Decision Analysis Today

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The newsletter of the INFORMS Decision Analysis Society

Inside:

President's Letter

Jeffrey Keisler

As I write my first letter as President of the Decision Analysis Society, I realize I have a lot of thanking to do because our group is nothing without contributions from superb people.

It has been really great working with Jim Smith the last few years – he is full of good judgment and good humor. Now that he has wrapped up his service as Past-President of the DAS, he has had a whole month of freedom before signing on as the DA Department Editor for Management Science (again). Thanks, Jim, for all of your past and future service.

It is a pleasure to continue working with (now) Past-President Vicki Bier. Her warmth and wisdom benefit the society, and we continue to benefit from her insight and energy as I get going as the new President. Thanks for everything you do, Vicki.

Thank you and welcome to our new Vice-President/President Elect, Eric Bickel, who has been in more or less continual service to the DAS since he first came on the scene many years ago. Eric is tackling this job with his usual can-do attitude.

Yael Grushka-Cockayne, after stepping in as interim Secretary/Treasurer, has now been elected to a two-year term in this position. She has quickly mastered the role, and her organization and immense efforts make us all look good. Many thanks, Yael (and thanks again to former longtime Secretary/Treasurer, John Butler, who helped Yael hit the ground running).

Jay Simon is our Social Media Officer, and as of this fall has also taken over the responsibilities of Webmaster. Jay is bringing his vision to building our LinkedIn, Twitter and Facebook presence (don't ask me, I'm too old to understand it), with hundreds of members in each network. There are more changes coming; we are keeping Jay busy.

Jason Merrick, after many years, has stepped down as Webmaster, but has still been working with Jay on an ongoing basis as they make the transition. This was just one of many contributions Jason has made to DAS, and certainly not the last (just look down a few lines).

Casey Lichtendahl and Patrick Noonan have finished their terms on the DAS council. I would like to thank them both for their service and commitment over the last three years – and for already engaging in additional service.

Continuing on the council for one more year are Seth Guikema and Canan Ulu, who are doing all sorts of things for DAS. Gilberto Montibeller and Larry Neal are also continuing in their 2nd year on the council, and have been actively building bridges from DAS to the rest of the world. Newly elected to the council are Victor Jose and Phil Beccue, both of whom bring charm and a bias for action to DAS. Thanks to the council for your ongoing contributions. I can't wait to see what this group can accomplish.

The DAS cluster at the October INFORMS meeting in Phoenix was a big success, with so many high-quality sessions that we were triple booked much of the time. In addition to the traditional sessions, we had a half day of joint sessions with our friends in the Society for Medical Decision Making. Thanks to Canan – who has co-chaired the cluster for the last two years, as well as to Jagpreet Chhatwaland Alec Morton, who co-chaired last year and will be co-chairing again for the DAS cluster at INFORMS in Minneapolis next October. Victor Jose will be joining them as a third co-chair.

We have some other conference activity coming up: The INFORMS Analytics Conference in San Antonio this coming April (Jack Kloeber, Dave Leonardi, Drew Pulvermacher will be organizing the DA sessions) and in an exciting development, this will be immediately followed by the SDP/DAAG conference in Austin, Texas, April 10-12 being organized by Eric Bickel, Jim Felli and Ellen Coopersmith, where we also hope to have a DAS presence – more on this soon. In addition, the EURO XXV Conference will be held in Rome next July, and will have a DAS presence within a stream on Decision Processes that Ahti Salo, Alec Morton and I are co-chairing.

Also making DAS happen are our award committees. The awards are our highest honors and one of our main faces to the world. Our esteemed committee members put in many hours to reach their decisions. I would like to thank all our chairs, starting with Detlof von Winterfeldt, who is stepping down after chairing the Ramsey Medal committee for several years; next year's chair remains to be determined. Greg Parnell chaired the Practice Award last year, and Frank Koch has graciously agreed to chair it next year. Jason Merrick chaired the publication award, and Robin Dillon-Merrill has stepped up to chair the committee next year. Jason is moving on to chair the committee for a new award associated with articles

in Decision Analysis, our flagship journal (more on this soon). Lea Deleris and Jun Zhuang chaired the student paper award and are going to continue chairing it for another year! Thanks, all.

Thanks also to Ali Abbas who agreed to serve as Membership Committee Chair and will be looking at ways for us to reach more of our potential and retain more of our existing members by better understanding how and why people become and stay members.

On the publications front, Heather Rosoff and Jun Zhuang, with the assistance of Elizabeth Newell, have given us another year of Decision Analysis Today. Thanks to all three of them for the wonderful job they do in making our newsletter something people look forward to and talk about, as well as a good recruiting tool for the Society. Robin Keller is stepping down after six years as Editor of Decision Analysis. As has been discussed elsewhere, under her leadership, the journal has flourished, and has achieved its first Impact Factor of 2.143, which is amazing. Beyond citation-based measures, Robin's impact has been immeasurable. She literally mentored a generation of editors, reviewers and authors, and all of DAS is thankful for her generous efforts. We are fortunate to have another masterful editor taking over from Robin. Rakesh Sarin comes to the position of Editor of Decision Analysis directly from his position as Department Editor at Management Science. It was apparent at the INFORMS conference that he not only has many ideas for the journal, but is also open to the many ideas that DAS members have. In other journal news, Kevin McArdle is the new DA Area Editor for Operations Research, succeeding Gordon Hazen's many productive years in this role.

This group does so much that I am already exhausted just by summarizing these efforts. Of course, many other DAS members are contributing in valuable ways every day, and it is all greatly appreciated. I want to discuss a little more DAS business before signing off for now. At the INFORMS meeting, we held a strategy session. Even though it started at 7:30AM on the third day of the conference, about thirty-five people (including quite a few student members!) came and participated vigorously for two hours. We brainstormed about a number of topics including:

- our conference activity, both at the INFORMS meeting and possibly outside of the annual meeting
- promoting the field and the Society;
- supporting and leveraging our publications;
- increasing our value to student members and better integrating them into our activities;
- building our web and social-media effectiveness;
- improving decision education; and
- relationships with other societies;

The interest in working on these topics was impressive and encouraging, and this seems like an opportunity to "build the house we want to live in." Following the meeting, we collated a rich set of notes and to-do's that should keep us as busy as we want to be. Yael and I surveyed the participants from the strategy meeting to gauge interest in follow-up activities. At press time, we are starting to contact those who expressed interest to form working groups on a few of these topics. Jason Merrick is taking the lead on investigating the possibility of a research conference, and you should contact him if you want to be involved in that conversation; if you are interested in getting involved in other areas, please get in touch with me! I will be communicating to DAS through the DA listserv and in later issues of the newsletter when there is more to report.

Happy New Year to you and your loved ones!
- JK

Letter from the Editors

Heather Rosoff, Jun Zhuang, and Elizabeth Newell

Hello Fellow Decision Analysts,

We hope everyone had a great holiday season and enjoyed some time with family and friends! As for our DA family, we would like to say good-bye to Vicki as President and thank her for her contributions and support to the DAS and to the newsletter. We would like to welcome Jeff into the role as current President and wish him all the best in his new position. We also want to add how nice it was to meet and see so many of you at the DAS events during this year's INFORMS meeting (a brief summary of the meeting has been included later in the newsletter).

We are keeping our letter short this time around, as the DA community has a lot to share this quarter! This newsletter opens with a full listing of upcoming conference opportunities, including the DAAG Conference in Austin, Texas on April 11, 2013-April 12, 2013 (for more information, visit: http://www.daag.net/). Robin Keller and Kelly Kophazi have provided us with a summary of the December issue of *Decision Analysis* – Robin's last issue as Editor-in-Chief. Thank you Robin for your many years of service and hard work! In DA Around the World, Kuno Huisman shares with us all we need to know and more about the European Decisions Professional Network. In DA Practice, Bill Klimack presents varied responses to the question "how do people explain the value of DA." In Research, Professors David Rios Insua, David Banks, and Jesus Rios provide a very comprehensive overview about what is adversarial risk analysis (ARA) and opportunities for future research. Finally, for Ask DAS, our columnists John and Florian have asked researchers to tackle the question of the difference between Decision Analysis and Judgment & Decision Making.

We hope you have as much fun reading this newsletter edition as we had putting it together. We wish you all the best in the coming year and appreciate your ongoing support and feedback on the newsletter throughout the year.

Sincerely,

Heather, Jun, and Elizabeth

Upcoming Conferences

February 6, 2013-February 9, 2013
Operations Research for Surgical Services
Hampton Inn
Iowa City, IA
http://www.franklindexter.net/PDF%20Files/SurgicalServicesCourse.pdf

February 7, 2013- February 10, 2013
INFORMS Organization Science Winter Conference
Sheraton Steamboat Resort
Steamboat Springs, CO
http://www.informs.org/Pubs/OrgSci/News/Organization-Science-Winter-Conference

April 11, 2013-April 12, 2013
DAAG 2013 Conference
Doubletree Guest Suites
Austin, TX
http://www.daag.net/

April 7, 2013-April 9,2013

INFORMS Conference on Business Analytics and Operations Research
Grand Hyatt San Antonio
San Antonio, TX
http://meetings.informs.org/analytics2013/

June 6, 2013- June 7, 2013
INFORMS Revenue Management and Pricing Conference
Georgia Institute of Technology
Atlanta, GA
http://www.informs.org/Community/revenue-mgt

June 16, 2013-June 19, 2013
INFORMS Transportation Science and Logistics Society Annual Workshop
Asilomar Conference Grounds
California
www.informs.org/Community/TSL/TSL-Workshop

June 23, 2013- June 26, 2013
INFORMS HEALTHCARE 2013
Chicago, IL
http://meetings.informs.org/healthcare2013/
July1, 2013-July 4, 2013
EURO – INFORMS Joint International Conference
Rome, Italy
http://euro2013.org/

October 6, 2013-October 9, 2013
INFORMS Annual Meeting 2013 Minneapolis
Minneapolis Convention Center and Hilton Minneapolis
Minneapolis, MN

INFORMS Summary: Phoenix 2012

***Decision Analysis* Editorial Board Meeting**

Row 1 - Robert Clemen, Don Kleinmuntz, Robin Keller (EIC, 2007-2012), Rakesh Sarin (incoming EIC, 2013-), and Jun Zhuang; Row 2 - Craig Kirkwood, Jason Merrick (AE), Jay Simon (AE), Vicki Bier (AE), Karen Jenni, Matthias Seifert, Greg Parnell, David Budescu (AE), Jeff Keisler, Jeff Stonebraker, and Alec Morton; Row 3 - Jim Smith, Erin Baker, Ahti Salo, David Rios Insua, Ali Abbas (AE), Manel Baucells, Dharma Kwon, Victor Richmond Jose, Casey Lichtendahl (AE), Eric Bickel (AE), and Canan Ulu; Row 4 - Ralph Keeney, Jack Soll, Gilberto Montibeller, Bill Klimack, Eric Bickel, John Butler (AE), and Warren Joe Hahn

INFORMS Fellow: **Rakesh Kumar Sarin**, University of California, Los Angeles

George E. Kimball Medal: Don N. Kleinmuntz, Strata Decision Technology, LLC (middle in the picture below)

Seth Bonder Scholarship for Applied Operations Research in Military Applications: Mehmet Ertem, University of Wisconsin-Madison (middle in the picture below)

The DAS Student Paper Winner: Mehmet Ayvaci (middle in the picture below) was this year's recipient for his paper "The Effect of Budgetary Restrictions on Breast Cancer Diagnostic Decisions," which also won a finalist for Doing Good with Good OR. Student Award Committee Co-Chairs: Jun Zhuang (left in the picture below) and Léa Deleris (right in the picture below)

The DAS Practice Award Competition: Catalyze Inc. (Chair, Greg Parnell; Presenter, Frank Koch)

The DAS Publication Award: Samuel D. Bond (Georgia Institute of Technology), Kurt A. Carlson (Georgetown University), and Ralph Keeney (Duke University, left in the picture below) for their paper "Improving the Generation of Decision Objectives". Chair: Jason Merrick (right in the picture below)

The DAS Ramsey Medal Award: Bob Clemen (right in the picture below); chair: Detlof von Winterfeldt (left in the picture below)

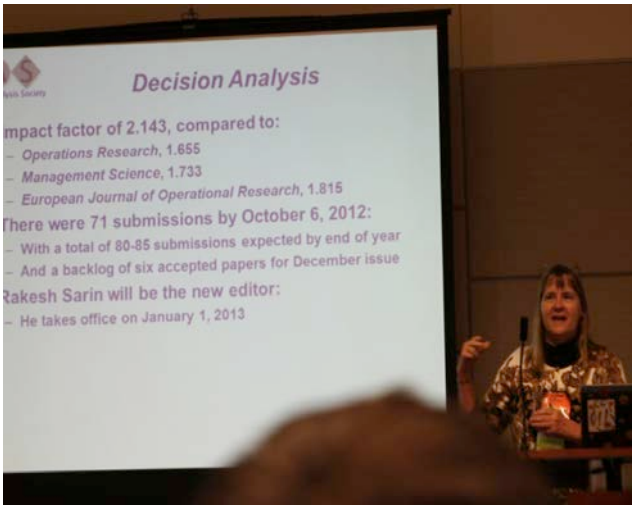
We congratulate all award recipients for their outstanding achievements!

Other Pictures from the 2012 DAS Meeting:

Jay Simon (left) and Jason Merrick (right) were presenting DAS website and social media issues

Frank Koch and Carl Spetzler were introducing Society of Decision Professionals.

Kevin McCardle was reporting the issue related to *Operations Research*, department of Decision Analysis



Robin Keller reporting the status of *Decision Analysis*

The DAS new president Jeffrey Keisler presents an award plaque to the past president Vicki Bier

Professional Postings

Visit http://jps.informs.org/ for the INFORMS Job Placement Service (JPS). For many years INFORMS (and its founding societies) has offered a Job Placement Service to connect employers searching for O.R. professionals and qualified O.R. professionals looking for employment.

The Job Placement Service database offers:

- Online access to job listings and applicant files
- Expanded information about jobs and applicants
- Updates of the database
- Improved database search capabilities
- Online data entry for applicants and employers
- Extended availability of the database

Award Winners

2012 Exeter Prize

We are happy to announce the winner of the 2012 Exeter Prize for the best paper published in the previous calendar year in a peer-reviewed journal in the fields of Experimental Economics, Behavioural Economics and Decision Theory.

The winner is *Transitivity of Preferences* by Michel Regenwetter, Jason Dana and Clintin P. Davis-Stober, published in Psychological Review.This paper addresses a deep conceptual problem (the issue of transitivity of preferences) in a very clear and precise way and should have a significant impact in mathematical psychology and the crossover group of empirical decision theorists in economics. See http://business-school.exeter.ac.uk/research/areas/topics/economics/exeterprize/ for a longer description of the winning research.The winning paper was selected from five finalists by the panel of Glenn Harrison (Georgia State University), Uzi Segal (Boston College) and Shmuel Zamir (Hebrew University).

The four other finalists were:

- *Performance Pay and Multidimensional Sorting: Productivity, Preferences and Gender* by Thomas Dohmen and Armin Falk published in American Economic Review.

- *Is Tiger Woods Loss Averse? Persistent Bias in the Face of Experience, Competition, and High Stakes* by Devin Pope and Maurice Schweitzer published in the American Economic Review.

- *Judicial In-Group Bias in the Shadow of Terrorism* by Moses Shayo and Asaf Zussman published in the Quarterly Journal of Economics.

- *Axiomatic Foundations of Multiplier Preferences* by Tomasz Strzalecki published in Econometrica.

The winners receive 3000 pounds. In addition, a representative of them will be visiting the University of Exeter in October to receive the award and give a lecture.

Looking forward to receiving your nominations for next year.

Miguel Fonseca
Todd Kaplan

Call for Papers

YoungOR 18 - Call for Papers

"Are you interested in presenting at the Young OR 18 conference or do you know someone who is?"
9-11 April 2013, The Peter Chalk Centre, Exeter University

OVERVIEW

Young OR is a highly popular conference for academics and practitioners within the first ten years of their careers in O.R. It provides an excellent opportunity to learn about how O.R. and analytics are used in a wide range of applications. The conference programme will include plenaries, keynotes, workshops and parallel stream, as well as a full social programme, where participants will have the opportunity to meet and network with fellow academics and practitioners working in different sectors and areas of O.R.. One key feature that makes the Young OR conference unique is that it provides participants a friendly and supportive environment to present to peers, hence facilitating the sharing of best practice.

CALL FOR PAPERS AND IMPORTANT DATES

The submission system is now open and presenters are invited to submit their title and abstract using the following link: http://www.theorsociety.com/Pages/Conferences/YOR18/YOR18Abstract.aspx .

A number of streams have been already set up as detailed in the list below. For an up-to-date list of streams and their descriptions please refer to: http://www.theorsociety.com/Pages/Conferences/YOR18/YOR18Streams.aspx

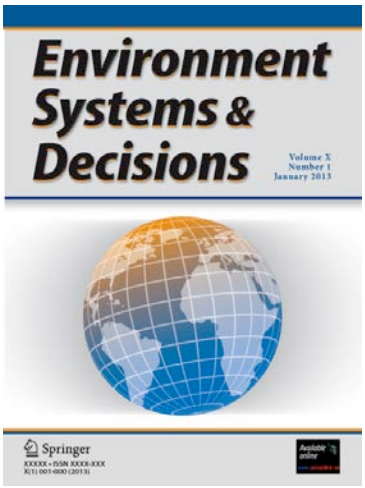
We are **open to submissions** until the **28th February 2013**. Please submit a **title** and a brief **abstract** not exceeding 300 words. If your talk does not fall into one of the streams listed, please leave your abstract unallocated. You can also contact the Conference Chair (Antuela Tako), or the Programme Scheduler (Tom Odell) Stream Coordinators (Miles Weaver and Vicky Forman) or the Conference Manager (Hilary Wilkes) at the email addresses detailed below.

STREAM LEADERS

Analytics: Sayara Beg, Datanut Ltd, sayara@datanut.co.uk
Consulting: Faridah Iskandar, Capgemini, faridah.iskandar@capgemini.com
Data Envelopment Analysis: Bing Xu, Aberdeen Business School - b.xu@rgu.ac.uk
Defence & Security: Alexander Sheen, Dstl, asheen@mail.dstl.gov.uk
Energy: Laura Harrison, Sellafield, laura.harrison@nnl.co.uk
Health: Praveen Thokala, University of Sheffield, p.thokala@sheffield.ac.uk
Infrastructure: Fuzhan Nasiri, University College London, f.nasiri@ucl.ac.uk
Manufacturing: Fereshteh Mafakheri, University of Greenwich, f.mafakheri@greenwich.ac.uk
MCDA: Brian Reddy, University of Sheffiled, b.reddy@sheffield.ac.uk
Optimisation: Pablo González-Brevis, University of Edinburgh P.Gonzalez-Brevis@sms.ed.ac.uk and Kimon Fountoulakis, University of Edinburgh K.Fountoulakis@sms.ed.ac.uk
Revenue Management: Rupal Rana, Loughborough University, R.Rana@lboro.ac.uk
Simulation: Hara Papachristou, Lanner, HPapachristou@lanner.com
Soft Methods: Juan Felipe Henao Piza, Universidad Icesi, jfhenao@icesi.edu.co
Supply Chain Management: Abhijeet Ghadge, Edinburgh University, A.Ghadge@hw.ac.uk
System Dynamics: Armin Leopold, Universität der Bundeswehr Munich, armin.leopold@unibw.de

CONFERENCE CONTACTS
Conference Chair: Antuela Tako, Loughborough University, a.takou@lboro.ac.uk
Joint Stream Co-ordinators: Miles Weaver, Edinburgh Napier University, M.Weaver@napier.ac.uk & Vicky Forman, Marks and Spencer, vickykforman@gmail.com
Programme Scheduler: Tom Odell, Dstl, TEODELL@mail.dstl.gov.uk
Conference Manager: Hilary Wilkes, OR Society, hilary.wilkes@theorsociety.com

Call for Papers
Value of Information: Theory and Application



The Editorial Board of the journal **Environment, Systems, and Decisions**, (formerly titled The Environmentalist), published by Springer, announces a special Call for Papers addressing the theoretical underpinnings and methodological applications of Value of Information (VoI) analysis.

Prospectus
Decisions made under conditions of uncertainty and/or low quality data are frequently made in a wide range of disciplines, from environmental management to business strategy to military operations. VoI is a tool that informs how decisions may change in light of additional information. In practice, VoI can be used to inform additional research or data gathering efforts, and its use has been increasing over recent years.

This special issue of **Environment, Systems, and Decisions** will explore the theory, methods, and applications of Value of Information analysis with linkages to other subject areas such as risk management and strategic decision making. Papers are encouraged in, *but not limited to*, the following areas:

- Novel theoretical advancements made in the field of VoI
- Cross-cutting research regarding both perfect information and sample information
- VoI applied to risk reduction decisions
- Linkages between VoI with other analytic methods
- Benefits, challenges, and the future of VoI applied in practice

Contact Details & Schedule
Inquiries regarding this Call for Papers should be directed to the Guest Editors:
Jeffrey M. Keisler, University of Massachusetts Boston, jeff.keisler@umb.edu
Roger M. Cooke, Resources for the Future, Cooke@rff.org

General inquiries can be directed to the Editors-in-Chief:
Igor Linkov, US Army Engineer Research & Development Center, Igor.Linkov@usace.army.mil
James H. Lambert, University of Virginia, lambert@virginia.edu

We welcome the submission of your abstracts anytime, with your papers by **1 March 2013 leading to publication of a special issue of Environment, Systems and Decisions in Spring 2014.**

Call for Papers - "Cybersecurity: Risk and Decisions"

The Editorial Board of the new journal *Environment, Systems, and Decisions*, (formerly titled The Environmentalist), published by Springer, announces a special Call for Papers addressing the decision making aspects of Cybersecurity. http://www.springer.com/environment/journal/10669

PROSPECTUS

As society relies more upon information technology systems, the importance of the security and resilience of these systems increases. As new safeguards are developed and implemented, adversaries continue to develop novel ways to breach information technology systems, steal sensitive data, and disrupt critical infrastructure. While significant advances in the field of Cybersecurity have been achieved, solutions tend to focus on the technical issues such as threat detection, encryption, and other mitigation procedures and technologies and not on how to manage and make decisions about Cybersecurity risks.

This special issue of Environment, Systems, and Decisions will explore the theory, methods, and applications of Cybersecurity (from both a software and hardware perspective) with linkages with other subject areas such as risk management and strategic decision making. Papers are encouraged in, but not limited to, the following areas:

* Identification and prioritization of threats and countermeasures
* Hardware security and counterfeiting
* Protection of information assurance assets
* Computer network security and defense
* Critical infrastructure protection
* Development and analysis of Cybersecurity policy
* Application of decision analytic, game theoretic, and other analytic approaches

CONTACT DETAILS AND SCHEDULE

Inquiries regarding this Call for Papers should be directed to the Guest Editors:
Irving Lachow, MITRE Corporation, ilachow at mitre.org
Benoit Morel, Carnegie Mellon University, bm1v at andrew.cmu.edu
Igor Linkov, US Army Engineer Research and Development Center Igor.Linkov at usace.army.mil

We welcome the submission of your abstracts anytime, with your papers by **30 January 2013 leading to publication of a special issue of Environment, Systems and Decisions in 2014**.

http://el.erdc.usace.army.mil/riskdecision/index.html

Call for Sessions

XXVI EURO – INFORMS Joint International Conference: " All roads lead to OR" held in Rome on July 1-4, 2013

Following the success of previous EURO Conferences, we announce the XXVI EURO – INFORMS Joint International Conference: "All roads lead to OR" which will be held in Rome on July 1-4, 2013.

The Program Committee chaired by Marc Sevaux (EURO) and David Simchi Levi (INFORMS) and the Organizing Committee chaired by Paolo Dell'Olmo (AIRO), are preparing a high quality scientific program and an exciting social program for the conference. We are confident that the XXVI EURO – INFORMS Joint International Conference will be an extraordinary opportunity for the OR community to get together again in a unique location, and we are looking forward to meeting you in Rome in 2013. Please visit the Conference website (www.euro2013.org) for more information.

IMPORTANT DATES

Submission Deadline: March 1, 2013; Notification of Authors: March 15, 2013

Deadline early registration (and inclusion in the program): April 15, 2013

Registration and Welcome Cocktail: June 30, 2013

Conference date: July 1-4, 2013

CALL FOR PAPER AND SESSIONS

We invite all researchers, academicians, practitioners, as well as students interested in any branch of Operational Research, Mathematical modeling or economic analysis to participate at the conference and to present their research. Invited and contributed papers will be organized in parallel sessions. No participant can present more than one paper at the conference.

- Abstract submission and registration are done online, via the conference web page (www.euro2013.org)
- Abstracts: max. 600 characters; submission deadline: March 1, 2013.
- Researchers who want to organize a stream (a collection of sessions around one topic) or a session or contribute with a paper within an invited session should contact the PC member of the corresponding area.

We invite submissions on - but not limited to - the following areas:
- Artificial Intelligence, Fuzzy systems
- Computing
- Continuous Optimization
- Control Theory & System Dynamics
- Data science, Business analytics, Data mining
- Decision Analysis, Decision Support Systems, DEA and Performance Measurement
- Discrete Optimization, Geometry & Graphs
- Emerging applications of OR

- Energy, Environment and Climate
- Financial Modeling, Risk Management, Managerial Accounting
- Game theory, Mathematical Economics
- Location, Logistics, Transportation
- Metaheuristics
- Multiple Criteria Decision Making and Optimization
- OR Education, History, Ethics
- OR for Developing Countries, Humanitarian applications
- OR in Health & Life Sciences
- OR in industry and software for OR
- OR in Natural Resources
- Production Management & Supply Chain Management
- Revenue Management
- Scheduling, Time Tabling & Project Management
- Service systems
- Simulation, Stochastic Programming and Modeling
- Soft OR and Problem Structuring Methods
- Telecommunication, Networks and Social Networks

PROGRAM COMMITTEE – EURO-INFORMS

- Marc Sevaux, France, (Chair)
- David Simchi-Levi, MIT (Chair)
- Sally Brailsford, UK (EURO VP1)
- Maria Antónia Carravilla, Portugal
- Marielle Christiansen
- Guillermo Gallego, Columbia University
- Jérémie Gallien, UK, London Business School
- Michel Gendreau, CA, Ecole Polytechnique, Montreal
- Diego Klabjan, Northwestern University
- Ana Meca Martínez, Spain
- Rolf Möhring, Germany
- Mike Pinedo, NYU
- Christian Prins, France
- Abraham, Seidmann, University of Rochester
- Kenneth Sörensen, Belgium
- Ariela Sofer, GMU
- Fabio Tardella, Italy
- Tamas Terlaky, Lehigh University
- Mike Trick, Carnegie Mallon University
- Steef van de Velde, The Netherland
- Christos Vasilakis, UK
- Gerhard Wilhelm Weber, Turkey (EURO-k organizer)

ORGANIZING COMMITTEE

- Paolo Dell'Olmo (Chair), University of Rome
- Renato De Leone, University of Camerino
- Giovanni Felici, Italian National Research Council
- IASI Rome
- Paola Festa, University of Naples
- Stefano Giordani, Tor Vergata - University of Rome II
- Francesca Guerriero, University of Calabria
- Silvano Martello, University of Bologna
- Gaia Nicosia, University of Rome III
- Laura Palagi, Sapienza - University of Rome
- Fabio Schoen, University of Florence
- Anna Sciomachen, University of Genova
- Roberto Tadei, University of Torino
- Walter Ukovich, University of Trieste

Professional News

Management Science Department Editor

For 2013 there will be some changes to the editorial board of the Decision Analysis Department at *Management Science*…

Rakesh Sarin (UCLA) is stepping down as Department Editor as he will become the Editor-in-Chief for *Decision Analysis*. Rakesh has given many, many years of outstanding service to *Management Science* – on behalf of the entire community, I thank him for his tremendous dedication to the journal.

As Rakesh leaves some very big shoes to fill, I could not be more pleased to announce that **Jim Smith** (Duke) has agreed to taken on the role of Department Editor. Jim already has experience as a Department Editor and I thank him for his willingness to assume this leadership role again.

Among our Associate Editors, **Georg Weizsacker** has decided to step down from the board. Thank you to Georg for his several years of valuable service!

Finally, our team of Associate Editors will gain **Casey Lichtendahl** (Virginia) and **Steven Lippman** (UCLA). I very much look forward to working with them (and continuing to work with the remaining Associate Editors)!

Gerard Cachon
Editor, Management Science

Study Shows Training in Decision Making Increased Decision Competence and Academic Performance

A year-long study establishing the benefits of including decision education within a school's US History curriculum has been published in PLOS ONE, an international, peer reviewed journal. The enhanced curriculum, incorporating the Decision Quality framework of the Decision Education Foundation, included both normative and behavioral decision science principles to approach historical scenarios.

Conducted with students at Thurston High School in Springfield, Ore., the randomized study demonstrates how integrating decision skills training into U.S. history instruction can improve both students' academic performance and decision skills. Sophomores in U.S. history courses with the decision skills curriculum scored better on a national assessment of history knowledge (NAEP), in addition to outperforming peers on measures of decision-making competence[1]. The improvement of over five percent on the NAEP is broadly equivalent to improving a student's grade from a B+ to an A.
That students also registered improvement in decision competence shows that decision skills can be learned. Prior research confirms that performing better on the validated measure of decision-making skill

[1] Retired questions from the National Assessment of Educational Progress (NAEP) where used to test student knowledge of US History.

is positively correlated with improved life outcomes[2]. Since both endpoints of the study showed a statistically significant effect, the outcome represents a strong indication of the benefits of incorporating a decision focus in classrooms.

The study's results highlight the benefits for schools adopting the innovative curriculum. "We were convinced of the value of DEF's curriculum before the study," explains Springfield, Schools Superintendent Nancy Golden, "It's exciting to see the benefits demonstrated conclusively, so that other educators and institutions will recognize the importance of teaching decision skills." The article can be viewed at: DEF PLOSONE article. http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0045775

About DEF: Created by a group of leading educators, decision scientists, and business professionals, the Decision Education Foundation is committed to empowering young people with effective decision skills that enhance their prospects for a better life. For more information about DEF, visit http://www.decisoneducation.org.

Jacobson D, Parker A, Spetzler C, Bruine de Bruin W, Hollenbeck K, et al. (2012) Improved Learning in U.S. History and Decision Competence with Decision-Focused Curriculum. PLoS ONE 7(9): e45775. doi:10.1371/journal.pone.0045775

Call for Applications - 2013 EAERE-FEEM-VIU European Summer School in Resource and Environmental Economics, June 30 - July 6, Venice, Italy

EAERE-FEEM-VIU European Summer School in Resource and Environmental Economics
Uncertainty, Innovation and Climate Change

June 30th- July 6th, 2013 - Venice, Italy

www.feem.it/ess/<http://www.feem.it/ess/>

Deadline for applications: February 1st, 2013

The European Association of Environmental and Resource Economists<http://www.eaere.org/> (EAERE), Fondazione Eni Enrico Mattei<http://www.feem.it/getpage.aspx?id=62> (FEEM) and Venice International University<http://www.univiu.org/> (VIU) are pleased to announce their annual European Summer School in Resource and Environmental Economics for postgraduate students. The 2013 Summer School will take place from **June 30th to July 6th**, at the VIU campus on the Island of San Servolo, in Venice, located just in front of St. Mark's Square. The theme of this Summer School is **Uncertainty, Innovation and Climate Change**.

Uncertainty is a key component of climate change policy making. Although the anthropogenic warming of the planet is unquestioned, there still exist large uncertainties affecting several dimensions of the problem. From the severity and rapidity of changes, to effectiveness of innovation, the future is crucially characterised by uncertainty.

[2] Parker A, Fischhoff B (2005) Decision-making competence: An individual-differences approach. Journal of Behavioral Decision Making 18: 1-27.

The Summer School will be of interest for students who have a thorough understanding of climate change economics and would like to contribute with original work focusing on the stochastic dimension of the problem. The lectures will broadly cover:
- modelling tools to deal with uncertainty;
- expert elicitation of uncertain processes (with a specific focus on innovation process);
- risk perception and behavioral responses to risk and uncertainty related to climate change;
- integrated assessment modelling of climate change under uncertainty.

FACULTY and LECTURE TOPICS

- Erin BAKER, Associate Professor, Director, Wind Energy IGERT and University of Massachusetts Amherst (School Coordinator)
  Uncertain innovation and climate change
- Valentina BOSETTI, Fondazione Eni Enrico Mattei - FEEM (School Coordinator)
  Modelling uncertain technical change
- David V. BUDESCU, Anne Anastasi Professor of Psychometrics and Quantitative Psychology and Fordham University
  Risk perception and behavioural responses to risk and uncertainty
- William NORDHAUS, Sterling Professor of Economics, Yale University
  Uncertainty and climate change
- Thomas F. RUTHERFORD, Professor, Agricultural & Applied Economics, University of Wisconsin Madison
  Modelling uncertainty, an overview

ADMISSION AND SCHOLARSHIPS

The Summer School is targeted to PhD and postgraduate students. Admission is conditional on the presentation of each student's doctoral work; therefore PhD students who want to apply normally need to be advanced in their PhD to have produced at least one substantive chapter, but not to have completely finished their thesis.

Application is restricted to 2013 EAERE members, both European and non-European citizens. Given the highly interactive activities planned at the Summer School, the number of participants is limited to 20.
There is no participation fee. All applicants can apply for a scholarship.
For further information on application and funding please access the Summer School Website at http://www.feem.it/ess/ or contact the Summer School Secretariat Chiara Zanandrea, Fondazione Eni Enrico Mattei at ess@feem.it.

Faculty Position at UCF

The Department of Industrial Engineering and Management Systems (IEMS) of the University of Central Florida (UCF), Orlando, Florida, invites applications for a tenure-track position at the assistant professor level to start in August 2013. Of particular interest are candidates who can demonstrate a strong record of research, teaching and service in industrial engineering with a preference in the area of systems engineering, engineering management or operations research. The successful candidate will also have a strong background in statistics.

The search committee will pay special attention to research background, publications, external funding and other related credentials that will further strengthen the mission of the department. The successful candidate will be expected to teach and advise students at the undergraduate and graduate levels, supervise graduate students' research, and establish a strong externally funded research program.

Located in the Orlando Metropolitan area, the University of Central Florida is the nation's second-largest university with nearly 60,000 students. The IEMS department is home to 15 full-time faculty, 368 undergraduate students and over 250 graduate students. There are opportunities for research and partnerships with local high-tech industries and with governmental agencies, and the military.

The department seeks candidates with innovative and creative ideas and a desire to realize revolutionary gains in research and education.

All applicants for this position are required to complete the application on the UCF web site: http://www.jobswithucf.com/postings/34053 The application should include a cover letter; current CV, a one-page statement of teaching philosophy, a one-page statement of research interests and a list of three references, with addresses, phone numbers, and email addresses. For further information, please contact:

Dr. Ahmad Elshennawy
Search Committee Chair
Department of Industrial Engineering and Management Systems
University of Central Florida
P.O Box 162993
Orlando, Florida 32816-2993
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The University of Central Florida is an Equal Opportunity/Affirmative Action employer. As an agency of the State of Florida, all application materials (including transcripts) and selection procedures are available for public review. Women and minorities are strongly encouraged to apply.

Decision Analysis Journal

The *Decision Analysis* December 2012 issue...

(available in Articles in Advance)

For more information about Articles in Advance: http://da.journal.informs.org/content/early/recent

Brainstorming, Multiplicative Utilities, Partial Information on Probabilities or Outcomes, and Regulatory Focus–From the Editors

L. Robin Keller, Ali E. Abbas, J. Eric Bickel, Vicki M. Bier, David V. Budescu, John C. Butler, Enrico Diecidue, Robin L. Dillon-Merrill, Raimo P. Hämäläinen, Kenneth C. Lichtendahl, Jr., Jason R. W. Merrick, Jay R. Simon, and George Wu

http://da.journal.informs.org/cgi/content/abstract/9/4/297 (link will activate upon printing)

This is the final issue under this Editor-in-Chief, so this column is fittingly co-authored with the associate editors whose terms also end with this issue, to emphasize their major role in the leadership of the journal.

Value-Focused Brainstorming

Ralph L. Keeney

http://dx.doi.org/10.1287/deca.1120.0251

Keeney presents a way to get a lot of good ideas via "Value-Focused Brainstorming." Keeney (2012) applies a key idea from his book on Value-Focused Thinking (Keeney, 1992) to improve brainstorming. He provides guidance to brainstormers by having the objectives (which can be used to determine the overall value of the alternatives) specified before alternatives are generated. He also has individuals generate alternatives alone before meeting for group brainstorming. Following a recommendation of an investigation of the 2001 World Trade Center disaster in New York, this new value-focused brainstorming approach was applied in a public policy workshop to create ideas for improving emergency evacuation from large buildings.

Multiplicative Utilities for Health and Consumption

Kenneth C. Lichtendahl Jr. and Samuel E. Bodily

http://dx.doi.org/10.1287/deca.1120.0248

Lichtendahl and Bodily (2012) present two multiplicative utility forms, one of which incorporates the possibility of a person being correlation averse in consumption streams, which cannot be modeled with an additive form. Consider the context of choosing a lottery with two possible states leading to different streams of financial consumption and health over time. A person exhibiting correlation aversion for financial consumption would prefer a lottery with states having a varying sequence of financial outcomes over time (exhibiting low correlation over time) over a lottery with states having corresponding constant sequences of financial outcomes over time (exhibiting high correlation), assuming health is held constant. When the person has constant health and consumption streams over a lifetime, their model forms reduce to a double exponential utility in life duration.

A Simulation-Based Approach to Decision Making with Partial Information

Luis V. Montiel and J. Eric Bickel

http://dx.doi.org/10.1287/deca.1120.0252

The Eagle Airlines example (from Clemen, 1996, and Clemen and Reilly, 1999) is used by Montiel and Bickel (2012) to illustrate a simulation procedure that can create a collection of possible joint probability distributions to match known probabilistic information. Then, as a new kind of sensitivity analysis, the decision problem is analyzed with the set of possible distributions.

Decision Trees with Single and Multiple Interval-Valued Objectives

Kash Barker and Kaycee J. Wilson

http://dx.doi.org/10.1287/deca.1120.0253

Barker and Wilson (2012) look at decisions with single or multiple objectives, where the resulting performance on an objective might only be known to be within an upper and lower bound. For example, a company might know that the return on an investment (ROI) at the end of a decision tree branch, following a specific path with a chosen alternative and a state of nature, will range between 4% and 10%, but the company might not be able to provide a probability distribution over those ROI levels. To preserve the information on ranges of final outcomes when rolling back the tree, interval arithmetic is used. The process is illustrated on a maintenance, repair, and overhaul decision.

Explaining Risk Attitude in Framing Tasks by Regulatory Focus: A Verbal Protocol Analysis and a Simulation Using Fuzzy Logic

Anton Kühberger and Christian Wiener

http://dx.doi.org/10.1287/deca.1120.0254

Kühberger and Wiener (2012) build upon the idea from regulatory focus theory (Higgins, 1997, 1998) that a person can have a promotion focus or a prevention focus when making decisions, and that can lead to different choices. They measured regulatory focus by coding verbal statements by participants (or by measuring it with a questionnaire) and found people avoided risk under a prevention focus, and preferred risk under a promotion focus for a monetary stock investment scenario similar to the classic Asian disease decision problem of Tversky and Kahneman (1981), which is framed as leading to either lives saved or loss lives lost. Then, the data from the questionnaire were input into a simulation of the participants' choices using a fuzzy-logic decision generator (Reyna and Brainerd (1991, 2011); Reyna et al. (2003, 2011)). They found that risk attitude in framing tasks can be modeled as a form of fuzzy processing.

For information on DAS: http://decision-analysis.society.informs.org/.

Decision Analysis is a quarterly journal dedicated to advancing the theory, application, and teaching of all aspects of decision analysis. The primary focus of the journal is to develop and study operational decision-making methods, drawing on all aspects of decision theory and decision analysis, with the ultimate objective of providing practical guidance for decision makers. As such, the journal aims to bridge the theory and practice of decision analysis, facilitating communication and the exchange of knowledge among decision analysts in academia, business, industry, and government. *Decision Analysis* is published in March, June, September, and December by the Institute for Operations Research and the Management Sciences (INFORMS) at 7240 Parkway Drive, Suite 300, Hanover, Maryland 21076. Please visit our website at http://www.informs.org/Pubs/DA.

DA Around the World

DA around the world

Alec Morton and Matthias Seifert, Column Editors

The aim of this column is to present a view of what is going on in the Decision Analysis community and its various sister communities, broadly conceived, beyond the confines of DAS and INFORMS. This issue, **Kuno Huisman** (Department of Econometrics and Operations Research, Tilburg University) describes the goals and activities of the **European Decisions Professional Network.**

Introduction

In 2010 the European Decisions Professional Network (EDPN) was started from within ASML[3] in the Netherlands. The main reason to start the network was to create a peer-to-peer network across multiple industries and domains for decision professionals. The aim was and still is to promote high quality decision making. Below more of EDPN is explained by describing the events it has organized, its vision, its mission, and its objectives.

EDPN Events

[3] ASML is one of the world's leading providers of lithography systems for the semiconductor industry, manufacturing complex machines that are critical to the production of integrated circuits or microchips. Headquartered in Veldhoven, the Netherlands, ASML designs, develops, integrates, markets and services these advanced systems, which continue to help our customers - the major chipmakers - reduce the size and increase the functionality of microchips, and consumer electronic equipment.

EDPN organized its first round table discussion on applying Real Options Analysis in September 2010. In May 2011 EDPN organized its second round table discussion on world class decision making. This year EDPN successfully organized its first conference titled: Competing through quality of strategic decisions - enhancing competitiveness by adopting structured decision analysis practices. Most of the presentations can be found on the EDPN website. At the moment EDPN is preparing its second conference that will be organized in the fall of 2013. Any suggestions and ideas are welcome!

EDPN Vision

The success of an organization is driven by the quality of the decisions it makes. Making high-quality decisions is both a science and an art. It requires the effective blending of analytical capabilities and tools, organizational structures, efficient processes, and a supportive culture. Decision professionals play a key role in all these areas. Decision professionals should be the trusted advisors of choice for decision makers facing uncertain and complex strategic decisions. It is the decision professional's role to guide and support decision makers in making high-quality decisions.

EDPN Mission

To engage European decision professionals in promoting high-quality decision making within their organizations or for their clients, enabling them to become trusted advisors of choice for decision makers by adopting and improving decision analysis and decision quality methodologies.

EDPN Objectives

The European Decision Professionals Network is a network organization created by and for decision professionals in Europe. It aims to improve strategic decision-making quality in the organizations the EDPN members serve. Its unique position is the focus on holistic organizational decision making covering the full range of disciplines, including operations research, business intelligence, strategy consulting, organizational change management, and cognitive science. The main domains are high tech, oil & gas, and life sciences.

The goal is to provide a platform for decision professionals and their organizations to exchange practical experiences, knowledge and latest insights in the area of decision analysis, with a view to improving the effectiveness and efficiency of decision-making processes within these organizations, with the potential benefit of the emergence of new and innovative decision analysis methodologies and practices.

EDPN aims to explore these fields, enabling its participants to advance their capabilities by learning from others. It will do this by recognizing and referring to the existing literature and forums, facilitating the exchange of practices and methodologies, and stimulating discussions, where relevant, as well as possibly venturing into new territory.

More information

More information can be found on the EDPN website (http://www.edpn.org) and the EDPN LinkedIn group (http://www.linkedin.com/groups?gid=2880104).

DA Practice

Column Editor: Bill Klimack

It was great to see everyone at the INFORMS annual meeting in Phoenix. Our journal *Decision Analysis* is doing well. The Society of Decision Professionals is active. It is rewarding to be part of such a vibrant community that works on such important issues.

Looking ahead the spring Analytics Conference will be in San Antonio. The DAAG meeting has been scheduled for later in the week in Austin. I understand there are plans to arrange for a bus to transport members of the DA community who will be attending both conferences (cue the Willie Nelson music …). The INFORMS topical conference in 2013 will be on healthcare and held in Chicago. The INFORMS international conference is a joint effort with EURO in Rome. Both of these will strong DA components. In 2014 the topical conference will be on Big Data and held in Silicon Valley. It will be interesting to see what DA talks will be given there.

Thanks to Jeff Keisler for a great column idea. He suggested getting a number of opinions as to how people explain the value of DA. (Of course I immediately asked him to contribute – proof for the axiom that no good idea goes unpunished.) Many of us have wrestled with this. When a DA engagement goes well, the path forward is compelling and the earlier confusion forgotten. We usually deal with non-repeatable decisions so how the momentum path would have unfolded is difficult to measure. Most clients are good decision makers – that's how they got to positions of responsibility – so they may feel they need no help in decision making.

Please send your comments, suggestions, and, especially, offers to be a guest columnist to me at billklimack@chevron.com. You can help improve the practice of decision analysis!

"How do you explain the value added by DA?"
So let's turn to how a number of experienced DA professionals explain the value of our field. They have a wide variety of experience and this is reflected both in their recommendations as well as their target audience. It's rare we get to hear so many opinions in one place. Thanks to each for sharing their thoughts and their valuable time.

"How have we explained the Value of Decision Analysis?"
Jack Kloeber, Kromite LLC

I have wrestled with this problem for years, as, I believe, most internal and external decision professionals have. Sometimes I use figures from past reports such as those referenced by Michael Menke during his 2011 SDP webinar about Decision Quality ROI. But most often, when I listen closely to the heads of R&D, VPs of Strategy and Portfolio Management, or heads of Global Strategic Marketing, they want to know they have either recommended the best alternative or made the right decision for the company. They want *Peace of Mind*.

So I ask them why they do not have this *ataraxis*, this Peace of Mind, and they mention typical frustrations of Decision Makers. While each company is different - we work mainly with pharmaceutical

companies and large agricultural companies - we find we can help them achieve Peace of Mind, by contributing in three key areas: **Creativity, Logic, and Transparency.**

The **creativity** we add is in two areas - *framing* the original decision and then helping the teams develop *creative alternatives*. Value-Focused Thinking techniques help us use the objectives of the company to casting a wide net in search of good and differentiated alternatives rather than rolling up our sleeves to work on the momentum strategy. These decision makers are worried that value is being left on the table; better alternatives are not being discussed or offered. A very simple example was a large partnering opportunity. The experimental drug's program had much larger than normal commercial opportunity but the risk was huge - over $400 M (after the initial deal price!) of development costs and only 35% chance of reaching the market. The creative part was simply to draw the risk profile - Total Probability of Success vs. Cumulative Cost for each phase - and discuss with the Business Development team the company's desire to mitigate risk. We pushed them to come up with an alternative development plan which would reduce some of the upfront risk, and change the shape of the risk profile. Within a day, a plan was developed which involved resolving about 1/3 of the risk with 1/10th of the money by running an additional trial. The drawback was that it would slow the project down, but the DM now had at least 2 good alternative strategies and the risk did not look as ominous as it had. The company made the deal and the drug is now on the market - and appears to be meeting expectations. While there was still tremendous risk involved, the Decision Maker felt he had made the right decision - and had *Peace of Mind* - on that issue.

Logic is extremely valuable simply because so many issues facing Decision Makers are quite complex. They just do not feel at ease with their cross functional team's ability to handle the complexities correctly. The logic we bring may be as simple as using influence diagrams to reduce the clutter of working with huge decision trees. Or the problem may require a sophisticated model of the system. For more than one company, the decisions they were facing were of internal structure, resource allocation, and level of effort. We built a discrete event simulation model for them which, once validated, became the platform which provides the manager and decision analysts with the ability to test different alternatives and obtain distributions and expected NPVs or expected costs or expected successful launches. The head of Commercial Strategy and Portfolio Management now has more *Peace of Mind*, knowing that his recommendations are for a very complex system, but logically backed by a consistent and validated platform.

Transparency has been an important element in helping Decision Makers in their quest for anxiety relief. We talk about transparency all the time with our clients. One good example is the MultiObjective approach for early development pharmaceutical decision making. After interviewing several of the top leaders of the company, it was clear that none of the functional heads or project leaders really knew how go/ no-go decisions were made on their projects. The result was management feeling that project leaders were only telling half of the story of their project and often were sent back for more information. The project leaders were asked for different information each time, delaying the decision and frustrating the team members. By working with both management and project team members and leaders to develop the MODA model, all major objectives were addressed, good to know information that was not critical to decision making was dropped, graphics of each characteristic, rolled up to major objectives then showed the connection. Project teams now know what is important, decision makers have the information they need to make the decision, and know they can dig into any of the objectives for more detail. The Project Leaders go into a decision making meeting with less uncertainty and DMs reach consensus more quickly - and achieve *Peace of Mind*.

Peace of Mind is often hard to achieve given the complex and risky business of R&D. But by focusing on creative problem solving and alternative generation, solid, defensible logic for both modeling a system and assessing the risk and value of each alternative, and finally ensuring transparency which builds confidence and credibility, increased Peace of Mind has become one way to explain the value we add.

"How do you explain the value added by DA?"
Jeff Keisler, University of Massachusetts Boston

It is important to understand the value of analysis (VoA) for: planning analyses so that they will be as valuable as possible; explaining the value to sponsors and champions of analyses; and committing appropriate resources to analyses (not too much, not too little). Two related frames are often used to discuss VoA. One compares the EV of the "momentum" decision that would have been selected without analysis to the EV of the actual decision selected, and the difference is the value added by decision analysis (DA). We have to be careful in using this frame– if DA happens to be biased in favor of one alternative, using DA value to justify the choice is circular reasoning and tends to overstate the actual benefit (Smith & Winkler, 2006). What this measures, anyway, is the ex-post value of analysis – it might be useful for demonstrating value but not so much for planning. In contrast, ex-ante expected value of analysis is useful for prescriptive purposes. While I believe it is helpful to explain VoA to project sponsors, it seems this should be done with modesty, and in some cases informally so as not to make VoA another set of calculations to be explained and justified.

For prescriptive use, it is useful to characterize VoA as value of information (VoI). This is an idea that arose early in the development of DA practice (Matheson, 1968, Watson & Brown, 1978). Here, prior to the analysis, we treat the possible outcomes of analysis as uncertain – the analysis may change our preferred alternative from the momentum plan to something significantly better (thus linking to the previous frame). The value is thus added if we assume that the decision maker will rationally select this highest value alternative. A theoretical way to think about it is to consider the uncertainty about the DM's estimates on value of the different alternatives and how analysis will affect this (and if we want to be fancy, about how much uncertainty remains afterward). Note, we could use this approach to think about any decision process, not just "decision analysis" (which can vary practice).

I am sympathetic to the view of VoA as VoI. It seems to me that in analyses that have added a lot of value, on reflection, we can trace the source as something that turned up. But it's not always as simple as just listing a range of uncertain values for alternatives and estimating the increase using a small tree. That can perhaps tell us whether analysis is justifiable, but doesn't tell us what kind of analysis. Instead, we can think about the possible ways the analysis may swing the estimated values of the alternatives. There is improved information, improved communication, facilitated negotiation, creation of alternatives, clearer valuation, improved coordination, identification of interactions and so on. While it's not practical to do a full pre-analysis decision analysis on these potential benefits, we can at least use pre-analysis checklists to get a sense of where we expect the value of analysis may reside, and plan out analyses accordingly. Some of my work (e.g., Keisler 1992, Keisler 2004, Keisler 2008) involves working out exact or simulated "value of analysis" for toy decision problems (or real problems, as in Keisler & Brodfuehrer, 2009) to learn how large this value can be and what drives it. In favor of the possibility of such approaches, the

level of model detail and precision necessary to estimate VoA is less than what is necessary to make the ultimate decision.

To communicate the pertinent ideas about value of analysis, we might take a less technical approach with clients. Simplified stories consistent with the thinking of ex-ante VoA models could be prepared to persuade them not just that DA in general is worthwhile (a point well supported by ex-post data), but also that a contemplated effort with a specific focus is appropriate. In addition, our field would benefit from more formal work on VoA. First, a bank of results could promote DA to decision makers at large. Second, a rich enough set of data on VoA, e.g., metadata about what was modeled and about the nature of the results obtained, could be used to improve our theory of the practice of DA. Ideally, at the beginning of a project, analyst and sponsor together would talk about the potential value and its sources. (Some internal efforts along these lines have occurred, but the only publication I am aware of along these lines is Clemen & Kwit, 2001). They would then track the actual results – what did change, how many alternatives generated, how many objectives identified, how much did weights change or expected values from base case (if any) – even if this is just compared to ballpark guesses. From these would be generated ex-post VoA along with an explanation of how that value was created, and thus the basis for going beyond war stories to knowledge.

Clemen, R. T. and R. Kwit. The value of decision analysis at Eastman Kodak Company, 1990-1999. Interfaces 31 (Sept-Oct), 74-92, 2001.
Keisler, J. A Framework for Organizational Decision Analysis. Doctoral Thesis. Harvard University, 1992.
Keisler, J. Value of information in portfolio decision analysis, Decision Analysis 1(3):177-189, 2004.
Keisler, J. The value of assessing weights in multi-criteria portfolio decision analysis. Journal of Multi-Criteria Decision Analysis 15(5-6):111-123, 2008.
Keisler, J. and M. Brodfuhrer. An application of value-of-information to decision process reengineering. The Engineering Economist 54(3):197-221, 2009.
Matheson, J.E. The Economic Value of Analysis and Computation. IEEE Transactions on Systems Science and Cybernetics, 4(3): 325-332, 1968.
Smith, J.E., & R. L. Winkler, The Optimizer's Curse, Management Science 52(3):311-322, 2006.
Watson, S.R. and R. V. Brown. The Valuation of Decision Analysis. Journal of the Royal Statistical Society. Series A. 141(1):69-78, 1978.

The Value of Decision Analysis

Larry Neal, Chevron

The value of decision analysis, or as I prefer, decision quality, begins with the incremental value gained by following better decision policies on identified opportunities. What I would like to offer are two additional value elements, and a risk. An increased opportunity set, the evolving confidence and courage of the decision maker, and the potential for developing overconfidence.

In my experience, once a decision maker recognizes what decision quality brings to the table they begin to view the landscape in a different way and often pursue "new" opportunities.

In one respect, they see value in opportunities that in their eyes of old weren't worthy of pursuit or even the most casual of analyses. They begin to visualize things differently, perhaps in a more probabilistic or less biased view. For others, it may come about as a clearly structured series of smaller more controllable

decisions, like a decision tree. Regardless of how the decision maker's view changes, they develop new ways of seeing and creating value out of older discarded opportunities.

In another respect, they begin to see opportunities where there were none before. It's a bit like seeing something for the first time, and then once you become aware of its existence, you see it everywhere. It was always there but filtered out by the brain as noise. I experienced this phenomenon when I bought a piece of land that included two antique tractors. At that time tractors were just tractors to me, I saw them in the countryside but paid no particular attention. After I owned these two tractors however, I began to see the same tractor model everywhere, even on trailers going down the highway. I often use this anecdote as an opening with decision makers when framing potential opportunities.

Once a decision maker experiences this frame shift or increase in clarity, I often see a subsequent change in their willingness to pursue these "new" opportunities. The first steps are generally small ones, capitalizing on slightly risk averse, option rich strategies to cut losses if necessary. As they learn to navigate this new landscape, bolder strategies begin to emerge with less risk aversion.

This new found decision making courage tends to also reduce the amount of analysis and effort necessary for the decision maker to reach clarity. Unfortunately, this development can potentially evolve into overconfidence or reinstate an overconfidence problem overcome in the beginning. In my experience with this issue, a systematic learning process becomes critical to mitigate and perhaps even prevent this from developing. I've seen this in my industry where historical "no-brainer" decisions suddenly quit working for some reason. The more successful decision makers utilize forensic analysis, determine the source of the failures, adjust strategies and reestablish success. The less successful decision makers continue making the same decisions convinced that things would get back to "normal" soon.

So in summary, what is the value of decision quality to me? Better, new, and more frequent opportunities, but carrying with it the potential for creating overconfidence.

How do you explain the value added by DA?
William Leaf-Herrmann, IMS Consulting Group

This question can be considered in either a prospective or a retrospective context and specific approaches to explain the value of decision analysis (DA) may be more appropriate in one than the other. As a consultant, the prospective context is most common for me, so I adopt that frame here.

One approach that often works is to first characterize with the decision maker the gap in Decision Quality, and then to translate the closure of that gap into results they value.

To do that, we need to first understand the issues making the decision difficult. These issues may include analytical challenges, such as the need to understand the risk of project failure, the uncertainties in the market environment, or the complexity in competitive dynamics. Organizational issues are often present, such as the challenge of cross-functional alignment around investment priorities.

The six dimensions of Decision Quality* provide a useful framework to categorize these issues:

1. Appropriate frame

2. Creative, doable alternatives
3. Meaningful, reliable information
4. Clear values and tradeoffs
5. Logically correct reasoning
6. Commitment to action

After categorizing the issues, we can then systematically explain how a DA-based approach, such as the Dialogue Decision Process, can address the full set of challenging issues.

Sometimes this discussion may manifest the value of DA. However, the question often remains: Is it worth the effort to adopt a structured approach to strategic decision-making? In this case, we need to investigate what the implications are for decision makers if the above issues are not well addressed. After establishing the gap in Decision Quality, we have to translate the closure of this gap into value for the client.

An example illustrates this approach. I recently discussed a project opportunity with the commercial director of a drug development project. Her immediate concern was that the development strategy did not include the option for patient stratification using an efficacy biomarker; the target patient population was broad – "all comers." The inclusion of a biomarker option may delay the development program, but without it the drug would likely face significant reimbursement and market access challenges if successfully approved. Her plan was to conduct primary market research with payers to demonstrate the need for a revised clinical program.

It was clear an opportunity existed for DA to add value based upon the need to evaluate the tradeoffs. After a short discussion, we both agreed that some quantitative analysis of the development options would be needed in addition to any payer research. She suggested a meeting with the clinical program leader to discuss a DA project.

When the three of us met, it was apparent that the clinical leader had considered a biomarker option, but did not support it because of the added time, complexity, and cost. The commercial director was asked about the implications for the product forecast if no further analysis of the strategy was conducted. She explained that the commercial team intended to lower the base case forecast and include a pessimistic scenario to reflect the downside risk of competing products having biomarkers.

The clinical leader was concerned with the prospect of a lowered forecast. Together we qualitatively characterized a range of potential outcomes, characterized by launch timing, payer reception of the product, and the competitive environment. Some of the scenarios had such limited commercial prospects that R&D funding for the current strategy would likely be jeopardized during the next review of resource allocation. The clinical leader and commercial director jointly requested a proposal for a DA engagement.

Here, both would likely agree that the choice of development strategy was challenging due to difficult tradeoffs, the need for better information regarding payer expectations, and organizational alignment. However, the potential value that DA could bring differed for each of the stakeholders. The commercial director needed to quantify the difference in expected value across strategic alternatives. At the same time, the clinical leader needed alignment with commercial colleagues to maximize the chance of continuing development of a high value asset.

To summarize, the manner in which DA adds value typically depends upon the unique characteristics of the decision, or decisions, to be made as well as the interests of the decision makers. Decision Quality

provides a framework to help characterize the barriers to making a high quality decision. The Decision Professional must then assist the decision maker in understanding the value created by closing this gap.

(*Here I use the definition of Decision Quality which appears in "The Smart Organization: Creating Value through Strategic R&D," by David Matheson and James E. Matheson)

"How do you explain the value added by DA?"
Paul Wicker, Decision Strategies, Inc

"How do you explain the value added by decision analysis?" and the closely related question "Why aren't more companies using decision analysis?" have plagued the decision analysis community and proponents for decades. Our mantra – *In the face of uncertainty, the use of decision analysis can create insights that can help you make better decisions* - has unfortunately received a protracted yawn from much of industry. Our company sells decision analysis consulting. Faced with this challenge, we tried to determine the value of decision analysis hoping that information would promote usage. In the world of consulting, these questions are typically linked to the justification of the expense and time associated with performing decision analysis. Therefore, the calculations naturally followed a "how much value bang do you get for each decision analysis buck" approach.

If you assume that the value of decision analysis is rooted in finding a better, more valuable strategy than the current or proposed strategy, the calculations become fairly straightforward. The value of decision analysis is the net present value delta between the decision analysis selected Strategy and the existing Strategy the company would likely follow without some type of intervention. We did a review of our projects over the past decade, and the value created per dollar spent on decision analysis averaged over $1,000:$1.

Ergo and Ipso Facto - using decision analysis is justified based on the value created. Case closed; please sign on the bottom line. At least we hoped so, but inexplicably, there was still push back. The responses ranged from "we would have found much of that value during implementation of our own strategy" to "even a deterministic analysis would have produced some of that value".

How about if we were only 10 percent correct? That would still yield a value to cost ratio of $100:1 for using decision analysis – still a great bargain. Again, the push back continued even in the face of what we considered a blindingly obvious conclusion.

Thinking about this situation a bit more deeply, we came to the conclusion that the resistance likely results from the confluence of two factors. First, business executives and managers are hired and promoted in part based on their decision making ability. They truly believe that making good decisions is solidly within their wheelhouses. They feel like they don't need our help. Decision analysis sounds like an onerous, expensive process as well as an abdication of their corporate delegation of authority.

Second, it has been our experience that once the decision analysis process is complete, many times the answer becomes an obvious choice. In one very poignant example, our company assisted with the decision analysis of a corporate strategy for one of the super-major oil companies. It was a very complex decision with tens of possible alternatives in a highly politically charged area. To begin the decision analysis

process, we interviewed most of the senior management. Due to the far reaching implications of the project and the magnitude of the capital involved, we cast our interview net especially wide.

At the beginning of the process, only one Vice President was promoting the alternative that became the ultimate strategy. Six months later when the Framing and Monte Carlo dust settled, every member of the senior management believed that the decision analysis process had merely confirmed what they knew in the first place. The answer was "obvious". While this is an excellent testament to the efficacy of decision analysis in creating clarity from chaos, this rampant hindsight memory correction dampens the desire to use decision analysis on the next project. A diminishing spiral can result, and decision analysis is hoisted on its own petard.

So what do we do? We could increase the font size and use all capitals in our slide presentations - WHAT PART OF $1000 to $1 BENEFIT RATIO DON'T YOU UNDERSTAND. Tried it – doesn't work. Our CEO, Pat Leach, recommends a different path forward for us decision analysis zealots – "Let's redefine the role and benefits of decision analysis".

First, trade in the word "uncertainty" for "risk management". Decision analysis has beaten the drum long and loudly that uncertainty cannot be avoided – it is inevitable. If true, many managers say, "Why should I bother with decision analysis? I should just make the best decision I can." On the other hand, everyone wants to manage risk. When you frame the question in terms of risk management, the response should be, "Tell me again what actions I can take to manage and avoid risk."

Second, get rid of "decision making" in favor of "strategy development". As I have mentioned, managers feel ordained to make the decisions, but they become inclusive when you talk about strategy creation. Developing the strategic direction for the company requires input and buy-in from all the units.

Now put those two ideas together, avoid mentioning decision analysis, and ask the question again: "What is the value of combining risk management with strategy development?" It doesn't sound like decision analysis; it doesn't even sound optional. The answer - $1000 in added value for each $1 spent in effort.

"A Cynic's Approach to Justifying DA"
Roger Chapman Burk, U.S. Military Academy

We like to imagine ourselves working for senior decision makers stumped by multi-billion-dollar life-or-death problems. But people like that usually imagine themselves to be pretty good decision makers on their own. Usually they are right—they wouldn't have obtained the position without a record of good decision making. So how do we convince them of the need for professional decision analysis?

If only we could make the same decision both with and without DA and observe which turns out better. Alas, this is not possible for real-world decisions. One might try unreal but lifelike decisions. I remember reading a study in which business decision-makers were given decision cases to work on that were designed so that a "best" decision could be identified. It turned out that the decision-makers were pretty good, but not quite as good as they thought they were. I don't think studies like this are really much help, though. You could show it to your prospective clients, but I'll bet you that almost everyone would dismiss the cases as unrealistic and the test subjects as not as good as he is.

And yet decision analysts do get hired, at least occasionally. Why is this? From my observations, usually it's because the problem is so complex that even the high-power professional decision maker has to confess himself at a loss. Problems can be that complex for any number of interlocking reasons, but I think the most common reason people are willing to ask for help is high-stakes uncertainty, for instance the results of clinical trials or drilling for oil. That's why DA is used more in pharmaceuticals and oil and gas than in most other industries.

However, my own DA work has been in another area with a different principal reason for complexity: multiple stakeholders and consequent multicriterion value. This is not so important in the private sector, where most decisions are ultimately driven by the criterion of profit (though subject to constraints on safety, legality, etc.), but multiple criteria are the norm in the public sector. Furthermore, the decision maker usually has to gain buy-in from a wide variety of stakeholders in order to make a decision that will stick, even if he is supposed to have the authority to make it unilaterally. This is where MCDA can really help: it can provide a rational and objective structure for making the decision and demonstrating that it is based on considering all stakeholders and not just on political considerations of the narrow interests of one influential group.

So my principal advice is to find a domain where decision makers already know they need help. The only other approach I have any confidence in is starting on them young. Right now in my office a team of cadets is wrestling with how to decide if an unmanned ground system (UGS) should be assigned to infantry platoons. They have some appreciation of the problem domain, but know that they aren't qualified to make this decision based on subjective judgment. So they are enumerating the functions of a platoon, estimating what UGS performance levels contribute how much to each function, and judging the relative importance of the resulting functional differences. In other words, they're doing a thorough value analysis. Hopefully they'll remember such decision-analytical approaches in the future when real money and lives are at stake.

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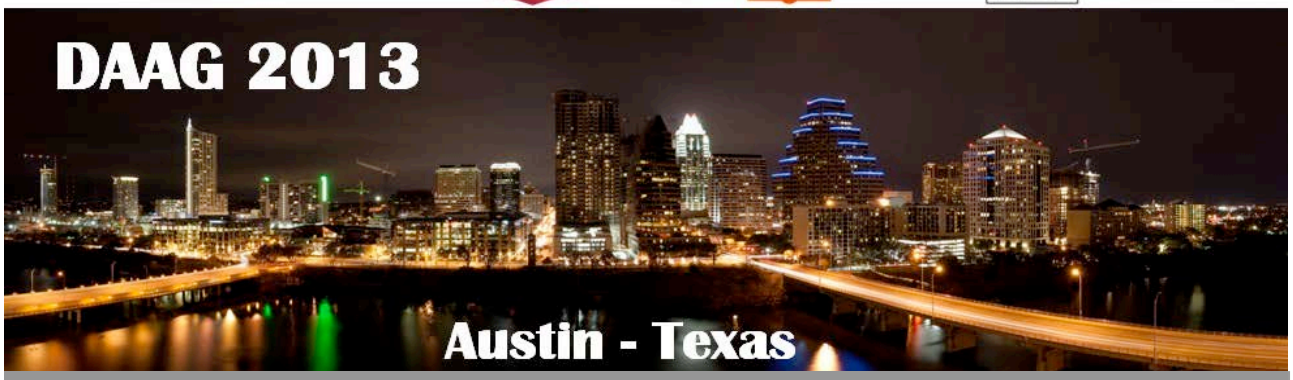

DAAG 2013 CONFERENCE - SAVE THE DATE

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Unique in its venue, DAAG is known across industries to unite Practitioners in DA application and implementation from Pharmaceuticals, to Military, to Oil and Gas and Manufacturing.

DAAG 2013

DATE
April 11-12

LOCATION
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DAAG is scheduled right after the INFORMS Analytics conference
April 7-9 held in [illegible]

APRIL 10 (8:00am to 12:00pm) - PRIOR TO DAAG in Austin
Join us to one of the two half day SDP COURSES
Registration TBA – Space is Limited
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Course 1
Managing Cultural Problems (The Alligators) in DA Projects: Theory and Tools

Instructors
Rob Kleinbaum, Ellen Coopersmith

This hands-on course teaches DA practitioners how to manage the problems caused by a company's corporate culture. These issues present a great challenge in DA projects. The material draws on the instructor's forthcoming book *Creating a Culture of Profitability*. The emphasis will be on practical understanding that enriches a decision analyst's tool set.

Course 2
The Art & Science of Probability Elicitation

Instructors
Jay Andersen, Jim Felli

How does your organization deal with uncertainty about the future? Many executives view this as one of their biggest obstacles in decision-making. Indeed, some decision-makers ignore uncertainty by making "base case" assumptions on key uncertainties. When the future does not play out as assumed, second-guessing and recriminations usually follow! Fortunately, there are well-tested techniques and methods for properly characterizing uncertainties in decision problems.

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Research

Column Editor: Debarun Bhattacharjya

I have been working with Prof. David Rios Insua, who has contributed an excellent article for the research column for the December issue of DA Today. Along with him, it is co-authored by David Banks and Jesus Rios. The article outlines the area of adversarial risk analysis (ARA); it serves as a great introduction to the field, provides key references and also suggests several avenues for further research.

Issues in Adversarial Risk Analysis

By: **David Banks** (Duke University, USA), **Jesus Rios** (IBM T. J. Watson Research Center, USA) and **David Rios Insua** (Royal Academy of Sciences, Spain)

1. Introduction

For decades, game theory and other group decision-making paradigms have been considered of little use in practical risk management problems. However, this viewpoint has recently become less dogmatic because: a) High-profile terrorist attacks have demanded significant national investment in protective responses, and there is public concern that not all of these investments are prudent and/or effective; b) Key business sectors have become more mathematically sophisticated, and now use this expertise to shape corporate strategy for auction bidding, lobbying efforts, and other decisions; c) Regulatory legislation must balance competing interests (growth, environmental impact, safety) in a way that is credible and transparent; and d) The on-going arms race in cyber-security means that the financial penalties for myopic protection are large and random. Solution strategies for such diverse applications must employ tools from many fields (statistics, economics, operations research, sociology, psychology, political science, etc.).

All of these problems are characterized by the fact that there are two or more intelligent opponents who make decisions for which the outcome is uncertain. Collectively, we refer to this problem area as Adversarial Risk Analysis (ARA). Traditional statistical risk analysis grew in the context of nuclear reactor safety, insurance, and other applications in which loss was governed by chance, rather than by the malicious (or self-interested) actions of intelligent actors. But in ARA, one needs to have some model for the decision-making of all participants. This model might be classically game-theoretic, with (non-cooperative) Nash equilibria as the core concept, or it might be psychological, reflecting either a decision analytic formulation or empirical studies of strategic behavior.

In counterterrorism, appropriate security measures represent one of the key challenges for states in this century. After recent large-scale terrorist attacks, multi-billion euro investments are being made to increase public safety. This has stirred debate about the cost-effectiveness of such measures. In turn, this has prompted research on modeling issues in counterterrorism, drawing upon tools from reliability analysis, data mining, and complex dynamic systems, among many others.

Parnell et al. (2008) provides an in-depth review for the US National Academy of Sciences on bioterrorist assessment models, concluding that (1) traditional risk analysis tools (such as fault trees) are inadequate because they do not address intentionality; (2) the common knowledge assumption, critical in game theoretic approaches, is not satisfied; and (3) decision analytic approaches have large uncertainties. These findings are controversial. Dillon et al. (2009) describes a decision-making framework based on risk analysis principles for allocating anti-terrorism resources using risk scores, while Ezell et al. (2010) defend the use of traditional probabilistic risk assessment methods, such as event trees, to estimate

terrorism risks. However, Cox Jr. (2009a) and Brown and Cox Jr. (2011) criticize application of conventional risk analysis to terrorism, warning that it is inappropriate to model terrorist actions in the same way as, say, random hurricanes.

In contrast, there is a rich literature in political sciences and economics regarding game theory and terrorism, though it places little emphasis on risk analysis aspects (Powell, 2007). Kardes and Hall (2005) surveys various approaches to strategic decision making in an adversarial context, arguing for the use of robust stochastic games to deal with counterterrorism, and pointing out the difficulty in assessing what the adversary intends. Bier and Azaiez (2009) contains many papers on attacker-defender models. Insights combining risk analysis and game theory can also be found in e.g. Cox Jr. (2009b).

Adversarial Risk Analysis (ARA) is an attempt to combine both strategic reasoning about opponents and probabilistic treatment of aleatory outcomes. It is an emerging perspective that has attractive features in counterterrorism applications, as described in Merrick and Parnell (2011) and Ríos Insua et al. (2009).

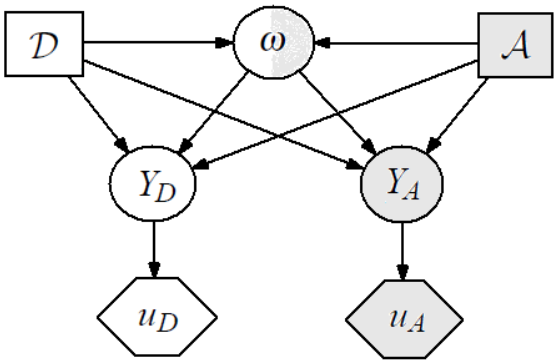

Figure 1. A coupled influence diagram showing the decision, chance, and utility nodes, together with the shared information structure, for the simultaneous Defend-Attack problem

2. An Overview of ARA

ARA treats security games as decision analysis problems, but uses game-theoretic reasoning to estimate the probability that the opponent will select a particular action. This framework avoids the implausible common knowledge assumption criticized by, among others, Raiffa et al. (2002); instead, the Bayesian decision maker simply places a subjective distribution over all unknown quantities. This is particularly valuable in counterterrorism, since opponents often conceal information or try to mislead.

Generally speaking, ARA views a two-person counterterrorism game as two coupled influence diagrams, one for the defender and one for the attacker (often with some shared nodes). Figure 1 shows such a diagram for the canonical simultaneous Defend-Attack problem. Instead of finding a joint equilibrium solution, ARA supports one of the opponents (say, the Defender) against the other. It employs a subjective expected utility model, treating the Attacker's decisions as random events.

The critical ingredient in ARA, which distinguishes it from conventional use of probabilistic risk analysis in counterterrorism, is that the Defender builds an explicit model for the strategic decision-making of the Attacker. Depending upon available counterintelligence and past history, that model might assume that the Attacker:

• seeks a Nash equilibrium (which requires the Attacker to assume they share knowledge of the payoff bimatrix); or

• seeks a Bayes Nash equilibrium (which requires similarly strong assumptions of common knowledge); or
• will use level-*k* thinking, for some unknown value of *k*, see Stahl and Wilson (1995); or
• will perform a mirror analysis, using ARA from the Attacker's perspective to infer the Defender's choice and then optimize against that; or
• will behave "irrationally" (e.g., by favoring attacks that occur on significant anniversaries or holidays, or by selecting targets that have emotional rather than strategic value).

Since the Defender rarely knows which among these (or other) solution concepts the Attacker is using, it is worth noting that the Defender can do a mixture analysis, in which all of the concepts have some probability of being used and the final answer is a weighted average of the solutions to each.

Given some specific model for the Attacker's decision-making, the Defender can simulate outcomes under such a model. That simulation will draw upon subjective probabilities about the Attacker's beliefs, utilities, and resources; it will also employ traditional risk analysis to describe uncertainty over the non-strategic elements (e.g., the number of people killed in a smallpox attack, conditional on the strategic choice by the Attacker to use smallpox and the strategic choice by the Defender to stockpile vaccine).

This ARA approach has been applied to stylized counterterrorism models such as the sequential Defend-Attack, the simultaneous Defend-Attack, the sequential Defend-Attack-Defend and the sequential Defend-Attack with private information (Wang and Banks, 2011; Rios and Ríos Insua, 2012; Sevillano et al., 2012). Traditional game theory assumes that all opponents are as smart as John von Neumann, and make decisions in the way that he did. Defense analysts know this is generally false; they prefer to use guesswork based on terrorist psychology, counterintelligence, and past history. A nice feature of ARA is that it can incorporate such information in a fairly straightforward way.

Similarly, traditional risk analysis is only partially applicable to counterterrorism. It is clearly relevant when assessing distributions over consequences conditional on the strategic choices made by the opponents. But in order to develop meaningful probability distributions on the strategic choices themselves, it is first necessary to use ARA to build an explicit model for the opponent's decision making process.

3. ARA: The Road Ahead

ARA is an active area of research. Some of the outstanding problem areas in this domain are:

- *Modeling and Methodology*. Fine-grained models are difficult; e.g., it is unclear how to close the infinite regress that can arise in level-*k* models or the mirror analysis. Rios and Ríos Insua (2012) suggest climbing the regress until reaching a level at which no further information is easily available, and then imposing a non-informative distribution. Rothschild et al. (2012) suggest thinking first about a given level *k*, and then propagating a non-informative prior up the regress hierarchy. Wang and Banks (2011) propose a mirroring equilibrium based on a consistency principle between the Defender's distribution over the Attacker's actions and the Attacker's distribution over the Defender's actions. In auction problems, one can appeal to heuristics based on standard bidding strategies (Ríos Insua et al., 2009) and model bidding functions using past behavior (Keefer et al., 1991).

  More generally, there is a growing machine learning literature on games. These methods aim at modeling the utilities of players from observed game traces or by adaptation to individual playing

styles based upon repeated play. Particularly interesting in this context are approaches to opponent modeling that estimate the opponent's utility function from observed behavior, with the goal of predicting actions and finding weaknesses (such as incoherent utilities). Even if a game-theoretically optimal solution to a game is known, ARA may obtain a higher reward. Player modeling is also of increasing importance in commercial computer games, so as to adapt the playing strength of artificial opponents to the skill level of the human player.

- *General Applications*. More work is needed on interactions between the attacker and the defender, which in the toy models mentioned previously are relatively simple. How does one deal with the case in which the Attacker and the Defender are modeled with complex influence diagrams which share multiple nodes? How does one handle multiple players, where there may be strategic alliances among various subsets? This leads to risk-sharing problems and a combinatorial explosion in the space of possible actions.

- *Computational*. Computation in realistic problems is challenging. Currently, ARA often follows a two-stage process in which one first simulates to obtain the probability distribution over the Attacker's actions, and then uses that as input to the Defender's analysis. This is cumbersome; one-stage procedures based upon the augmented simulation method might scale better. Spatial games and network routing games are also problematic. For example, one might deploy a simple ARA model over each cell in the spatial structure, with the models related by resource constraints and value aggregation across cells. This introduces complications associated with the combinatorial nature of the resource allocation process. A computational environment to support ARA, much as there is GeNIe for decision analysis, would be welcome.

This note has focused on security applications. Indeed, within the current EU project SECONOMICS, some of the authors are exploring how ARA may be used to protect critical infrastructure such as the Barcelona Metro station, the Anadulu airport and a national electricity grid. But there are many other fruitful areas, e.g., auctions (Rothkopf, 2007), Borel games (Banks et al., 2011), commercial cyber-security, and robotics (Razuri et al., 2012). ARA is pertinent to these domains as well, and has great potential for finding more reasonable solutions than either traditional game theory or traditional risk analysis can achieve.

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References

D. Banks, F. Petralia and S. Wang. Adversarial risk analysis: Borel games. *Applied Stochastic Models in Business and Industry*, 27(2):72–86, 2011.

V. M. Bier and M. N. Azaiez. *Game Theoretic Risk Analysis of Security Threats*. Springer, 2009.

G. G. Brown and L. A. T. Cox Jr. How probabilistic risk assessment can mislead terrorism risk analysts. *Risk Analysis*, 31(2):196–204, 2011.

L. A. T. Cox Jr. Improving risk-based decision making for terrorism applications. *Risk Analysis*, 29(3):336–341, 2009a.

L. A. T. Cox Jr. Game theory and risk analysis. *Risk Analysis*, 29(8):1062–1068, 2009b.

R. L. Dillon, R. M. Liebe and T. Bestafka. Risk-based decision making for terrorism applications. *Risk Analysis*, 29(3):321–335, 2009.

B. C. Ezell, S. P. Bennett, D. Von Winterfeldt, J. Sokolowski and A. J. Collins. Probabilistic risk analysis and terrorism risk. *Risk Analysis*, 30(4):575–589, 2010.

J. Razuri, P. G. Esteban and D. Rios Insua. An adversarial risk analysis model for an autonomous imperfect decision agent. In T. Karny, T. Guy, and D. Wolpert, editors, *Multiple Imperfect Decision Makers*. Springer, 2012.

E. Kardes and R. Hall. Robust stochastic games and applications to counter-terrorism strategies. CREATE report, 2005.
D. Keefer, F. Smith and H. Back. Development and use of a modeling system to aid a major oil company in allocating bidding capital. *Operations Research*, 39(1):28–41, 1991.
J. Merrick and G. S. Parnell. A comparative analysis of PRA and intelligent adversary methods for counterterrorism risk management. *Risk Analysis*, 31(9):1488–1510, 2011.
G. S. Parnell, D. Banks, L. Borio, G. Brown, L. A. T. Cox, Jr., J. Gannon, E. Harvill, H. Kunreuther, S. Morse, M. Pappaioanou, S. Pollack S., N. Singpurwalla and A. Wilson. Report on methodological improvements to the department of homeland security's biological agent risk analysis. National Academies Press, 2008.
R. Powell. Allocating defensive resources with private information about vulnerability. *American Political Science Review*, 101(4):799–809, 2007.
H. Raiffa, J. Richardson and D. Metcalfe. *Negotiation Analysis: The Science and Art of Collaborative Decision Making*. Harvard University Press, 2002.
J. Rios and D. Ríos Insua. Adversarial risk analysis for counterterrorism modeling. *Risk Analysis*, 32(5):894–915, 2012.
D. Ríos Insua, J. Ríos and D. Banks. Adversarial risk analysis. *Journal of the American Statistical Association*, 104(486):841–854, 2009.
M. H. Rothkopf. Decision analysis: The right tool for auctions. *Decision Analysis*, 4(3):167–172, 2007.
C. Rothschild, L. McLay and S. Guikema. Adversarial risk analysis with incomplete information: A level-k approach. *Risk Analysis*, 32(7):1219–1231, 2012.
J. C. Sevillano, D. Ríos Insua and J. Ríos. Adversarial risk analysis: The Somali pirates case. *Decision Analysis*, 9(2):86–95, 2012.
D. O. Stahl and P. W. Wilson. On players' models of other players: Theory and experimental evidence. *Games and Economic Behavior*, 10(1):218–254, 1995.
S. Wang and D. Banks. Network routing for insurgency: An adversarial risk analysis framework. *Naval Research Logistics*, 58(6):595–607, 2011.

Ask DAS

Column Editors: John Coles and Florian Federspiel

Decision Analysis versus *Judgment and Decision Making*: Where's the difference?

For a young researcher, finding the right articles, journals, and niche can be challenging in any field. The sheer number of journals that are now available for reading and reference provide a great number of options, but can result in a disconnected approach to the literature or to the development of applications. The focus of this column is to look at a particular distinction in the decision literature; specifically, we address some of the nuances between *Decision Analysis (DA)* and *Judgment and Decision Making (JDM)* to bring to light differences in the two fields. We hope to start a conversation using this piece, and we would love to get feedback from readers for a future piece delving further into how to clarify these fields.

When studying how decisions ought to be made as opposed to how decisions are actually made in practice, it is important that we work to understand and close any gap that might exist. The remainder of this column looks at three particular questions about DA and JDM, taking comments and perspectives from people active in one or both fields to provide practical and actionable insight. Given the topic of this article, it should come as no surprise to the reader that not all of the opinions collected agreed. We have intentionally incorporated some of the disagreements to highlight points for future discussion. Finally, even though this issue is focused on analyzing some aspects of the literature, we believe it should still be useful to both researchers and practitioners as they attempt to find, apply, and improve upon current research.

Is the distinction between DA and JDM necessary?

Before we delve into the topic of differentiating between two fields, it is important to provide sufficient motivation for the work. The aim of this article is provide enough clarity in the comparison between DA and JDM to be useful for practical application. First, it is important for researchers to know where useful information can be found, and how such information should be used. Second, as one contributor noted, "optimal scientific progress can only be achieved through effective collaboration and cooperation between the two fields, with all participants knowing when to turn to the other sub-discipline for help and advice." Thus, understanding the goals, motivation, and methodology of both DA and JDM may significantly advance the work of many.

Many of our contributors mentioned that they survey or attend the DA Society sessions at INFORMS, the Behavioral Decision Research in Management (BDRM), Society of JDM (SJDM), or the Brunswik Society meetings amongst others. There is considerable overlap between research topics and people (and similarities and connections are not only confined to the fields of DA and JDM). While there may exist more or less overlap between certain fields and societies, in practice it may not be an issue – as long as one is aware of and well informed regarding all relevant fields and outlets. At the end of the day, to quote another of our contributors, "each of us has a certain amount of time which we can invest. Thus, we should decide/find out what interests us and then see where that leads." We hope that this article provides enough distinction between DA and JDM for our readers to better define their interests.

How do the fields of DA and JDM compare?

In this section we present some of the initial thoughts shared with us about the distinctions between the two fields of study. Whereas JDM is often most strongly associated with Social and Cognitive Psychology, the field of DA may be most closely associated with the broader area of Operations Research and Management Science.

Yet both DA and JDM frequently relate to the same economic, mathematical and psychological foundations and both often approach decisions using the same methods. Additionally, both fields differentiate between normative, descriptive, and prescriptive strands. The two main perspectives shared by our contributors were that JDM and DA are distinct but tightly interconnected, or that DA is a sub-field of JDM. Here we list some of the characteristics proposed for each field of study:

JDM is said to be the study of normative, prescriptive, and descriptive models of judgments and decisions. Yet the most common aspects of JDM listed were the identification of:

1. If and how decision processes deviate from normative prescriptions

2. What factors affect these decision processes
3. What can be done to improve possible deviations (e.g. settings, procedures, implementation and elicitation methods)

On the other hand, DA is said to be mostly about decisions, and generally seen as being more theoretical, less experimentally based, and more concerned with:

1. Developing axiomatic and normative models of decision-making
2. Applying and studying the application of these models for prescriptive purposes in practice

The second point is of particular interest for identifying the relevance of JDM for DA. In that case, many of those insights stemming from JDM research may significantly increase the effectiveness of the actual implementation and the quality of the result. For example, JDM research may provide guidance on how to most effectively elicit uncertainty estimates. If JDM is defined as being the study of normative, prescriptive, and descriptive models of judgments and decisions, then DA could be described as a sub-field of JDM. Further, whereas JDM research is seen as being concerned with both judgments (for example the role of cognitive processes in moral judgments) and decisions, DA focuses on decisions only.

As a Ph.D. student, I am interested in both DA and JDM, what are my job opportunities and how do I best go about positioning myself?

A common take-away theme from our contributors was that students and young faculty should focus first on a problem, position, or field that is interesting, and then position oneself accordingly. On this note, here are some final thoughts:

1. As much as possible, make your resume and teaching interests fit. The journals you publish in and the publication titles are crucial in that fit.
2. Regardless of the area you are working in (be it engineering, medicine, social sciences, etc.), make up your mind about your professional identity and work to strengthen it.
3. Be able to rely on a good and broad background of both DA and JDM specific knowledge.
4. Concentrate on what is both scientifically interesting to you and good for the world. Admittedly, relying exclusively on this point may well harbor the highest risk, yet probably also the highest possible return.

This piece was not written with the goal of providing a comprehensive or definitive overview of JDM and DA; rather, we hope that this piece will stimulate discussion and contributions for future pieces exploring this or other dichotomies in our field.

The "Ask DAS" column is intended to target the interests, needs, and questions of members of the Decision Analysis Society. Special thanks go out to David Budescu, Jonathan Baron, Robin Hogarth and Robin Keller for providing valuable insights and advice. If you have ideas or questions that you would like us to deal with in future Ask DAS columns, please just send us an email (jbcoles@buffalo.edu, ffederspiel.phd2014@student.ie.edu).

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