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## 992 - BURNS SHANIA

Speed in acquiring the knowledge and skills to perform tasks is crucial. Yet, it still ordinarily takes many years to achieve high proficiency in countless jobs and professions, in government, business, industry, and throughout the private sector. There would be great advantages if regimens of training could be established that could accelerate the achievement of high levels of proficiency. This book discusses the construct of 'accelerated learning.' It includes a review of the research literature on learning acquisition and retention, focus on establishing what works, and why. This includes several demonstrations of accelerated learning, with specific ideas, plans and roadmaps for doing so. The impetus for the book was a tasking from the Defense Science and Technology Advisory Group, which is the top level Science and Technology policy-making panel in the Department of Defense. However, the book uses both military and non-military exemplar case studies. It is likely that methods for acceleration will leverage technologies and capabilities including virtual training, cross-training, training across strategic and tactical levels, and training for resilience and adaptivity. This volume provides a wealth of information and guidance for those interested in the concept or phenomenon of "accelerating learning"— in education, training, psychology, academia in general, government, military, or industry.

This paper overviews a Cognitive Task Analysis (CTA) of the tasks accomplished by space operators in the Combat Operations Division of the Joint Space Operations Center (JSpOC). The methodology used to collect data will be presented. The work was performed in support of the Air Force Research Laboratory's (AFRL) Space Situation Awareness Fusion Intelligent Research Environment (SAFIRE) effort. SAFIRE is a multi-directorate program led by Air Force Research Laboratory (AFRL), Space Vehicles Directorate (AFRL/RV). It is designed to address research areas identified from completion of a rapid response effort for the JSpOC. The report is intended to be a resource for those developing capability in support of SAFIRE, the Joint Functional Component Command (JFCC) Space Integrated Prototype (JSIP) User-Defined Operating Picture (UDOP), and other related projects. The report is under distribution restriction; our purpose here is to expose its existence to a wider audience so that qualified individuals may access it. The report contains descriptions of the organization, its most salient products, tools, and cognitive tasks. Tasks reported are derived from the data collected and presented at multiple levels of abstraction. Recommendations for leveraging the findings of the report are presented. The report contains appendices that amplify the methodology provide background or context support, and includes references in support of cognitive task methodology. In a broad sense, the CTA is intended to be the foundation for relevant, usable capability in support of space warfighters. It presents, at an unclassified level, introductory material to familiarize inquirers with the work of the Combat Operations Division; this is embedded in a description of the broader context of the other divisions of the JSpOC. This Handbook serves as a single source for theories, models, and methods related to cognitive task design. It provides the scientific and theoretical basis required by industrial and academic researchers, as well as the practical and methodological guidance needed by practitioners who face problems of building safe and effective human-technology s

A task analysis is a very critical and fundamental component of an ISD project since it ultimately determines what tasks and contents will be included in the training program. The existing task analysis for the F-16 pilot compiled by General Dynamics was analyzed in terms of the specific requirements of the F-16 training program. The level of detail and scope of this existing task analysis were found to be adequate. The coverage of job tasks was found to be inadequate and in need of revision. The mission orientation of the existing analysis was considered to be weak in the areas of tactics, premission planning, and air-to-surface combat. The logical consistency of the analysis was found to be weak and in need for revision in the areas of air maneuvers and system operations. It was concluded that the existing F-16 task analysis would be helpful as a suggestive tool, but additional analysis is required to provide a solid foundation for the F-16 ISD effort. Areas particularly needing attention are those behaviors associated with cognitive performance (e.g., air-to-air or air-to-surface combat, mission planning, navigation, etc.) as opposed to equipment operation.

Design Recommendations for Intelligent Tutoring Systems (ITSs) explores the impact of intelligent tutoring system design on education and training. Specifically, this volume examines "Domain Modeling". The "Design Recommendations book series examines tools and methods to reduce the time and skill required to develop Intelligent Tutoring Systems with the goal of improving the Generalized Intelligent Framework for Tutoring (GIFT). GIFT is a modular, service-oriented architecture developed to capture simplified authoring techniques, promote reuse and standardization of ITSs along with automated instructional techniques and effectiveness evaluation capabilities for adaptive tutoring tools and methods.

Neurotechnology in National Security and Defense: Practical Considerations, Neuroethical Concerns is the second volume in the Advances in Neurotechnology series. It specifically addresses the neuroethical, legal, and social issues arising from the use of neurotechnology in national security and defense agendas and applications. Of particular concern are the use of various neurotechnologies in military and intelligence operations training, acquisition of neurobiological and cognitive data for intelligence and security, military medical operations, warfighter performance augmenta-

tion, and weaponization of neuroscience and neurotechnology. The contributors discuss the neuroethical questions and problems that these applications generate as well as potential solutions that may be required and developed. The book examines how developments in neurotechnology in national security and defense agendas are impacted by and affect ethical values and constructs, legal considerations, and overall conduct of the social sphere. Presenting an integrative perspective, leading international experts lay the scientific groundwork and establish the premises necessary to appreciate the ethical aspects of neurotechnology in national security and defense. It is not a question of "if" neurotechnology will be used in such ways, but when, how, and to what extent. Therefore, it is imperative to foster a deeper understanding of neurotechnology, the problems and debates arising from its use in national security and defense, and how such issues can and should be addressed. In doing so, we can guide and govern the use of these innovative neurotechnologies in ways that uphold ethical accountability.

This book constitutes the refereed proceedings of the 13th International Conference on Augmented Cognition, AC 2019, held as part of the 21st International Conference on Human-Computer Interaction, HCII 2019, in Orlando, FL, USA in July, 2019. The 1274 full papers and 209 posters presented at the HCII 2019 conferences were carefully reviewed and selected from 5029 submissions. The papers cover the entire field of human-computer interaction, addressing major advances in knowledge and effective use of computers in a variety of applications areas. The papers in this volume are organized in the following topical sections: cognitive modeling, perception, emotion and interaction; human cognition and behavior in complex tasks and environments; brain-computer interfaces and electroencephalography; and augmented learning.

This book reports on the latest research and developments in the field of cybersecurity, giving a special emphasis on personal security and new methods for reducing human error and increasing cyber awareness, and innovative solutions for increasing the security of advanced Information Technology (IT) infrastructures. It covers a wealth of topics, including methods for human training, novel Cyber-Physical and Process-Control Systems, social, economic and behavioral aspects of the cyberspace, issues concerning the cyber security index, security metrics for enterprises, risk evaluation, and many others. Based on the AHFE 2016 International Conference on Human Factors in Cybersecurity, held on July

27-31, 2016, in Walt Disney World®, Florida, USA, this book not only presents innovative cybersecurity technologies, but also discusses emerging threats, current gaps in the available systems and future challenges that may be coped with through the help of human factors research.

This book constitutes the refereed proceedings of the 11th International Conference on Engineering Psychology and Cognitive Ergonomics, EPCE 2014, held as part of the 16th International Conference on Human-Computer Interaction, HCII 2014, held in Heraklion, Greece, in June 2014, jointly with 13 other thematically similar conferences. The total of 1476 papers and 220 posters presented at the HCII 2014 conferences were carefully reviewed and selected from 4766 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. The total of 54 contributions included in the EPCE proceedings were carefully reviewed and selected for inclusion in this volume and are organized in the following topical sections: mental workload and stress; visual perception; cognitive issues in interaction and user experience; cognitive psychology in aviation and space; transport and industrial applications.

The first International Conference on Intelligent Tutoring Systems (ITS) was held ten years ago in Montreal (ITS '88). It was so well received by the international community that the organizers decided to do it again in Montreal four years later, in 1992, and then again in 1996. ITS '98 differs from the previous ones in that this is the first time the conference has been held outside of Montreal, and it's only been two years (not four) since the last one. One interesting aspect of the ITS conferences is that they are not explicitly bound to some organization (e.g., IEEE or AACE). Rather, the founder of these conferences, Claude Frasson, started them as a means to congregate researchers actively involved in the ITS field and provide a forum for presentation and debate of the most currently challenging issues. Thus the unifying theme is science. This year's "hot topics" differ from those in the earlier ITS conferences as they reflect ever changing trends in ITS research. A few of the issues being examined at ITS '98 include: Web based tutoring systems, deploying ITS in the real world, tutoring and authoring tools, archi-

tectures, and knowledge structure and representation.

Explores the breadth and versatility of Human Systems Engineering (HSE) practices and illustrates its value in system development A Framework of Human Systems Engineering: Applications and Case Studies offers a guide to identifying and improving methods to integrate human concerns into the conceptualization and design of systems. With contributions from a panel of noted experts on the topic, the book presents a series of Human Systems Engineering (HSE) applications on a wide range of topics: interface design, training requirements, personnel capabilities and limitations, and human task allocation. Each of the book's chapters present a case study of the application of HSE from different dimensions of socio-technical systems. The examples are organized using a socio-technical system framework to reference the applications across multiple system types and domains. These case studies are based in real-world examples and highlight the value of applying HSE to the broader engineering community. This important book: Includes a proven framework with case studies to different dimensions of practice, including domain, system type, and system maturity Contains the needed tools and methods in order to integrate human concerns within systems Encourages the use of Human Systems Engineering throughout the design process Provides examples that cross traditional system engineering sectors and identifies a diverse set of human engineering practices Written for systems engineers, human factors engineers, and HSI practitioners, A Framework of Human Systems Engineering: Applications and Case Studies provides the information needed for the better integration of human and systems and early resolution of issues based on human constraints and limitations.

This research note is a collection of papers and summary recommendations resulting from a two-day workshop focused on training transfer. Supported by the Army Research Institute, the workshop features presentations by academic, non-academic, and military laboratory scientists on psychological research and applications related to transfer of training. Among the specific topics dealt with are: the development of cognitive simulation models, skills development methods, the need for intelligent job aids, cognitive task analysis, and methods for measuring job performance. Recommendations for further research and applications are provided.

As ubiquitous as the atmosphere, intelligent adaptive systems (IASs) surround us

in our daily lives. When designed well, these systems sense users and their environments so that they can provide support in a manner that is not only responsive to the evolving situation, but unnoticed by the user. A synthesis of recent research and developments on IASs from the human factors (HF) and human–computer interaction (HCI) domains, Intelligent Adaptive Systems: An Interaction-Centered Design Perspective provides integrated design guidance and recommendations for researchers and system developers. The book explores a recognized lack of integration between the HF and HCI research communities, which has led to inconsistencies between the research approaches adopted, and a lack of exploitation of research from one field by the other. The authors integrate theories and methodologies from these domains to provide design recommendations for human–machine developers. They then establish design guidance through the review of conceptual frameworks, analytical methodologies, and design processes for intelligent adaptive systems. The book draws on case studies from the military, medical, and distance learning domains to illustrate intelligent system design to examine lessons learned. Outlining an interaction-centered perspective for designing an IAS, the book details methodologies for understanding human work in complex environments and offers understanding about why and how optimizing human–machine interaction should be central to the design of IASs. The authors present an analytical and design methodology as well as an implementation strategy that helps you choose the proper design framework for your needs.

Work is all around us and permeates everything we do and everyday activities. Not all work is justified, not all work is properly designed, or evaluated accurately, or integrated. A systems model will make work more achievable through better management. Work is defined as a process of performing a defined task or activity, such as research, development, operations, maintenance, repair, assembly, production, and so on. Very little is written on how to design, evaluate, justify, and integrate work. Using a comprehensive systems approach, this book facilitates a better understanding of work for the purpose of making it more effective and rewarding.

Today, when a security incident happens, the top three questions a cyber operation center would ask are: What has happened? Why did it happen? What should I do? Answers to the first two questions form the core of Cyber Situation Awareness (SA). Whether the last question can be satisfactorily addressed is largely de-pendent upon the cyber situation awareness capability of an enterprise. The goal of this book is to present a summary of recent research advances in the development of highly desirable Cyber Situation Awareness capabilities. The 8 invited full papers presented in this volume are organized around the following topics: computer-aided human centric cyber situation awareness; computer and information science aspects of the recent advances in cyber situation awareness; learning and decision making aspects of the recent advances in cyber situation awareness; cognitive science aspects of the recent advances in cyber situation awareness

This second edition of Human Factors Methods: A Practical Guide for Engineering and Design now presents 107 design and evaluation methods as well as numerous refinements to those that featured in the original. The book has been carefully designed to act as an ergonomics methods manual, aiding both students and practitioners. The eleven sections represent the different categories of ergonomics methods and techniques that can be used in the evaluation and design process. Offering a 'how-to' text on a substantial range of ergonomics methods that can be used in the design and evaluation of products and systems, it is a comprehensive point of reference for all these methods. An overview of the methods is presented in chapter one, with a methods matrix showing which can be used in conjunction. The following chapters detail the methods showing how to apply them in practice. Flowcharts, procedures and examples cover the requirements of a diverse audience and varied applications of the methods. The final chapter, a new addition, illustrates the EAST method, which integrates several well-known methods into a teamwork analysis approach.

Networked computers are ubiquitous, and are subject to attack, misuse, and abuse. One method to counteracting this cyber threat is to provide security analysts with better tools to discover patterns, detect anomalies, identify correlations, and communicate their findings. Visualization for computer security (VizSec) researchers and developers are doing just that. VizSec is about putting robust information visualization tools into the hands of human analysts to take advantage of the power of the human perceptual and cognitive processes in solving computer security problems. This volume collects the papers presented at the 4th International Workshop on Computer Security - VizSec 2007. Researchers have revealed that real expertise, while applied to well-defined tasks with highly circumscribed contexts, often stretches beyond its routine boundaries. For example, a medical doctor may be called upon to diagnose a rare disease or perform emergency surgery outside his or her area of specialization because other experts are not available. Moreover, in some cases, the context for expertise is in a constant state of flux, such that no one case is identical. Expertise Out of Context is a culmination of some of the most insightful studies conducted by researchers in the fields of cognitive systems engineering and naturalistic decision making in the effort to better understand expertise and its development. Born out of the Sixth International Conference on Naturalistic Decision Making, a conference that gathers researchers who study cognition, perception, and reasoning outside of the traditional laboratory, this book is organized in five parts, the first of which provides an overview of the topic and presents varied perspectives. Consequent sections cover how to make sense of things, tools for thinking out of context, how to cope with uncertainty in a changing workplace, and teams operating out of context. As researchers in naturalistic decision making have investigated such areas as the knowledge and decision-making skills of expert firefighters, critical care nurses, military commanders, and aircraft pilots, this volume is of importance to an expansive audience, including individuals in business, government, industry, and society at large.

Cognitive Systems Engineering (CSE) is primarily a blend of technological opportunities, findings from cognitive research, and Cognitive Task Analysis. Using CSE, we were able to produce an efficient and effective redesign of the AWACS weapons Director (WD) station. The revised WD station was tested using 17 WDs. These WDs performed Defensive Counter Air Missions with both the current interface and the revised interface. The training of the participants on the revised interface was quite brief (4.5 hours). As a result, the WDs did not achieve the same degree of familiarity or automation with the revised interface that they have with the current interface. Yet, when WDs were using the revised system, their performance improved. This is indicated by an increase in performance for a number of process and outcome measures. Also, a skilled WD provided blind ratings of WD performance. These global ratings were significantly higher for the revised interface. The effectiveness of the revised interface suggests that it is possible to pinpoint cognitive task requirements and to make these the driving factors in a design effort. The use of CSE ray be a feasi-

ble aspect of the design process, enabling system developers to achieve a much stronger effectiveness at relatively low cost.

This volume is the first comprehensive history of task analysis, charting its origins from the earliest applied psychology through to modern forms of task analysis that focus on the study of cognitive work. Through this detailed historical analysis, it is made apparent how task analysis has always been cognitive. Chapters cover the histories, key ideas, and contributions to methodology of a number of communities of practice, including: Sociotechnics, European Work Analysis, Naturalistic Decision Making, Cognitive Systems Engineering, Ethnography, Human Factors. Further, integrative chapters focus on the purposes of cognitive task analysis. It is shown how all the various communities of practice are living in the same scientific universe, though are in many ways distinctive in terms of their key concerns and main theories. It is a historiography of task analysis, and the people who invented task analysis. It is also an explanatory primer on what cognitive task analysis is all about and what it can do. Perspectives on Cognitive Task Analyis will be of value to professionals in allied disciplines who might come to rely on cognitive task analysis in their system development programs. It will be invaluable to students who need to know what task analysis and cognitive task analysis are really all about. For practitioners of cognitive task analysis, this volume is a major presentation of what their scientific universe is all about.

Models that simulate cognitive processes have demonstrated considerable success in a variety of technical domains such as, intelligent tutoring, predicting the complexity of human system interactions, decision support and expert systems among others. Creating such models requires considerable skill in conducting a cognitive task analysis. The conduct of a cognitive task analysis is costly and labor intensive. As a result, a few computerized aids have been developed to assist in the process of conducting such analyses. However, none have been evaluated to determine how accurately and consistently users of such tools can create cognitive models. If such tools cannot demonstrate the creation of accurate models of cognitive tasks across users then such tools will be ineffective and unreliable. The research reported herein presents the results of experimentation, which focuses upon the evaluation of a computerized aid, specifically CAT-HCI (Cognitive Analysis Tool - Human Computer Interface), for the conduct of a detailed cognitive task analysis. A sample of users for a newly developed interface (tactical display) for the Army's Bradley A3 Fighting Vehicle were asked to model their knowledge of a routine task. Measures of the accuracy and of the consistency of the user generated models were recorded and analyzed. Accuracy measures the level of agreement between subject models and a baseline model, while consistency measures the level of agreement between subject models.

Over the past decade, Cognitive Work Analysis (CWA) has been one of the popular human factors approaches for complex systems evaluation and design applications. This is reflected by a diverse range of applications across safety critical domains. The book brings together a series of CWA applications and discussions from world-leading human factors researchers and practitioners. It begins with an overview of the CWA framework, including its theoretical underpinnings, the methodological approaches involved (including practical guidance on each phase), and previous applications of the framework. The core of the book is a series of CWA applications, undertaken in a wide range of safety critical domains for a range of purposes. These serve to demonstrate the contribution that CWA can make to real-world projects and provide readers with inspiration for how such analyses can be practically carried out. Following this, a series of applications in which new approaches or adaptations have been added to the framework are presented. These show how practical applications feedback into the theories/approaches underpinning CWA. The closing chapter then speculates on future applications of the framework and on a series of new research directions required in order to enhance its utility. In emphasising the practical realities of performing CWA, and the real-world impacts it can provide, the book tackles several common misconceptions in a constructive and persuasive way. It provides a welcome demonstration of how CWA can be a powerful ally in tackling complexity-related problems that afflict systems in all areas.

The critical link between psychology and the military is imprtant to recruiting, training, socializing, assigning, employing, deploying, motivating, rewarding, maintaining, managing, integrating, retaining, transitioning, supporting, counseling, and healing military members. These areas are hardly distinct, and the chapters in The Oxford Handbook of Military Psychology have contents that cross these boundaries. Collectively, the topics covered in this volume describe the myriad ways in which modern psychology influences warfare and vice versa. The extensive topics included come from within the areas of clinical, industrial/organizational, experimental, engineering, and social psychology. The contributors are top international experts in military psychology -- some uniformed soldiers, others academics and clinicians, and others civilian employees of the military or other government agencies. They address important areas in which the science and practice of psychology supports military personnel in their varied and complex missions. Among the topics addressed here are suitability for service, leadership, decision making, training, terrorism, socio-cultural competencies, diversity and cohesion, morale, quality-of-life, ethical challenges, and mental health and fitness. The focus is the ways in which psychology promotes the decisive human dimension of military effectiveness. Collectively, the 25 topical chapters of this handbook provide an overview of modern military psychology and its tremendous influence on the military and society as a whole.

This edited book gives a comprehensive picture of the state of the art in authoring systems and authoring tools for advanced technology instructional systems. It includes descriptions of fifteen systems and research projects from almost every significant effort in the field. The book will appeal to researchers, teachers and advanced students working in education, instructional technology and computer-based education, psychology, cognitive science and computer science.

Just a sample of the contents ... contains over 2,800 total pages .... PROSPECTS FOR THE RULE OF LAW IN CYBERSPACE Cyberwarfare and Operational Art CYBER WARFARE GOVERNANCE: EVALUATION OF CURRENT INTERNATIONAL AGREEMENTS ON THE OFFENSIVE USE OF CYBER Cyber Attacks and the Legal Justification for an Armed Response UNTYING OUR HANDS: RECONSIDERING CYBER AS A SEPARATE INSTRUMENT OF NATIONAL POWER Effects-Based Operations in the Cyber Domain Recommendations for Model-Driven Paradigms for Integrated Approaches to Cyber Defense MILLENNIAL WARFARE IGNORING A REVOLUTION IN MILITARY AFFAIRS: THE NEED TO CREATE A SEPARATE BRANCH OF THE ARMED FORCES FOR CYBER WARFARE SPECIAL OPERATIONS AND CYBER WARFARE LESSONS FROM THE FRONT: A CASE STUDY OF RUSSIAN CYBER WARFARE ADAPTING UNCONVENTIONAL WARFARE DOCTRINE TO CYBERSPACE OPERATIONS: AN EXAMINATION OF HACKTIVIST BASED INSURGENCIES Addressing Human Factors Gaps in Cyber Defense Air-

power History and the Cyber Force of the Future How Organization for the Cyber Domain Outpaced Strategic Thinking and Forgot the Lessons of the Past THE COMMAND OF THE TREND: SOCIAL MEDIA AS A WEAPON IN THE INFORMATION AGE SPYING FOR THE RIGHT REASONS: CONTESTED NORMS IN CYBERSPACE AIR FORCE CYBERWORX REPORT: REMODELING AIR FORCE CYBER COMMAND & CONTROL THE CYBER WAR: MAINTAINING AND CONTROLLING THE "KEY CYBER TERRAIN" OF THE CYBERSPACE DOMAIN WHEN NORMS FAIL: NORTH KOREA AND CYBER AS AN ELEMENT OF STATECRAFT AN ANTIFRAGILE APPROACH TO PREPARING FOR CYBER CONFLICT AIR FORCE CYBER MISSION ASSURANCE SOURCES OF MISSION UNCERTAINTY Concurrency Attacks and Defenses Cyber Workforce Retention Airpower Lessons for an Air Force Cyber-Power Targeting ¬Theory IS BRINGING BACK WARRANT OFFICERS THE ANSWER? A LOOK AT HOW THEY COULD WORK IN THE AIR FORCE CYBER OPERATIONS CAREER FIELD NEW TOOLS FOR A NEW TERRAIN AIR FORCE SUPPORT TO SPECIAL OPERATIONS IN THE CYBER ENVIRONMENT Learning to Mow Grass: IDF Adaptations to Hybrid Threats CHINA'S WAR BY OTHER MEANS: UNVEILING CHINA'S QUEST FOR INFORMATION DOMINANCE THE ISLAMIC STATE'S TACTICS IN SYRIA: ROLE OF SOCIAL MEDIA IN SHIFTING A PEACEFUL ARAB SPRING INTO TERRORISM NON-LETHAL WEAPONS: THE KEY TO A MORE AGGRESSIVE STRATEGY TO COMBAT TERRORISM THOUGHTS INVADE US: LEXICAL COGNITION AND CYBERSPACE The Cyber Threat to Military Just-In-Time Logistics: Risk Mitigation and the Return to Forward Basing PROSPECTS FOR THE RULE OF LAW IN CYBERSPACE Cyberwarfare and Operational Art CYBER WARFARE GOVERNANCE: EVALUATION OF CURRENT INTERNATIONAL AGREEMENTS ON THE OFFENSIVE USE OF CYBER Cyber Attacks and the Legal Justification for an Armed Response UNTYING OUR HANDS: RECONSIDERING CYBER AS A SEPARATE INSTRUMENT OF NATIONAL POWER Effects-Based Operations in the Cyber Domain Recommendations for Model-Driven Paradigms for Integrated Approaches to Cyber Defense MILLENNIAL WARFARE IGNORING A REVOLUTION IN MILITARY AFFAIRS: THE NEED TO CREATE A SEPARATE BRANCH OF THE ARMED FORCES FOR CYBER WARFARE SPECIAL OPERATIONS AND CYBER WARFARE LESSONS FROM THE FRONT: A CASE STUDY OF RUSSIAN CYBER WARFARE ADAPTING UNCONVENTIONAL WARFARE DOCTRINE TO CYBERSPACE OPERATIONS: AN EXAMINATION OF HACKTIVIST BASED INSURGENCIES Addressing Human Factors Gaps in Cyber Defense Air-

In complex sociotechnical systems such as military, health care, and nuclear power systems, poor performance or errors resulting from inadequate designs can have catastrophic consequences. Although considered challenging to learn and execute well, work domain analysis can be used as a framework to assist in the design of these systems. Work Domain Analysis: Concepts, Guidelines, and Cases helps you develop a deep understanding of this framework—not by oversimplifying the principles but by explaining its concepts and methodology in considerable depth. Building on the foundational concepts of cognitive work analysis by providing the first comprehensive treatment of work domain analysis, the book begins with fundamental topics such as abstraction, decomposition, and structural means-ends and part-whole relations, clearly outlining the basic characteristics of a work domain model. It then explores more advanced topics such as the development of multiple models of a system and the distinction between causal and intentional systems and illustrates them with numerous examples across a range of systems including warships, libraries, and petrochemical plants. It also provides comprehensive guidelines for performing work domain analysis. The author provides three detailed case studies that examine the impact, unique contribution, and feasibility of applying work domain analysis in industrial settings. These case studies demonstrate that work domain analysis can be used to address a range of problems beyond interface design, such as team design, training, and the evaluation of system design concepts. They also provide concrete illustrations of the guidelines for work domain analysis. Without an appreciation of the variety of applications of work domain analysis, and its suitability for implementation

in industrial settings, the benefits of this approach may not be fully realized. This book supplies the deep knowledge of this tool that will lead both to more powerful and innovative applications of the approach and to designs that support flexibility or adaptation in the workplace, making systems safer, healthier, and more productive for workers.

This book presents a research thesis of a large-scale study conducted with over 50 large organizations in 7 countries with 80 business leaders to understand how businesses speed up the proficiency of their employees to meet business challenges. The book describes a start-to-end research study that explored the concept of 'accelerated proficiency' of employees in organizations. The book is organized into five chapters. The book introduces the concept of accelerated proficiency in a business context in light of reviews of four decades of classic studies. The research methodology to identify sources, recruit participants, and the mechanism to collect as well as analyze data have been explained in detail. The book reveals six business practices implemented by organizations across the board that seem to make a major impact in shortening the time to proficiency of employees. Important observations and findings have been discussed as implications in regards to how organizations orchestrated six business practices as an input-output-feedback system to reduce the time--to-proficiency of the workforce. The book briefly explains how these six practices were implemented through a set of twenty-four strategies in various contexts. The concepts and findings discussed in this book contribute significantly to the body of knowledge on accelerated proficiency. In particular, the conceptual model and the framework developed in this study can be implemented across a range of contexts, business sectors, job types, and settings to reduce the time-to-proficiency of the workforce.

The expanding application of Concept Mapping includes its role in knowledge elicitation, institutional memory preservation, and ideation. With the advent of the Cmap-Tools knowledge modeling software kit, Concept Mapping is being applied with increased frequency and success to address a variety of problems in the workplace. Supported by business application case studies, Applied Concept Mapping: Capturing, Analyzing, and Organizing Knowledge offers an accessible introduction to the theory, methods, and application of Concept Mapping in business and government. The case studies illustrate applications across a range of industries—including engineering, product development, defense, and

healthcare. The authors provide access to a free download of CmapTools, courtesy of the Institute for Human and Machine Cognition, to enable readers to create and share their own Concept Maps. Offering examples from the United States, Canada, Australia, Spain, Brazil, Scotland, and The Netherlands, they highlight a global perspective of this dynamic tool. The text is organized into three sections: Practitioners' Views—supplies narratives, guidance, and reviews of applications from career Concept Mappers Recent Case Studies and Results—presents in-depth examinations of specific applications and their results Pushing the Boundaries—explores what's possible and where the boundary conditions lie Applied Concept Mapping facilitates the fundamental understanding needed to harness the power of Concept Mapping to develop viable solutions to a virtually unlimited number of real-world problems.

This two-volume set LNCS 10915 and 10916 constitutes the refereed proceedings of the 12h International Conference on Augmented Cognition, AC 2018, held as part of the 20th International Conference on Human-Computer Interaction, HCII 2018, in Las Vegas, NV, USA in July 2018. The 1171 papers presented at HCII 2018 conferences were carefully reviewed and selected from 4346 submissions. The papers cover the entire field of human-computer interaction, addressing major advances in knowledge and effective use of computers in a variety of applications areas. The papers in this volume are organized in the following topical sections: context aware adaption strategies in augmented cognition, brain sensors and measures for operational environments, artificial intelligence and machine learning in augmented cognition, augmented cognition in virtual and mixed reality.

Cognitive task analysis is a broad area consisting of tools and techniques for describing the knowledge and strategies required for task performance. Cognitive task analysis has implications for the development of expert systems, training and instructional design, expert decision making and policy-making. It has been applied in a wide range of settings, with different purposes, for instance: specifying user requirements in system design or specifying training requirements in training needs analysis. The topics to be covered by this work include: general approaches to cognitive task analysis, system design, instruction, and cognitive task analysis for teams. The work settings to which the tools and techniques described in this work have been applied include: 911 dispatching, faultfinding on

board naval ships, design aircraft, and various support systems. The editors' goal in this book is to present in a single source a comprehensive, in-depth introduction to the field of cognitive task analysis. They have attempted to include as many examples as possible in the book, making it highly suitable for those wishing to undertake a cognitive task analysis themselves. The book also contains a historical introduction to the field and an annotated bibliography, making it an excellent guide to additional resources.

'Complex sociotechnical systems' are systems made up of numerous interacting parts, both human and non-human, operating in dynamic, ambiguous and safety critical domains. Cognitive Work Analysis (CWA) is a structured framework specifically developed for considering the development and analysis of these complex socio-technical systems. Unlike many human factors approaches, CWA does not focus on how human-system interaction should proceed (normative modelling) or how human-system interaction currently works (descriptive modelling). Instead, through a focus on constraints, it develops a model of how work can be conducted within a given work domain, without explicitly identifying specific sequences of actions (formative modelling). The framework leads the analyst to consider the environment the task takes place within, and the effect of the imposed constraints on the way work can be conducted. It provides guidance through the process of answering the questions of why the system exists, what activities can be conducted within the domain as well as how these activities can be achieved, and who can perform them. The first part of the book contains a comprehensive description of CWA, introducing it to the uninitiated. It then presents a number of applications in complex military domains to explore and develop the benefits of CWA. Unlike much of the previous literature, particular attention is placed on exploring the CWA framework in its entirety. This holistic approach focuses on the system environment, the activity that takes place within it, the strategies used to conduct this activity, the way in which the constituent parts of the system (both human and non-human) interact and the behaviour required. Each stage of this analysis identifies the constraints governing the system; it is contended that through this holistic understanding of constraints, recommendations can be made for the design of system interaction; increasing the ability of users to cope with unanticipated, unexpected situations. This book discusses the applicability of the approach in system analysis, development and evaluation. It

provides process to what was previously a loosely defined framework.

This book reports on the latest research and developments in the field of cybersecurity, particularly focusing on personal security and new methods for reducing human error and increasing cyber awareness, as well as innovative solutions for increasing the security of advanced Information Technology (IT) infrastructures. It covers a broad range of topics, including methods for human training; novel cyber-physical and process-control systems; social, economic, and behavioral aspects of cyberspace; issues concerning the cybersecurity index; security metrics for enterprises; and risk evaluation. Based on the AHFE 2018 International Conference on Human Factors in Cybersecurity, held on July 21–25, 2018, in Orlando, Florida, USA, the book not only presents innovative cybersecurity technologies, but also discusses emerging threats, current gaps in the available systems, and future challenges that can be successfully overcome with the help of human factors research.

This book constitutes the refereed proceedings of the 9th IFIP WG 11.8 World Conference on Security Education, WISE 9, held in Hamburg, Germany, in May 2015. The 11 revised papers presented together with 2 invited papers were carefully reviewed and selected from 20 submissions. They are organized in topical sections on innovative methods, software security education, tools and applications for teaching, and syllabus design.

Despite continued interest in Cognitive Work Analysis (CWA) techniques for the analysis and design of complex, human-technology systems, few published accounts exist that document all of the five recommended phases of CWA in real world applications. Delineating a work-centered conceptual framework that guides the design of technology, Applications of Cognitive Work Analysis provides the understanding necessary to apply these robust techniques to real world, large scale system design problems in a variety of domains. The book provides a complete CWA analysis for a complex, simulated air traffic control environment and a three phase analysis of an actual healthcare system. It includes detailed applications of work domain, control tasks, and strategies analysis for systems including military command and control, transportation, and emergency management. The contributors present discussions and examples of techniques drawn from research and design traditions other than CWA that can be used to complement and enrich CWA analyses in areas of social and organization analy-

sis, and knowledge and skills analysis. They emphasize important theoretical and application oriented advances in CWA related to the integration of CWA within a larger system design. The concluding chapter examines the progress of CWA as a cognitive engineering tool, then outlines its theoretical underpinnings and a path for the future of this approach. The book demonstrates how these methods can be applied in complex, real world design contexts, subject to constraints of cost, time, and information. It shows the how, when, and where CWA techniques can be integrated into the systems engineering design process and provides concrete evidence for the value that the CWA approach provides in every domain.

Since its inception, just after the Second World War, Human Factors research has paid special attention to the issues surrounding human control of systems. Command and control environments continue to represent a challenging domain for human factors research. Modelling Command and Control takes a broad view of command and control research, to include C2 (command and control), C3 (command, control and communication), and C4 (command, control, communication and computers) as well as human supervisory control paradigms. The book presents case studies in diverse military applications (for example, land, sea and air) of command and control. The book explores the differences and similarities in the land, sea and air domains; the theoretical and methodological developments, approaches to sys-

tem and interface design, and the workload and situation awareness issues involved. It places the role of humans as central and distinct from other aspects of the system. Using extensive case study material, Modelling Command and Control demonstrates how the social and technical domains interact, and why each require equal treatment and importance in the future.

Due to the requirements of automatic system design, and new needs for the training of complex tasks, Cognitive Task Analysis (CTA) has been used with increasing frequency in recent years by the airline industry and air traffic control community. Its power is reflected in the literature on professional training and systems design, where CTA is often cited as one of the most promising new technologies, especially for the complex cognitive tasks now confronting those working in aviation. The objective of this book is to bridge the gap between research and practice, to make what we know about CTA available to practitioners in the field. The book focuses on cognitive psychology and artificial intelligence analyses of aviation tasks. It is designed to help readers identify and solve specific design and training problems, in the flight deck, air traffic control and operations contexts. Distilling experience and guidelines from the best aviation cognitive analyses in accessible form, it is the first comprehensive volume on CTA, and is written for practitioners of cognitive analysis in aviation. It provides an overview of anal-

yses to date; methods of data collection; and recommendations for designing and conducting CTA for use in instructional design, systems development, and evaluation. The first part of the book provides the principles and foundations of CTA, describing traditional approaches to task analysis and ways that cognitive analyses can be integrated with the analysis and development processes. The next part details how to: select the appropriate method or methods; determine job tasks that can be trained for automatic performance; extract knowledge structures; analyse mental models; and identify the decision-making and problem-solving strategies associated with experienced job performance. The authors also describe when to use and how to design and conduct a cognitive task analysis; how to use CTA along with traditional task analysis and ISD; and how to use CTA in training program development and systems design, as well as in personnel selection and evaluation. The current demand for cognitive analyses makes this a timely volume for those in aviation and, more generally, the industrial development and training communities. Readers will find this a thorough presentation of cognitive analyses in aviation and a highly usable guide in the design, implementation and interpretation of CTA. The book will be useful to instructional developers, aviation equipment and systems designers, researchers, government regulatory personnel, human resource managers, instructors, pilots, air traffic controllers, and operations staff.