

DECISION LINE

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PRESIDENT'S LETTER

Happy New Year DSI!



Morgan Swink, Texas Christian University

Please accept greetings and warm wishes from the Board of Directors and myself. We trust that your holidays were enjoyable and refreshing. I want to congratulate Natasa Christodoulidou, Shawnee Vickery, the conference committee, and the home office for putting on a fantastic annual conference in Seattle. Many of you who attended the conference commented to me that it was one of the best ever! Thanks to all you who played a part in making the conference so enjoyable. I know that Sri Talluri (2016 program chair) and his team are working hard to create an equally rewarding experience for all of us in Austin Texas this coming November.

2016 promises to be a great year for our Institute, as we move forward with some important initiatives. Early this year, the Board of Directors will communicate to the membership a set of proposed changes to the DSI constitution. Please closely examine these changes in preparation for a subsequent vote. Many of the changes are small corrections or updates. However, there are two important changes I will call to your attention here:

1. **Colleges.** This change defines the structure for the new "colleges" that the DSI is creating. The colleges will serve as venues for members who have similar "subject-area" interests to organize, meet and collaborate. These new groups will provide great ways to make our Institute even more inclusive and intimate. Please consider getting involved in one of the new colleges!
2. **Membership.** The DSI has not been operating in compliance with the constitution in some areas of membership. The proposed changes will clarify some of the classes of membership and associated rights, especially for student members and regional members. In particular, the proposed changes should help to eliminate conflicts between regional membership requirements and Institute membership re-

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DECISION LINE

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Vision Statement

The Decision Sciences Institute is dedicated to excellence in fostering and disseminating knowledge pertinent to decision making.

Mission Statement

The Decision Sciences Institute advances the science and practice of decision making. We are an international professional association with an inclusive and cross-disciplinary philosophy. We are guided by the core values of high quality, responsiveness and professional development.

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DSI President Swink explains the two important changes that the board has been working on. He briefly explains the concept of “College” within DSI organization and the changes that has been proposed in DSI membership.

Those of you who attended DSI Annual conference, know that the conference was a resounding success. Co-Program Chairs Natasa Christodoulidou and Shawnee Vickery put a great conference together and in this issue provide a summary of the highlights of the program and list of recipients of various awards if you know these award winners, please extend your congratulations to them for their accomplishments.

Under the Analytics and Data Science Feature, Professor Storey discusses the real challenges of using big data. She argues that although much attention is focused on the V’s of big data, there should be equal attention given to syntax and semantics (S’s of big data). She argues that challenges such as context, interoperability, and surrogates cannot be effectively dealt with using the current technologies.

The Program chair for the 2016 conference invites you to join him in Austin in November. Sri Talluri, Program Chair of 2016 DSI Annual Conference is inviting submit your research papers and participate in various activities that he is planning for the conference in Austin, Texas.

The Research Issue Feature contains a very interesting article by Park and Amouzegar. They provide a very interesting look at how the Science and Technology improved our lives and why scientist should be consulted when politicians making decision regarding issues that affect our lives. I encourage you to read this very interesting piece.

The International Issue features an article by Nawal Bonomo. In this article you will learn about the country of Oman and the current state of affair in this country. For those who are no familiar with

countries in Persian Gulf area, you will find this article very interesting piece and a quick lesson about one of the countries in this most talked about region of the world.

Under the Doctoral Student Feature, Rajiv Sabherwal, presents an interesting reading for doctoral students reminding them about five important aspects for students during their journey through the doctoral program.

As always, I encourage you, our reader, to share your opinions, ideas with us by writing and sending it to me at mebrahimpour@uri.edu, or you may send it to the feature editors as shown in this section.

I am looking forward to reading your articles for inclusion in Decision Line.

Maling Ebrahimpour, PhD

Editor ■

From PRESIDENT’S LETTER, page 1

quirements. We expect that these changes will help to build stronger ties between the regional and global organizations.

Please look for communications of these items along with all the detailed proposed changes through e-mail, on the DSI website, and in *DecisionLine*. We are working to making this process as transparent and inclusive as possible. Your input and vote matters!

I fully expect 2016 to be a milestone year in the life of the DSI. Along with the above changes, we are working on additional exciting opportunities for our home office, systems, journals, and regional support. Stay tuned, and better yet, get involved!

Best wishes,

Marc
President, Decision Sciences Institute ■

2015 Program Chairs' Message



Co-Program Chair:
Natasa Christodoulidou of the California State University Dominguez Hills

The 2015 DSI Annual Meeting in

Seattle was organized around two conference pillars: (1) RESEARCH and (2) EDUCATION AND PROFESSIONAL DEVELOPMENT. The theme of the conference, "Decision Sciences in the 21st Century: Theoretical Impact and Practical Relevance", highlighted the increasing importance of research that creates and advances knowledge and helps define and influence practice in the decision sciences fields. We are grateful to Jeet Gupta who put together a special panel of distinguished scholars (Lisa Ellram, Miami University; Sunil Kumar, University of Chicago; and Morgan Swink, Texas Christian University) who comprehensively examined this compelling theme. The conference featured many interesting papers and abstracts across a variety of research, as well as education, tracks. There were several award competitions including a new "Lean Enterprise Paper Award" sponsored by the Demmer Center for Business Transformation at Michigan State University and a number of professional development events including consortia for senior faculty, junior faculty, and PhD students. A number of workshops provided expert advice and guidance in areas such as publishing in top tier journals and teaching statistics more effectively. For the second year in a row DSI contracted with a publisher to produce a "Best Papers of the Conference" book to highlight some of the most outstanding papers submitted to the conference.

We would like to extend our heartfelt thanks and congratulations to everyone who contributed to this mem-



Co-Program Chair:
Shawnee K. Vickery of Michigan State University

orable conference. The program team did a spectacular

job in developing and implementing the sessions, consortia, workshops, award competitions and events that made the conference a great success. We appreciate the efforts of all who traveled to the conference to present their research, pedagogy, and/or share their professional insights and to participate in the many avenues of engagement that the conference offered. We would like to especially recognize Alan Mackelprang (Georgia Southern University) for the outstanding work he did as Proceedings Coordinator and Stephen Ostrom (Arizona State University) for the superb support he provided as the Annual Meeting Webmaster and CMS Manager. Finally, we wish to thank Johnny Rungtusanatham, Executive Director of DSI (Ohio State University) and the DSI Board of Directors for their support and guidance.

Our goal this year was to provide a heightened conference experience for our DSI members by providing a number of special events in stellar venues that would offer excellent opportunities for socializing and networking with old and new colleagues. The Welcome Reception was held in the Personal Courage Wing of the Museum of Flight with foods and drinks catered by the renowned McCormick and Schmick. An International Networking Reception was held at the Space Needle, made possible by generous contributions from Michigan State University's International Business Center (IBC) and the University of Texas at Dallas Jindal School of Management (JSOM). We replaced the traditional Awards Luncheon with a gala Awards Dinner

Banquet that was preceded by a reception featuring a popular local band. We are thankful to Dana Evans from the Home Office who came up with the wonderful idea of holding a couple of late night after-glow receptions at the conference hotel to make sure everyone had plenty of opportunities for socializing and networking. Our fundraising team went above and beyond the call of duty – without their efforts these special events would not have been possible. Special fundraising recognition goes to Alan Mackelprang (Georgia Southern University), Samia Siha (Kennesaw State University), and Kathy Steckel (University of Texas Dallas).

We are thrilled to recognize the outstanding individuals who were the recipients of the 2015 Annual Meeting Awards:

- Dennis E. Grawoig Distinguished Service Award: M. Johnny Rungtusanatham (The Ohio State University)
- Carol J. Latta Memorial DSI Emerging Leadership Award for Outstanding Early Career Scholar: Tingting Yan (Wayne State University)
- Best Application Paper Award: Gregory N. Stock (University of Colorado, Colorado Springs) and Kathleen McFadden (Northern Illinois University)
- Best Theory-Driven Empirical Research Paper: Stephan M. Wagner (Swiss Federal Institute of Technology, Zurich), Christoph Bode (University of Mannheim), and Moritz A. Peter (International School of Management)
- Best Analytical Research paper: Yan Dong (University of South Carolina), Kefeng Xu (University of Texas (San Antonio), and Sining Song (Arizona State University)
- Best Lean Enterprise Paper Award:

See WRAP UP FROM DSI 2015 ANNUAL CONFERENCE, page 17

The Real Challenges of Big Data

by Veda C. Storey, Georgia State University

In the recent times, the big data and its analysis have taken a critical role in most business decision making. It is also increasing its influence on in whatever we do in general in our life. However, not surprisingly, it has its own challenges. In this thought provoking article, Professor Veda Storey, by using data management perspectives, delineates the many challenges posed by the very characteristics of big data. I look forward to other submissions on this or other related topics from the readership.

Abstract

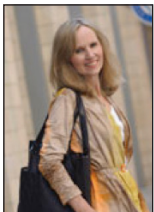
Although the V's of volume, variety, and velocity, traditionally used to characterize big data, are well-accepted, the underrepresented S's of syntax and semantics, are equally important in the wide world of data analytics. Without being able to capture and represent the semantics of the underlying big data upon which decision makers base their conclusions, incorrect inferences may be drawn. Challenges involved with modeling information systems that attempt to deal with semantics include context, interoperability, and surrogates, none of which can be dealt with effectively using current technologies.

ers, reflecting the magnitude and impact of data-related problems that need to be addressed in contemporary organizations (Chen et al., 2012).

The phrase "big data" has evolved to represent the notion that data can exceed the processing capacity of conventional database systems because it is too big, moves too fast, or does not fit traditional database architectures, requiring alternative approaches to processing and analysis for decision making (Dumbill, 2012). Human users of big data, especially decision makers, have difficulty even understanding the scale, with applications being developed that will eventually generate over an exabyte of data per day, requiring unique advancements in hardware and software to process this data (Embley and Liddle 2013). Claimed advantages of analyzing big data include: 1) using larger and more complete data sets (e.g., biology); 2) increasing computational intensity for analytics, text mining, and sentiment (e.g., business applications); 3) adopting new learning techniques (e.g., computer vision); and 4) generating new questions (e.g., as a result of using a complete data set).

2. The V's of Big Data

Big data is traditionally characterized by the 3 V's of volume, variety, and velocity,



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1. Introduction

Big data is intended to change the way we live, work and think (Mayer-Schonberger and Cukier, 2013), enabling us to participate in a world where decision-making can happen in real time or close to it. Doing so, however, requires context-dependent methodologies and automation of large-scale network analysis that will result in better assessments and predictions than we are currently capable of making (Goes, 2014). Business intelligence and data analytics are well recognized as important areas of study for both practitioners and research-

resulting from advances in sensing, measuring, and social computing technologies. These V's have been extended to 5 V's with the addition of veracity (accuracy) and value. All of these V's have their own unique challenges. The volume is too big, the variety requires both structured and unstructured analysis, and the velocity is so fast that we might not even have time to identify reasonable questions to ask. The veracity leads to uncertainty, the volume competes with velocity (Rubin, 2015), and the value is the most difficult to ascertain (Song, 2015). The extension to 7 V's incorporates validity and volatility (Khan et al. 2014). Applicable, additional V's include visualization, variability, vulnerability, visibility, vagueness and, no doubt, others.

Sources of big data are operational (from transaction systems, monitoring of streaming data and sensor data); dark (owned, but not used, from emails, contracts, written reports, etc.); commercial (structured or unstructured purchased from industry organizations, etc.); social (from Twitter, Facebook, etc.); and public (economic, socio-demographic, weather, etc. appearing in many formats and on numerous topics) (Gartner 2013; Song 2015). With such emphasis on classifying characteristics and sources of big data, however, the challenge of making big data useful still remains. As our understanding and advancement of tools and techniques to deal with big data for predictive analytics (Dhar, 2013), and other applications, increases, accurate representation and modeling of data are crucial, although issues of content and semantics continue to be challenging (Storey et al., 2015).

3. The Role of the S's in Big Data

Big data has the potential to advance our understanding and adoption of information within our society to help us understand phenomena in the real world. Although the V's of big data are important, progression in big data analytics also requires a focus on syntax and semantics. In the past, semantics has been addressed by using surrogates, which include mappings to ontologies and other stocks of knowledge. However, more

emphasis on the meanings of terms used to model the real world and representing it in our information systems is required.

Modeling the Real World

Conceptual models have long been considered as a means of capturing semantics of some subset of phenomena of the real world, serving as a model of a particular domain (Burton-Jones and Weber 2014). Models are intended to capture and represent concepts, which are the "glue that holds our mental world together" (Murphy, 2002). However, the ability to understand how things behave, coupled with social knowledge of how things interact, provide insights into how people understand the context of a real world application. A truly intelligent information system that deals with data, either big or small, structured or unstructured, needs knowledge of how things behave in the real world and how people comprehend them (Cambria and White, 2014). Models, however, are only representations which are dealt with using syntax.

Syntax as a Surrogate for Semantics

Researchers strive, in general, to build complex information systems that will benefit our society (Obrst et al., 2007). A huge problem exists in that some level of capture and representation of the context of an application are important for facilitat-

ing understanding. The problem is only amplified with large amounts of data to be modeled. Two issues emerge: understanding the context of an application; and facilitating interoperability (the ability of two or more systems to communicate effectively both syntactically and semantically) (Tolk and Muguira, 2003).

The semantics of a real world relationship is the nature of a statement's relationship to the object to which it refers (Barron et al. 1999). The three interdependent notions are (Stamper et al. 2000):

- **Semantics (Can it be understood?)** -- meaning of signs or the mapping between signs and what they represent in the real world
- **Syntactic (Can it be read?)** -- relationship among signs including their formal logical arrangement
- **Pragmatic (Is it useful?)** -- relationships between signs and their consequences.

The most common way to represent semantics in information systems has, historically, been through mappings. Guarino (1998), in fact, has long asserted that every information system has an ontology that often is not explicit but, instead, is obscurely embedded in parts of a system.

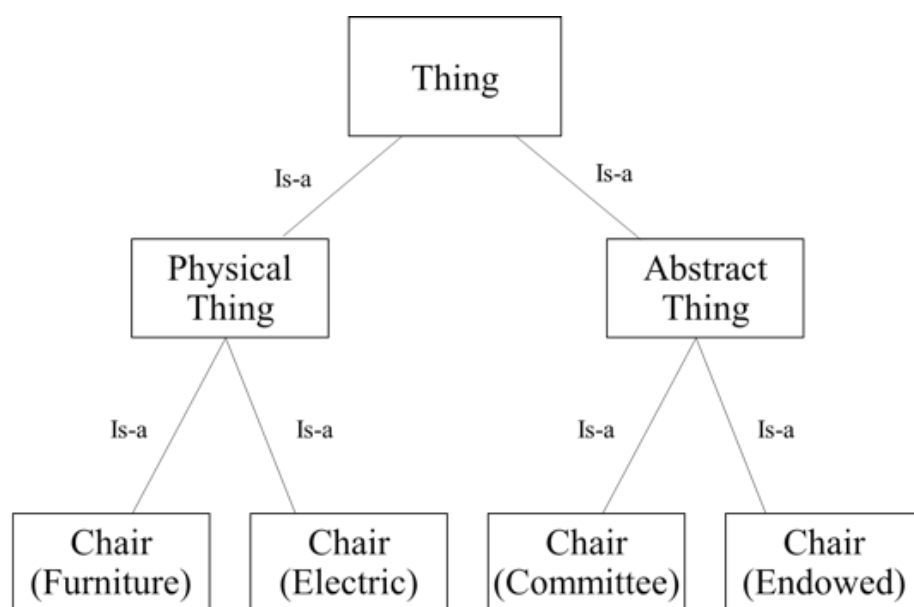


Figure 1. Semantics of "Chair"

Models and Mappings for Semantics

Humans organize and represent concepts in their minds. Is a chair a(n): piece of furniture, head of a committee, endowed chair, or electric chair? The answer is context-dependent, but this example exemplify well-known modeling problems associated with natural language understanding and parsing. Considering these four interpretations brings to mind differences between a living concept (a person as a chair of a committee) versus a physical concept (a piece of furniture). A mapping can make this distinction, as shown in Figure 1, with a high-level “thing” or “concept” that relates to something in the real world, divided into the somewhat arbitrary, but non-overlapping, subclasses of “physical” and “abstract.” Then, one way in which the specific interpretations of these subclasses can be represented is through “is-a” mappings capturing the well-defined semantics of a subclass.

A second example deals with the notion of “bass.” Is this concept referring to a type of fish? A musical instrument? A singer? Or something else? The best interpretation, obviously, depends upon the context. In this example, the classified interpretations are all

subclasses of a physical thing as shown in Figure 2.

4. Challenges Posed by Big Data

Context: These two small examples illustrate some of the complexity involved with simple mappings. The “semantics” of “is-a” relationships are well known, corresponding to the mathematical notion of a subset. Then, the higher-level characteristics map to the lower-level ones. For example, a human being is a subclass of physical things. The challenge is to be able to identify such subclasses, as well as which ones are appropriate, whether the subclasses are exhaustive, overlapping, etc. The context is important. In Figure 2, is there a missing level(s) of abstraction between singer and human, such as the mutually exclusive subclasses of adult and child? Such modeling decisions require knowledge of how things work in the real world. Even so, this is only one example of one relationship between concepts, when millions exist, without corresponding, well-understood semantics in the real world. With the amount of heterogeneity characteristic of big data, as well as the velocity with which big data arrives, the extent of this

challenge will continue to increase.

Interoperability: To realize real-time analysis and decision making, which are well-known goals when employing big data, we need to establish complete interoperability among data sources. This involves issues of semantic integration of interrelating information from multiple sources to obtain a shared understanding. Semantic integration is intended to address the variety problem in big data so that software which uses multiple datasets has no semantic mismatches (Obrst et al., 2014). Effective resolution of interoperability challenges, however, requires that human intervention be left out of the process (Obrst et al., 2007). Furthermore, there is a need to make sense out of the massive amounts of data distributed over the web, including dealing with issues involving completeness of metadata, granularity, vocabulary, and data transformation. There are “too many domains to have very deep semantics common to all of them” (Obrst et al., 2014, p.3). Schema.org, however, has been “tackling the formidable problem of developing a generally accepted vocabulary that is now being used by over five million internet domains, and gradually introducing deeper semantics” (Obrst et al., 2014, p.3).

Interactions: To capture explicit and implicit interactions from vast amounts of data, we need to understand what the data means with respect to how the real world operates. Consider the notion of a standard, e-commerce application with the need to manage large amounts of transactions. A transaction is an abstract, high-level notion, involving some form of currency for a good or service (physical or digital). Various types of currency exist, all of which map to each other, though the common, and globally-accepted, notion of an exchange rate. This is used to assess the “value” of a transaction because the semantics of exchange rates are well-understood.

Semantic technologies: True semantic integration requires no mismatch. Approaches include annotation of data and metadata to derive “assured” knowledge (Obrst et al 2014).

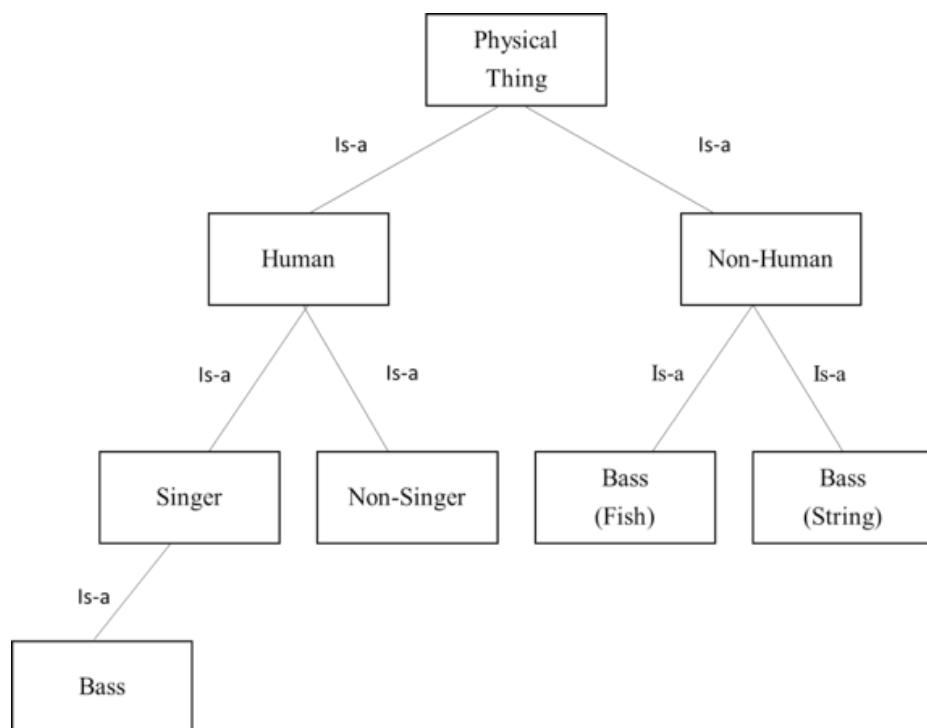


Figure 2. Semantics of “Bass”

Although there are many references to “semantic” technologies, still, the semantic part is difficult. Semantic technology attempts to encode meaning separately from data and files, and the application code. The objective is to enable machines, as well as humans, to share and reason. Markup languages attempt to create annotations so concepts can be matched to higher-level or generic concepts; for example, connecting the name of a person to the concept of a person or the notion of being associated with a birthplace.

Other surrogates: Wikipedia includes “infoboxes” (<https://en.wikipedia.org/wiki/Help:Infobox>) that provide structured information about items discussed in Wikipedia pages. Similarly, Google attempts to return objects that correspond to the keywords upon which one is searching. For example, if one searches for “avenger,” Google’s tools infer that the user is seeking information about the 2012 movie, *The Avengers*, and presents an infobox-like structure describing that movie. Search on “guitar,” and a box about guitars appears, and so forth.

Conclusion

Big data has the potential to help us better understand and react to phenomena in the real world as many organizations move from “data poverty” to “data wealth.” The focus on developing methods, tools, and techniques to deal with big data, however, has overlooked a fundamental problem in that contemporary information systems can only represent data syntactically. Complementary to syntax is semantics, but capturing and representing semantics remains challenging. Although the V’s of big data are important and somewhat understood, the S’s of syntax and semantics, and perhaps even surrogates and structure, need to be understood with respect to the distinctive role each plays in contributing to big data analytics. Clearly, big data can provide a basis from which useful insights can be gained. However, correct interpretations of big data analysis require dealing with inherent semantics. Otherwise, patterns may be generated upon which decisions are based that can lead to

incorrect conclusions and actions on the part of a decision maker.

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2016 Program Chair's Message



Sri Talluri,
Michigan State Uni-
versity,
Program Chair

Welcome to
Austin,
Texas, for
the 2016 Decision

Sciences Institute Annual Conference!
The theme for next year's conference is
Effective Decision Making in Uncertain

**Business Environ-
ments: Strategies,
Practices, and
Techniques.** The
conference dates
are **November 19-
22, 2016.** While
the conference is
almost a year away,
the deadline for
submission of full papers and abstracts
is fast approaching:

Full Paper Submission
Deadline: April 1, 2016

Abstract Submission
Deadline: April 15, 2016

www.decisionsciences.org

We are continuing with the two-
pillar format for next year focusing on
research and education & professional
development pillars. Some of the new
tracks we are adding for next year's

conference include: **Decision Making
in Practice, E-Commerce Technologies
and Strategies, Humanitarian Opera-
tions and Logistics, Risk Management,
Social Issues and Sustainability,
Teaching Innovation, and On-line
Degree Programs & Execution.** In ad-
dition, we are organizing workshops
on topics such as **Business Analytics,
Social Network Analysis, Behavioral
Research and Experimentation,** and
others.

The pillar struc-
ture is:

Pillar 1

Research

We would like to
invite full papers,
abstracts, and pan-
el proposal submissions focusing on
developing new knowledge across all
functional areas of business. Papers
in this pillar are ideally positioned for
publication consideration by Decision
Sciences or other high impact business
journals. Panels and workshops in this
pillar focus on identifying emerging

research topics and methodologies.

Pillar 2

Education and Professional Develop- ment

We would like to invite full papers, ab-
stracts, and panel proposal submissions
focusing on developing new knowledge
pertinent to the design, delivery, and
evaluation of business curricula. Papers
in this pillar are ideally positioned for
publication consideration by Decision
Sciences Journal of Innovative Educa-
tion or other business education jour-
nals. Panels and workshops for this
pillar focus on identifying leading edge
issues and topics.

We look forward to seeing everyone
at the DSI 2016 Annual Meeting in Aus-
tin! Stay tuned for detailed information
on various tracks, panels, workshops,
keynotes, special events and activities!



The World: Made Better Through Science and Technology

by Christopher Park and Mahyar Amouzegar

Problems related to war, poverty, education, social injustice, national security and everything in between are so complex that scientists and engineers are not only needed to solve them, but their expertise is also required to explain these issues to others and to speak out about them publicly.

Yet in today's society, we still have some members of congress that deny climate change and state leaders who make multi-billion dollar policy decisions without consulting a single expert. We have citizens who think public schools can survive and still provide a quality education without support, and we have leaders of some companies who hire the best of the best from regional colleges and schools, and yet do not fully appreciate the notion that regional public education cannot adequately cope with the expansive constraints in resources without their help.

Traditional scientists and engineers, as well as operations researchers, and management and decision scientists have the tools to identify, communicate and solve many of the world's grand challenges, but they need the appropriate support to do so.

"Engineering solves problems for people and society, ranging from such handy innovations as displaying room temperature on your cell phone to devising ways to protect buildings against earthquakes to the enormous complexity involved in putting a man on the moon," says National Academy of Engineering President C.D. Mote, Jr. in a 2014 report titled "Making a World of Difference."

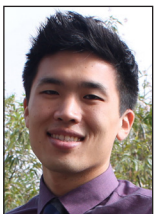
Mote's comment can be extended beyond engineering since over the past 60 years, operations researchers, management and decision scientists along with other scientists have transformed daily life as we know it and will continue to do so moving forward, utilizing new capabilities, creating new applications and providing ever-expanding services to a growing population.

Enriching and enhancing human lives

Practically every aspect of our daily routine has been streamlined and become more efficient due to technological progress, enabled by advanced design, accurate modeling and simulation, and cost-effective development and manufacturing. From the ordinary to extraordinary, modern-day conveniences like organizing your calendar or navigating foreign streets in a new city to traveling thousands of miles across the globe or living in a structurally sound space have all been reimaged and improved through engineering and scientific efforts.

A once futuristic but now commonplace device like a smart phone has transformed the way we pay bills, communicate with others, travel, eat, sleep and play. This "essential" tool is among the many advancements changing the way we live and perceive the world around us.

But beyond these more visible improvements, work done by traditional scientists and engineers, operations researchers, and management and decision scientists (TSE-OR-MDS) continue to provide advancements in areas that may or may not be so apparent, such as improving



Christopher Park

is a communications specialist for Cal Poly Pomona College of Engineering. Park's work involves the development and production of print and digital materials for the College of Engineering to increase visibility and awareness of the

college throughout the nation. He is the associate editor of the college's annual magazine, Xpressions of Xcellence, which features stories of exceptional alumni, students, and faculty. In this role, Park helps develop the magazine with direction from his managing editor and college leadership to the shape the messaging for prospective development and advancement opportunities.



Mahyar Amouzegar

is dean of engineering at California State Polytechnic University, Pomona. He is on the editorial boards of Advances in Operations Research, and the International Journal of Strategic Decision Sciences. He is a fellow at IMA (UK)

and ICA (Canada), and a Senior Member of IEEE. He serves as an officer on the Alpha Iota Delta board.

aging infrastructure, addressing terrorism and developing tools that protect our food, water and air from contaminants. The positive impact of TSE-OR-MDS groups have had on society are immense.

A driving economic force

TSE-OR-MDS groups are an agent of positive change through progress and advancements in the tools and devices we interface with every day and play an essential role in creating an active economy. According to a report by Brookings Institution, the nation's top 50 advanced industries – which range from manufacturing industries such as automobile and aerospace to energy industries such as oil and gas extraction to high-tech services such as computer software and computer system design – make up 17% of all U.S. gross domestic product (GDP). This is more than any other sector, including healthcare, finance, or real estate. [1]

A defining challenge of the 21st century

A global perspective is needed to fully understand the significant role science and engineering play in our individual lives and society as a whole. As the world-wide population continues to grow and reaches an estimated eight billion by 2020 [2], demands for basic resources such as food, water and energy will increase. In addition, urbanization will continue to rise as cities expand and developing nations grow at an exponential rate. Earth's natural resources will struggle, if not outright fail to meet the needs of billions within the next decade.

With population growth as one of the pressing challenges of this century, scientists and engineers have proactively begun to address this issue. For example, a diverse group of researchers in TSE-OR-MDS fields have developed sustainable energy solutions like smart grid technology to improve the efficiency and quality of energy generation and distribution. They are also providing viable solutions to the diminishing water supply with advancements in groundwater extraction

and desalination technologies.

Every aspect of adapting to the resource demands of a growing world population requires research and development in TSE-OR-MDS. From protecting people against pandemic diseases to more efficient methods of food production, scientists and engineers from all disciplines are needed to present practical solutions to problems once perceived as impossible to solve.

Threats to science and engineering advancements

TSE-OR-MDS fields undeniably had a profound impact on all aspects of society, yet scientific and engineering advances have become so commonplace that the improvements they provide are easily taken for granted. Alarming, the public's perception of science and technology's value to society is diminishing.

In 2003, the National Academy of Engineering listed the top engineering impacts of the 20th century in the report, *"A Century of Innovation: Twenty Engineering Achievements that Transformed our Lives."* The report says that technologies integral to our daily lives, such as automobiles, electricity, the Internet and others, have become less extraordinary over time and are now minimum expectations of society. Furthermore, the absence of any one of these is no longer just an inconvenience, but a detriment to society's health, culture and national wealth [3].

The 21st century will require more researchers in TSE-OR-MDS fields than ever before as complex issues related to energy and conservation, water and waste management, an aging population, climate change, globalization and its impact on popular unrest and terrorism all challenge society. Yet in the United States, the number of students in science and technology is decreasing as we produce fewer engineers than India, China, Russia and Japan, as well as less-developed countries like Iran and Vietnam. Historically, American students have fallen

behind other countries in the critical core subjects of math and science (known as STEM subjects), further contributing to this concern. This continuing decline must be addressed not only in terms of supply and demand, but also in terms of the fundamental structure of tertiary education and the strategic direction of the country

Closing minority and gender gaps is also critical in order for the U.S. to remain globally competitive. Although the number of women and minorities who studied in TSE-OR-MDS grew substantially in the late '60s and '70s, this progression has since stalled. For example, in 2014, women represented only 14% of the engineering workforce in the U.S., with Hispanics representing less than 7% and African Americans a mere 4% [4-6].

Ensuring a better world now and in the future

Scientists and engineers have transformed the modern world we live in through a vast array of innovations. It is a world that has become more interconnected, providing a better quality of life than it did just a decade ago.

Over the next century, researchers and practitioners in TSE-OR-MDS fields will tackle many complex issues and environmental concerns including Earth's dwindling resources and climate change to ensure the well-being of all living organisms on the planet. Yet, as those issues are solved, new and potentially greater challenges will undoubtedly arise. As such, government cooperation and public support is critical.

State leaders should consider consulting engineers and scientists, especially when making important policy decisions. Help from the public is also needed to ensure the quality of public education, and more companies should invest in public institutions of higher learning, if they want these institutions to continue to attract and provide a sufficient number

See RESEARCH ISSUE, page 17

Oman: Beyond Oil

by Nawal Bonomo, Bloomsburg University

Oman, is an oil producing country in the Middle East. Under the leadership of Sultan Qaboos, Oman has seen significant economic and technological progress. Oman's economy is dependent on oil and gas production. However, with the fluctuations in oil and gas prices and dwindling reserves, the government of Oman has undertaken a vast economic diversification program.

Fifty percent of population of Oman is under the age of 25 whereas expatriates represent forty-five percent of the labor force. Omanization, higher participation of nationals in the workforce, is one of the initiatives under the economic diversification program. Increasing the percentage of the nationals can vary by sector and the availability of workforce. It is easy to do so in the banking industry, but it seems much harder to accomplish a fraction of that percentage in industrial sectors where skilled labor is needed. This issue is compounded by a climate where Omanis opt for government jobs that tend to offer good wages and early retirement. In addition, there are no successful workforce development initiatives to go hand in hand with the Omanization project.

Another economic diversification initiative of the government has been promoting Oman as an investment hub in an effort to expand the private sector and decrease government presence. The Arab Spring did not leave Oman unscathed. Even though the demonstrations were short-lived, the reform

policies that ensued were very expensive. These policies were viewed as factors to ensure stability of the country, making it more attractive for business. As one prominent businessman put it, this was "a strategy of peace." In fact, the rule of law, fiscal and financial policies, and ease of doing business are all attractive aspects for investment in Oman.

The most significant of these economic diversification initiatives has been establishment of free trade zone and facilitating exports and imports based on Oman's strategic geographical location. Oman views the Indian Ocean as its highway and link to the world beyond. The free zone in the port of Salalah offers an appealing tax incentive package, infrastructure development, and reduced tariff charges that compete with other ports in the Persian Gulf. Salalah is the only port between Europe and Singapore to accommodate 5-class container vessels (1).

Moreover, Oman is cultivating a growing tourism sector. It is rich in historical sites and has miles of unspoiled beaches. Travelling through Muscat and Salalah, construction of new luxury hotels and integrated tourism complexes are evident. Oman aims to position itself not only as a traditional tourist destination, but also as a hub for corporate meetings and international conferences. The economic boost from tourism will translate into more jobs for Omanis. To accomplish this, Oman is also investing

See INTERNATIONAL ISSUE, page 17



Nawal Bonomo

is Director of Global and Multicultural Education at Bloomsburg University of Pennsylvania. In August 2015, she was among a delegation of eight university representatives from across the U.S. who participated in

the Oman Alwaleed Fellowship Study Visit. The visit was sponsored by the National Council on US-Arab Relations.

WDSI 2016 CONFERENCE ANNOUNCEMENT

SANJAY KUMAR AND CEYHUN OZGUR, Valparaiso University



MEETING ANNOUNCEMENT

We are delighted to announce that 2016 Annual Meeting of Midwest region DSI will be hosted by College of Business at Valparaiso University. We have an exciting conference theme of Big Data Analytics. One of the leading proponents of Business Analytics, Google, receives testimonials such as "Conversions have increased by 26% with Google Analytics." - Daisy Downs, Chief Marketing Officer, Urbansitter. This shows the importance of Business Analytics in modern business practice. Join us for this powerful event filled with exciting research presentations, networking opportunities, and plant tours.

CONFERENCE VENUE

Valparaiso, Indiana, the home of Valparaiso University, is a city of about 31,000, attractively situated in a rural setting at the edge of the busy industrial district of Northwest Indiana. The town is part of Chicago Metropolitan area and is about an hour (about 50 miles) drive from downtown Chicago. City of Chicago, offering almost limitless resources for culture and entertainment. Chicago is easily accessible by bus or train, and the University often charters

buses so that students and faculty can take advantage of the theatres, museums, and other educational benefits of this great city. The town of Valparaiso is in Northwest Indiana and is famous for its popcorn festival.

Fifteen miles to the north, on the shore of Lake Michigan, are the Indiana Dunes National Lakeshore and Indiana Dunes State Park, important recreational and scientific resources that offer a combined 17,000 acres of varied natural landscape.



VALPARAISO UNIVERSITY

Valparaiso University is a selective, independent Lutheran institution in Valparaiso, Indiana. The university has been recognized as one of the best universities in the Midwest by U.S. News & World Report every year since



1990. The university enrolls about 3150 undergraduate 1250 graduate students. Valparaiso University participates in division 1 athletics program with 9 men's and 10 women's sports. Valparaiso University belongs to Horizon League conference consisting of 10 universities. The Valparaiso University campus is spread over 300 acres in the town of Valparaiso.

COLLEGE OF BUSINESS ADMINISTRATION

Valparaiso University's College of Business is AACSB accredited with 20 full-time faculty and eight staff members. The college offers six undergraduate majors in Accounting, Business Analytics, Finance, International Business, Management, and Marketing. It also offers minors in Business, Entrepreneurship and Business Analytics. There is also a newly developed Entrepreneurship Center for the College. The College also offers a one-year, full-time Global MBA, an evening, part-time Professional MBA, and a JD/MBA. The MBA program offers eight concentrations and eight certificates. The MBA program is nationally ranked by U.S. News and World Report and the Princeton Review. Full-time MBA graduates earn higher starting salaries than the U.S. national average.

CONFERENCE ORGANIZING COMMITTEE

Conference Co-Chairs:

Ceyhun Ozgur & Sanjay Kumar,
Valparaiso University

Proceedings Coordinator:

Sanjeev Jha, Valparaiso University

Local Arrangements

Coordinator: Coleen Wilder,



WDSI 2016 CONFERENCE ANNOUNCEMENT

Valparaiso University

TRACKS

Supply Chain Management

Janet Hartley, Bowling State University

Operations Management/Research

Eugene Flidner, Oakland University

Innovative Education and Student papers

Xiaodong Deng, Oakland University

Marketing, Sports Management, Business Law, & Ethics

Elizabeth Gingerich, Valparaiso University

Business Analytics

David Booth, Kent State University

Information Systems/Technology:

Sanjeev Jha, Valparaiso University

Finance & Accounting:

Jiangxia Liu, Valparaiso University

Entrepreneurship & Management:

Joseph Trendowski, Valparaiso University

Health Care Management:

Jeffrey A Coto, Valparaiso University

PLANT TOURS

We have organized two exciting plant tours as part of the conference events. The conference registration fees cover the cost of plant tours. A charter bus service has been arranged for the plant tours. Busses will leave at 4:30pm on Thursday, April 14th and Friday, April 15th.

Urschel Laboratories

www.urschel.com

Urschel Laboratories, Inc., is known worldwide for precision-engineered size reduction equipment. The company focuses on new ideas and invented many revolutionary machines for the food industry. Because of this extensive research and development, the company took on the name "laboratory".

Urschel Laboratories is a global leader in food cutting technology. The tour will cover product planning, production,

inventory management, and sales.

Task Force Tips

www.tft.com

Task Force Tips Inc. is one of the leading



companies in the fire industry. The company designs and manufactures innovative agent delivery solutions that exceed customer expectations.

The tour covers various aspects including innovative product design, manufacturing, and testing.

AWARDS

Stan Hardy best paper award is determined from a selection of the best manuscripts as identified by the editors of *Decision Sciences*, the *International Journal of Production Research*, the *Journal of Operations Management*, *Manufacturing*



and Service Operations Management, and Production and Operations Management.

Best Innovative Education Paper award sponsored by Alpha Iota Delta

Best Conference Paper award sponsored by MWDSI

Best Student Paper award sponsored by MWDSI

REGISTRATION

Registration Information and link available at the conference website: www.mwdsi.org

Registration fee:

\$175 for regular participants

\$25 for student participants

HOTEL INFORMATION

Frequent Shuttle service to and from University to the Hotels is provided for participants. Approximate distance 1 mile.

@\$119 *Hampton Inn and Suites*

1451 Silhavy Rd
Valparaiso, IN 46383

A direct link for room booking is : <http://group.hamptoninn.com/MidWestDecision>

@\$89 *Holiday Inn*

1251 Silhavy Rd
Valparaiso, IN 46383

SUBMISSION GUIDELINES

All full papers and abstracts can be submitted to Ceyhun Ozgur at ceyhun.ozgur@valpo.edu. ■

A Few Things Students Should Not Forget During The Doctoral Program

by Rajiv Sabherwal, University of Arkansas Fayetteville

Edwin & Karlee Bradberry Chair in Information Systems, and
Chair of Department of Information Systems
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Dr. Rajiv Sabherwal

Rajiv Sabherwal is Department Chair of Information Systems, Edwin & Karlee Bradberry Chair in the Walton College of Business, and Executive Director of Information Technology Research Institute at the University of Arkansas.

He has published extensively in prestigious journals, authored textbooks on knowledge management and business intelligence, and presented at conferences and universities worldwide. He is the Editor-in-Chief of IEEE Transactions on Engineering Management and a Fellow of Association of Information Systems. He was Conference Co-chair for International Conference on Information Systems (2010). He has performed senior editorial roles for MIS Quarterly, Information Systems Research, and IEEE Transactions on Engineering Management, and has served on, or currently serves as associate editor for several prestigious journals, including Management Science, Journal of MIS, and Journal of AIS. He has been fortunate to have worked with doctoral students in numerous roles over the past 25 years, including as dissertation advisor or committee member, instructor, mentor at doctoral consortia, or through discussions as a guest scholar.

Aldai Ewing Stevenson II, who served as Governor of Illinois and as U.S. Ambassador to the United Nations, is quoted as telling graduating students: “When you leave here, don’t forget why you came.” During my interactions with doctoral students over the past thirty-plus years, as their teacher, mentor, and collaborator, or as someone visiting their academic institution for some time, I have often felt the need to remind doctoral students of why they are in a doctoral program. I am grateful to be invited to author this column for *DecisionLine*, because it allows me to share this advice more broadly.

New doctoral students often arrive into the program excited and charged up, with a strong desire to either create knowledge through their research or become qualified to impart knowledge as a teacher. As they go through the program, they change, slowly but steadily. Some of the changes are desirable and expected, as they first explore and then dig deeper into their field of study, gaining knowledge and acquiring skills as a researcher and usually also as a teacher. Some other changes, however, are not as positive. A year or two into the doctoral program, students lose some of the passion, excitement, and spark with which they enter the program. For example, I found a doctoral student to be passionate about exploring new areas and creating new knowledge during our interactions in his first semester of a doctoral

program. However, about a year and a half later, I found him to be focused on getting a journal hit through “safe” research rather than being creative and pushing the envelope. A detailed two-hour conversation, and a few others later during the semester, helped remind him of the passion and desire he had when he joined the program. Since then, that student has actively pursued innovative topics, become more creative with research methods, and is also poised for success in terms of criteria such as journal publications.

Based on my experiences such as above, I encourage doctoral students to remember a few things as they journey through the program. More specifically, I offer some suggestions regarding five aspects that should not be forgotten.

1. **Don’t forget that you are a student.** Considered by faculty as colleagues, and having their own students either as teachers or as teaching students, doctoral students tend to sometimes forget that they are students themselves, even though at a higher level than in their earlier programs. Accordingly, and influenced by a culture wherein faculty members are striving hard to publish refereed journal papers in order to achieve their career milestones, doctoral students begin to focus almost entirely on outcomes such as journal acceptances or instructional evaluations. Instead, they should remember that they are stu-

dents, and their primary focus should therefore be on learning, or acquiring knowledge about their fields, research methods, and pedagogy rather than on creating or disseminating knowledge through research and teaching, respectively. In other words, instead of focusing only on the outcomes such as publications, doctoral students should remember to enjoy and benefit from the process of learning as they go through the doctoral program.

2. **Don't forget that you are a student in a doctoral program.** While it is important for doctoral students to remember they are students, they should also not forget that they are students in a doctoral program. Doctoral programs are inherently marked with a lack of structure, with students having a high degree of independence. Doctoral students need to motivate themselves, customize their own programs of study, and do much more than simply take a set of courses and meet the formal program requirements. Doctoral students need to learn from faculty and other students as they develop the skills to maneuver through the program. Thus, they should not only remember that they are students, and therefore should focus on learning, but should also remember that they are students in a doctoral program, and therefore chart their own path of learning.
3. **Don't forget the reasons you are a student in a doctoral program.** Most students join a doctoral program due to a passion to create knowledge and a desire to impart knowledge. Unfortunately, pushed by their teachers (such as myself) and reviewers to provide citations for key ideas, doctoral students begin to — at least inadvertently — suppress their creativity. Moreover, perceived research-centered drivers of placement diminish attention to teaching. I would like to remind doctoral students to not forget the reasons due to which they are students in a doctoral program. They should not let go of their passion to create knowledge, as

it will make them better researchers even when following the traditions of basing arguments on logic or theory. They should also not let go of their desire to disseminate knowledge because teaching will continue to be an important source of satisfaction and a key component of workload even post graduation. In pursuing the passion to create knowledge and the desire to disseminate knowledge, students would benefit from recognizing the harmony between these aspects as well as developing a harmony within their portfolio of research projects. Indeed, it may be useful to view the “Ph.D.” program in terms of the three key pillars of Passion, Harmony, and Desire.

4. **Don't forget the reasons you are a student in this particular doctoral program.** Individuals apply to, and join, specific doctoral programs based on information they collect about those programs, and their strengths (and weaknesses) relative to other programs. However, once they join a doctoral program and begin their journey through it, they sometimes tend to forget the inherent strengths of the program and the associated faculty. Focusing on specific courses and research or teaching assignments for each semester, they lose sight of the bigger picture and may not develop connections with faculty who don't teach them doctoral seminars and to whom they are not assigned as assistants. Junior assistant professors are often not involved in teaching doctoral seminars due to their focus on publishing their dissertation papers, but may have valuable insights due to their recent doctoral experiences and exposure to latest research methods and topics. Also, some senior faculty may not teach doctoral seminars due to service or administrative demands, but may have valuable insights into research, teaching, and career issues. Doctoral students not assigned to such faculty may fail to leverage their insights. I therefore encourage doctoral students to remember why they

are students in their specific program, leverage the strengths of their program, learn from the faculty who are associated with the program as well as the faculty who are not teaching in it, and try to use their connections.

5. **Don't forget that you will not always be a doctoral student.** Although the above words of advice have largely focused on remembering the past, doctoral students should also remember what lies ahead. They should not forget that they would not always be doctoral students. While still remembering the reasons they joined the doctoral program — such as a passion to create knowledge and a desire to impart knowledge — doctoral students should therefore develop the skills needed to succeed beyond the doctoral program. They should therefore strive to acquire skills related to both research and teaching, as well as the political skills that are needed in academia. In cultivating these skills, doctoral students should balance between the demands related to research and teaching, while also manage multiple time horizons (such as the short-term horizons related to papers, comprehensive exams, graduation and placement, and the longer term horizons related to third-year review as faculty member and subsequently tenure). Identifying synergies across projects and papers, and between teaching and research, can help students to cultivate these skills while managing the multiple time horizons. However, it all begins with the doctoral students recognizing the likely path after completing the doctoral program.

In conclusion, doctoral students join a particular program based on information they are able to obtain about the program, and arrive into the program with a desire to make a significant difference through their research and teaching. However, as they progress through the program, they learn to some extent how they can pursue their goals, but unfortunately lower their ambitions, start focusing on outcomes rather than

learning, and thereby begin to settle for less. Perhaps, the negativity arising from rejections by journals outnumbering acceptances and the criticism received by reviewers or faculty lead doctoral students to lose some of the passion with which they join doctoral programs. In this article, I have tried to remind doctoral students to remember a few things during their doctoral journey, so that they retain the passion and the desire, get more out of the program, achieve greater success in their subsequent career, and make a difference as they had sought prior to joining the program. ■

From RESEARCH ISSUE, page 11

of highly educated, work-ready engineers and scientists to meet their needs.

By advocating the importance of science and engineering, it can be assured that the TSE-OR-MDS disciplines will be a critical part of the solution to improve lives and face future challenges.

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- [4] National Science Foundation (NSF), www.nsf.gov
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- [6] American Society of Engineering Education (ASEE), www.asee.org ■

From WRAP UP FROM DSI 2015 ANNUAL CONFERENCE, page 4

- Kathleen McFadden (Northern Illinois University), David Dobryzowski (Rutgers) and Mark Vonderembse (University of Toledo)
- Best Student Paper: Yinliang Tan and Janice Carillo (University of Florida)
 - Best Student Paper: Subhajit Chakraborty (Coastal Carolina University) and Halle Kaynak (The University of Texas, Rio Grande Valley)
 - Instructional Innovation Award: Janet L. Hartley (University of Kentucky) and Karen Eboch (Bowling Green State University)
 - Best Teaching Case Studies Award: Din Tai Fung, Xiao Long Bao, H. Brian Hwang (National University of Singapore) and Xuchuan Yuan (Harbin Institute of Technology)
 - Elwood S. Buffa Doctoral Dissertation Award: Clair Senot (Tulane University)

Overall, we received a total of 610 abstracts and 215 paper submissions with 1024 Registrations. We trust that everyone who attended the conference found it to be a value-added experience. Many of you are working hard to continuously improve the annual conference in every way and your efforts are much appreciated. Please consider what part you might play in our upcoming DSI annual meetings. We wish you the very best for 2016 and look forward to seeing you next November in Austin, Texas! ■

From INTERNATIONAL ISSUE, page 12

in infrastructure, roads, airports, and rails.

Current political stability in Oman and its economic culture of entrepreneurship make achieving the goals and objectives of the economic diversification initiatives more promising. Nevertheless, continuing in this positive direction will be contingent upon the leadership and vision of Sultan Qaboo's successor and the determination to actively promote economic diversification program. Moreover, Oman is in close proximity to conflict zones. Security and stability of the area will be crucial to the success of Oman's economic diversification plans.

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PAST DSI PRESIDENTS

2014-2015 - Marc Schniederjans, University of Nebraska-Lincoln
2013-2014 - Maling Ebrahimpour, University of Rhode Island
2012-2013 - E. Powell Robinson, Jr., University of Houston
2011-2012 - Krishna S. Dhir, Berry College
2010-2011 - G. Keong Leong, University of Nevada, Las Vegas
2009-2010 - Ram Narasimhan, Michigan State University
2008-2009 - Norma J. Harrison, Macquarie Graduate School of Management
2007-2008 - Kenneth E. Kendall, Rutgers University
2006-2007 - Mark M. Davis, Bentley University
2005-2006 - Thomas E. Callarman, China Europe International Business School
2004-2005 - Gary L. Ragatz, Michigan State University
2003-2004 - Barbara B. Flynn, Indiana University
2002-2003 - Thomas W. Jones, University of Arkansas-Fayetteville
2001-2002 - F. Robert Jacobs, Indiana University-Bloomington
2000-2001 - Michael J. Showalter, Florida State University
1999-2000 - Lee J. Krajewski, University of Notre Dame
1998-1999 - Terry R. Rakes, Virginia Tech
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1996-1997 - Betty J. Whitten, University of Georgia
1995-1996 - John C. Anderson, University of Minnesota-Twin Cities
1994-1995 - K. Roscoe Davis, University of Georgia
1993-1994 - Larry P. Ritzman, Ohio State University
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1989-1990 - Bernard W. Taylor, III, Virginia Tech
1989-1990 - Bernard W. Taylor, III, Virginia Tech
1988-1989 - William L. Berry, Ohio State University
1987-1988 - James M. Clapper, Aladdin TempRite
1986-1987 - William R. Darden, Deceased
1985-1986 - Harvey J. Brightman, Georgia State University
1984-1985 - Sang M. Lee, University of Nebraska-Lincoln
1983-1984 - Laurence J. Moore, Virginia Tech
1982-1983 - Linda G. Sprague, China Europe International Business School
1981-1982 - Norman L. Chervany, University of Minnesota-Twin Cities
1979-1981 - D. Clay Whybark, University of North Carolina-Chapel Hill
1978-1979 - John Neter, University of Georgia
1977-1978 - Charles P. Bonini, Stanford University
1976-1977 - Lawrence L. Schkade, University of Texas-Arlington
1975-1976 - Kenneth P. Uhl, Deceased
1974-1975 - Albert J. Simone, Rochester Institute of Technology
1973-1974 - Gene K. Groff, Georgia State University
1972-1973 - Rodger D. Collons, Drexel University
1971-1972 - George W. Summers, Deceased
1969-1971 - Dennis E. Grawoig, Deceased

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Beranek, William	Gonzalez, Richard F.	Mabert, Vincent A.	Smunt, Timothy
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Bonini, Charles P.	Green, Paul E.	Malhotra, Naresh K.	Sorensen, James E.
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Ebert, Ronald J.	Khumawala, Basheer M.	Reinmuth, James R.	Winkler, Robert L.
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Evans, James R.	Klein, Gary	Sanders, Nada	* Deceased
Fetter, Robert B.	Koehler, Anne B.	Schkade, Lawrence L.	
Flores, Benito E.	Krajewski, Lee J.	Schniederjans, Marc J.	
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Send nominations to:

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