

Physical Science Spring Exam 2011 Study Guide

This book is the first book that looks at both the politics of maintaining the trajectory toward humanity's final hundred years and the politics of those final hundred years. It is the first book to take up theoretical and practical aspects with respect to both the movement toward and events during these final hundred years. As a result, it is the first book that attempts to provide a more complete picture of the politics of catastrophic human-caused environment change. The fact that the book provides a way into the variety of policy problems that catastrophic human-caused environment change is creating means that it is also important to those in Public Policy. The book also raises a series of philosophical and ethical questions associated with human rights, which are significant to those who study Political Philosophy (and some of those who study Law), international action to mitigate the effects of climate change, the nature of science and the limitations of political institutions. NASA's current missions to the International Space Station (ISS) and potential future exploration missions involving extended stays by astronauts on the lunar surface, as well as the possibility of near-Earth object (NEO) or Mars missions, present challenges in protecting astronauts from radiation risks. These risks arise from a number of sources, including solar particle events (SPEs), galactic cosmic rays (GCRs), secondary radiation from surface impacts, and even the nuclear isotope power sources transported with the astronauts. The serious early and late radiation health effects potentially posed by these exposures are equally varied, ranging from early signs of radiation sickness to cancer induction. Other possible effects include central nervous system damage, cataracts, cardiovascular damage, heritable effects, impaired wound healing, and infertility. Recent research, much of which has been sponsored by NASA, has focused on understanding and quantifying the radiation health risks posed by space radiation environments. Although many aspects of the space radiation environments are now relatively well characterized, important uncertainties still exist regarding biological effects and thus regarding the level and types of risks faced by astronauts. This report presents an evaluation of NASA's proposed space radiation cancer risk assessment model, which is described in the 2011 NASA report, Space Radiation Cancer Risk Projections and Uncertainties--2010. The evaluation in Technical Evaluation of the NASA Model for Cancer Risk to Astronauts Due to Space Radiation considers the model components, input data (for the radiation types, estimated doses, and epidemiology), and the associated uncertainties. This report also identifies gaps in NASA's current research strategy for reducing the uncertainties in cancer induction risks.

The dynamism in modern Asia, especially with the current revival in Japan, stands in sharp contrast to the situation in Europe. An in-depth understanding of what is happening in contemporary Asia is key to grasping opportunities that this dynamism creates for all. This multi-volume reference work consists of three up-to-date and comprehensive volumes on Asia and the world economy. It covers the most important aspects of the world economy as they pertain to Asia in the increasingly accelerating globalization process and is a must-have for anyone keen to understand Asia and the contemporary world. The three-volume set covers the climate change challenges and solutions from the Asian perspectives, focusing on both domestic arrangements and trade-based options, and discusses scenario analyses for future climate regimes; the sustainability of growth in the Indian economy determined by analyzing the role of economic, technological and environmental factors and lastly, the growth experiences and prospects of India and China.

The research and its outcomes presented here focuses on tropospheric or ground level ozone, in particular due to its surfacing as a major threat to crop productivity around the world. This book presents the ozone concentration data for a variety of geographical regions, examines

the factors responsible for its increasing concentrations and its potential effects on physiological and biochemical responses culminating in crop productivity losses which, in turn may pose a serious threat to global food security. Beside this, certain ameliorative measures that could be adopted to assess ozone injury in plants are also discussed. Global climate change scenarios predict a significant increase in future tropospheric ozone concentration. Particular attention is therefore given to evaluate the effect of global climate change on ozone concentrations. Readers will also discover how yield losses due to ozone are related to changes in the socio-economic conditions of the society, especially in South Asian regions. Students and researchers studying crop and soil science, environmental scientists, risk assessment professionals and policy makers will find this book of interest.

How the biggest forest fire in North American history affected and changed forest fire management.

Stimulating growth through adjusting macroeconomic conditions remains the principal policy responses to pressing problems of unemployment, poverty and environmental degradation. However, are the current policy approaches capable of tackling these problems by generating win-win solutions or are they the root causes of these problems? The current growth trajectory has neither lead to a reduction of our overall resource use – as we use resources and energy more efficiently we consume more – nor create the conditions for employment and well-being. Increasingly, there is the realization that it is necessary to make substantial interventions into our national economies and create better framework conditions and incentive systems in order to more widely and rapidly develop and disseminate workable, innovative solutions for realizing sustainable development. This is the task of politics, and the concrete design of the measures must be built upon a broad public debate and shared long-term visions. The authors of this book intend to trigger a dialogue among stakeholders about how we can shape this transformation process towards sustainability. Following a detailed presentation of the key arguments for reconsidering the necessary conditions for sustainable economies, an international cast of commentators from politics, administration, civil society, business and science engage with the central question: is there an alternative trajectory for Western economies that sustains wellbeing whilst confronting ecological and social breakdown?

Under pressure and support from the federal government, states have increasingly turned to indicators based on student test scores to evaluate teachers and schools, as well as students themselves. The focus thus far has been on test scores in those subject areas where there is a sequence of consecutive tests, such as in mathematics or English/language arts with a focus on grades 4-8. Teachers in these subject areas, however, constitute less than thirty percent of the teacher workforce in a district. Comparatively little has been written about the measurement of achievement in the other grades and subjects. This volume seeks to remedy this imbalance by focusing on the assessment of student achievement in a broad range of grade levels and subject areas, with particular attention to their use in the evaluation of teachers and schools in all. It addresses traditional end-of-course tests, as well as alternative measures such as portfolios, exhibitions, and student learning objectives. In each case, issues related to design and development, psychometric considerations, and validity challenges are covered from both a generic and a content-specific perspective. The NCME Applications of Educational Measurement and Assessment series includes edited volumes designed to inform research-based applications of educational measurement and assessment. Edited by leading experts, these books are comprehensive and practical resources on the latest developments in the field. The NCME series editorial board is comprised of Michael J. Kolen, Chair; Robert L. Brennan; Wayne Camara; Edward H. Haertel; Suzanne Lane; and Rebecca Zwick. Peterson's Graduate Programs in the Physical Sciences, Mathematics, Agricultural Sciences, the Environment & Natural Resources contains a wealth of information on colleges and universities that offer graduate work in these exciting fields. The institutions listed include those in the

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United States and Canada, as well international institutions that are accredited by U.S. accrediting bodies. Up-to-date information, collected through Peterson's Annual Survey of Graduate and Professional Institutions, provides valuable information on degree offerings, professional accreditation, jointly offered degrees, part-time and evening/weekend programs, postbaccalaureate distance degrees, faculty, students, degree requirements, entrance requirements, expenses, financial support, faculty research, and unit head and application contact information. Readers will find helpful links to in-depth descriptions that offer additional detailed information about a specific program or department, faculty members and their research, and much more. In addition, there are valuable articles on financial assistance, the graduate admissions process, advice for international and minority students, and facts about accreditation, with a current list of accrediting agencies. Which is the role of the European Union in dealing with crises that go beyond the nation states borders – terrorism, proliferation of weapons of mass destruction, regional conflicts, state failure, organised crime, natural and man-made disasters? The authors assess the main challenge for the EU: the need to operate in a multidimensional setting where with a wide range of actors, such as member states, national and international NGOs, international organisations (NATO and the UN in primis), as well as a wide range of activities, rules and norms are generated for these diversified crises.

These volumes comprise papers, on the topic of “Materials Processing Technology”, selected from the second International Conference on Advances in Materials and Manufacturing (ICAMMP 2011) held on the 16-18th December 2011 in Guilin, China. The 469 peer-reviewed papers are grouped into the chapters: 1: Advanced Engineering Materials, 2: Surface Engineering/Coatings, 3: Materials Forming, Machining and Joining, 4: Laser Processing, 5: Powder Metallurgy and Plastic Deformation, 6: Friction and Wear, 7: Waste-to-Energy, Waste Management and Waste Disposal, 8: CAD/CAE/CAM, 9: Product Design and Development, 10: Other Related Topics.

Education for sustainable development, the educational offshoot of the concept of ‘sustainable development’, has rapidly become the predominant educational response to the global environmental crisis. The authors apply a critical lens to the field and find it wanting in many regards. Sustainability Frontiers is an international, academic non-governmental organization based in Canada and the United Kingdom. It engages in research and innovation in the broad fields of sustainability and global education challenging dominant assumptions and current orthodoxies as it seeks to foster learner empowerment and action. It places particular emphasis on climate change, disaster risk reduction and peacebuilding and their implications for the nature and directions of sustainability education.

This volume presents recent developments in atmospheric sciences driven by numerical modeling which makes use of geospatial technologies and increasing computational power. It gathers examples of how geoinformatics supports meteorological, climatological and water-related studies. One of the most important features of geospatial technologies is that they provide methods and tools which may be utilized in real time or near real time in order to monitor and predict atmospheric processes. This is particularly crucial in areas where dynamics of atmospheric phenomena is considerable and causes difficulties in accurate forecasting. One of such areas is the transitional zone between oceanic and continental features of the mid-latitude climate. Good examples of investigations into the transitional zone come from Poland and its neighboring countries. The topical volume provides the reader with a selection of papers on physically-based and data-based modelling of weather-related phenomena over Poland. This main theme of the topical volume is extended to cover case studies on the use of geoinformatics in atmospheric studies in other regions at a range of spatial scales.

Peterson's Graduate Programs in the Physical Sciences 2011 Sections 1-6 of 10 Peterson's

Peterson's Graduate Programs in the Physical Sciences contains a wealth of information on colleges and universities that offer graduate work

in Astronomy and Astrophysics, Chemistry, Geosciences, Marine Sciences and Oceanography, Meteorology and Atmospheric Sciences, and Physics. The institutions listed include those in the United States, Canada, and abroad that are accredited by U.S. accrediting bodies. Up-to-date information, collected through Peterson's Annual Survey of Graduate and Professional Institutions, provides valuable information on degree offerings, professional accreditation, jointly offered degrees, part-time and evening/weekend programs, postbaccalaureate distance degrees, faculty, students, degree requirements, entrance requirements, expenses, financial support, faculty research, and unit head and application contact information. As an added bonus, readers will find a helpful "See Close-Up" link to in-depth program descriptions written by some of these institutions. These Close-Ups offer detailed information about the physical sciences program, faculty members and their research, and links to the program or department's Web site. In addition, there are valuable articles on financial assistance and support at the graduate level and the graduate admissions process, with special advice for international and minority students. Another article discusses important facts about accreditation and provides a current list of accrediting agencies.

A solution to the problem of climate change requires close international cooperation and difficult reforms involving all states. Law has a clear role to play in that solution. What is not so clear is the role that law has played to date as a constraining factor on state conduct. International Climate Change Law and State Compliance is an unprecedented treatment of the nature of climate change law and the compliance of states with that law. The book argues that the international climate change regime, in the twenty or so years it has been in existence, has developed certain normative rules of law, binding on states. State conduct under these rules is characterized by generally high compliance in areas where equity is not a major concern. There is, by contrast, low compliance in matters requiring a burden-sharing agreement among states to reduce global greenhouse gas emissions to a 'safe' level. The book argues that the substantive climate law presently in place must be further developed, through normative rules that bind states individually to top-down mitigation commitments. While a solution to the problem of climate change must take this form, the law's development in this direction is likely to be hesitant and slow. The book is aimed at scholars and graduate students in environmental law, international law, and international relations.

Do you like polar bears? Do you want polar bears to be around in 50 years? Do you think that climate change is the only major threat to polar bear survival? Do you believe that polar bears are adequately protected today? Would you like to contribute to saving polar bears today and in the future? If your answer to any of those questions is yes, you need to read this book. "This book is an eye-opener and should kick off extensive debates." Dr. Thor S. Larsen, professor emeritus, Member of the IUCN Polar Bear Specialist Group 1968-1985. "In this impassioned book Morten raises very important, provocative questions that are not being addressed by the international environmental groups." Art Wolfe, Award-winning conservation photographer. In this book, the author analyses the current status of the polar bear. And he punctures the myth that polar bears are well protected and managed today. While most people think that global warming is the overhanging threat to polar bear survival, the author documents that it is actually the continuation of an unsustainable hunting pressure that is driving the species towards extinction. Across 228 pages, interspersed with beautiful photographs, Morten Joergensen demonstrates how there are probably fewer polar bears than most authorities claim, how hunting is the greatest manageable threat to the species, how current protection measures are insufficient, how the animal has been commercialized and how lack of courage and honesty is allowing this scenario to continue. The book also contains a long string of realistic and very urgent recommendations for action - to save polar bears before they are gone forever.

'Transgovernance: Advancing Sustainability Governance' analyses the question what recent and ongoing changes in the relations between politics, science and media – together characterized as the emergence of a knowledge democracy – may imply for governance for sustainable development, on global and other levels of societal decision making, and the other way around: How can the discussion on sustainable development contribute to a knowledge democracy? How can concepts such as second modernity, reflexivity, configuration theory, (meta)governance theory and cultural theory contribute to a 'transgovernance' approach which goes beyond mainstream sustainability governance? This volume presents contributions from various angles: international relations, governance and metagovernance theory, (environmental) economics and innovation science. It offers challenging insights regarding institutions and transformation processes, and on the paradigms behind contemporary sustainability governance. This book gives the sustainability governance debate a new context. It transforms classical questions into new options for societal decision making and identifies starting points and strategies towards effective governance of transitions to sustainability.

Towards a Final Story is the first history of the modern scientific epic. These epic stories pull together our knowledge of the universe, uniting material and biological origins, from beginning to end. The authors of these epics--among them Carl Sagan, E.O. Wilson, and Steven Weinberg--saw their task as providing an integrated schema that would not only bring together but also go beyond the particular scientific results and disciplines available as they wrote their histories. Nasser Zakariya traces how such epic stories could achieve what they claimed, how they inhabit culture and politics, and how they arrived at the present moment from a period in the previous century when inquiries into ultimate origins were regarded by many as unscientific and unanswerable. These prominent, popular historical narratives of science are important forms of knowledge in their own right. They expose what science means in the wider culture and at the same time focus attention on the near paradoxical nature of a universal history narrated by humanity for humanity.

Moving beyond most conventional thinking about energy security in Europe which revolves around stability of supplies and the reliability of suppliers, this book presents the history of European policy-making regarding energy resources, including recent controversies about shale gas and fracking. Using the United States as a benchmark, the author tests the hypothesis that EU energy security is at risk primarily because of a lack of market integration and cooperation between member states. This lack of integration still prohibits natural gas to flow freely throughout the continent, which makes parts of Europe vulnerable in case of supply disruptions. The book demonstrates that the EU gas market has been developing at different speeds, leaving the Northwest of the continent reasonably well integrated, with sufficient trade and liquidity and different supplies, whereas other parts are less developed. In these parts of Europe there is a structural lack of investments in infrastructure, interconnectors, reverse flow options and storage facilities. Thus, even though substantial progress has been made in parts of the EU, single source dependency often prevails, leaving the relevant member states vulnerable to market power abuse. Detailed comparisons are made of the situations in the Netherlands and Poland, and of energy policy in the USA. The book dismantles some of the existing assumptions about the

concept of energy security, and touches upon the level of rhetoric that features in most energy security and policy debates in Europe.

On June 15, 2011, the Air Force Space Command established a new vision, mission, and set of goals to ensure continued U.S. dominance in space and cyberspace mission areas. Subsequently, and in coordination with the Air Force Research Laboratory, the Space and Missile Systems Center, and the 14th and 24th Air Forces, the Air Force Space Command identified four long-term science and technology (S&T) challenges critical to meeting these goals. One of these challenges is to provide full-spectrum launch capability at dramatically lower cost, and a reusable booster system (RBS) has been proposed as an approach to meet this challenge. The Air Force Space Command asked the Aeronautics and Space Engineering Board of the National Research Council to conduct an independent review and assessment of the RBS concept prior to considering a continuation of RBS-related activities within the Air Force Research Laboratory portfolio and before initiating a more extensive RBS development program. The committee for the Reusable Booster System: Review and Assessment was formed in response to that request and charged with reviewing and assessing the criteria and assumptions used in the current RBS plans, the cost model methodologies used to frame [frame?] the RBS business case, and the technical maturity and development plans of key elements critical to RBS implementation. The committee consisted of experts not connected with current RBS activities who have significant expertise in launch vehicle design and operation, research and technology development and implementation, space system operations, and cost analysis. The committee solicited and received input on the Air Force launch requirements, the baseline RBS concept, cost models and assessment, and technology readiness. The committee also received input from industry associated with RBS concept, industry independent of the RBS concept, and propulsion system providers which is summarized in Reusable Booster System: Review and Assessment.

The Fuzzy Systems, Knowledge Discovery, and Natural Computation Symposium (FSKDNC 2013) was successfully held from 24 to 25 July 2013, in Shenyang, China. The Symposium was a platform for authors to present their recent development on fuzzy systems, knowledge discovery, and natural computation (i.e., intelligent techniques inspired from nature, such as neural networks, genetic algorithms, and particle swarm optimization). The Symposium attracted numerous submissions from around the globe. Each submitted paper was rigorously reviewed by the program committee and additional reviewers based on originality, significance and quality of the research, clarity of the presentation, and relevance to the Symposium theme. 60 papers are included in the Symposium proceedings after the review process. The great efforts of the authors, the Organizing Committee members, the Program Committee members, and the additional reviewers are acknowledged here. The Symposium would not have been possible without the support from Liaoning Technical University. The professional and courteous staff from DEStech Publications, Inc also deserves special credits.

The Fifth Assessment Report of the IPCC is the standard scientific reference on climate change for students, researchers and policy makers.

This book represents a first attempt to investigate the relations between Law and Agroecology. There is a need to adopt a transdisciplinary approach to multifunctional agriculture in order to integrate the agroecological paradigm in legal regulation. This does not require a super-law that hierarchically purports to incorporate and supplant the existing legal fields; rather, it calls for the creation of a trans-law that progressively works to coordinate interlegalities between different legal fields, respecting their autonomy but emphasizing their common historical roots in *rus* in the process. *Rus*, the rural phenomenon as a whole, reflects the plurality and interdependence of different complex systems based jointly on the land as a central point of reference. "Rural" is more than "agricultural": if agriculture is understood traditionally as an activity aimed at exploiting the land for the production of material goods for use, consumption and private exchange, rurality marks the reintegration of agriculture into a broader sphere, one that is not only economic, but also social and cultural; not only material, but also ideal, relational, historical, and symbolic; and not only private, but also public. In approaching *rus*, the natural and social sciences first became specialized, multiplied, and compartmentalized in a plurality of first-order disciplines; later, they began a process of integration into Agroecology as a second-order, multi-perspective and shared research platform. Today, Agroecology is a transdiscipline that integrates other fields of knowledge into the concept of agroecosystems viewed as socio-ecological systems. However, the law seems to still be stuck in the first stage. Following a reductionist approach, law has deconstructed and shattered the universe of *rus* into countless, disjointed legal elementary particles, multiplying the planes of analysis and, in particular, keeping Agricultural Law and Environmental Law two separate fields.

Sustainable agriculture is a rapidly growing field aiming at producing food and energy in a sustainable way for humans and their children. Sustainable agriculture is a discipline that addresses current issues such as climate change, increasing food and fuel prices, poor-nation starvation, rich-nation obesity, water pollution, soil erosion, fertility loss, pest control, and biodiversity depletion. Novel, environmentally-friendly solutions are proposed based on integrated knowledge from sciences as diverse as agronomy, soil science, molecular biology, chemistry, toxicology, ecology, economy, and social sciences. Indeed, sustainable agriculture decipher mechanisms of processes that occur from the molecular level to the farming system to the global level at time scales ranging from seconds to centuries. For that, scientists use the system approach that involves studying components and interactions of a whole system to address scientific, economic and social issues. In that respect, sustainable agriculture is not a classical, narrow science. Instead of solving problems using the classical painkiller approach that treats only negative impacts, sustainable agriculture treats problem sources. Because most actual society issues are now intertwined, global, and fast-developing, sustainable agriculture will bring solutions to build a safer world.

The future of China, India and Asia's other emerging economies and their ability to take a 'low-carbon' and 'climate-resilient' development path determine the future of global carbon emissions and climate change. Indeed, the battle to confront global climate change will be won or lost in Asia. The transition to a low-carbon, climate-resilient economy (LCE), which involves many steps towards improved energy efficiency, alternative energy sources and transport systems, sustainable land use, eco-friendly consumption and proactive adaptation, may be regarded

as the world's fourth revolution, after the industrial revolution, agricultural revolution, and the information revolution. Asia is highly vulnerable to impacts of climate change. Yet because of its dynamic economies and massive populations, Asia offers the greatest opportunity for overcoming the trade-offs and pursuing low-carbon development pathways. With a growing consensus that there is limited time to avoid the worst impacts of climate change, scientists, engineers, policymakers, and economists across Asia have recently begun discussions on how Asia can make a transition to LCE. Most discussions, however, focused on transfer of technologies from developed to developing countries and overlooked other equally important challenges such as financing, governance, and information dissemination. This book is the first to look at these neglected aspects of LCE and attempt to integrate both market-based and technology-based solutions into a comprehensive strategy to creating a roadmap for LCE in Asia. This book is an essential reading for economists, policy makers, practitioners, engineers and researchers concerned with climate change, energy production and development in Asia and the impacts and potential for the world.

In response to requests from Congress, NASA asked the National Research Council to undertake a decadal survey of life and physical sciences in microgravity. Developed in consultation with members of the life and physical sciences communities, the guiding principle for the study is to set an agenda for research for the next decade that will allow the use of the space environment to solve complex problems in life and physical sciences so as to deliver both new knowledge and practical benefits for humankind as we become a spacefaring people. The project's statement of task calls for delivery of two books--an interim report and a final survey report. Although the development of specific recommendations is deferred until the final book, this interim report does attempt to identify programmatic needs and issues to guide near-term decisions that are critical to strengthening the organization and management of life and physical sciences research at NASA.

There is no shortage of articles and books exploring women's underrepresentation in science. Everyone is interested--academics, politicians, parents, high school girls (and boys), women in search of college majors, administrators working to accommodate women's educational interests; the list goes on. But one thing often missing is an evidence-based examination of the problem, uninfluenced by personal opinions, accounts of "lived experiences," anecdotes, and the always-encroaching inputs of popular culture. This is why this special issue of *Frontiers in Psychology* can make a difference. In it, a diverse group of authors and researchers with even more diverse viewpoints find themselves united by their empirical, objective approaches to understanding women's underrepresentation in science today. The questions considered within this special issue span academic disciplines, methods, levels of analysis, and nature of analysis; what these articles share is their scholarly, evidence-based approach to understanding a key issue of our time.

The search for alternative, renewable sources of fuel and energy from plants, algae, and waste materials has catalyzed in recent years. With the growing interest in bioenergy development and production there has been increasing demand for a broad ranging introductory text in the field. *Bioenergy: Principles and Practices* provides an invaluable introduction to the fundamentals of bioenergy feedstocks, processing, and industry. Bioenergy provides readers with an understanding of foundational information on 1st, 2nd, and 3rd generation biofuels. Coverage spans from feedstock production of key energy sources such as grasses, canes, and woody plants through chemical conversion processes and industrial application. Each chapter provides a thorough description of fundamental concepts, definitions of key terms, case studies and practical examples and exercises. *Bioenergy: Principles and Practices* will be an essential resource for students, bioengineers, chemists, and industry personnel tying key concepts of bioenergy science to valuable real world application.

The chapters presented in this book draw on ethnography as a methodology in a variety of disciplines, including education, management, design, marketing, ecology and scientific contexts, illustrating the value of a qualitative approach to research design. The chapters discuss

the use of traditional ethnographic methods, such as immersion, observation and interview, as well as innovative ethnographical methods which have been influenced by the new digital culture. The latter challenges notions of identity, field and traditional culture such that people are able to represent themselves in the research process rather than be represented. New approaches to ethnography also examine the use and implication of images in representation as well as critically examining the role and impact of the researcher in the process.

Many fundamental technological and managerial issues surrounding the development and implementation of intelligent analytics within multi-industry applications remain unsolved. There are still questions surrounding the foundation of intelligent analytics, the elements, the big characteristics, and the effects on business, management, technology, and society. Research is devoted to answering these questions and understanding how intelligent analytics can improve healthcare, mobile commerce, web services, cloud services, blockchain, 5G development, digital transformation, and more. Intelligent Analytics With Advanced Multi-Industry Applications is a critical reference source that explores cutting-edge theories, technologies, and methodologies of intelligent analytics with multi-industry applications and emphasizes the integration of artificial intelligence, business intelligence, big data, and analytics from a perspective of computing, service, and management. This book also provides real-world applications of the proposed concept of intelligent analytics to e-SMACS (electronic, social, mobile, analytics, cloud, and service) commerce and services, healthcare, the internet of things, the sharing economy, cloud computing, blockchain, and Industry 4.0. This book is ideal for scientists, engineers, educators, university students, service and management professionals, policymakers, decision makers, practitioners, stakeholders, researchers, and others who have an interest in how intelligent analytics are being implemented and utilized in diverse industries.

Cement-based concrete has excellent properties as a construction material, and the raw materials of cement—rocks, and limestone and clay—are bountiful. Yet its production generates high quantities of CO₂, making it a potentially unsustainable material. However, there are no alternatives to concrete and steel as basic methods for development of socioeconomic infrastructure at this time. Highlighting sustainability issues in the construction industry, *The Sustainable Use of Concrete* presents guidelines on how to move toward sustainable concrete construction. The book begins by clarifying the historic background and meaning of sustainability, after which it outlines areas that need to be considered in connection with sustainability in the concrete and construction field. It examines environmental, social and cultural, and economic aspects, then considers an evaluation system of sustainability. The authors include various tools and ISO standards, and then explore technologies for sustainability, with case studies and examples that promote understanding of current technologies. Although the construction sector, in the broadest sense, has come to recognize that infrastructure development over the past two centuries has been unsustainable, it has been slow to adjust. Comprehensive information and relevant practical guidance are very scarce. This book lays out a roadmap for creating a human-friendly and safe environment with low environmental burden.

"This book is a one of a kind, definitive reference source for technical students and researchers, government policymakers, and business leaders. It provides an overview of past and present initiatives to improve and commercialize fuel cell technologies. It provides context and analysis to help potential investors assess current fuel cell commercialization activities and future prospects. Most importantly, it gives top executive policymakers and company presidents with detailed policy recommendations as to what should be done to successfully commercialize fuel cell technologies."--pub. desc.

In February 2009, the commercial communications satellite Iridium 33 collided with the Russian military communications

satellite Cosmos 2251. The collision, which was not the first recorded between two satellites in orbit--but the most recent and alarming--produced thousands of pieces of debris, only a small percentage of which could be tracked by sensors located around the world. In early 2007, China tested a kinetic anti-satellite weapon against one of its own satellites, which also generated substantial amounts of space debris. These collisions highlighted the importance of maintaining accurate knowledge, and the associated uncertainty, of the orbit of each object in space. These data are needed to predict close approaches of space objects and to compute the probability of collision so that owners/operators can decide whether or not to make a collision avoidance maneuver by a spacecraft with such capability. The space object catalog currently contains more than 20,000 objects, and when the planned space fence radar becomes operational this number is expected to exceed 100,000. A key task is to determine if objects might come closer to each other, an event known as "conjunction," and the probability that they might collide. The U.S. Air Force is the primary U.S. government organization tasked with maintaining the space object catalog and data on all space objects. This is a complicated task, involving collecting data from a multitude of different sensors-many of which were not specifically designed to track orbiting objects--and fusing the tracking data along with other data, such as data from atmospheric models, to provide predictions of where objects will be in the future. The Committee for the Assessment of the U.S. Air Force's Astrodynamic Standards collected data and heard from numerous people involved in developing and maintaining the current astrodynamics standards for the Air Force Space Command (AFSPC), as well as representatives of the user community, such as NASA and commercial satellite owners and operators. Preventing collisions of space objects, regardless of their ownership, is in the national security interest of the United States. Continuing Kepler's Quest makes recommendations to the AFSPC in order for it to create and expand research programs, design and develop hardware and software, as well as determine which organizations to work with to achieve its goals.

Working with educators at all academic levels involved in WAC partnerships, the authors and editors of this collection demonstrate successful models of collaboration between schools and institutions so others can emulate and promote this type of collaboration.

In the five decades since NASA was created, the agency has sustained its legacy from the National Advisory Committee on Aeronautics (NACA) in playing a major role in U.S. aeronautics research and has contributed substantially to United States preeminence in civil and military aviation. This preeminence has contributed significantly to the overall economy and balance of trade of the United States through the sales of aircraft throughout the world. NASA's contributions have included advanced flight control systems, de-icing devices, thrust-vectoring systems, wing fuselage drag reduction configurations, aircraft noise reduction, advanced transonic airfoil and winglet designs, and flight systems. Each of these

contributions was successfully demonstrated through NASA flight research programs. Equally important, the aircraft industry would not have adopted these and similar advances without NASA flight demonstration on full-scale aircraft flying in an environment identical to that which the aircraft are to operate-in other words, flight research. Flight research is a tool, not a conclusion. It often informs simulation and modeling and wind tunnel testing. Aeronautics research does not follow a linear path from simulation to wind tunnels to flying an aircraft. The loss of flight research capabilities at NASA has therefore hindered the agency's ability to make progress throughout its aeronautics program by removing a primary tool for research. Recapturing NASA's Aeronautics Flight Research Capabilities discusses the motivation for NASA to pursue flight research, addressing the aspects of the committee's task such as identifying the challenges where research program success can be achieved most effectively through flight research. The report contains three case studies chosen to illustrate the state of NASA ARMD. These include the ERA program and the Fundamental Research Program's hypersonics and supersonics projects. Following these case studies, the report describes issues with the NASA ARMD organization and management and offers solutions. In addition, the chapter discusses current impediments to progress, including demonstrating relevancy to stakeholders, leadership, and the lack of focus relative to available resources. Recapturing NASA's Aeronautics Flight Research Capabilities concludes that the type and sophistication of flight research currently being conducted by NASA today is relatively low and that the agency's overall progress in aeronautics is severely constrained by its inability to actually advance its research projects to the flight research stage, a step that is vital to bridging the confidence gap. NASA has spent much effort protecting existing research projects conducted at low levels, but it has not been able to pursue most of these projects to the point where they actually produce anything useful. Without the ability to actually take flight, NASA's aeronautics research cannot progress, cannot make new discoveries, and cannot contribute to U.S. aerospace preeminence.

NASA's Office of the Chief Technologist (OCT) has begun to rebuild the advanced space technology program in the agency with plans laid out in 14 draft technology roadmaps. It has been years since NASA has had a vigorous, broad-based program in advanced space technology development and its technology base has been largely depleted. However, success in executing future NASA space missions will depend on advanced technology developments that should already be underway. Reaching out to involve the external technical community, the National Research Council (NRC) considered the 14 draft technology roadmaps prepared by OCT and ranked the top technical challenges and highest priority technologies that NASA should emphasize in the next 5 years. This report provides specific guidance and recommendations on how the effectiveness of the technology development program managed by OCT can be enhanced in the face of scarce resources.

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