ICEAAWorld

The magazine for the International Cost Estimating & Analysis Association

All aboard for the
2015 Professional Development & Training Workshop!

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2015: Issue #1

ICEAA International Cost Estimating and Analysis Association

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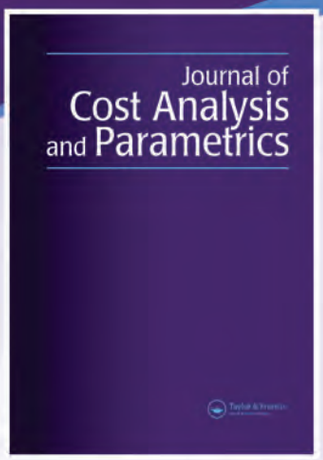

CALL FOR PAPERS

Journal of Cost Analysis and Parametrics

The ***Journal of Cost Analysis and Parametrics*** is the official publication of the International Cost Estimating and Analysis Association. It is a scholarly journal featuring peer-reviewed articles that provide the latest developments in cost estimating, cost analysis, and cost management. Its objective is to improve the theory and practice of cost estimating, analysis, management, and research results among cost-analysis educators and practitioners around the world.

The journal seeks to publish research that is interesting, intellectually rigorous, and advances the body of knowledge of cost analysis and parametrics. Papers involving a variety of topics, settings, and research methods are solicited. Manuscripts related to a broad range of application areas for any sector of the economy including manufacturing, financial services, construction, retail, defense, and not-for-profit are desired. New theories, topical areas, and research methods are encouraged. Areas of interest include, but are not limited to:

- Cost model development and validation
- Decision analysis
- Risk and uncertainty
- Simulation
- Trade studies
- Learning curves
- Productivity assessment
- Earned value management
- Design to cost
- Lifecycle costing
- Statistical techniques for analyzing data
- Data visualization

SUBMISSIONS

Submissions will be evaluated based on their: (1) readability; (2) relevance; and (3) reliability. All papers accepted for publication in the Journal must have a high level of readability. Poor readability can impede the ability of a reviewer to evaluate the contribution of a paper and may lead to rejection. It is necessary to ensure the paper can be readily understood by individuals involved in the area discussed in the paper. References should not impede the flow of the paper and unnecessary obscure jargon should not be used. If applicable, details of the statistical methodology should be in an appendix rather than in the body of the paper if they are not central to the focus of the manuscript.

The second criterion is relevance. A paper is relevant if it has the potential to influence cost estimating, analysis, or management. A paper that appeals to a broad spectrum of readers or is unique or innovative has a better possibility of influencing practice and theory development and therefore, is more relevant than a paper without these features.

The third criterion is reliability. The paper is reliable if the conclusions of the paper can be reasonably inferred from the arguments. Reliability is easier to assess when a paper is statistical or involves empirical research with which the reviewer is familiar. Authors can improve the probability of acceptance of a paper by including a section on the limitations of the research techniques.

Authors are advised to consult previous issues of ***JCAP***—and its predecessor journals—for suitable topics to submit for consideration. For questions from potential authors please contact:

Ricardo Valerdi, Editor-in-Chief
(rvalerdi@arizona.edu).

www.tandfonline.com/UCAP

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The International Cost Estimating and Analysis Association is a 501(c)(6) international non-profit organization dedicated to advancing, encouraging, promoting and enhancing the profession of cost estimating and analysis, through the use of parametrics and other data-driven techniques.

ICEAA World is a publication of the International Cost Estimating and Analysis Association. Members of the association receive copies as a benefit of membership. Subscriptions for non-members are available on a yearly basis for $30.00 per year.

President's Address

Brian Glauser, ICEAA International President

2015 is already shaping up to be an exciting year for ICEAA. Plans for the Professional Development & Training Workshop, June 9-12 in San Diego are in full swing. Mike Thompson has put together a fantastic overview of the entire Workshop and all of the efforts and innovations he and the 2015 Workshop Committee have developed so far.

There is important news to share as a result of our most recent Board meeting, about which you may already be aware. Effective April 1, 2015, annual dues will increase to $95.

Having performed a thorough analysis of ICEAA's current and projected financial situation, as well as an analysis of membership value, the Board gave very careful and thoughtful consideration to the issue of increasing membership dues. There has not been an increase to membership dues in over 20 years. However, over that same period of time, there has been an ever increasing level of service and member benefits. Paired with simple inflation, the $55 annual dues rate no longer covers the rising costs and expenses of the association commensurate with the benefits provided, resulting in depleting our reserve funds for continued operations.

The Board has calculated a new dues structure that will sufficiently fund member benefits including *The Journal of Cost Analysis and Parametrics*, which increased from two issues to three issues per year in 2014, *ICEAA World*, the new website and database engine behind the ICEAA Members Only Portal, and the direct support provided to our chapters and members.

The increased rate will provide a modest surplus, which will reverse the impact on reserve funds and provide capital to launch new initiatives, such as additional online members-only features, a new version of CEBoK, and enhanced resources for members and chapters.

The current dues rates will be available through March 31, 2015. New, renewing, and expired members may purchase or extend their membership for one year at $55 or two years at $100 during this time. Lifetime memberships, however, are no longer available, but existing lifetime memberships will continue to be honored.

In addition, the fees for CCEA and PCEA certification

continued

ICEAA Dues Structure

	Current Rates (Through March 31)	New Rates (Effective April 1)
One Year	$55	$95
Two Years	$100	$170
Five Years	N/A	$425
Student Rate	$30	$ 45

Certification Fees

	Current Rates (Through March 31)	New Rates (Effective April 1)
PCEA Member	$125	$150
PCEA Non-Member	$250	$275
CCEA Member	$225	$300
CCEA Non-Member	$400	$475
CCEA Renewal	$125	$125

will be increased slightly to keep in line with cost increases. The listed certification fees will become effective April 1. The fee for re-certification will remain at $125.

For additional information on the membership dues and certification fees increases, please visit iceaaonline.com/membership

On behalf of the entire ICEAA International Board, I would like to thank all of our members for years of support. Your membership and active participation in the work of this association is greatly valued. Some of you reading this have been members of ICEAA or one of our predecessors for upwards of 30 years, a genuine indication of the lasting value our association provides to the cost community. We believe that this dues increase will help to ensure that the association remains viable and is properly funded for years to come, to meet the needs of our cost professionals' community.

Strategic Plan:

In 2012, the ICEAA Board established a committee to draft a Strategic Plan consisting of **Rick Collins** (Technomics), **Daniel Mask** (Booz Allen Hamilton) and **Eric Nardi** (AF ASC). The committee presented a draft to the Board in October 2012 and the Board accepted the draft at the June 2013 meeting. Then in September of 2014, a task force was formed to develop the strategic plan in more detail and to translate the ideas outlined into more measureable goals. I had the pleasure of working on the task force along with **Jason Dechoretz, John Deem, Megan Jones, Paul Marston, Jeff Moore and Andy Prince.**

The resulting document, available on the ICEAA website at iceaaonline.com/about/#governance

provides greater definition to the original three goals identified in the Strategic Plan, namely to create a Community of Technical Excellence, a Community of Collaboration and a Community of Relevance.

It is the intent that the Strategic Plan be a living document and its purpose to provide guidance to the Board as it considers any undertaking requiring effort/funds in order to confirm that these activities support the tenets contained within the Strategic Plan. I encourage everyone to take a moment to review the document to get a better idea of the strategies that will help guide Board decisions for the coming years.

Letter from the Editor

Joe Wagner, ICEAA World Editor

To paraphrase a folk song from my youth - (how long ago WAS 1967?) – If you're go-ing to San Di-ego, be sure to attend the 2015 ICEAA Professional Development & Training Workshop. Five years ago we were at the same venue – the Sheraton San Diego Hotel & Marina. Now we are back, looking forward to renewing acquaintance with Balboa Park, Mission Bay, and Old Town San Diego, among many other memories of our last visit.

In this issue of *ICEAA World*, you'll find a run-down on the coming workshop from co-chairs **Mike Thompson** and **Doug Druley**. You will also find a brief look at some local San Diego attractions, including a surprising historical location that should be dear to the hearts of ICEAA estimators/analysts.

As I've mentioned before, the activities of the Air Force's AFIT graduate cost students always interest me, having once been a staff member of AFIT. In this issue we learn from **LTC Dan Ritschel**, Director of the Air Force graduate cost analysis program, about the current student thesis projects, and some interaction they recently had with the Dayton chapter of ICEAA. We are also featuring an article by an AFIT student, **Captain Chris Thomas**, dealing with the costing of munitions. Later this spring, one of the AFIT students will be awarded an ICEAA plaque for producing the best thesis on a cost topic.

If you saw the movie "Moneyball", you will recall it dealt with the use of statistics and other STEM (Science, Technology, Engineering, and Math) concepts to build a winning pro baseball club. Today there is a real-life advocate of the same concepts, working with the MLB Arizona Diamondbacks and other teams. He also happens to be a major player in ICEAA professional development efforts. Read about **Dr. Ricardo Valerdi** and his "Science of Baseball" in this issue.

Joe Hamaker, along with his "Ask an Analyst" column, is providing information in this issue on the 2015 ICEAA awards nomination process. Each year at the June workshop, we present annual awards to recognize the contributions of our membership to the Association and the profession. Read up on the process and join in selecting some ICEAA winners.

If it still needs to be pointed out, ICEAA-related activity in the UK continues to grow. We include in this issue a report on certification examinations from **John Yeaman** of BMT High-Q Sigma, as well as the doings of **Dale Shermon** of the Society for Cost Analysis & Forecasting (SCAF).

And finally, I cannot let pass a great story told in a few words of chapter reporting by the President of the Detroit chapter, David Holm. The difficulty of finding ideas for events and activities to interest the members is a common problem for all chapters. Taking advantage of the unique circumstances in Detroit, David, who is the Director of the US Army Tank Automotive Command cost function, went to his civilian counterparts at the Chrysler/Fiat Corporation and arranged to give them a presentation on his costing activities, with the idea to generate joint members and collaboration from both sides of the civilian-government cost community. There is an example of a chapter doing things for the profession and this Association.

Want to be Published?

ICEAA World is always in need of articles and studies of a professional/technical nature.

See your name in print and your work recognized by our peers.

Send your articles to Joe Wagner at jwagner@iceaaonline.org

Business Office Update

Megan Jones, ICEAA Executive Director

After so many of us faced a long and frigid winter this year, it's a relief to know the 2015 ICEAA Professional Development & Training Workshop in sunny San Diego is on the horizon. Planning and preparation are in full swing and I've had the pleasure of working closely with the entire 2015 Workshop committee on all of the details. The special Workshop section towards the end of the issue has the scoop on everything there is to look forward to June 9-12.

Another group I have had the pleasure of working with recently is the nomination committee for the upcoming ICEAA Board elections. The committee members, **Tim Anderson**, Hank **Apgar, Madeline Ellis**, Joe **Hamaker**, and chair **Andy Prince,** have been orchestrating all the necessary tasks to support the nomination process and upcoming election. We have an impressive slate of engaged members willing to take on the personal responsibility, time commitment and level of effort required to keep ICEAA at the forefront of the cost community.

Electronic ballots were distributed on March 1 with a completion/submission date of April 1. If you did not receive a ballot, please email me at megan@iceaaonline.org. Please take the time to review the slate of candidates and return your vote by the April 1 deadline. Results will be announced on May 1.

I'm excited to report that the inaugural offering of ICEAA's newest program, the Technology Showcase Webinar Series, was a solid success. Over 50 people registered to learn more about a cloud-based earned value management software platform, CloudEVM, over lunch from the comfort of their offices. The gold and silver sponsors of the ICEAA Workshop will also be conducting Technology Showcase Webinars in the weeks leading up to the Workshop, so keep an eye out for announcements with the dates and times.

Response to the call for Workshop sponsors has been outstanding. With gold sponsor PRICE Systems, LLC and silver sponsors Booz Allen Hamilton; Galorath, Inc.; and Technomics, Inc. already committed to support us this year, there is only one silver sponsorship left, and booths are going fast! Visit the Workshop website at www.iceaaaonline.org/sd15 to view the latest sponsoring and exhibiting prospectus or email me to discuss details.

Technology Showcase

Webinar Series

ICEAA is proud to announce our new Technology Showcase Webinar Series, designed to bring the latest in cost estimating and cost analysis technology straight to our members' offices. These webinars connect the companies innovating the products, methods, and theories at the forefront of the profession with the members who want to know more about them.

Contact Megan Jones to schedule your webinar: megan@iceaaonline.org

or visit www.iceaaonline.com/techshowcase for a schedule of upcoming webinars.

Certification Corner

Peter Andrejev, CCEA®, PMP®
ICEAA Director of Certification

What's next for the Certification Program?

The 2007 Fall issue of *The Estimator* marked my first "Director's Corner" article. In it I promised to reengineer the Certification Program "to make the CCEA designation more valuable" and to "make holders of the CCEA more desirable to employers." Since then, we completely revised the examination to test more directly against the Cost Estimating Body of Knowledge and created new questions that reward applicants for their ability to synthesize responses from multiple learning sources. We increased the work experience requirements from 2 to 5 years to recognize the value of on-the-job experience, but also created an intern-like PCEA certification to assist industry in attracting and retaining entry level staff into the costing profession. We revised the recertification standards to better motivate, reward and balance active participation in hands-on cost estimating work, professional development, and cost community service activities. We registered the CCEA® and PCEA® certification marks with the US Patent and Trademark Office in 2011, and in 2013 we started development of specialty certifications; a work that's in progress for a Parametric specialty designation.

Prior to this undertaking, in 2006 we had 76 applicants sit for the CCEA examination with only 53% passing leaving the number of CCEAs at just over 200 with only about 10 per year applying for recertification. Last year, 92 applicants tested with a 60% pass rate leaving ICEAA with 704 CCEAs, 116 PCEAs, and 70 recertifying for the year (which included estimator/analysts from Australia, Canada, Egypt, Japan, Saudi Arabia, and the UK). These numbers are great…except when compared to the prior two years. One hundred forty-one (141) applicants tested in 2013 with 77% earning certification. We closed 2013 with 665 CCEAs, 115 PCEAs and 87 recertifications from around the globe. We had similar numbers on 2012: 143 applicants with a 73% pass rate for a total of 617 CCEAs and 134 PCEAs with 41 recertifying. In other words, the number of people seeking certification has been decreasing since 2012.

Just like a company takes a strategic pause when sales in a product line shrinks, it's time for us to pause and determine what's next for the Certification Program. On a tactical level, we need to complete the CCEA-Parametric designation, but grandfathering during the ISPA-SCEA merger has made the demand for this designation not nearly as big as the interest in country-specific certifications, and for ICEAA to consider also the proposition in certifying individual companies' training programs.

Country-Specific Certification Programs

In discussions with representatives from several of these countries, it's clear that an examination tailored to their specific interpretation and application of topics like inflation & index numbers, economic analysis, contract pricing, Earned Value Management, and cost management (including Total Ownership Cost and Cost as an Independent Variable) is warranted. These topics are US-(if not DoD-) centric, and penalize professionals from other countries who have limited need to master these US-based competencies. That's not to say they should be excluded from these topics. Country-specific certification examinations will still test on all topics in the cost estimating body of knowledge. However county-specific examinations will test applicants on how inflation, contract pricing, economic analyses and related

continued

items are properly calculated and conducted in that country.

Certifying Company Training and Certificate Programs

There are many professionals in commercial industry who use our methods and techniques to generate basis of estimates, develop engineering trade studies, and create price proposals for their company's products. Yet most of these professionals are not affiliated with ICEAA, nor seek certification because our body of knowledge extends too far beyond their needs.

We have been approached by companies to partner with them to create tailored training and internal certification programs. And while we continue to hold our existing PCEA and CCEA designations in highest regard, it is time to consider the merit offered to industry and members if ICEAA "certifies" that a company uses and applies the cost estimating processes and methods endorsed by our association.

ICEAA Certification Benefits UK Government and Industry Professionals

John Yeaman

Recognition of the power of an ICEAA certification has well and truly crossed the pond. After a burst of activity from the UK MoD's Cost Assurance and Analysis Services (CAAS) in 2006 produced a handful of Certified Cost Estimators/Analysts, interest in the certification has recently been reinvigorated. Last autumn saw CAAS send a group of current Cost Forecasters and Cost Engineers through the CEBoK-based training program followed by the Certification exam. The examination also took place in early February of 2015 at the BMT Hi-Q offices in the historic city of Bath. The company hosted the examination for a number of their own consultants as well as staff from BMT Reliability Consultants, LSC, QinetiQ, and a freelance estimator.

Companies such as BMT Hi-Q Sigma see the ICEAA CCE/A certification process as a cornerstone for their Investment Analysis (IA) experts, complementing their experience in other aspects of systems and program management support. **Andrew Jones**, Head of Capability for IA at BMT Hi-Q Sigma, said "Achieving CCE/A status coupled with other corporately respected qualifications such as the Association for Project Management Professional (APMP) can demonstrate to clients, both current and potential, how seriously companies like ours regard ongoing professional development."

Money Changes Hands…
…A Good Book Changes Minds

Book review by Lt Col David Peeler

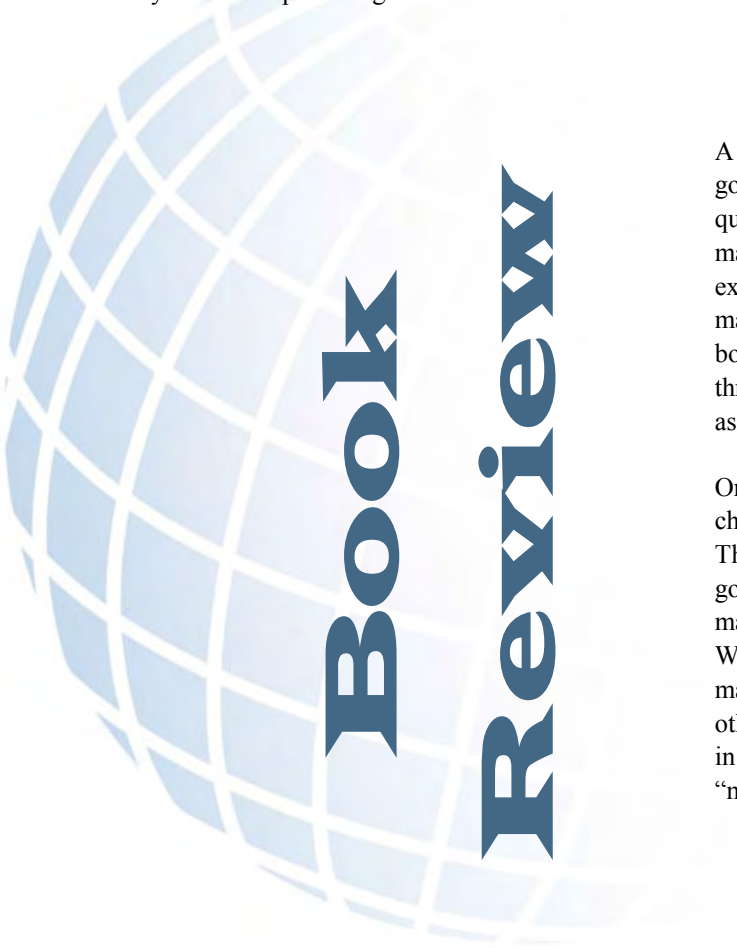
Maturing the theme from the title reviewed in the last issue, this review addresses that oft asked question about why learn math – "When will I ever use this again?" As I stated in the introduction to the last review in these pages, cost folks appreciate numbers and analysis; however, we also thrive on understanding. Is that not the point of analysis? This title shifts from analytics to understanding, helping to answer and explain the "why math matters", and why it should be studied by all. Typical cost estimators/analysts have some serious mathematics background; but like many, including the average math teacher, we usually struggle to give an adequate answer to the question "When will I ever use this stuff?" I offer this month's title as a way to arm yourself for providing a better answer.

HOW NOT TO BE WRONG:

THE POWER *OF* MATHEMATICAL THINKING

JORDAN ELLENBERG

The Penguin Press:
New York, N.Y.; 2014.



A math book devoid of equations and formulas… what good is that? Well, a lot, if you are seeking answers to the question all kids seem to ask at some point – Why learn math? In a flowing style that incorporates numerous examples, Ellenberg captures the essence of the value of mathematics to the everyday world of decision-making – both personal and professional. He walks the reader through practical applications in How Not To Be Wrong as a product of learning to think via mathematics.

Organized into five parts with roughly three to five chapters each, the book begins with a short introduction. The author highlights the age-old question, of when am I going to use all this math. Further, he points out that math, like war, is an expansion of collective activity. While war is the continuation of politics by other means, mathematics is simply the extension of common sense by other means. Thus, math is way to "understand the world in a deeper, sounder, and more meaningful way" that "makes you better at things."

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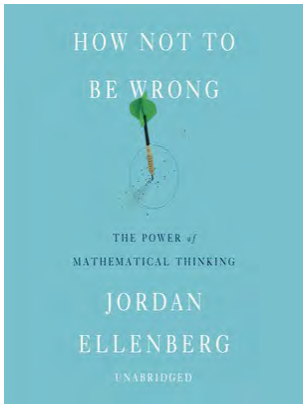


Part I addresses linearity and its absence. In this part, the reader learns about tax rates and Zeno's paradox; tuition and test scores; obesity and how to create more economic pie. I cannot do it justice; you just have to read it.

Inference is the subject of Part II. Rather than provide a snippet of these topics, I will simply list the chapter titles*: The Baltimore stockbroker and the Bible code*; *Dead fish don't read minds*; *Reduction ad unlikely*; *The international journal of haruspicy*; and *Are you there, God? It's me, Bayesian inference*. You gotta read them to grasp the point they make about thinking differently

Part III, Expectation, delves into probability theory, and how it informs daily observations. The author walks through some very interesting lottery math, helping people think deeper. Another chapter is on why you should miss more planes. The last chapter in this part deals with why parallel lines often do not seem so in the everyday world; and how pomegranates maximize their area for seed production.

Part IV covers regression. The chapters*: The triumph of mediocrity*; *Galton's ellipse*; and *Does lung cancer make you smoke cigarettes*. The first of these addresses what Darwinism, business success, baseball, and regression to the mean can teach in regard to clearer thinking. The second chapter gets into the mechanics of scatter plots, eugenics, and relatedness. As you might deduce from the title, the last chapter of this part discusses causality. A very important concept, often lost on many.

Existence is the subject of Part V, which engages the topics of public opinion, cardinality voting, genius, leadership and democracy, as well as capital punishment and the progression of the human mind. The book concludes with a short final section composed of reflections on how to be right, which is something different from not being wrong.

How Not To Be Wrong will help you talk to kids and young adults, as well as your non-quantitative friends and co-workers about the importance of mathematics. The book is well worth the time invested in its 440 or so fun-filled and informative pages. The view and articulation regarding topics with which we are all familiar is refreshing and beneficial. The points are well presented, and make for a quick read that is full of supportive material explaining why the process of learning mathematics makes us better thinkers. After all, most of us could benefit from being wrong less often.

Colonel Peeler serves as Interim Director, Financial Management and Comptroller for the Air Force Life Cycle Management Center. He is a certified cost estimator/analyst and an Air Force certified acquisition professional in both financial and program management. He is a member of both the American Society of Military Comptrollers and the International Cost Estimating and Analysis Association.

RICARDO VALERDI

and the Science of Baseball

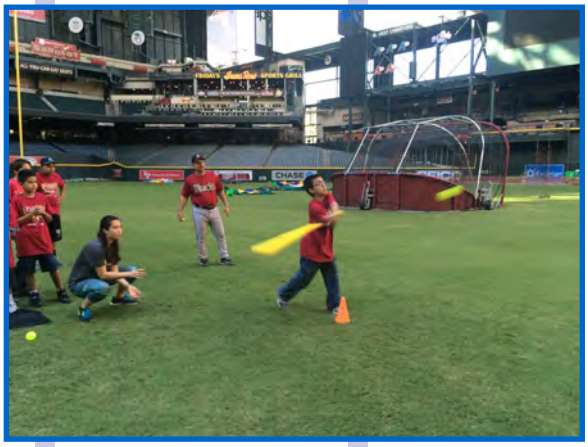
BY JOE WAGNER

If you do a web search for **Ricardo Valerdi**, the first response will be from the University of Arizona website. There you will learn that staff member Dr. Valerdi is a systems engineer who focuses on cost estimation of complex systems, human systems integration, and performance measurement. His research in these fields has been funded by, among others, US Army Test & Evaluation, Navy Acquisition Research, the Air Force Office of the Surgeon General, Air Force Acquisition Office, BAE Systems, Lockheed Martin, and the IBM Center for the Business of Government. You also learn that he was a Research Associate in the Systems Engineering Division at the Massachusetts Institute of Technology and a Visiting Associate in the Center for Systems and Software Engineering at the University of Southern California, where he also earned his PhD.

Other things you can learn about Dr. Valerdi include the fact that he is the Editor of the *Journal of Cost Analysis and Parametrics* (JCAP), ICEAA's professional publication. In that role he is the primary agent for the gathering of articles, editing and vetting of the material, and coordinating with the publisher and the ICEAA Executive Director in publishing the three issues per year to our membership.

But probably the most unusual thing you will find concerning Dr. Valerdi is that he teaches the University of Arizona freshman honors seminar entitled "HNRS195I-018 - The Science of Baseball". And he has taken that interest in baseball and his course material out of the university classroom and onto a real world baseball diamond.

In cooperation with the MLB Arizona Diamondbacks, Dr. Valerdi developed a "Science of Baseball" camp, in which middle-schoolers use STEM (Science, Technology, Engineering, Math) concepts to understand the dynamics of baseball, and how a player and team can improve their performance through measurement and analysis. Many of the



general concepts included in his program are the same as those recounted in the recent successful Hollywood production “Moneyball”, starring Brad Pitt. The process of capturing masses of statistical data to perform analysis of baseball player performance and conduct overall game management were originally publicized by the author Michael Lewis in his non-fiction book based on the experience of the Oakland Athletics in 2003. As Dr. Valerdi says, "The motivation for the Diamondbacks Science of Baseball program is to promote real-world applications of numeracy – the ability to reason and apply simple numerical concepts. Baseball provides a rich laboratory to apply fundamental mathematical skills like measurement, geometry, probability and statistics." The Science of Baseball camp is staffed by Dr. Valerdi’s recent UA Engineering School graduates who serve as volunteer mentors. Their presence not only provides instructional talent for the camp, but also helps generate interest from the campers for careers in STEM subject areas.

The Science of Baseball program, begun in 2013, was so successful it is being expanded to other Major League teams, including the Anaheim Angels, San Diego Padres, and Colorado Rockies. Despite the many duties he has taken on with his University of Arizona teaching, operating the Science of Baseball camps, and editing the ICEAA Journal, Dr. Valerdi continues to exhibit his enthusiasm for statistics and other STEM concepts by seeking new applications for the concepts and innovating with more “real world” contact to broaden the benefits of STEM knowledge in the world at large.

Ask an Analyst

Edited by
Joseph W. Hamaker PhD, CPP®,CCEA®

This installment of "Ask A Cost Analyst" features a question which, as it turns out, requires a fairly detailed and complicated answer. So let's get right to it. The submitted question was:

Q: How do you determine a Prediction Interval around a multivariable CER developed using log transforms and multiple regression? What formulas/methods would one use? Is there an Excel template that does this calculation?

Answer provided by Brian Alford and Matt Pitlyk from Booz Allen Hamilton

Speaking for myself, I know that I have a fairly good grasp of what Prediction Intervals are and their usefulness to cost analysis but upon seeing this question, I pretty quickly realized that I did not know how to derive a Prediction Interval for the case implied—the case involving multivariable log transformed CERs. But you don't run this column for as long as I have without learning humility and also learning to reach out to others in our community of practice for answers. In this case, I had recently seen some related work proceeding as part of NASA Marshall Space Flight Center's (MSFC) development of the new Project Cost Estimating Capability (PCEC) being managed by **Andy Prince** of MSFC. With Andy's permission I punted the question to a couple of the Booz Allen Hamilton analysts that are working on PCEC, specifically **Matt Pitlyk** and **Brian Alford**. I don't know how many hours Matt and Brian worked on this answer but I know that it was less than the infinite number of hours I would have needed to untangle the solution. In addition to the narrative description below, Matt and Brain supplied an Excel file that provides the solution as well which can be assessed at

http://www.iceaaonline.com/?p=3063

One last thing before I "turn it over" to Matt and Brian, please remember that I am always on the lookout for good questions to use in this column. This edition is very mathematical. Others have been more philosophical. The field is wide open—this column can only be as good as the questions you send in. Please send to me at joe.hamaker@galorathfed.com.

Now here is the answer:

Regression analysis is the process of taking historical data and deriving an equation from it that can be used to make predictions about similar events in the future. Ordinary Least Squares Regression (OLS) takes data that follows a linear pattern and produces a CER. The math is the same whether you have one predictor (independent) variable or many predictor variables (single versus multivariable regression). When data does not inherently follow a linear pattern, log transforms can sometimes manipulate the data into a form that does follow a linear pattern. This process converts the data from Unit space into Log space. Once the data is in Log space, OLS can be used just as if the data were in Unit space, with one additional step at the end. Thus, this question is almost equivalent to the more general question of "How do you determine a Prediction Interval around a CER produced by OLS?"

continued

The regression equation predicts the mean (average) y value for specific x values (the average output for specific inputs[1]). That is, given a specific input value (or input values for a multivariable regression), the regression equation outputs a value, $\hat{y}$ (called "y hat"), that is the estimated average of all possible y values in the population associated with the chosen x value(s). But $\hat{y}$ is just the *average* number outputted by an equation that was created based on data with variation (if there was no variation, there would be no need for regression!). Thus, uncertainty must be applied to the output to account for the variation in the original data.

Figure 2: Confidence Intervals (Tighter Inside Lines) and Prediction Intervals (Looser Outside Lines)

In Figure 1, the three vertically oriented red distributions illustrate the variation around the best fit regression line at different values along the cost driver axis. This variation is called *model uncertainty*, and prediction intervals describe it.

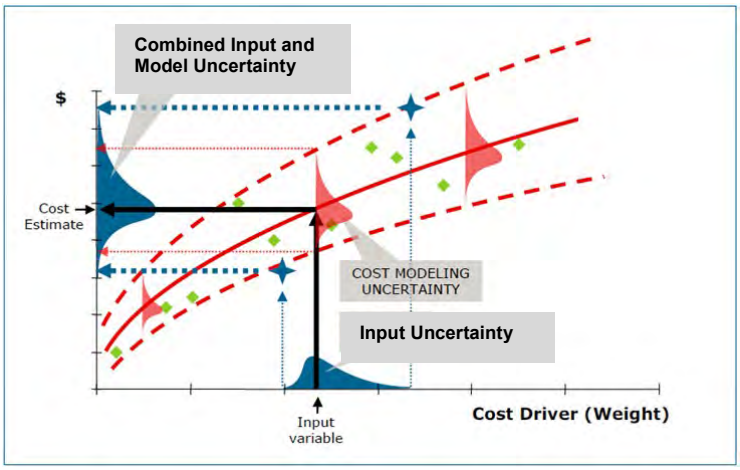


Figure 1: Non-linear regression example adapted from NASA Cost Estimating Handbook v4.0

A quick word on "Why Prediction Intervals?"

As noted above, OLS finds the line through the data that minimizes the sum of the squared errors. This produces a *mean* estimator. There are two types of intervals associated with OLS that provide more information about the regression at a given input value: Confidence Intervals and Prediction Intervals. These intervals are related but provide bounds for different types of estimation.

Confidence intervals give bounds for estimating the true *value of the regression line* (the true mean of Y) at a particular x value (or vector if there are multiple independent variables).

Prediction intervals give bounds for estimating *another observation* (a particular value of Y) at a particular x value (or vector if there are multiple independent variables).

Prediction intervals include two types of variation: the error around estimating the true mean and the natural variation around the true mean. Because the estimate of the mean necessarily has less variation than the estimate of observations that produce that mean, confidence intervals are smaller than prediction intervals. Figure 2 illustrates this concept in a single-variable case. Since cost estimators are more interested in developing new predictions of cost given an input (or set of inputs), it is Prediction intervals that are most important in cost models.

Producing Prediction Intervals

The expression for a Prediction or Confidence Interval is the following:

Output from regression equation ± critical value from t-distribution × Standard Error

Note that the critical value from the distribution can either be randomly sampled as in simulation or chosen based on

continued

[1] The regression equation itself predicts the mean (average) y value, denoted $\hat{y}$, for a given input value of x ($\hat{y} = ax + b$ is an estimator of $E(Y \mid X = x)$). (If Multiple Linear Regression is being performed, then x is a multi-valued vector, $\vec{x}$.)

a specific percentile as when creating an s-curve (but more on this later).

OLS dictates that we use a t-distribution because of the following two conditions. First, we assume normally distributed data around means. Second, we do not know the actual variance of the residuals (sigma^2). Thus, we must use an estimate of the residuals from the regression: the Standard Error of the Estimate (SEE).

The general equation for the Prediction Interval is

$$\text{P.I.} = \hat{y}_0|x_0 \pm t_{(confidence\ level,\ residual\ degress\ of\ freedom)} * SEE * \sqrt{1 + x_0 (X'X)^{-1} x_0'}$$

Where SEE comes from the regression analysis and is the estimate for sigma. By comparison, the confidence interval equation is very similar but has a smaller Standard Error term (note the 1 missing from the square root):

$$\text{C.I.} = \hat{y}_0|x_0 \pm t_{(confidence\ level,\ residual\ degress\ of\ freedom)} * SEE * \sqrt{x_0 (X'X)^{-1} x_0'}$$

In the univariate case, these formulas are more commonly written as:

$$\text{P.I.} = \hat{y}|x_0 \pm t_{\frac{\alpha}{2},df} \times SEE \sqrt{1 + \frac{1}{n} + \frac{(x_0 - \bar{X})^2}{\sum X^2 - n\bar{X}^2}}$$

$$\text{C.I.} = \hat{y}|x_0 \pm t_{\frac{\alpha}{2},df} \times SEE \sqrt{\frac{1}{n} + \frac{(x_0 - \bar{X})^2}{\sum X^2 - n\bar{X}^2}}$$

However, these formulas do not extend to the case with multiple independent variables (multivariable regression). Thus, matrix algebra (and notation) is used. The math, however, is exactly the same!

Why Are Prediction Intervals curved?

Prediction (and confidence) intervals are narrowest near the point ($\bar{x}$, $\bar{y}$) and get wider as the x value(s) move away from the mean. To understand why, it is easier to refer to the Prediction Interval equation for a univariate regression:

$$P.I. = \hat{y}|x_0 \pm t_{\frac{\alpha}{2},df} \times SEE \sqrt{1 + \frac{1}{n} + \frac{(x_0 - \bar{X})^2}{\sum X^2 - n\bar{X}^2}}$$

Looking at this expression, we can make a few observations:

- When the input value equals the mean ($x_0 = \bar{x}$), the third term under the radical is 0, and the standard error is at its smallest.

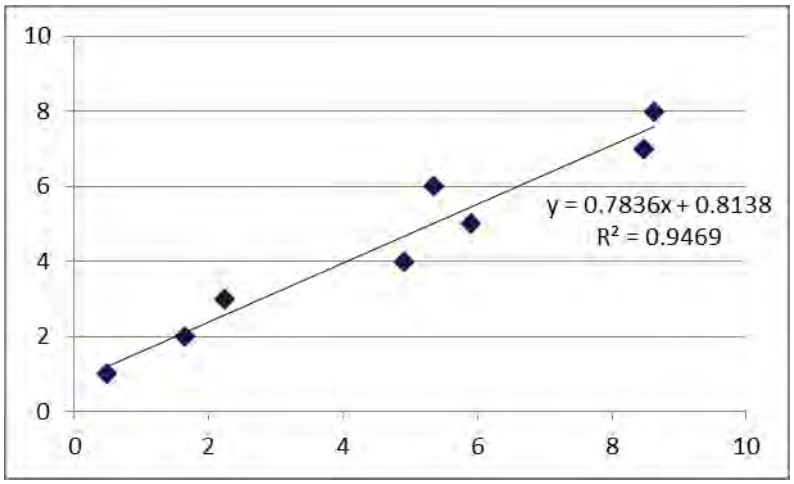
continued

- When $x_0 \neq \bar{x}$, the third term under the radical is positive. Moreover, the standard error grows larger as x_0 gets farther from $\bar{x}$. This happens in either direction because the term is squared and thus always positive.

- The regression equation is most precise near the center of the data set. Estimating outside the range of the data carries large uncertainty because the standard error grows large.

- The standard error must be calculated for every input value. During simulations where x_0 is varied (input uncertainty), the standard error must be recalculated for each trial.

- Increasing the number of data points (n) adds precision to the C.I. more than the P.I. This is because increasing n makes the second and third terms under the radical vanish to 0. These are the only terms under the radical for C.I., but the P.I. has the 1 under the radical as well.



SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.973075
R Square	0.946876
Adjusted R Square	0.938021
Standard Error	0.609812
Observations	8

ANOVA

	df	*SS*	*MS*	*F*
Regression	1	39.76877	39.76877	106.9424
Residual	6	2.231226	0.371871	
Total	7	42		

	Coefficients	*tandard Err*	*t Stat*	*P-value*
Intercept	0.813835	0.416583	1.953596	0.098566
X Variable 1	0.783633	0.075777	10.3413	4.78E-05

Figure 3: A CER Plot with Related Regression Output

1 Now that we know what predictions intervals tell us and how they are different than confidence intervals, how do we use them?

2 Imagine a cost estimator has developed a CER as illustrated in Figure 3. This figure and table show the data, the regression line equation, and the basic output statistics associated with OLS. These statistics (and many others) are generated by data analysis packages in Excel and by many other COTS software tools.

3 The cost estimator would use the resulting CER to create a parametric estimate of the cost of his/her new system. However, this calculation would only generate an estimate of the mean cost and not account for any uncertainty in the CER. This is where prediction intervals come in.

4 A common use for prediction intervals is to create estimated y values for a Monte Carlo simulation. Because Monte Carlo simulations rely on the range of future observations rather than the mean of the observations, prediction intervals are used to randomly sample from the distribution of future observations.

5 The recommended steps for computing this are as follows:

1. Calculate the output of the regression equation for the x value(s). (Plug the x values into the CER and grab the output.) This is the mean estimate.

2. Randomly sample from a t-distribution with degrees of freedom equal to the residual degrees of freedom from the regression analysis. (t-distributions are available in Excel and most COTS risk simulation software. The residual degrees of freedom will be an output from your regression analysis tool such as the Excel table in figure 3.)

3. Calculate the Standard Error for the regression equation at the given input vector using the equation below:

$$se(\tilde{y}|x_0) = SEE\sqrt{1 + x_0(X'X)^{-1}x_0'}$$

continued

where SEE = the Standard Error of the Estimate for the regression analysis and X is the design matrix. The design matrix is of size [(number of data points) x (number of variables + 1)] where the first column is all 1istribution of future observations. and prod the first variable in the regression, the third column is the data points for the second variable in the regression, etc.

4. Compute the prediction using the three parts above and the expression:

Output from regression equation + critical value from t-distribution × Standard Error

This process will produce a single potential future observation of y either above or below the estimated mean (because the value from the t-distribution may be positive or negative). The prediction corresponds to the estimate for one trial of a Monte Carlo simulation. Running the simulation over a specified number of trials will generate a distribution of predictions.

Some estimating software has the calculations for accounting for model uncertainty built-in. For example, NASA's Project Cost Estimating Capability (PCEC) tool includes Prediction Interval calculations for appropriate CERs. Users can then use any Monte Carlo add-in with the PCEC to repeat this calculation for the appropriate number of trials.

Final Step

Now comes the final step: transforming back to Unit space. Everything since the initial log transform has been done in Log space and has been exactly the same as if we were in Unit space with linear data. Now, however, we need to transform the results of our calculations back to Unit space. To do this we simply raise the number e to the power of each of our values: the mean estimate produced by the regression equation and the upper and lower bounds of the prediction interval. That's it!

Practical Applications

Since the process above produces one prediction interval (an upper and lower bound), many of these values must be calculated in order to create a cumulative distribution function (CDF) (or S-curve) of the model error or to be used in a Monte Carlo model. For both of these applications, the input vector is constant and the confidence level is varied.

To simulate the uncertainty distribution around a particular x value, repeat the construction and transformation of the prediction interval upper and lowers bounds while sampling from the t-distribution.

To produce a CDF, the percentiles are chosen from between 0-100% at regular intervals, often every 0.5% or 1%. These are then fed into a one-tailed inverse t-distribution function to obtain the critical values to be used in the prediction interval equation. Each value will be positive or negative depending on whether the specified percentile was greater than or less than 50%.

In Monte Carlo simulations, random sampling from the t-distribution gives an approximation of the model space. Thus, rather than picking percentiles, a random one-tail t-distribution function is used to pick the critical values. One value is picked for each run of the simulation and used to calculate the predicted y value.

Less practical, but somewhat interesting, is looking at the prediction bounds at a particular confidence level for the entire CER. To see a particular prediction interval for the entire CER, repeat the process of predicting the mean and constructing the upper and lower prediction bounds (transforming all three to Unit space) while varying the x value(s) and keeping the value from the t-distribution constant. For example, to see a 90% prediction interval around the CER, find the t-distribution critical value when alpha = 0.1, and run the calculations while varying the x value(s).

Conclusion

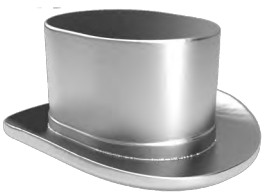
Prediction intervals are essential for understanding CERs built by regression. While the CER itself produces a single value that is the estimate of the mean (and thus not likely to be the actual cost), Prediction intervals illustrate the entire range of possible costs and assign percentiles to them. They quantify the uncertainty inherent in regression equations, which leads to a better understanding of the CER and its predictive power.

WINNING the GAME

An editorial by Megan Jones, ICEAA Executive Director

I have a confession to make: I'm a gamer. Video games, word games, puzzle games, strategy games, you name it. But what I love most are board games. Some conversations I've had recently with ICEAA chapter presidents and board members got me thinking about board games and how they relate to our association.

From simple kiddie games like *Chutes & Ladders* to epic strategic undertakings like *Risk* (or if there are any other game nerds out there, *Arkham Horror*), board games all have one thing in common: a set of rules that are shared and understood by all players. The game designer writes the rules to give the players a structure of how the game is set up, the order in which actions are taken, what is and is not allowable during play, and what it takes to win. But ultimately, a designer writes rules to get people to experience what s/he has created, because without a set of rules, how do you play?



It has become apparent during my first year with ICEAA that our rulebook needs expanding. Our constitution told us how to set up the board and where to put the pieces, and our bylaws explain who can play, for how long, and how players can be broken out into teams. Which is a good start, but not enough to really get into the game. What do I do once I start playing? How do my turns impact the other players? What does it take to win?

Everyone has a memory of that unfortunate *Monopoly* game where someone at the table quit in a fit of rage after saying things they regret to someone they love. While the settings of these memories are all different, I'd bet money that each one erupted from either a misunderstanding of, ignorance on, or different interpretations of the rules.

The ICEAA bylaws indicate who is eligible to be a board member or a chapter president, but what the document doesn't cover is what is expected of them. What should they do when they take the position? What is going to be asked of them throughout the year? What resources are available? None of us have ever taken a job that didn't come with a description, and yet, we don't have much by the way of descriptions for any of our volunteer leadership positions.

Sometimes the rules of a game don't cover the exact situation the players find themselves in, and there's a debate. Should the debate come to a civilized and

continued

mutually-agreeable conclusion, players will often create a "house rule." Well-managed house rules are written by hand into the rulebook, and/or stated clearly at the beginning of the game for all the players to know in advance, acknowledge, and utilize equally. A good number of ICEAA's policies fall into the category of unwritten house rules, known only to the players that have been at the table for years and remember when they were determined. The terms for our volunteer leadership positions are only two years and if everything is going well, there will be a nice balance of experienced and novice players in each board or committee. Everyone should have easy access to clearly documented policies and procedures in order to do the best they can in their position.

Sometimes not all of the players have read the rules, or not everyone has read them as thoroughly. Often when my friends and I play a new game for the first time, we rely on my husband, whose ability to absorb the rules completely before restating them in easy-to-follow tutorials is unparalleled. The funny thing is though, he always seems to win a new game the first time we play it. Every rulebook has a section called "Winning the Game" that goes in to far more detail than "get pawn A across line B." It's not a section that's usually summarized in a quick-and-dirty rules overview to get the group playing, but he reads it and he wins.

ICEAA has several chapters that are struggling, and several chapters that are thriving. The stronger chapters don't always use the same strategies to succeed, but they all started from the same core rules set. Like in games, our rulebook needs to contain more than just conscriptions and restrictions, but sets of tried and true best practices that can help other volunteers find the tactics that will put their chapters in the right direction.

I strongly believe in ICEAA and I have confidence that we as an association can win if we can provide all of our players with a clear, comprehensive, and accessible rulebook. During the last board meeting, it was agreed that Brian Glauser, as our International President, would appoint a committee to take our rulebook and make it comprehensive by creating standard practices for common situations and determining solutions for some less common ones. If you would like to be a part of the committee, please contact me and I will pass your name along. I also encourage everyone in a volunteer leadership position or anyone interested in pursuing a volunteer leadership position to come to the volunteer leadership orientation at the 2015 Workshop in San Diego. It will be a great place to exchange ideas and get involved in the process.

Grab your dice and shake 'em, victors. Let's win this.

Training Corner

Remmie Arnold,
2015 Workshop Training Co-Chair
and Kevin Cincotta,
Chapter & Organization Training Coordinator

We are excited to be planning the 3rd annual ICEAA training workshop since the merger of SCEA and ISPA. The call for 2015 conference trainers was sent out in December. Even with the earlier timetable, we received an overwhelming response from the community. This year we are excited to announce the ICEAA Conference will provide 42 courses in 4 tracks; Cost Estimating Basic (CE-B), Cost Estimating Advanced (CE-A), Parametrics (PAR), and Integration (INT). As in years past, CE-B, CE-A, and PAR will focus on covering CEBoK and PEH modules, while the INT track will provide courses that integrate cost estimating with other facets of our industry.

Our call for instructors produced some new faces and returned several veteran instructors. Look for **David Hulett** and **Eric Druker** to present on Joint Cost Schedule Risk, **Christian Smart** and **Chris Price** to present on CER Risk and S-Curves, and **Marc Greenberg** and **John Deem** to present on Target Costing and Trades. We are pleased at the strong response from first-time volunteers to help plan and coordinate the training portion of the Workshop. **Joe Bauer**, **Thomas Harless**, and **Melissa Winter** will be co-chairing the Cost Estimating Basic track. **Laura Barker**, **Emily Beltramo**, and **Brandon Bryant** will be co-chairing the Cost Estimating Advanced track. **Jessica Boatwright**, **Rick Garcia**, and **Cynthia Price** will be co-chairing the Parametric track. **Mike Allen**, **Sabrina Beane**, and **Ken Rhodes** will be co-chairing the Integration track. Be sure to look for them at the conference, and they will be glad to answer any questions you may have about our Training offerings.

Keep your eyes open in the coming month for a schedule of courses! As always, Training will be offered on all four days, but for the first time the Training-only day will be moving from Tuesday to Friday to better support those preparing for the CCEA exam. If you have any questions or recommendations for anything related to conference training, please contact Remmie Arnold (rarnold@technomics.net). Mark your calendars for June 9-12, 2015 in San Diego, California.

Of course, there's more to training than Conference Training, and more to both kinds of training than CEBoK. While CEBoK is ICEAA's flagship training product, it's important to remember that ICEAA sponsors non-CEBoK training as well. Like an NCAA basketball team that plays a strong non-conference schedule, we strive each year to have strong non-conference training. A shining example of this is the Greater Alabama Chapter's recent joint workshop with the Missile Defense Agency, which occurred on January 21, 2015. MDA's Director of Cost of Estimating and Analysis and multiple-time ICEAA Best Paper Award Winner **Christian Smart** and Chapter President **Stephen Newton** hosted a productive

continued

and collaborative exchange. NASA, the University of Alabama Huntsville, and Defense Acquisition University were among the other organizations represented. Topics included Should Cost Analysis, Better Buying Power 3.0, and even a pro football pool! Technomics, Sikorsky, the UK Ministry of Defence, and the Canadian Department of Defence have all also recently embarked upon chapter, organizational, or international training initiatives.

Would you like your organization to be next? You'll get the great feeling of helping yourself and the cost estimating community, as well as the opportunity to promulgate best practices (and learn others' best practices in the process). Best of all, you may get a mention in the snazzy, slick pages you now hold in your hand. Topics like WBS Development, Independent Government Cost Estimates, and Should Cost don't have dedicated modules in CEBoK. Why not present your own, and get national recognition for doing so? Here at the Training Corner, we eschew traditional social media, but an email to Kevin Cincotta (kevin.cincotta@icfi.com), or a note sent by carrier pigeon, are both highly effective. After the training event is a huge success, you can tweet about it all you want. We promise.

Finally, do you (or someone you know) have training *content* to share? Or maybe you have ideas about future conference (or non-conference) training. Perhaps you'd like to register yourself or your organization in our evolving **Trainers Database**? Or maybe you just want to ask what everyone else asks me: *What's causin' all this?!?* Whatever the feedback, you may share it with us, and it just might appear in the next Training Corner!

Upcoming Events:

Region 7/SoCal Workshop
March 18, 2015
Fort MacArthur
San Pedro, California
kurt.r.brunner@leidos.com

1st Annual ICEAA Canada Workshop
April 8-9, 2015
Ottawa, Canada
www.iceaaonline.com/canadaworkshop

ICEAA Awards - Nomination Submission Deadline
April 10, 2015
www.iceaaonline.com/awards

2015 ICEAA Professional Development & Training Workshop
June 9–12, 2015
Sheraton San Diego Hotel & Marina
San Diego, California
www.iceaaonline.org/sd15

Region 7 SoCal Workshop
September 16, 2015
Aerospace Corp.
El Segundo, California
kurt.r.brunner@leidos.com

Remember: workshops and training at ICEAA Chapters or at other ICEAA-affiliated events may qualify for points towards your CCEA® recertification!

2015 Professional Development & Training Workshop

June 9-12, 2015 | San Diego, CA

Sponsor the year's premiere cost estimating and cost analysis workshop

Sponsoring ICEAA's 2015 Professional Development & Training Workshop provides a unique opportunity to position your company as an active player in advancing the profession of cost estimating and analysis. The ICEAA 2014 Workshop exhibit hall will be open for over 20 hours, with 8 hours on the Workshop schedule dedicated for attendees to visit our exhibitors. The limited number of available booths allows for a focused, consultative environment in which you can meet with current and future clients. Tuesday and Wednesday's receptions as well as food buffets and beverage breaks will be served in the exhibit hall among the booths, providing ample time to develop leads. The exhibit hall is centrally located to the breakout session rooms and mere feet from the general session ballroom.

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Details and information at www.iceaaonline.org/sd15

Workshop Overview

By Mike Thompson & Doug Druley

Sunny San Diego and the 2015 ICEAA Professional Development & Training Workshop are only a few short months away. June 9-12 we'll be at the Sheraton San Diego Hotel & Marina, home of the SCEA/ISPA Joint Conference in 2010. We would like to thank the members of the 2015 Workshop Committee for all of their preparation efforts. We're excited to announce several new ideas that we'll be trying out this year!

Restructured

The 2015 Workshop will follow a different schedule than previous years. In the past we started on Tuesday focusing on training sessions, shifting the spotlight to papers on Wednesday through half the day Friday. We realized that many of the attendees coming for the training sessions did so with the intention of taking the CCEA and PCEA exams on Saturday, and decided to try a switch. Papers will be scheduled all day Tuesday and Wednesday, with the final papers of the Workshop concluding on Thursday afternoon. Training will begin on Tuesday afternoon, run all day Wednesday and Thursday, and then Friday will consist of CEBoK-based training sessions all morning, with opportunities for attendees to review specific topics, break out into study groups, and leave the workshop with a thorough understanding of what it takes to earn the CCEA or PCEA designation.

The response to our call for papers was overwhelming, even with the earlier deadline. **Nathan Honsowetz** and **Christina Snyder**, our program co-chairs, have done an outstanding job of identifying the 80 abstracts that will result in the most robust, topical, and informative papers program to date. We're trying out a few new processes with the papers program as well: along with the earlier abstract submission deadline, we're requesting papers and presentations earlier than usual (**March 30**) to allow the track chairs to provide expert feedback and guidance.

The organization of papers and tracks was also given a new approach. Rather than pre-determining track topics and hoping the papers submitted would be a good fit, we extracted the track topics from the variety of abstracts received. This resulted in a refreshing update to the usual lineup. While the abstract subjects made core standards like Parametrics, Risk, and Methods & Models clear choices, three new tracks emerged: Program Management, Software Estimating, and Government Processes.

Best of the Best

In order to qualify for a 2015 Best Paper Award, authors must provide a long-form paper by the **March 30** deadline. A a team of judges will review the qualifying papers for technical content, creativity, potential application to the cost estimating and analysis fields, and overall quality and style. One paper from each track will be

2015 ICEAA Workshop Committee

Workshop Co-Chairs:
Doug Druley
Mike Thompson

Training Co-Chairs:
Remmie Arnold
Peter Braxton

Program Co-Chairs:
Nathan Honsowetz
Christina Snyder

Best Paper Co-Chairs:
Stacy Dean
Andrew Drennon

selected as the best paper from that track, then from those winners the best paper overall will be chosen.

Competition is sure to be stiff with abstracts from several previous Best Paper Overall winners having been accepted: 2014 winner Dr. **Christian Smart**, 2013 winner Dr. **Shu-Ping Hu**, and 2012 co-winner **Katherine Mann**.

The Best Paper Awards will be presented as part of the opening general session on Tuesday morning. We got feedback last year that the room in which the Best Paper was held was overcrowded, and that the concurrently-scheduled papers' attendance suffered. In response, after the award is announced, the Best Paper Overall will be rescheduled to an uncontested time slot in the general session room just before lunch on Wednesday.

Greg Cotten

Keynotes of Distinction

Following the Best Paper Awards on Tuesday morning will be the first of our keynote speakers, Retired Naval Commander **Greg Cotten**, the former Deputy Commander for Undersea Rescue with Submarine Squadron ELEVEN in San Diego. The ability to quickly respond to a submarine disaster anywhere in the world on short notice is a daunting challenge requiring a complex mixture of engineering, logistics, and personnel management. Greg will provide a brief history of submarine rescue, discuss the current status of the world's capability, and ultimately present the challenges of cost estimating and analysis required to deliver predominately fixed price contracts to submarine escape and rescue services.

Wednesday morning's keynote speaker, **Dennis Conner**, captained the Stars and Stripes in the America's Cup yacht race a total of six times: winning four and losing twice. While he has achieved great feats with the America's Cup, Dennis is also regarded as one of the best all-around sailors on the water. He has filled every position from bowman to helmsman and has competed in all sizes of boats, from the smallest one man dinghies, through two man Olympic classes to the largest ocean racing Maxi-Yachts. His experience organizing everything that is required for a race, from situating minute details

Dennis Conner

to leading a team of experts, is not unlike what our analysts, estimators, project and program managers go through every day.

Recognizing Outstanding Contributions

One of the more important endeavors ICEAA takes on every year is the Annual Association Awards program, designed to formally recognize outstanding individual contributions to the improvement of cost estimating that enhance the professional competence and achievements of our members. Nominations will be accepted until **April 10**:

The awards committee, chaired by **Joe Hamaker,** will review all nominations against the award criteria and the winners will be announced at the Workshop during Thursday morning's general session.

continued

2015 Professional Development & Training Workshop

June 9-12, 2015 | San Diego, CA

Paper Tracks:	Training Tracks
Parametrics	Cost Estimating Basic
Risk	Cost Estimating Advanced
Methods & Models	Parametrics
Government Processes	Integration
Software Estimating	
Program Management	

ICEAA Authors

Following the ICEAA Awards on Thursday morning will be a roundtable discussion featuring authors of published books on cost estimating and related topics. What sets these distinguished authors apart is that they are all active ICEAA members. The invited panelists include Ray Covert, Dan Galorath, Paul Garvey, Dan Nussbaum, Greg Mislick, and Dale Shermon. Moderated by Tim Anderson, the panel will discuss the entire publishing process from idea to hard cover, what it takes to get published, and what made the experience memorable for each of them. Look forward to an email in the coming weeks requesting your questions for the panel to help guide the discussion!

Strengthening ICEAA's Core

The Workshop is the time of the year when the most ICEAA members from around the world can be found in the same place at the same time. On Tuesday morning, we will be taking advantage of this opportunity by rolling out what we hope to be the first of many volunteer leadership orientation sessions. Whether you are an experienced chapter president or you've only recently been elected; whether you're a seasoned chapter board member or you're interested in exploring volunteer leadership, this will be a great chance to develop relationships with other members in your position, ask questions of the international office staff and board members, and gain a better understanding of the inner workings of the association. As ICEAA continues to grow and expand, it is more important than ever for us to establish a solid foundation, and our volunteer leaders are the cement that hold it all together.

Improving the Workshop Experience

The 2015 Workshop Committee has been hard at work since we first met in Denver last June to build upon the event's strengths, apply attendee feedback to make improvements, and truly make the ICEAA Professional Development & Training Workshop the premiere cost estimating and cost analysis workshop!

Register online at

www.iceaaonline.org/sd15

Tentative Schedule

Tuesday, June 9				
Breakfast buffet available			7:00	8:00
Welcome & Overview			7:45	8:00
Best Paper Awards			8:00	8:30
Greg Cotten			8:30	9:30
Volunteer Leadership Orientation	Exam Overview	Papers	9:45	10:30
Break			10:30	11:00
Volunteer Leadership Orientation	Training Welcome	Papers	11:00	11:45
Exhibitor Setup			*12:00*	*4:00*
Lunch			11:45	12:45
Training		Papers	12:45	1:30
		Papers	1:45	2:30
Break			2:30	3:00
Training		Papers	3:00	3:45
		Papers	4:00	4:45
Welcome Reception			4:45	7:00

Wednesday, June 10			
Breakfast buffet available		7:00	8:00
Welcome, day intro		7:45	8:00
Dennis Conner		8:00	9:00
Training	Papers	9:15	10:00
	Papers	10:15	11:00
Best Paper		11:15	12:00
Lunch		12:00	1:15
Training	Papers	1:15	2:00
	Papers	2:15	3:00
Refreshment Break		3:00	3:30
Training	Papers	3:30	4:15
	Papers	4:30	5:15
Networking Reception		5:15	7:00

Thursday, June 11			
Breakfast buffet available		7:00	8:00
Association Awards		7:30	8:30
Author Panel		8:30	9:30
Training	Papers	9:30	10:15
	Papers	10:30	11:15
Lunch		11:15	12:15
Training	Papers	12:15	1:00
	Papers	1:15	2:00
Break		2:00	2:30
Exhibitor Teardown		*2:45*	*5:00*
Training	Papers	2:30	3:15
	Papers	3:30	4:15
Training	Papers	4:30	5:15
			6:15
Free Evening			

Friday, June 12		
Continental Breakfast Available	8:00	9:00
Training day review, Q&A etc.	8:45	9:00
Training	9:00	10:30
Break	10:30	11:00
Training	11:00	12:30
Conference Ends		12:30

Association Awards

By Joe Hamaker

ICEAA provides many benefits to its members including education, handbooks, standards, certification, chapter workshops, an online library, the annual international workshop and many, many others. One of the more important endeavors of the Association is that of recognizing outstanding individual contributions to improve cost estimating and analysis in government and industry and to acknowledge those who enhance the professional competence and achievements of our members. ICEAA does this with its Annual Awards. Each year we follow a process which begins with you, as a member of the Association, nominating individuals that you believe have made outstanding contributions to our community of practice. The Award Committee, which I chair, will review all nominations against the award criteria and make selections. But none of that can happen until you make nominations. The nomination process is now open through **Friday, April 10**.

So I ask you, as a valued ICEAA member to consider those with whom you have worked and take the time to nominate one or more of your fellows for any of the awards for which you believe they should be considered. Remember the **April 10** deadline and please get those nominations in.

ICEAA Service Award: Uncommon and sustained volunteer service to the Association

Annual Achievement - Technical: Estimator making technical contributions to the profession

Annual Achievement – Management: Estimator making management contributions to the profession

Parametrician of the Year: Estimator with focus on parametric model building or estimating

Educator of the Year: Estimator making contributions to professional training

Lifetime Achievement Award : Lifetime accomplishments

Freiman Award: Lifetime accomplishments with focus on parametric cost analysis or estimating innovation

Read the judging criteria and submit your nomination at www.iceaaonline.com/awards

Beyond the Workshop

By Joe Wagner

Each year as the ICEAA Workshop moves around the country, attendees have the opportunity to dive into the life and attractions of some great places they may never have seen before. Just to date myself, I recall great evenings along the San Antonio River Walk (1999), the quiet roads and byways in the arts center of Sedona, Arizona (2002), the unique atmosphere of New Orleans (2007 and 2013), and the dubious excitement of a microburst that ripped the walls off of the hotel (St. Louis 2009) or the massive wildfires that blanket a city in smoke (Albuquerque 2011).

From June 9 to 12, 2015 we head once again for San Diego, California, where last we met in 2010, at which time I do not recall any dangers or disasters, but instead a wonderful week in a relaxed city bursting with new and interesting things to see and do. For this year, the first thing that caught my eye was the San Diego County Fair, which runs throughout the month of June, closed on Mondays.

Typical of most fairs, but on a grand scale, the San Diego County fair includes the usual animal exhibits and competitions, a "World of Horses" demonstration, auctions, and exhibits of fine art, photography, gems, and hobbies. It also contains the many rides and attractions as

well as food choices (the Krispy Kreme cheeseburger!!) you expect at a great county fair.

On June 6, the Saturday before the workshop, the Encinitas Wine Festival is held at the San Diego Botanic Gardens. You'll be able to sip beverages from over 20 wineries, breweries and other vendors, including food from a wide variety of local restaurants. There's also music from top local musicians, a large silent auction and raffle with over 5,000 items offered. Make a reservation early if you plan on this one, as it sells out every year.

Among the oldest (1888) landmarks of San Diego is the Hotel Del Coronado, located in Coronado, across the bay from San Diego and accessible by a quick trip over the Coronado Bridge. When it opened, it was the largest resort hotel in the world, and is still the second largest wooden structure in the United States. While you can certainly go over and see the hotel or have a meal in its dining rooms on your own, the best way to experience and learn is to take a walking tour of the property hosted by the Coronado Historical Association, which includes a knowledgeable docent who covers the entire hotel in about an hour and a quarter. There is a $15 charge for adults – under 12 are free.

Probably the largest and most well-known attraction in San Diego is Balboa Park. To give you some idea of the scale of this 1,200 acre site, it is home to over a dozen individual museums, as well as amusement rides, gardens, restaurants and the famed San Diego Zoo. Originally created for the 1915 Panama -California Exposition, associated with completion of the Panama Canal, to enjoy its attractions could occupy an entire vacation, so the best bet is probably to pick your favorite attractions and go for those.

San Diego County Fair

Finally, just to the north of downtown San Diego, across the San Diego River, lies the area of Mission Bay. A beautiful bay surrounded by golf courses, Mission Bay Park, and Sea World San Diego, this is also the location of a historic building associated with the founding of ICEAA and its predecessor organizations. On the far side of Mission Bay, at the intersection of Mission Boulevard and Pacific Beach Drive, stands the Catamaran Resort Hotel. No plaque or commemorative sign marks the spot, but it was at the Catamaran Resort, on January 5th, 1960, that the Industrial Estimating Society of San Diego (IESSD) held its first organizational dinner meeting and signed up 126 cost estimators to become the first professional association for systems cost estimators and analysts. The IESSD was the progenitor of the National Estimating Society (NES) which along with the Institute of Cost Analysis (ICA), the Society of Cost Estimating & Analysis (SCEA), and the International Society of Parametric Analysts (ISPA), led the way forward to our current organization of cost professionals – the International Cost Estimating & Analysis Association (ICEAA).


Balboa Park Gardens

Obviously, San Diego offers much more in the way of diversions, but central to your plans for the second week of June should be the Sheraton San Diego Hotel & Marina on Harbor Island, where we trust the 2015 ICEAA Workshop will also play the central role in your visit to San Diego.

Flexible Architecture and its Impact on the Life Cycle Cost of Air-to-Surface Munition Systems

By Captain Christopher Thomas

The following is a brief summary of a graduate thesis research project conducted at the Air Force Institute of Technology by members of the current Graduate Program in Cost Analysis. This summary exemplifies the educational program operated by the Air Force to enhance the professional skills and development of Air Force cost analysts.

The United States military is experiencing a twofold challenge. This challenge is defined by constrained resources and rapid improvement in adversarial tactics and technology. These tensions have bolstered the urgency for flexibility in the weapon systems we develop and acquire. This interest in flexibility represents a paradigm shift within the Department of Defense (DoD) as "Traditionally, complex DoD systems have been designed to deliver optimal performance within a narrow set of initial requirements and operating conditions."[i] The Air Force Research Laboratory (AFRL) Munitions Directorate is currently investigating the utility of flexibility in the air-to-surface munition domain and has designated the potential flexible weapon the GBU-X.[ii] This weapon may replace eleven legacy munition systems and address a variety of problematic characteristics demonstrated in the legacy inventory.

The legacy inventory of air-to-surface munitions can be segregated into two subsets: dumb bombs equipped with guidance kits and highly integrated weapons. The first subset is heavily reliant on mid-20th century technology, creates a large logistics footprint, and has difficulty accommodating the size restricted internal weapons bays of next generation fighter aircraft. The second subset incorporates twenty-first century technology, but exhibits a variety of shortcomings with respect to chemical and propulsion shelf life, technological upkeep, high unit costs, and system over-specification.[iii] Figure 1, below, depicts a traditional missile. This missile combines thrust, guidance, aerodynamics, and armament through the combination of tightly coupled, highly integrated subsystems to accurately engage a target.[iv]

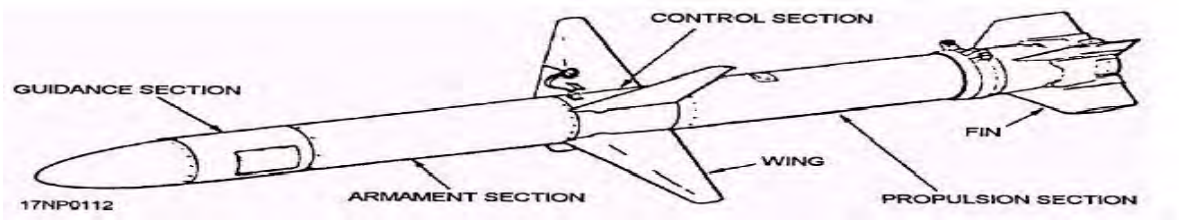

Figure 1: Traditional Highly Integrated Missile

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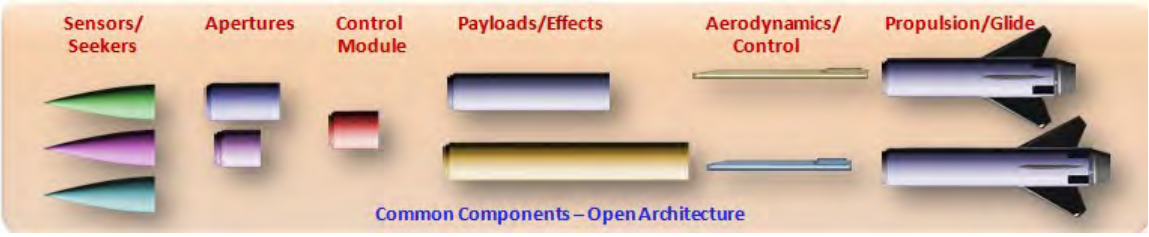


Figure 2: Hypothetical GBU-X Modular Design

The deficiencies exhibited in the current inventory of munitions have spurred an investigation into the development of the GBU-X. Under the GBU-X paradigm, the highly integrated munition depicted in Figure 1 will be replaced by the modular munition depicted in Figure 2. Open system architecture, or a modular design that employs consensus-based standards for key interfaces, would ideally enable the GBU-X to replace the interconnected subsystems within the legacy inventory with a variety of interchangeable modules. These modules should facilitate GBU-X modification in response to changes in mission requirements, threats, and technological breakthroughs in an affordable and expedient manner.

The GBU-X model represents a novel method of addressing the deficiencies present within the current air-to-surface munition inventory, but a comprehensive analysis is necessary to justify Air Force investment. A more informed understanding of the costs associated with the legacy inventory and proposed GBU-X is necessary to prove the feasibility of the GBU-X acquisition strategy. The focus of this Air Force Institute of Technology (AFIT) thesis research was developing a methodology that enables a cost comparison between the legacy inventory and GBU-X. During this research process, we characterized the cost of the legacy inventory, developed a rough order of magnitude cost estimate for the GBU-X, and compared the cost of the GBU-X to the current inventory.

Our first goal was capturing the Life Cycle Cost (LCC) of the eleven munitions that the GBU-X is likely to replace. These costs provided a baseline of comparison for the GBU-X. Preliminary analysis indicated that Operating & Support (O&S) costs account for a very limited proportion of the LCC of legacy munitions, and we focused our efforts solely on acquisition costs for this reason. DoD Selected Acquisition Reports provided the primary data source for development costs, while the average unit procurement costs (from FY97-FY13) depicted on the President's Annual Budget coupled with the inventory quantities and expenditures since the beginning of Operation Enduring Freedom were utilized to develop the procurement cost estimate for the inventory of legacy weapons. The combination of development and procurement costs for the legacy inventory of munitions summed to a total cost just below $25B (Base Year 2012).

The next step in the analysis called for the development of a GBU-X cost estimate. We assumed that every unique subsystem within the legacy inventory would have to be present as a GBU-X module if the GBU-X is to replace all the mission capabilities of the current inventory. For this reason, our GBU-X cost estimate included Work Breakdown Structure (WBS) elements for two propulsion modules, three warhead modules, three seeker modules, and one INS/GPS module. *The 2011 Missile Systems Sufficiency Review Handbook* [vii] (MSSR) provided an indispensable data source for the development of the GBU-X acquisition cost estimate as it contains cost data on 52 munition programs, broken-down by WBS element. The costs associated with the legacy subsystems of interest in the MSSR were used as analogies for the GBU-X modules, and we developed three separate ranges and distributions of costs associated with each GBU-X WBS element to account for varying degrees of risk and

continued

uncertainty in the GBU-X cost estimate. We summed the distributions of GBU-X WBS costs in a 10,000 iteration Monte Carlo simulation to develop a range of GBU-X cost estimates. Table 1 illustrates the mean cost estimate for the three separate GBU-X cost estimates, ordered from least to most conservative.

Table 1 illustrates that the estimated cost of the GBU-X compares favorably to the cost of the legacy inventory of munitions. This estimate incorporated a variety of simplifying assumptions that may turn out false. One of these assumptions stated that the added flexibility inherent in the GBU-X would reduce the necessary inventory levels to half that of the current inventory. This GBU-X estimate was highly sensitive to this assumption, and as GBU-X inventory replacement levels rose to match the current inventory, the increased acquisition cost associated with the GBU-X reduced its feasibility. The GBU-X outperformed the legacy inventory in all scenarios where we assumed that initial GBU-X production would replace 70 percent or less of the legacy inventory. Once initial inventory levels of the GBU-X increased to above 70 percent of the legacy inventory, the legacy model became the preferred acquisition strategy.

	Mean Estimated GBU-X Cost (BY 12, $K)		
	Low	Medium	High
RDT&E	$1,807,455	$2,689,731	$3,473,022
Nonrecurring Production	$923,204	$932,605	$1,174,365
Recurring Production	$15,290,470	$16,713,986	$23,355,532
Total Acquisition Estimate	$18,021,129	$20,336,322	$28,002,919

Table 1: Mean GBU-X Acquisition Cost Estimates

[i] Wortman, Marty, Barry Boehm, Dave Jacques, Tom Housel, Kevin Sullivan, and Paul Collopy. *RT-18: Value of Flexibility Phase 1 Progress Report*. Rep. no. ERC-2010-TR-010. N.p.: n.p., n.d. Print. Systems Engineering Research Center.

[ii] Rose, Leo. *Flexible Weapon Brief to AFIT*. Product of Air Force Research Laboratory, AFIT, WPAFB. 16 April 2014. PowerPoint.

[iii] Ibid.

[iv] Newdick, Thomas. *Postwar Air Weapons: 1945-present*. London: Amber, 2011. Print.

[v] OSDAD, Office of the Deputy Assistant Secretary of Defense. "DoD Systems Engineering - Initiatives." *DoD Systems Engineering - Initiatives*. N.p., n.d. Web. Dec. 2014.

[vi] Rose, Leo. *Flexible Weapon Brief to AFIT*. Product of Air Force Research Laboratory, AFIT, WPAFB. 16 April 2014. PowerPoint.

[vii] McDowell, Jeff, Tom Parr, Rod Troyanowski, and Karen Jacobs. *MISSILE SYSTEMS SUFFICIENCY Review Handbook*. Rep. no. CR-1461/2. N.p.: n.p., 2011. Print.

Air Force Institute of Technology (AFIT)

By LTC Dan Ritschel

It has been an exciting few months for the graduate Cost Analysis Program at the Air Force Institute of Technology (AFIT). On November 17, 2014, AFIT hosted the Honorable Lisa Disbrow (SAF/FM) during her visit to Wright Patterson AFB. Ms. Disbrow, accompanied by Ms. Watern (SAF/FMC), Mr. Herrera (SAF/FMP), and BGEN Pletcher (AFMC/FM), spoke to an audience of 20 military and civilian students who are currently pursuing a Master of Science degree in Cost Analysis at AFIT. Ms. Disbrow discussed the top Air Force acquisition priorities and the increasing importance of credible cost estimates for decision support. Seven of our AFIT cost students then took the stage to discuss their on-going research efforts. It was an awesome experience for our young cost professionals.

In late February, the AFIT Cost Program renewed our strong ties with the Greater Dayton ICEAA Chapter. For the fourth year in a row, the Greater Dayton ICEAA chapter hosted two graduating students to present their research. **Capt Greg Brown's** research on time-phasing aircraft development expenditures using Rayleigh, Weibull, and Beta curves was sponsored locally by the AF Life Cycle Management Center (LCMC). His excel based model is already being tested by LCMC cost staff and received great feedback from the ICEAA audience. **Capt Justin Moore's** research on learning curves in airframe cost estimating was also sponsored by LCMC. His research demonstrated the potential for more accurate estimating and the importance of correctly modeling the manufacturing environment. Having the opportunity to discuss these efforts with 40+ members of the cost community was immensely valuable in furthering their research. Thanks to Mr. **Tom Woltman** (ICEAA Dayton Chapter President) for making this happen!

Captain Greg Brown (top) and Captain Justin Moore (bottom), AFIT graduate students in cost analysis, describe their research projects that were briefed to the Dayton ICEAA chapter.

Society for Cost Analysis & Forecasting (SCAF): Costing News from the UK

by Dale Shermon, SCAF Chairman

A wish to all for a successful 2015 from SCAF in the UK. I trust that the membership in the northern climes are enjoying the winter, and looking forward to a spring someday.

Well, like all of you I am sure, the SCAF committee is hard at work. On January 6th, we had our first meeting and continued to plan for the coming year of SCAF professional activity. My first duty was to update the committee with our progress on developing the memorandum of understanding (MOU) between SCAF and the Association of Cost Engineers (ACostE). For those of you not familiar with ACostE, it is an organization in the UK which represents the professional interests of those with responsibility for the prediction, planning and control of resources and the cost of activities that involve engineering, manufacturing, and construction. You will recall that we recently signed a MOU with the International Cost Estimating and Analysis Association (ICEAA). Well, as you can see from the picture of myself and Alan Barltrop, President of ACostE, this has now been followed by signing of the same MOU with the ACostE. Why? Because we wish to provide more value for our members.

The goals of the cooperation between SCAF and ACostE as well as ICEAA are:

1. To share, to elaborate, and to develop analysis methodologies in the area of cost engineering.
2. To facilitate professional networking opportunities between SCAF and ACostE / ICEAA memberships.
3. To promote and to develop educational programs in the area of cost engineering.

The MOU will be reviewed by all parties each year. We believe that it will bring network meetings, seminars, educational programs, and other relevant activities to the attention of SCAF members. To this end, once a year SCAF and ACostE / ICEAA will jointly organize a seminar on a theme of mutual interest. We are looking forward to working with both the ACostE and ICEAA.

Over the Christmas holiday I started the SCAF awards assessment. The SCAF committee will be reviewing the newsletter articles and presentations for last previous year and judging them against our SCAF award to be presented in July. Don't forget to send Arthur Griffith (Editor) your newsletter articles and Neil Morrill (SCAF Secretary) your presentation ideas. Who knows - you could be receiving an award?

We look forward to seeing you all at the SCAF events throughout 2015. Have a successful and prosperous New Year.

Australia Region Report

By Tracey Clavell, ICEAA Canberra

2014 was a successful year of growth and exciting events. With this in mind, planning for the Canberra events this year is well underway:

- March 31 – Russel offices – PCAT Costing tool - 3-5pm
- May – KPMG Offices – Topic TBC
- July – Russel Offices - possible lunch time presentation
- September – BAE Offices – Topic TBC
- November – Membership social

Adelaide events are still work in progress but as discussed with the membership last year we will be aiming for 3 events:

- After Easter – venue somewhere in town – ASC costing tool
- August – TBC
- November – TBC

Please feel free to contact any board members if you have any suggestions for topics, speakers, or venues. We would be very interested in hearing about and innovative estimating approaches you have undertaken in the recent past.

The board is continuing to drive a calendar of interesting topics and speakers for the events this year. We would like to hear more feedback from the membership to ensure we are hitting the mark.

U.K. Region Report

By Andy Nicholls, U.K. Region Director

Upcoming Events:

There are no specific UK ICEAA events this year. However some ICEAA members will be attending SCAF Events in Bristol and around the UK. I have no further news concerning the planning for the international conference.

Member Outreach:

Since my last report in the fall 2014 issue of ICEAA World, I have met and spoken with a number of people who were not yet members and who deliver cost estimates as the main part of their day job. I always encourage such professionals to consider membership in ICEAA. Usually as part of training delivered, my employer offers a one year membership to students who have not been previous members of ICEAA. Because the training schedules have been light over the past 6 months, no new members have entered by this route.

I receive several enquiries from both members and non-members about access to data and historic papers from conferences, my reply is usually to join up (to the non-members) and take a look at the ICEAA web site section covering previous conferences. For the fall 2015 issue of ICEAA World, I would like to have a short section describing what kinds of data is offered to the membership and the conditions surrounding access and use.

Member Recognition:

There has been nothing outstanding to report in this category. UK MoD CAAS staff recently took the CCE/A examinations and most people I spoke to indicated that the examination was a real test of their abilities. I wish all those who sat a successful outcome.

Last year at this time I was driving into work through flood water sometimes 2 feet deep. This winter there has been almost no snow and no flooding and January has passed as one the warmest on local record. I had a short spell of duty in Philadelphia in late January where a few inches of fallen snow persuaded me it was winter and on a Sunday afternoon the sunshine allowed me to enjoy the town and architecture of Princeton University – it almost made me wish I was a student again!!

Region 5 Report

By Mike Doherty, Region 5 Director

I would first like to thank the Northwest Chapter out going officers for their dedication and work during the 2013-2014 term. Congratulations are also in order for the new Northwest Chapter officers!

The new group of officers has gotten off to a quick start by holding its initial Chapter meeting in January, where all of the officers got a chance to meet one another and review the Chapter's By-Laws and Constitution. This new team then held a half day get together and is planning several activities which you can check out in the Northwest Chapter article.

The Rocky Mountain Chapter which is led by **John Fasciani** (President) is working with his officers to plan several activities this year. John has also reached out to Justin Woulfe the current President of the Pikes Peak Chapter to explore holding future joint activities and or workshops.

This spring all the Chapters in Region 5 are also reaching out to the at large members within their area and encouraging them to select a Region 5 Chapter preference. This will ensure that these ICEAA members stay up-to-date on local ICEAA events and activities.

ICEAA Northwest Chapter 2013-2014 Board of Directors:

President	**Spencer Comert**
Vice-President	**Christian Petrini**
Secretary	**Dave Padineant**
Treasurer	**Cheryl Wilson**
Education Chair:	**Stacy Dean**
Fundraising Chair:	**Shawn Mahoney**

ICEAA Northwest Chapter 2015-2016 Board of Directors:

President:	**Stacy Dean** stacy.m.dean@boeing.com
Vice-President:	**Rod Olin** rodney.p.olin@boeing.com
Secretary:	**Chad Larson** chad.m.larson@boeing.com
Treasurer:	**Jim Deignan** james.r.deignan@boeing.com
Education Chair:	**David Torgerson** david.k.torgerson@boeing.com
Fundraising Chair:	**Cheryl Wilson** cheryl.r.wilson@boeing.com

Northwest Chapter Report

Recent Developments from ICEAA Northwest / Washington Chapter

NW Chapter Officer Elections
By Stacy Dean

The NW Chapter just completed its 6th election term in January of 2015. With the election results finalized the new board 2015-2016 is as follows:

The chapter is greatly appreciative of the support and efforts of the 2014 Election Committee: **Mike Doherty, Darren Du, Sarah Cabezas, Jeani Comert, and Katherine Coyle**. The election committee did an outstanding job getting the word out to potential candidates and conducting the elections. Additionally a very special thanks to the **David Padineant** (2013-2014 NW Chapter secretary) in his exceptional coordination of the overall election process.

NW Chapter Officer activities!
By Stacy Dean

The new officers are in the process of familiarizing themselves with their new roles, as well as the

continued

Chapter's previous accomplishments and activities. Each member is energized in exploring new and beneficial opportunities to provide the NW Chapter members. The officers are currently focused on goal setting for the next 2 years. Specific area of focus include:

- Expanding the chapter's member base through increased outreach activities and communication
- Building and improving upon the chapter's educational/training offerings
- Deploying an accelerated certification preparation course
- Exploring fun networking opportunities for the members
- Seeking new fundraising opportunities

The NW Chapter officers are committed to providing beneficial activities and opportunities for Chapter members. As a result, feedback from the members is not only welcome but highly desired. Want to get involved or have an idea? Please feel free to contact any of the Chapter officers, or attend our monthly officer meetings. Officer meetings are scheduled the 4th Wednesday of each month and are open to all members. Time and location are posted on the Chapter's website as well as sent to all members monthly.

NW Chapter 2014 Year End Event

By Cheryl Wilson

ICEAA NW held our second end of the year event on December 18th, 2014. The past two years we have sponsored a wonderful time at The Pyramid Alehouse in Seattle with game tables, a silent auction, a buffet style meal and a guest speaker.

This year our speaker was Jim Hayes (Chief Estimator of the Boeing Commercial Division) who shared some of his experiences as an estimator, and his views on important skill development areas for a career in estimating. He highlighted ICEAA as a valuable educational resource in parametric estimating techniques and noted the significance of mastery of these techniques in the field of Estimating. The NW members enjoyed this opportunity to network at a relaxed and fun venue.

Fundraising:

By Cheryl Wilson

As part of our end of the year event we have incorporated a silent auction for entertainment as well as for a fundraising opportunity. This year we made over $500.00 from the silent auction. Along with the silent auction the NW Chapter is brainstorming new ways of raising funds. The Chapter's fundraising is a key activity to ensure we are able to hold educational and networking events for our members. This year the chapter is planning on sponsoring at least 4 networking events, educational workshops and have many potential educational ideas.

NW Chapter Officers' workshop

By Rod Olin

We held a half-day offsite workshop on Valentines' Day (Yes, we are THAT dedicated), to delve into the areas of training, growth, and member involvement. The workshop allowed us to explore those areas with an eye toward determining exactly what we want to do, and how to do it. In the end, we came away with the beginnings of a solid foundation for conducting the Chapter administrative functions as well as plans for desired events and activities for the next 2 years.

Lunch & Learn workshop

By David Torgerson

The NW Chapter of ICEAA held a virtual lunch and learn presentation on March 4 for all Estimating and Pricing and Procurement Finance Analyst employees of Boeing in the Puget Sound area. The purpose was to introduce ICEAA the new NW Chapter Officers as well as give an overview of the professional certification offered by ICEAA, The Certified Cost Estimating/Analysis (CCEA®). The discussion centered on the CCEA®, study support available, testable topics and eligibility, and the examination. In addition, the application process to join ICEAA was reviewed as well as the ICEAA website and related links. The NW Chapter was pleased to conduct this informational session and were thankful for the good turnout.

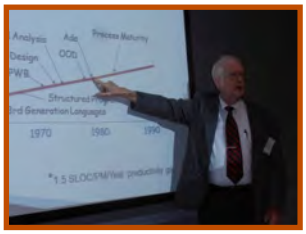
Region Seven News

Southern California and San Diego Chapters

By Kurt Brunner, SoCal Chapter President and Region 7 Director; Omar Mahmoud, San Diego Chapter President; and Quentin Redman, SoCal Chapter Vice-President

Edward Burnett

Wayne Wright



Randy Jensen

Joe Hamaker

Melissa Winter

The Southern California (SoCal) Chapter of ICEAA Region 7 successfully conducted a winter workshop on December 17, 2014 at Lockheed Martin in El Segundo, California, which was well attended and very highly rated by the many attendees. Opening remarks were given by **Edward Burnett,** Senior Fellow from Lockheed Martin Aeronautics Company, who welcomed us to the facility, there were terrific presentations from **Wayne Wright**, a senior value engineer at Lockheed Martin Aeronautics Company; who spoke on *Estimating Prototype Air Vehicle Development Costs at the Skunk Works",* Dr. **Randy Jensen**, a software consultant, speaking on improved software development productivity, and Dr. **Joe Hamaker**, a senior cost analyst at Galorath Inc. speaking on parametric analysis. Over lunch and through the afternoon, there were presentations by **Melissa Winter** from PRICE Systems (*"Data Analysis In Support Of Defensible Estimates"*), **Doug Howarth** of MEE, Inc. (*"Aiming and Missing In Multiple Dimensions"*), and Dr. **Christopher Rush** of Galorath (**"***Continuous Fiber Composite Part Cost vs Production Volume By Manufacturing Process and Material"*).

Kurt Brunner

Quentin Redman

Omar Mahmoud

Doug Howarth

Now that the winter workshop is completed, naturally we are working on a dynamite Southern California Chapter Spring 2015 workshop. It will be held **18 March 2015** at beautiful Fort MacArthur in San Pedro, California. Currently the agenda includes:

Christian Smart, Ph.D., Director of Cost Estimating and Analysis, Missile Defense Agency; *"Bayesian Parametrics: Developing a CER with Limited Data and Even Without Data"* [Best Overall Paper at the 2014 Annual ICEAA Workshop]

Bob Hunt, President, Galorath Federal; *"Cost Estimation using Story Points"*

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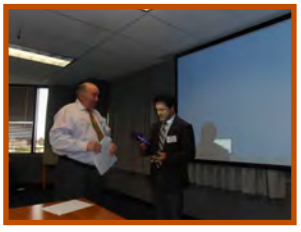

Kurt Brunner (L) and Christopher Rush (R)

December Workshop Attendees

Tom Harwick, Engineering Specialist in Concept and Preliminary Design Cost Models, Northrop Grumman; *"Multi-Discipline Design Analysis & Optimization (MDAO) 2014"*

Kent Joris, Chief Technology Officer, MEE LCC; Cost Estimating Body of Knowledge (CEBoK) Training Topic: *"Earned Value Management (EVM)"*

Bob Becker, V.P. Business Development, PRICE Systems LLC; *"Cost Management Implementation At U.S. Army PRO STRI"*

David Graham, Independent Consultant, Salient Federal Solutions; "*Two Complementary EVM Cost-Risk Tools"*

Typically we have 80 to 100 attendees from across the nation (and also from overseas) that participate in these no cost, daylong events. These forums have consistently drawn a huge cross section of the cost analysis and parametric community while presenting the latest concepts and techniques, and have produced animated and enthusiastic dialogues and great interest in the topics discussed. We look forward to seeing you at the next workshop!

Looking beyond our spring event, the Fall 2015 SoCal workshop promises to continue this tradition! It's scheduled for **16 September 2015** at Aerospace in El Segundo, California, and many dynamic speakers are already enlisted. This promises to be another exciting event, so start your planning now!

At the conclusion of our ICEAA Southern California workshops, and as an incentive to stay until the last presentation is complete, a membership drawing is held. Our Membership Chair, **Steve Sterk**, is always on hand with a selection of great gifts for the drawing – "winner must be present".

SoCal workshop agendas are available to all ICEAA members, are emailed to previous workshop attendees, and they contain registration information, a location map, and driving instructions. The agenda is also posted on the ICEAA Southern California website. As always, our workshops are free. Stay tuned!

If you would like a copy of previous workshop briefings please go to the ICEAA website. All available presentations are loaded on the web site immediately following the meeting. If you have any questions about the presentations please feel free to contact the ICEAA Southern California Board of Directors or the ICEAA office.

Our focus is always to "Advance, encourage, promote and enhance the profession of cost estimating and analysis through the use of

continued

Questions? Contact the following for questions on:

Hosting or presenting at a SoCal workshop:
Kurt Brunner: kurt.r.brunner@leidos.com (310) 524-3151 or
Quentin Redman: quentin.redman@pricesystems.com (310) 692-5926

Membership Status: Steve Sterk: steve.a.sterk@nasa.gov (661) 276-2377
Or you can always reach out to the ICEAA office at
iceaa@iceaaonline.org or (703) 938-5090.

View upcoming SoCal Chapter workshop agendas or download previous workshop briefings at:
www.iceaaonline.com/chapters/socal

ICEAA Southern California Chapter Board of Directors:
January 1, 2015 - December 31, 2016

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Secretary	**Sheona Whitwer**
Director of Membership	**Sam Toas**

parametrics and other data-driven techniques for use by the membership as well as the general public". The ICEAA Region 7 chapters of Southern California and San Diego will continue to offer workshops that include a notable and diverse group of extraordinary speakers, training sessions, cutting edge topics, and knowledgeable attendees that are fully entertained and engaged.

We would like to thank the chapter board for their tireless teamwork in making the SoCal workshops a great success, as well as all the members and participants for their support over the years. We look forward to seeing you at the next workshop!

The San Diego Chapter has been holding regular webinars and early evening get-togethers. It will be holding nominations this coming November for the 2015 San Diego Chapter Senior and Junior Cost Estimator/Analyst of the Year. Additionally, the San Diego Chapter is planning a joint ICEAA/AACE event. More details will be available soon.

December 17, 2014 SoCal Workshop Attendees

Baltimore Chapter Report

By Asha Dachepalli, Baltimore Chapter President

The Baltimore Chapter conducted a series of Risk Webinars during the last half of 2014. The purpose of these webinars was to inform and educate cost professionals of some of the tools and applications available to conduct risk analyses. The Baltimore Chapter was pleased to host the vendors listed here to explain the capabilities of their software tools:

The series was successful and included widespread participation from members and non-members in the Baltimore, DC, and Virginia areas. We ended the year with a holiday social to meet, greet, and be merry with our fellow Chapter members!

ICEAA Baltimore Chapter Risk Webinar Series

Quantitative Solutions Management, Inc. (QSM) presentation on SLIM software (August 2014)

Tecolote Research, Inc. presentation on ACEIT's RI$K module (September 2014)

Galorath presentation on SEER software (December 2014)

PRICE Systems presentation on TruePlanning software (December 2014)

Detroit Chapter Report

By David A. Holm, Detroit Chapter President

One of the guiding principles that motivates the newly activated Detroit ICEAA chapter is the concept of bridging the divide between the government-oriented membership, in the form of costing staff from the US Army Tank Automotive Command (TACOM) and those who work with the private industrial firms that build civilian vehicles in the Detroit area. On January 22, 2015 Detroit chapter President **David Holm** initiated an effort to bring these related but distinct groups together by giving a presentation on TACOM Cost Management Activities to the Cost Engineering and Purchasing teams of the Chrysler/Fiat Corporation at the Chrysler/Fiat Headquarters in Auburn Hills, Michigan. The presentation was another step in trying to share techniques between the government and automotive sectors and look for areas of collaboration.

Reflecting the energy level among Detroit chapter members in terms of their professional development, five of them sat for the ICEAA certification exam on Feb18, 2015. This was the first certification exam event since the Chapter was reestablished in 2013.

TACOM Director of Cost David Holm briefs government costing to Chrysler/Fiat cost staff

Central Virginia Chapter Report

By Tucker Moore, Central Virginia Chapter President

Warm Greetings from the Central Virginia Chapter! Attention interested members, it's time to vote! The chapter has experienced several recent personnel transitions from our leadership board. This, along with the end of the two-year term cycle for our board members, means that it's time to vote for a new board. We will be holding elections in the month of March to identify a new President, Vice President, Treasurer, and Secretary. If you are interested in holding a leadership position, please contact Chapter President **Tucker Moore** at tucker.s.moore@leidos.com for more information. To be considered for a leadership position, you must be in good standing as an ICEAA member. Once the ballot has been constructed, the voting will take place via a secure web-based service (to be determined). Remember, the Central Virginia Chapter primarily serves the Quantico, Stafford, Dahlgren, Richmond, and Charlottesville, Virginia areas; however, we're open to any and all interested members and participants. We're always looking for new members, and we're excited for a reinvigoration of support and participation during 2015. We look forward to meeting you at our next chapter event.

Certification Congratulations

ICEAA would like to acknowledge both those who volunteer their time to proctor the Certification Examination and those who achieve certification. Without CCEA® certified proctors to manage exam administration, ICEAA would be unable to offer the exam in so many locations throughout the year. If you are CCEA® certified and would like to proctor an exam in your area in exchange for points toward recertification, please contact the ICEAA International Business office.

Thanks go out to following individuals for volunteering their time to proctor the certification exam between October 2014 and January 2015: **Daniel Garcia, Chris Caldes, Edward Kobilarcik, Richard Osseck, Gary Hill, John Reddy,** and **Antony March**.

CCEA® Achievers:

Shannon Adams
Department of National Defence (Canada)

Peter Bedard
Booz Allen Hamilton

Samuel Cartwright
UK MOD

Andrew Davies
UK MOD

Jason Ford
Boeing

Vrenti Ghergari
Department of National Defence (Canada)

Kevin Hewitt
Huntington-Ingalls Industries - Newport News Shipbuilding

Peter Iburg
Department of National Defence (Canada)

Michael Johns
UK MOD

Craig Reineck
Deloitte

Eric Wishon
Huntington-Ingalls Industries - Newport News Shipbuilding

Julia Wu
Tecolote Research, Inc.

PCEA® Achievers/CCEA® Eligible:

Betsy Gibson
Technomics, Inc.

Jack Bruce
UK MOD

Cassandra Capots
ICF International

Eric Cohen
Technomics, Inc.

Richard Jenkins
UK MOD

Matthew McNally
UK MOD

Thomas Parish
UK MOD

Francis Santiago-Merced
United States Navy

Jamie Welch
UK MOD

PCEA® Achievers:

Betsy Gibson
Technomics, Inc.

Samantha Sparks
Deloitte

Re-certified CCEAs:

Sabrina Bean

Gregory Brink

John Deem

Mike Fuller

Daniel Garcia

Mike Ipsaro

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Participation Status

☐ ICEAA Member ☐ First time attendee

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Job Position Category

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Email us for information on passes for guests to attend meals but not workshop sessions.

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Cancellations received before May 27, 2015 will be issued a full refund less a $100 processing fee.
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