaluation of the air transportation domain As air traffic modernization efforts begin to vastly increase the capacity of the system, the issues facing engineers, scientists, and other practitioners of human factors are becoming more challenging and more critical. Reflecting road themes and trends in this field, the book documents the latest research in this area.

**Automation and Systems Issues in Air Traffic Control**-John A. Wise 2012-12-06 In recent years, increases in the amount and changes in the distribution of air traffic have been very dramatic and are continuing. The need for changes in the current air traffic systems is equally clear. While automation is generally accepted as a method of improving system safety and performance, high levels of automation in complex human-machine systems can have a negative effect on total system performance and have been identified as contributing factors in many accidents

and failures. Those responsible for designing the advanced air traffic control systems to be implemented throughout the alliance during the next decade need to be aware of recent progress concerning the most effective application of automation and artificial intelligence in human-computer systems. This volume gives the proceedings of the NATO Advanced Study Institute held in Maratea, Italy, June 18-29, 1990, at which these issues were discussed.

**Human Factors in Aviation**-Eduardo Salas 2010-01-30 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

**Human-automation teamwork**-Åsa Svensson 2020-04-07 This dissertation explores the topic of human-automation teamwork in Air Traffic Control (ATC). ATC is a high stakes environment where complex automation is being introduced while the human operator has the legal responsibility. With increasing demands on productivity in various industries (as also in ATC), automation is introduced for efficiency, maintaining safety, and to keep the workload of the human operator within acceptable limits. However, previous research has shown that automation may cause negative effects on the human operator and performance, such as forcing the operator out of the control loop, which might lead to problems or confusion. Previous research suggests a need for strengthening human-automation collaboration where automation is seen as a team member to keep the operator in the loop. In order to achieve such teamwork, the design of the automation needs to be human-centred, i.e. that the automation is designed for the underlying need of the operator. The aim of this dissertation is to explore teamwork in ATC from several angles to understand how the air traffic controllers are working in current ATC environments and how automation could be designed to support human-automation teamwork. The included studies rely on interviews, simulations, and questionnaires, all with operational air traffic controllers as participants. The results indicate that for both human-human teamwork and human-automation teamwork, teamwork factors such as adaptability and mutual performance monitoring (knowing what the other team members are doing) are important for the work performance in current ATC environments, where mutual performance monitoring is especially important during stressful situations. When designing automation, lessons learned from human-human teamwork should be considered. The work within the scope of this dissertation identifies and concerns two human-automation teamwork aspects: boundary awareness and implicit communication. These are proposed to support the operator's knowledge about the automation and the communication flow between the operator and the automation. Boundary awareness is the operator's knowledge of the automation's abilities, its boundaries (what it can or cannot manage), and about consequences if it would go outside of these boundaries. Implicit communication is the unspoken or implied small cues that the operator and the automation can use to communicate with each other. It is proposed that implicit communication can be based on the work patterns of the operator. The knowledge gained through the work in this dissertation can be used as a foundation for further research and design of automation regarding operator knowledge about the automation boundaries and the communication within the team. Denna avhandling utforskar teamwork mellan människa och automation inom flygtrafikledning. Flygtrafikledning är en högriskmiljö där komplex automation introduceras samtidigt som den

mänskliga operatören har det juridiska ansvaret. Med ökade krav på produktivitet inom olika industrier (och även inom flygtrafikledning) så introduceras automation för effektiviteten, för att bibehålla säkerheten och för att hålla arbetsbelastningen för den mänskliga operatören inom acceptabla gränser. Tidigare forskning har däremot visat att automationen kan orsaka negativa effekter på den mänskliga operatören och på prestationen, som till exempel att tvinga ut operatören utanför kontrollloopen vilket leder till problem och förvirring. Tidigare forskning föreslår ett starkare samarbete mellan människa och automation där automationen är sedd som en teammedlem för att behålla operatören i loopen. För att uppnå ett sådant samarbete behöver automation vara människo-centrerad, att automation med andra ord är designad för operatörens underliggande behov. Syftet med denna avhandling är att utforska teamwork från olika vinklar inom flygtrafikledning för att förstå hur flygledare jobbar i nuvarande flygtrafikledningsmiljöer och för att förstå hur automation skulle kunna designas för att stödja teamwork mellan människa och automation. Studierna som denna avhandling bygger på har använt sig av intervjuer, simuleringar och enkäter, alla med operativa flygtrafikledare som deltagare. Resultatet tyder på att för både människa-människa teamwork och människa-automations teamwork så är teamwork faktorer så som flexibilitet och ömsesidig övervakning av teammedlemmarnas prestationer viktiga där övervakning av teammedlemmarnas prestationer är speciellt viktigt under stressiga situationer. När man designar automation bör man ta lärdom från teamwork mellan människor. Vidare så identifierar och behandlar arbetet inom denna avhandling två aspekter gällande teamwork mellan människa och automation: gränsmedvetenhet och implicit kommunikation. Dessa aspekter är föreslagna vi att stötta operatörens kunskap om automationen och kommunikationsflödet mellan operatören och automationen. Gränsmedvetenhet är operatörens kunskap om automationens förmågor, dess gränser och dess konsekvenser när automation går utanför dessa gränser. Implicit kommunikation är de uttalade eller implicita ledtrådar som operatören och automationen kan använda för att kommunicera med varandra. Det är föreslaget att implicit kommunikation kan baseras på arbetsmönster från operatören eller från prediktioner från automationen. Kunskapen från denna avhandling kan användas som ett underlag för vidare forskning och design av automation gällande operatörers kunskap om automationens gränser och kommunikationen inom teamet.

**Human Factors and Ergonomics in Practice**-Steven Shorrock 2016-11-18 This edited book concerns the real practice of human factors and ergonomics (HF/E), conveying the perspectives and experiences of practitioners and other stakeholders in a variety of industrial sectors, organisational settings and working contexts. The book blends literature on the nature of practice with diverse and eclectic reflections from experience in a range of contexts, from healthcare to agriculture. It explores what helps and what hinders the achievement of the core goals of HF/E: improved system performance and human wellbeing. The book should be of interest to current HF/E practitioners, future HF/E practitioners, allied practitioners, HF/E advocates and ambassadors, researchers, policy makers and regulators, and clients of HF/E services and products.

**Safety-I and Safety-II**-Erik Hollnagel 2018-04-17 Safety has traditionally been defined as a condition where the number of adverse outcomes was as low as possible (Safety-I). From a Safety-I perspective, the purpose of safety management is to make sure that the number of accidents and incidents is kept as low as possible, or as low as is reasonably practicable. This means that safety management must start from the manifestations of the absence of safety and that - paradoxically - safety is measured by counting the number of cases where it fails rather than by the number of cases where it succeeds. This unavoidably leads to a reactive approach based on responding to what goes wrong or what is identified as a risk - as something that could go wrong. Focusing on what goes right, rather than on what goes wrong, changes the definition of safety from 'avoiding that something goes wrong' to 'ensuring that everything goes right'. More precisely, Safety-II is the ability to succeed under varying conditions, so that the number of intended and acceptable outcomes is as high as possible. From a Safety-II perspective, the purpose of safety management is to ensure that as much as possible goes right, in the sense that everyday work achieves its objectives. This means that safety is managed by what it achieves (successes, things that go right), and that likewise it is measured by counting the number of cases where things go right. In order to do this, safety management cannot only be reactive, it must also be proactive. But it must be proactive with regard to how actions succeed, to everyday acceptable performance, rather than with regard to how they can fail, as traditional risk analysis does. This book analyses and explains the principles behind both approaches and uses this to consider the past and future of safety management practices. The analysis makes use of common examples and cases from domains such as aviation, nuclear power production, process management and health care. The final chapters explain the theoret

**Human Factors in Aviation**-Earl L. Wiener 2014-06-28 Since the 1950s, a number of specialized books dealing with human factors has been published, but very little in aviation. Human Factors in Aviation is the first comprehensive review of contemporary applications of human factors research to aviation. A "must" for aviation professionals, equipment and systems designers, pilots, and managers--with emphasis on definition and solution of specific problems. General areas of human cognition and perception, systems theory, and safety are approached through specific topics in aviation--behavioral analysis of pilot performance, cockpit automation, advancing display and control technology, and training methods.

**Human Performance, Situation Awareness, and Automation**-Dennis A. Vincenzi 2005-01-06 In 2000, the Conference on Automation joined forces with a partner group on situation awareness (SA). The rising complexity of systems demands that one can be aware of a large range of environmental and task-based stimulation in order to match what is done with what has to be done. Thus, SA and automation-based interaction fall naturally together and this conference is the second embodiment of this union. Moving into the 21st century, further diversification of the applications of automation will continue--for example, the revolution in genetic technology. Given the broad nature of this form of human-machine interaction, it is vital to apply past lessons to map a future for the symbiotic relationship between humans and the artifacts they create. It is as part of this ongoing endeavor that the present volume is offered.

**Human Performance and Situation Awareness Measures**-Valerie Jane Gawron 2019-01-04 This book was developed to help researchers and practitioners select measures to be used in the evaluation of human/machine systems. The book begins with an overview of the steps involved in developing a test to measure human performance. This is followed by a definition of human performance and a review of human performance measures. Another section defines situational awareness with reviews of situational awareness measures. For both the performance and situational awareness sections, each measure is described, along with its strengths and limitations, data requirements, threshold values, and sources of further information. To make this reference easier to use, extensive author and subject indices are provided. Features Provides a short engineering tutorial on experimental design Offers readily accessible information on human performance and situational awareness (SA) measures Presents general description of the measure Covers data collection, reduction, and analysis requirements Details the strengths and limitations or restrictions of each measure, including proprietary rights or restrictions

**Human Factors in the Training of Pilots**-Jefferson M. Koonce 2002-05-23 In this educational yet entertaining text, Jeff Koonce draws on his 44 years of pilot experience and 31 years as a professor of psychology and human factors engineering in addressing the questions of how to apply sound human factors principles to the training of pilots and to one's personal flying. The author discusses principles of human factors, and how they can be utilized in pilot training and evaluation. With a conversational tone, he also relates anecdotes, jokes, and truisms collected during his time as a flight instructor. He takes a positive approach to the subject, focusing on safety and good practice rather than on accidents. While problem areas are acknowledged, and the book points out how certain problems may result in mishaps, the author avoids focusing on individual accidents. Human Factors in the Training of Pilots is a must for pilots wanting to make a systematic study of the human factors issues behind safe flying, and for instructors or serious students needing an authoritative text.

**A Human Error Approach to Aviation Accident Analysis**-Douglas A. Wiegmann 2017-12-22 Human error is implicated in nearly all aviation accidents, yet most investigation and prevention programs are not designed around any theoretical framework of human error. Appropriate for all levels of expertise, the book provides the knowledge and tools required to conduct a human error analysis of accidents, regardless of operational setting (i.e. military, commercial, or general aviation). The book contains a complete description of the Human Factors Analysis and Classification System (HFACS), which incorporates James Reason's model of latent and active failures as a foundation. Widely disseminated among military and civilian organizations, HFACS encompasses all aspects of human error, including the conditions of operators and elements of supervisory and organizational

failure. It attracts a very broad readership. Specifically, the book serves as the main textbook for a course in aviation accident investigation taught by one of the authors at the University of Illinois. This book will also be used in courses designed for military safety officers and flight surgeons in the U.S. Navy, Army and the Canadian Defense Force, who currently utilize the HFACS system during aviation accident investigations. Additionally, the book has been incorporated into the popular workshop on accident analysis and prevention provided by the authors at several professional conferences world-wide. The book is also targeted for students attending Embry-Riddle Aeronautical University which has satellite campuses throughout the world and offers a course in human factors accident investigation for many of its majors. In addition, the book will be incorporated into courses offered by Transportation Safety International and the Southern California Safety Institute. Finally, this book serves as an excellent reference guide for many safety professionals and investigators already in the field.

**Human Factors in Flight**-Frank H. Hawkins 2017-10-03 The late Captain Frank H Hawkins FRAes, M Phil, was Human Factors Consultant to KLM, for whom he had flown for over 30 years as line captain and R & D pilot, designing the flight decks for all KLM aircraft from the Viscount to the Boeing 747. In this period he developed and applied his specialization in Human Factors. His perception of lack of knowledge of Human Factors and its disastrous consequences led him to initiate both an annual course on Human Factors in Transport Aircraft Operation at Loughborough and Aston Universities, and the KLM Human Factors Awareness Course (KHUFAC). A consultant member of SAE S-7 committee, he was also a member of the Human Factors Society and a Liveryman of the Guild of Air Pilots. He was keynote speaker at the ICAO Human Factors Seminar held in St Petersburg, Russia in April 1990. About the Editor The late Captain Harry W Orlady was an Aviation Human Factors Consultant and a former Senior Research Scientist for the Aviation Safety Reporting System (ASRS); he also worked with NASA/Ames, with private research firms and the FAA in its certification of the Boeing 747-400 and the McDonnell-Douglas MK-11. As a pilot with United Airlines he flew 10 types of aircraft ranging from the DC-3 to the Boeing 747. He conducted studies in ground and flight training, Human Factors, aviation safety and aeromedical fields, and received several major awards and presented nearly 100 papers or lectures. He was an elected fellow of the Aerospace Medical Association; a member of the Human Factors Society, of ICE Flight Safety and Human Factors Study Group, and the SAE Human Behavioural Technology and G-10 Committees.

**Human Performance and Situation Awareness Measures**-Valerie Jane Gawron 2019-01-04 This book was developed to help researchers and practitioners select measures to be used in the evaluation of human/machine systems. The book begins with an overview of the steps involved in developing a test to measure human performance. This is followed by a definition of human performance and a review of human performance measures. Another section defines situational awareness with reviews of situational awareness measures. For both the performance and situational awareness sections, each measure is described, along with its strengths and limitations, data requirements, threshold values, and sources of further information. To make this reference easier to use, extensive author and subject indices are provided. Features Provides a short engineering tutorial on experimental design Offers readily accessible information on human performance and situational awareness (SA) measures Presents general description of the measure Covers data collection, reduction, and analysis requirements Details the strengths and limitations or restrictions of each measure, including proprietary rights or restrictions

**Improving the Continued Airworthiness of Civil Aircraft**-National Research Council 1998-09-11 As part of the national effort to improve aviation safety, the Federal Aviation Administration (FAA) chartered the National Research Council to examine and recommend improvements in the aircraft certification process currently used by the FAA, manufacturers, and operators.

**Airport and air traffic control system.-**

**Human Performance, Workload, and Situational Awareness Measures Handbook, Third Edition - 2-Volume Set**-Valerie Jane Gawron 2019-12-17 This two-volume set was developed to help researchers and practitioners select measures to be used in the evaluation of human/machine systems. It can also be used to

supplement classes at both the undergraduate and graduate courses in ergonomics, experimental psychology, human factors, human performance, measurement, and system test and evaluation. Volume 1 of the handbook begins with an overview of the steps involved in developing a test to measure human performance, workload, and/or situational awareness. This is followed by a definition of human performance and a review of human performance measures. Situational Awareness is similarly treated in a subsequent chapter. Volume 2 presents a definition of workload and a review of workload measures. Provides a short engineering tutorial on experimental design Offers readily accessible information on human performance, workload, and situational awareness (SA) measures Presents general description of the measure Covers data collection, reduction, and analysis requirement Details out the strengths and limitations or restrictions of each measure, including any known proprietary rights or restrictions, as well as validity and reliability data

**Autonomy Research for Civil Aviation**-National Research Council 2014-07-23 The development and application of increasingly autonomous (IA) systems for civil aviation is proceeding at an accelerating pace, driven by the expectation that such systems will return significant benefits in terms of safety, reliability, efficiency, affordability, and/or previously unattainable mission capabilities. IA systems range from current automatic systems such as autopilots and remotely piloted unmanned aircraft to more highly sophisticated systems that are needed to enable a fully autonomous aircraft that does not require a pilot or human air traffic controllers. These systems, characterized by their ability to perform more complex mission-related tasks with substantially less human intervention for more extended periods of time, sometimes at remote distances, are being envisioned for aircraft and for air traffic management and other ground-based elements of the national airspace system. Civil aviation is on the threshold of potentially revolutionary improvements in aviation capabilities and operations associated with IA systems. These systems, however, face substantial barriers to integration into the national airspace system without degrading its safety or efficiency. Autonomy Research for Civil Aviation identifies key barriers and suggests major elements of a national research agenda to address those barriers and help realize the benefits that IA systems can make to crewed aircraft, unmanned aircraft systems, and ground-based elements of the national airspace system. This report develops a set of integrated and comprehensive technical goals and objectives of importance to the civil aeronautics community and the nation. Autonomy Research for Civil Aviation will be of interest to U.S. research organizations, industry, and academia who have a role in meeting these goals.

**A Guide To Practical Human Reliability Assessment**-B. Kirwan 2017-12-14 Human error is here to stay. This perhaps obvious statement has a profound implication for society when faced with the types of hazardous system accidents that have occurred over the past three decades. Such accidents have been strongly influenced by human error, yet many system designs in existence or being planned and built do not take human error into consideration.; "A Guide to Practical Human Reliability Assessment" is a practical and pragmatic guide to the techniques and approaches of human reliability assessment HRA. It offers the reader explanatory and practical methods which have been applied and have worked in high technology and high risk assessments - particularly but not exclusively to potentially hazardous industries such as exist in process control, nuclear power, chemical and petrochemical industries. A Guide to Practical Human Reliability Assessment offers the practitioner a comprehensive tool-kit of different approaches along with guidance on selecting different methods for different applications. It covers the risk assessment and the HRA process, as well as methods of task analysis, error identification, quantification, representation of errors in the risk analysis, followed by error reduction analysis, quality assurance and documentation. There are also a number of detailed case studies from nuclear, chemical, offshore, and marine HRA'S, exemplifying the image of techniques and the impact of HRA in existing and design-stage systems.

**Beyond Aviation Human Factors**-Daniel E. Maurino 2017-03-02 The authors believe that a systematic organizational approach to aviation safety must replace the piecemeal approaches largely favoured in the past, but this change needs to be preceded by information to explain why a new approach is necessary. Accident records show a flattening of the safety curve since the early Seventies: instead of new kinds of accident, similar safety deficiencies have become recurrent features in accident reports. This suggests the need to review traditional accident prevention strategies, focused almost exclusively on the action or inaction's of front-line operational personnel. The organizational model proposed by the authors is one alternative means to pursue safety and prevention strategies in contemporary aviation; it is also applicable to other production systems. The

model argues for a broadened approach, which considers the influence of all organizations (the blunt end ) involved in aviation operations, in addition to individual human performance (the sharp end ). If the concepts of systems safety and organizational accidents are to be advanced, aviation management at all levels must be aware of them. This book is intended to provide a bridge from the academic knowledge gained from research, to the needs of practitioners in aviation. It comprises six chapters: the fundamentals, background and justification for an organizational accident causation model to the flight deck, maintenance and air traffic control environments. The last chapter suggest different ways to apply the model as a prevention tool which furthermore enhances organizational effectiveness. The value of the organizational framework pioneered by Professor Reason in analyzing safety in high-technology production systems is felt by his co-authors to have an enduring role to play, both now and in coming decades. Applied now in this book, it has been adopted by ICAO, IFATCA, IMO, the US National Transportation Safety Board, the Transportation Safety B

**Human Engineering for an Effective Air-navigation and Traffic-control System**-Ohio State University. Research Foundation 1951

**The Future of Air Traffic Control**-Panel on Human Factors in Air Traffic Control Automation 1998-02-09 Automation in air traffic control may increase efficiency, but it also raises questions about adequate human control over automated systems. Following on the panel's first volume on air traffic control automation, Flight to the Future (NRC, 1997), this book focuses on the interaction of pilots and air traffic controllers, with a growing network of automated functions in the airspace system. The panel offers recommendations for development of human-centered automation, addressing key areas such as providing levels of automation that are appropriate to levels of risk, examining procedures for recovery from emergencies, free flight versus ground-based authority, and more. The book explores ways in which technology can build on human strengths and compensate for human vulnerabilities, minimizing both mistrust of automation and complacency about its abilities. The panel presents an overview of emerging technologies and trends toward automation within the national airspace system--in areas such as global positioning and other aspects of surveillance, flight information provided to pilots and controllers, collision avoidance, strategic long-term planning, and systems for training and maintenance. The book examines how to achieve better integration of research and development, including the importance of user involvement in air traffic control. It also discusses how to harmonize the wide range of functions in the national airspace system, with a detailed review of the free flight initiative.

**Workload Measures**-Valerie Jane Gawron 2019-01-04 This book was developed to help researchers and practitioners select measures to be used in the evaluation of human/machine systems. The book includes definitions of human workload and a review of measures. Each measure is described, along with its strengths and limitations, data requirements, threshold values, and sources of further information. To make this reference easier to use, extensive author and subject indices are provided. Features Offers readily accessible information on workload measures Presents general description of the measure Covers data collection, reduction, and analysis requirements Details the strengths and limitations or restrictions of each measure, including proprietary rights or restrictions Provides validity and reliability data as available

**Air Transportation Systems Engineering**-George L. Donohue 2001

**Resilience Engineering**-David D. Woods 2017-11-01 For Resilience Engineering, 'failure' is the result of the adaptations necessary to cope with the complexity of the real world, rather than a breakdown or malfunction. The performance of individuals and organizations must continually adjust to current conditions and, because resources and time are finite, such adjustments are always approximate. This definitive new book explores this groundbreaking new development in safety and risk management, where 'success' is based on the ability of organizations, groups and individuals to anticipate the changing shape of risk before failures and harm occur. Featuring contributions from many of the worlds leading figures in the fields of human factors and safety, Resilience Engineering provides thought-provoking insights into system safety as an aggregate of its various components, subsystems, software, organizations, human behaviours, and the way in which they interact. The

book provides an introduction to Resilience Engineering of systems, covering both the theoretical and practical aspects. It is written for those responsible for system safety on managerial or operational levels alike, including safety managers and engineers (line and maintenance), security experts, risk and safety consultants, human factors professionals and accident investigators.

**Aircraft Technology**-Melih Kushan 2018-09-12 It is well known that improvements in space and aviation are the leader of today's technology, and the aircraft is the most important product of aviation. Because of this fact, the books on aircraft are always at the center of interest. In most cases, technologies designed for the aerospace industry are rapidly extending into other areas. For example, although composite materials are developed for the aerospace industry, these materials are not often used in aircraft. However, composite materials are utilized significantly in many different sectors, such as automotive, marine and civil engineering. And materials science in aviation, reliability and efficiency in aircraft technology have a major importance in aircraft design.

**Securing the Future of U.S. Air Transportation**-National Research Council 2003-11-18 As recently as the summer of 2001, many travelers were dreading air transportation because of extensive delays associated with undercapacity of the system. That all changed on 9/11, and demand for air transportation has not yet returned to peak levels. Most U.S. airlines continue to struggle for survival, and some have filed for bankruptcy. The situation makes it difficult to argue that strong action is urgently needed to avert a crisis of undercapacity in the air transportation system. This report assesses the visions and goals for U.S. civil aviation and technology goals for the year 2050.

**Assessment of Staffing Needs of Systems Specialists in Aviation**-National Research Council 2013-07-29 Within the Federal Aviation Administration (FAA), the Airway Transportation System Specialists (ATSS) maintain and certify the equipment in the National Airspace System (NAS). In fiscal year 2012, Technical Operations had a budget of \$1.7B. Thus, Technical Operations includes approximately 19 percent of the total FAA employees and less than 12 percent of the \$15.9 billion total FAA budget. Technical Operations comprises ATSS workers at five different types of Air Traffic Control (ATC) facilities: (1) Air Route Traffic Control Centers, also known as En Route Centers, track aircraft once they travel beyond the terminal airspace and reach cruising altitude; they include Service Operations Centers that coordinate work and monitor equipment. (2) Terminal Radar Approach Control (TRACON) facilities control air traffic as aircraft ascend from and descend to airports, generally covering a radius of about 40 miles around the primary airport; a TRACON facility also includes a Service Operations Center. (3) Core Airports, also called Operational Evolution Partnership airports, are the nation's busiest airports. (4) The General National Airspace System (GNAS) includes the facilities located outside the larger airport locations, including rural airports and equipment not based at any airport. (5) Operations Control Centers are the facilities that coordinate maintenance work and monitor equipment for a Service Area in the United States. At each facility, the ATSS execute both tasks that are scheduled and predictable and tasks that are stochastic and unpredictable in. These tasks are common across the five ATSS disciplines: (1) Communications, maintaining the systems that allow air traffic controllers and pilots to be in contact throughout the flight; (2) Surveillance and Radar, maintaining the systems that allow air traffic controllers to see the specific locations of all the aircraft in the airspace they are monitoring; (3) Automation, maintaining the systems that allow air traffic controllers to track each aircraft's current and future position, speed, and altitude; (4) Navigation, maintaining the systems that allow pilots to take off, maintain their course, approach, and land their aircraft; and (5) Environmental, maintaining the power, lighting, and heating/air conditioning systems at the ATC facilities. Because the NAS needs to be available and reliable all the time, each of the different equipment systems includes redundancy so an outage can be fixed without disrupting the NAS. Assessment of Staffing Needs of Systems Specialists in Aviation reviews the available information on: (A) the duties of employees in job series 2101 (Airways Transportation Systems Specialist) in the Technical Operations service unit; (B) the Professional Aviation Safety Specialists (PASS) union of the AFL-CIO; (C) the present-day staffing models employed by the FAA; (D) any materials already produced by the FAA including a recent gap analysis on staffing requirements; (E) current research on best staffing models for safety; and (F) non-US staffing standards for employees in similar roles.

**Cockpit Resource Management**-Earl L. Wiener 1995-12 Cockpit Resource Management (CRM) has gained

increased attention from the airline industry in recent years due to the growing number of accidents and near misses in airline traffic. This book, authored by the first generation of CRM experts, is the first comprehensive work on CRM. Cockpit Resource Management is a far-reaching discussion of crew coordination, communication, and resources from both within and without the cockpit. A valuable resource for commercial and military airline training curriculum, the book is also a valuable reference for business professionals who are interested in effective communication among interactive personnel. Key Features \* Discusses international and cultural aspects of CRM \* Examines the design and implementation of Line-Oriented Flight Training (LOFT) \* Explains CRM, LOFT, and cockpit automation \* Provides a case history of CRM training which improved flight safety for a major airline

**Virtual and Remote Control Tower**-Norbert Fürstenau 2016-05-13 The interdisciplinary research and development work carried out in the last ten years which is presented in this book aimed at replacing the conventional airport control tower by a new "remote tower operation" work environment (RTO) which should enhance work efficiency and safety and reduce costs. This revolutionary human-system interface allows for remote aerodrome traffic control without a physical tower building and enables the establishment of remote airport traffic control centers (RTC) of which each may serve several airports from a central location.