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The Top 10 Reasons
To Join AACE International

Ready to advance your career and begin enjoying the advantages that our members enjoy? Whether you are an experienced cost engineer or a student, we have a membership ready for you.

1 Time
Gain access to a wealth of resources that will save you time and money! You’ll stay informed about the complexities of the cost and management profession - plus you’ll have access to discounts on educational programs, publications, and more!

2 Information
Locate thousands of technical papers and publications in the Virtual Library. AACE’s database is keyword searchable for quickly locating appropriate reference articles.

3 Career
Members can post resumes at no additional cost in our Career Center and keep your career on track through information sources such as our annual Salary and Demographic Survey of Project and Cost Professionals.

4 Learning
We offer numerous online learning courses on estimating and project management. The Approved Educational Provider program helps maintain high quality development courses and providers. AACE also holds many seminars throughout the year.

5 Resources
Starting with the TCM Framework and Recommended Practices that are available for free only to members to our bi-monthly publication Cost Engineering featuring articles for cost professionals around the world. Through the AACE International website, the Cost Engineering journal is a great current resource for members and as a member, you gain access to an archive of past issues.

6 Technical Development
Increase your knowledge and expertise by joining one of AACE International’s many technical subcommittees, subcommittees, and Special Interest Groups (SIGs) at no additional cost to members. Discuss industry problems with your peers or help experts develop new and improved techniques and practices for the profession.

7 Networking
By attending a local section or our Annual Conference & Expo for interesting speakers, informational tours, social dinners and much more. The online Membership Directory is an excellent source for a list of contact information on thousands of members. Join one of our many technical subcommittees and participate in the AACE Forums - a great way to tap into the collective wisdom and experience of our world-wide membership.

8 Excellence
Our certification programs are independently accredited by the Council of Engineering & Scientific Specialty Boards. AACE certifications are a recognized credible standard in the cost management field. A recent study shows that individuals with an AACE Certification earn 17.4% more than their counterpart without a certificate.

9 Discounts
On products and services ranging from AACE International Conference & Expo registration fees, archived webinars and presentations, certification examination registrations, and more!

10 You!
We are your professional partner bringing you information and support you can trust. Join and become part of a unique network of individuals who are dedicated to improving the cost and management profession.

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“Parrhesia” first appears in Greek literature in 407 BC, and is a word used to describe the practice of speaking the truth, with connotations of candor, frankness, and boldness. Etymologically, it means “to say everything”, and implies an act of courage.

The dynamics of truth and consequences exist in our daily lives, and in the project profession. In project controls, there is a push and pull between a) the daily routine of data management and reporting, and b) critical analysis of the data. Frankness, truth-telling, and criticism of the status quo can be said to be part of our duty and ethical obligation as project controls professionals, adding value to our services beyond just wrangling data into a usable format. However, project and organizational politics tend to problematize truth in reporting, when the report is not favorable. Power and cliques may work to suppress open dialogue, even to the extent of denying the truth; those who speak up may be penalized and ostracized. Gaining the right to provide independent, honest feedback and analysis then requires winning support from a stakeholder champion, and strength in numbers. I enjoy a certain amount of privilege as an auditor, wherein I am expected to offer independent critique. The term ‘speaks truth to power’ is one I had never before heard until recently, when it was used to describe me. I find it to be entirely appropriate and accurate, yet it causes me some dismay. How many of us are truly in a position to flex the entirety of our skills as project controls professionals and quantity surveyors, with a definitive impact on project actions and outcomes?

As members of AACE International, we are already entitled to what the ancient Greeks called “isegoria”. That is, freedom of speech as equal citizens (members), to participate in public, democratic debate. This, we do. AACE International would not exist without the contributions of its members and passionate participation. I hold that it is every member’s duty and obligation to contribute to AACE International, by attending section events and the annual conference, helping to write and offering honest public critique of draft recommended practices, authoring technical articles for publication and presentation, and actively engaging in the debate by serving on committees, task forces, local section boards, associate boards, and board of directors.

However, isegoria is not enough. I encourage you to also embrace parrhesia. Connect one-on-one with the leaders of AACE International and tell us where we need to improve. It does the association no good to remain static, while the world around us progresses; we need to continually evolve and respond, to best serve our members and our profession. And, to do that, we need your honest input and guidance.

You know how to reach me.

If you would like to contact our current president with questions or comments about The President’s Message please address your e-mail to president@aacei.org. To engage in other discussions, check out AACE International’s online Communities at communities.aacei.org.

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1 Oxford English Dictionary
2 The Greek roots are pan = all, and rhesis = speech
Why Create a Basis Document for your Project Schedule?

BY STEPHEN P. WARHOE, PHD, PE CCP CFCC

INTRODUCTION

After analyzing many schedules for delay on construction projects over the past few decades, I find that it can be argued that no two planners or schedulers are exactly alike in their thinking on how to create a project schedule. It can be further argued that no two projects can be exactly the same, given the multiple characteristics and influences that can and do affect the outcomes of each. Therefore, a project’s schedule is a management tool that is unique to any other schedule, and as projects become more complex, so do their schedules.

Unfortunately, as sometimes happens, there are scope changes and disputes between the project’s contractor and owner concerning delays and other issues that affect the project schedule.

THE ROLE OF THE SCHEDULE

Generally, the project schedule represents the contractor’s plan on how its scope of work will be sequenced and performed over a specified period of time. Usually, as the fulfillment of a requirement of the contract between the owner and contractor, the contractor creates a detailed project schedule. One of the primary reasons that an owner usually requires a project schedule is that it communicates the contractor’s plan to execute a scope of work. Often, the schedule will include milestones by which the owner’s or other stakeholder’s input is required before the contractor can continue; e.g., design reviews and inspections. The contractor’s project schedule helps the owner plan its own allocation of resources, whether it be staffing, financing, or other resources needed to meet its obligation to complete the project without significantly hindering the contractor’s progress. Also, the project schedule allows the owner to independently track the contractor’s progress to understand what the contractor foresees are the project’s near-term and longer-term challenges.

One of the other advantages of having a detailed schedule for both, the owner and contractor, is that it provides a starting point from which to incorporate scope changes and the delays that may occur to the project as a result. A well prepared and maintained project schedule can help eliminate a lot of tension and disputes between the owner and contractor concerning causes and responsibility for delay impacts by the time the project is completed.

THE SCHEDULE BASIS DOCUMENT

Although the contractor creates the project schedule based on an understanding of its own means, methods, resource availability, etc., the owner normally has the right to review (not revise) the schedule to understand the contractor’s strategy on how it intends to execute its work. As part of the owner’s schedule review process early in the project, the contractor is typically expected to explain to the owner the bases by which the project plan was created, including the planning and schedule creation decisions that were made. Allowing the owner to understand the bases used to create and maintain the project schedule, will help reduce any future anxiety concerning what may appear as questionable planning or scheduling techniques.

It is becoming more of a common practice that the bases on which a schedule was created are documented by the contractor and shared with the owner. Providing a Basis of Estimate (BOE) has become a more common practice, but the premise behind the need for an estimate’s basis document is the same for the project schedule. Concerning the creation of a schedule basis document, AACE has published a Recommended Practice (RP 38R-06, Documenting the Schedule Basis) that provides a lot of insight and discussion on what should be included in a schedule basis document, and why the inclusion of this information is important to the project stakeholders, including the contractor and owner.

The schedule basis document should provide discussion on many of the decisions made by the contractor as it created the project schedule. According to RP 38R-06, in addition to a discussion of its execution strategy, there are many aspects of the schedule bases that should be addressed. When creating a schedule basis document, the following aspects of the schedule should be considered:
The Peru Section will host its 6th Cost Engineering Congress at Lima Peru on Oct. 19-20. The theme is “Project Profitability,” and the conference will be at the Auditorio Sociedad Nacional de Industrias, Los Laureles 365, San Isidro – Lima Peru. The 6th edition of the Congress is organized by the Peru Section. The Congress will address cost competitiveness by world class companies using cost engineering tools and techniques. The 6th Congress will have renown national and international speakers, who will share their knowledge and experience in total cost management. Speakers will include: Jim Zack, Nelson Bonilla, Calvin Speight, Mark Sanders, Luis Miralles, Gustavo Vinueza, Danilo Arba, Alder Caceres, and Rodolfo Stonner. For additional information, please contact: presidente@aacei.org.pe or Carlos.daga@aacei.org.pe or david.chigne@aacei.org.pe

THE VALUE OF A SCHEDULE BASIS DOCUMENT WHEN THERE IS A DISPUTE
As a delay analyst, one of my first tasks on a project in which there are disputed delays, is to review the contractor’s baseline and update schedules. My clients pay me to provide an opinion on why delays occurred, and which party is responsible based on the information that is provided to me. Therefore, I need to not only understand the dynamics of the schedule (how the schedule works), but also understand why it was built the way it was. My understanding of the schedule is to the benefit of the contractor as much as it is to the owner. Without a basis document, I can only surmise, based on my experience and maybe other available documentation, why questionable aspects of the schedule were created the way they were. I may be right, but I may be wrong with my assumptions on how durations were determined, why certain logic ties were created, why a certain scope of work was or was not incorporated into the schedule, etc.

CONCLUSION
One of the most common causes of disputes on construction project results from poor communication between stakeholders. Because the project schedule is a communication tool, a poorly documented schedule without documented bases written early in the project, can easily be the foundation for anxiety and disputes later in the project. When the parties of a disputed project have hundreds of thousands or hundreds of millions of dollars at stake with respect to assigning delay damages, creating a basis document for the schedule seems like a minor insurance policy.

Editor’s Note: This is part of a continuing series of short articles provided by members of the AACE International Technical Board.

PERU SECTION HOSTING
6th Cost Engineering Congress Oct. 19-20

The Peru Section will host its 6th Cost Engineering Congress at Lima Peru on Oct. 19-20. The theme is “Project Profitability,” and the conference will be at the Auditorio Sociedad Nacional de Industrias, Los Laureles 365, San Isidro – Lima Peru. The 6th edition of the Congress is organized by the Peru Section. The Congress will address cost competitiveness by world class companies using cost engineering tools and techniques. The 6th Congress will have renown national and international speakers, who will share their knowledge and experience in total cost management. Speakers will include: Jim Zack, Nelson Bonilla, Calvin Speight, Mark Sanders, Luis Miralles, Gustavo Vinueza, Danilo Arba, Alder Caceres, and Rodolfo Stonner. For additional information, please contact: presidente@aacei.org.pe or Carlos.daga@aacei.org.pe or david.chigne@aacei.org.pe
BEHIND THE SCENES: Certification Questions Answered

BY VALERIE SMITH, CREDENTIALING ANALYST

If you have ever considered taking one of our certification exams, you may have had some questions like: What kind of questions are on the exam? Who makes up the questions? How do I know if these questions are legitimate? Is there training for the exams? Why can’t I get my numerical score?

Before any of these questions can be answered, we must first consider what a certification actually is.

Certifications, according to the Institute for Credentialing Excellence (ICE), are: Standards that are set through a defensible, industry-wide process that results in an outline of required knowledge and skills and has ongoing requirements to maintain; a certification holder must demonstrate that s/he continues to meet requirements (remain current) through recertification. Unlike certificate programs where the prime focus is to provide instruction and training, certification programs assess knowledge and skills (competencies) you already have. This is why each of our certifications have a minimum experience (and/or education) requirement which must be met before you are cleared to take the exam.

So how does this translate to a certification exam? There are many considerations taking place behind the scenes before a question can be used in a certification exam.

1. **All questions must be vetted.** Vetting means that all questions have been reviewed by the Certification Exam Advisory Group (CEAG). The CEAG is comprised of designated members from the Technical, Education, and Certification associate boards. Depending on the complexity of the question, members may be called upon to collaborate in the review process.

2. **Terminology needs to be familiar.** Since English is the accepted global business language, authors must keep it in mind when writing an exam question. It is also important to ensure the terminology used is familiar to test takers. This means that slang cannot be used, outdated or obsolete terminology must be up-to-date, and absolutely no opinions may be expressed. Each question must have a concise, simple sentence structure that is clear to the reader.

3. **The Body of Knowledge is tested.** While each exam question tests a candidate's experience and knowledge, there must also be a tie-back to core competencies and industry standards. AACE’s Body of Knowledge is comprised of the Total Cost Management (TCM) Framework, AACE’s Recommended Practices, and the Skills & Knowledge of Cost Engineering. (Note: Members have access to the TCM Framework and Recommended Practices for free!)

4. **There are specific ways candidates are tested.** Because certifications exams are a test of the candidate’s knowledge, there are specific criteria we look for via exam questions:
   a. **Basic knowledge:** The candidate’s recollection of facts and information.
   b. **Comprehension:** The demonstration of the candidate’s understanding of facts and terminology.
   c. **Application:** The use of information and knowledge in concrete applications.
   d. **Analysis:** The ability to break information down into its parts, identifying both the parts, as well as their relationships to each other.
   e. **Synthesis:** The ability to put pieces together to produce a new entity, generate a plan, or derive new relationships.
   f. **Evaluation:** The ability to use evidence and criteria to judge the value of something for a given purpose.

5. **All approved and vetted exam questions are stored in a “bank.”** This bank is where questions are pulled to make up the exams. Having a large bank of questions provides room for more unique exams and randomization, which in turn protects the integrity and security of the certification program.

6. **Certified individuals are able to submit questions for CEUs.** If you are certified, you have the opportunity to submit questions through our volunteer program. All questions will be reviewed by the CEAG, and if approved are awarded CEUs. Please note that if your certification is about to expire, don’t count on submitting questions to get your CEUs quickly. Due to the required review for each question, it may take up to four months to receive a response.
What about education or training? Can the Certification Program provide training to me, so I can pass the exam? Is my certification considered “higher education”?\(^1\)

While AACE’s Education Program offers a variety of courses, the Certification Program does not have a role with/in the courses, nor does your certification apply to higher education. Here’s why:

1. **Certification exams are not tied to education.** Our exams are based on acquired knowledge, skills, and competencies. There is no relationship with higher education or attaining a degree; holding a certification will not help you earn credits toward a degree (none of which we are aware). Conversely, a certification is not designed to evaluate the mastery of a course or class.\(^4\)

2. **Training cannot be offered by the Certification Program.** Based on the international standard set forth in ISO/IEC 17024 (International Organization for Standardization/International Electrotechnical Commission) – General requirements for bodies operating certification of persons, if the certification program offers training, it could be a threat to impartiality. All training has to be done by a separate entity (in our case, through the Education Program) to ensure that confidentiality, information security, and impartiality are not compromised.\(^5\)

What about my results? Can I get my score?\(^3\)

AACE exam results are provided on a pass/fail basis only. The Certification Board adopted this industry best practice because there are potential issues and unintended interpretations or uses of scores that can arise with providing a numerical score. Here are a few scenarios you may not have considered:

1. **Using pass/fail prevents candidates/certificants from assuming meanings in performance differences.** The Certification Board has already established the metrics for passing the exams. If you pass an exam with a 73%, but your co-worker has passed with an 80%, does that make your co-worker more qualified or more certified than you? No. According to best practices, you have met the criteria to be certified.

2. **Keeping results at pass/fail keeps scoring aligned with current metrics.** As new exams are created, questions are randomized, and new standards are set, comparison becomes difficult. Not only is it difficult to compare a score on one exam six months ago to a score from this minute, it would be impossible to compare a score from 1998 to a score in 2018.

3. **Providing pass/fail results also reduces ranking.** Certification is not about ranking certificants in order of performance. Consider a situation where you received a 70% on your exam, and two of your other co-workers received 80% and 90% respectively. Your employer gives raises according to your performance on the exam. Although all of you passed and are certified, it is possible you would not receive the same raise as the other two.

Now that you know some of the whys of our certifications, what’s stopping you from getting certified? Certification demonstrates the holder knows the importance of adhering to certain professional standards. Certificants can be more confident in their ability to meet industry standards and employers can expect a certain level of measured performance.

The Certification Department is ready to help you. If you have any questions about any of our certifications, you can contact us at certification@aaeci.org or +1-304-296-8444, ext. 1110.

**REFERENCES**


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**2017 COST ENGINEERING JOURNAL IS AVAILABLE IN PRINT FROM AMAZON**

A combined print version of all six issues of the 2017 Cost Engineering journal, AACE International’s peer reviewed professional technical journal, are now available for purchase in hard copy print format at Amazon.com. Click the button to purchase. The Cost Engineering journal in 2017 was offered only in digital pdf format as an AACE member benefit. This print edition is designed for those who maintain a personal library of the journal in hard copy print format and for libraries and engineering schools that can benefit from having a print format edition on the shelves.
Mentoring — A two-way knowledge avenue

Sami Jaroudi is currently an active board member of AACE Houston Gulf Coast Section and a Past Section President. In addition, he accumulated over 25+ years of experience in project controls management, systems and processes applications with major industrial capital projects for both government agencies and in the private sector. In his career, he has worked as a field engineer, cost engineer, scheduler, project engineer, project controls manager, and a cost system administrator of project controls for major EPC firms. Projects included power plants, waste to energy processing facilities, mining and minerals, chemical plants, FPSO, drilling platforms, NASA International Space Station, including a recent engagement with a defense agency in the UK — currently Director of Project Controls for Systems and Tools (Petroleum & Chemicals / Mining & Minerals) at Jacobs.

TESTIMONY
As a start, I was pleasantly surprised that no matter how much experience you have there are always ideas, opinions, and methods on approaching many subjects in our filed of project controls. Specifically, my discussion with my mentee was around project controls system deployment where we tried to come up with a generic way to implement and deploy a cost system guidance document. The results after months and months of review and discussion was a PC-48 CMS (Cost Management System) Requirement now open to public comments. Obviously, not every mentor/mentee discussion will turn to an RP, but the latter is just an example what mentoring can contribute to it. It opens your mind to new paths not taken and in the process a sprout is born. Go ahead challenge yourself and be a mentor and share the knowledge. It is always guaranteed to open your mined and learn. Its definitely a two-way street in knowledge transfer.

MENTOR/MENTEE FEEDBACK:
The general advise I give mentors and mentees is to go in with an open mind and record minutes of your meetings and do follow up with a consistent schedule. Establish a road map of when you’ll start how you’re going to conduct the meeting appointments (example: WebEx, video, email, conference calls…. etc). Be cordial to each other’s schedule and flexible of course. If you are the mentor do not approach as the know it all individual and I can advise you on everything. I have challenged many known topics that were practiced in last 20 years or so — but now with technology evolving daily some are null and void and we must evolve or be extinct.

Also, make it fun and exciting. As both of you are looking forward to the call. Best is to focus on a couple of subjects that are challenging to both and go from there. It is always refreshing to see new perspective on things with a new angle.

Just to be clear and follow these simple steps:

• Make a schedule or a road map of your journey
• Focus on a few subjects
• Be clear on the purpose of the mentoring sessions (example: learning, solving an issue, or writing a paper)
• Listen, listen, and listen
• Always confirm/plan for next meeting at the end of each meeting
• Maintain and respect the privacy and honesty of each other’s discussions

Lastly, do not forget to learn about each other first. As we said, make it fun and interesting and not a rigid process. Start with hobbies, travel, interesting events, etc., then lead to work experiences or some fascinating project that always come to mind. Nothing will stick better than a story line of an event or a project that taught you something you still remember till today.

Happy Mentoring

Sami Jaroudi, CCP
Jacobs Engineering Group

Editor’s Note: This is the fourth of a series of Spotlight on Mentoring profiles of AACE members who are currently participating in the AACE International Mentoring program. If reading these profiles inspire you to want to become a mentor, contact the AACE Committee for Mentoring Excellence, by sending an e-mail to: mentoring@aacei.org.
Josie Brown was born and raised in “Bonnie Scotland”, where she remains to this day. She grew up in a small seaside town called Troon, well known for golf. She played golf as a junior. Josie had the great opportunity to work at the UK Golf Open Championship in her hometown’s Golf Club Royal Troon. She enjoyed many sports, especially grass hockey. At school, she learned early how to not only work on a team but lead it as well. She was elected both vice captain of her school and captain of the 1st XI hockey team for Marr College. Her favorite subject was mathematics and it was her love for this subject that helped to shape her career and the desire to work with numbers.

Another important influence on Josie’s life and career was her father who was a chartered accountant. It was his life’s work that inspired her to follow him into the world of business and accounting. After high school, she moved to Aberdeen, North East Scotland, to study accounting. She would eventually gain her CIMA Chartered Institute of Management Accounting degree. As the oil capital of the UK, she was fortunate to start her career with Chevron within the finance department.

She worked in several areas within the finance department but found the operational asset accounting function the most enjoyable – working alongside the engineers. She provided them with forecasts, budgets, and variance analysis to allow them to make informed decisions on available capital and operating funds to commit and spend. Using her knowledge from various roles, she became supervisor of a team of operations and drilling accountants. She found that by taking on more responsibility, she came to enjoy the additional opportunities and challenges that managing staff brings.

It was from this role that Josie was introduced to the possibility of moving into project controls within the Major Capital Projects (MCP) group within Chevron – a career move similar to her then supervisor, a fellow female who inspired her. It sounded like an exciting and varied opportunity and Josie was successful in being offered the role of project controls advisor on two of Chevron’s UK MCP’s which were in different phases. She was able to apply her prior business experience to the role and has expanded her knowledge by learning about the many aspects of project controls. One of the projects, a multi-billion-dollar deep-water project (located west of Shetland) progressed in to Front End Engineering and Design (FEED) phase and the engineering contract was awarded to a company based in Houston. Though Josie would remain in Aberdeen as the main project controls point of contact, her supervisor along with the majority of the project team moved to Houston. This provided Josie with the opportunity to travel to Houston and participate in many project engagements including Estimate and Schedule Assurance Review (ESAR) and Cost and Schedule Risk Assessment (CSRA). She embraced the diverse culture Chevron provided, both from a career perspective, but also from a personal level by getting to experience the rich culture of Texas itself.

Josie’s career took another step forward when she was offered a role as project controls lead, taking on additional responsibility in managing several cost engineers based in Aberdeen and Houston. Effective communication is critical to supervising people, especially in multiple locations, and Josie has embraced this, finding it a very rewarding role.

Josie has been very fortunate to work for one of AACE’s very own past presidents, Martin Darley. He has not only been her direct supervisor, but also her mentor and educator who introduced her to various aspects of her field such as quantity measurement, Bills of Approximate Quantity (BOAQ), contingency management and contract management. Martin’s enthusiasm and encouragement pushed Josie to continue her education and is currently studying toward the AACE CCP certification. She has attended several project controls conferences in the last year including; the UK annual conference, UK Project Controls Expo with over 1,000 attendees, ‘Advancing Project Controls’ based in Houston. Josie found the sessions to be very informative both from an educational and net-working perspective with like-minded professionals. There is a lot to gain from attending project controls conferences and she is hoping to attend the AACE Conference & Expo in 2019. Being a member of AACE has provided her with the knowledge that she has been able to apply within her job. Chevron has adopted the rules and principles from
AACE and this has provided a consistent approach to Josie’s learning and application. In 2017, she presented to Chevron UK employees the benefit of project controls in major capital projects which was well received. She also presented to the Chevron Cost Engineering Network on the major capital project she was working on and the impact that good project controls brings to such a multi-billion-dollar project.

Josie strongly believes in giving back to the community; she has been involved in Engineers’ n’ Our Lives, a program developed and delivered by Live Wire Productions and sponsored by Chevron. Over 10,000 school children have taken part in the program which gives them the opportunity to appreciate the role engineering plays in their lives. The students take part in age-appropriate Science, Technology, Engineering and Mathematics (STEM) challenges with the help of Chevron professionals. Josie was also the vice chair of a group set up in Chevron to promote safety and well-being of the workforce and lately has participated in a session on raising awareness and changing perception of mental health in the workplace. Josie found this a valuable discussion and has volunteered to help set up a network called ENABLED - ENhancing ABilities and LEveraging Disabilities, focusing specifically on mental health.

Josie’s philosophy in life is that things happen for a reason and people need to take hold of opportunities in life when they happen. Her wee Scottish grandmother had a very wise saying - “Whit’s fur ye’ll no go by ye!” which translated means “What’s meant for you won’t pass you by!”

Daniel J. Sweeney
ENGINEER ON A JOURNEY

As a born and true Philadelphian, Dan comes from a split background family, half rearing from the Irish grasslands, the other from the villas of southern Italy. Just outside of Philadelphia in Newtown Square, Dan spent time with friends hiking in the woods and riding bikes. Having gone to two different grade schools growing up, he continued his education at St. Joseph's Preparatory school in North Philadelphia. After commuting in and out of the city for four years, he proceeded to study engineering at The Pennsylvania State University at University Park, PA.

He began his scholastic education as a mechanical engineering student, but the scope and range of choices that civil engineering offered captured his interest and he made the switch. Dan also pursued a minor in business during his time in college, craving a desire to understand economics, finance, and the basics of business law before entering into the professional world. During his four years at PSU, he was a member of the Penn State Rugby team, serving as a team captain his senior year. He also participated in THON, Penn State’s student run philanthropy that raises money and awareness against childhood cancer. Upon graduating with a BS in Civil Engineering with a specialization in transportation, Dan returned to the “City of Brotherly Love” to pursue a position where he had previously interned.

The Southeastern Pennsylvania Transportation Authority, also known as SEPTA, offered him a role on the planning, project coordination, and scheduling team. Starting as an engineer, Dan quickly reacquainted himself with the authority and was integrated into multiple projects, both in the field and in the office. Dan also successfully passed the FE exam and received his EIT for civil engineering, with the goal of attaining his PE in the future. Dan worked as a field engineer on a variety of projects, such as railroad track rehabilitation, new railroad passenger station construction, new power infrastructure construction, the Philadelphia trolley tunnel restoration project, freight railroad track transfer construction, right-of-way and track inspections, and other restoration work throughout the authority.

Dan also worked on project coordination and asset development within the authority. He worked as a project planner for multiple railroad shutdowns and single-tracking projects. Because of the collaborative nature of public transportation, Dan interacted and worked with many other entities such as PennDOT, Philadelphia water department, CSX, and he had a large role coordinating and tracking projects with AMTRAK. Furthermore, Dan was a major contributor to the advancement of SEPTA’s asset development, both internally and publicly. He assisted in the development of an accessible database that tracked and updated information about all of the authority’s assets and their conditions. He also was the point person on the design and content for the webpage that features SEPTA’s current construction projects. He frequently was writing updates on the projects, as well as posting pictures and data concerning the projects in an effort to feature the projects in a positive, public light.

There are so many opportunities to serve, learn, and find your passion within AACE. I see many opportunities to gain valuable experiences, connections, knowledge, and understanding of where the industry is on a macro level.
Dan accepted a job with McDonough Bolyard Peck at their main office in Fairfax, VA. He came in as an engineer and took on several project control roles right away. He worked on architectural takeoff and estimates, low level schedule reviews, research and analysis for construction claims cases, and he was part of a small value engineering team. Dan also worked in the field as a construction manager on a 14-acre site development project, as well as a supporting role on a school improvement project. During that time he also earned his Construction Manager in Training (CMIT) certification. Dan furthered his project control's experience by working with senior schedulers on schedule development, learning to build and develop detailed baseline schedules for mid-large capital projects. Further he worked as the assistant lead scheduler for a 90% design summary schedule for a large scale international multi-building facility.

Currently, Dan is working as a project engineer in a project controls role on the Cannonhouse Renewal project in Washington DC, where he works as a project coordinator, scheduler reviewer, manages RFI's and submittals, and develops reports for project leadership teams. In addition to his professional career as an engineer, Dan is also an active member of Toastmasters International, an organization that promotes the practice of public speaking skills and leadership skills. Dan served as the Vice President of his club and has served multiple roles in meetings and competitions.

Dan has had many different supporters during his life, including his parents, close friends, and his current fiancé. At work, he has had multiple managers and supervisors who have helped him progress to where he is currently. One specific mentor who helped Dan develop his scheduling technical skills was Eddie Kwon. Eddie worked on projects and helped develop Dan's scheduling across the course of over a year with many one on one learning sessions. From there, Eddie served as a manager on multiple scheduling efforts that Dan undertook for the next year. They created a bond through work as well as social interaction, as Dan celebrated when Eddy had his first born, and Eddy talked with Dan about his various vacations. The mentorship has helped Dan become confident in scheduling, as well as in the project controls landscape as a whole.

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Dan has had the privilege to attend two AACE Conferences and Expos, and he has greatly enjoyed both of them. In his first annual conference, Dan came in with an open mind and a desire to learn as much as he could through the technical sessions, as well as meeting and interacting with as many members as possible. In his second conference & Expo he was working with the Rising Professional Committee (RPC) to record media of the meeting and the technical sessions. He was able to reconnect with many members he had met from the previous meeting. Dan found that the meeting was easier to navigate the second year, and he was able to plan out his week better for technical sessions and to meet up with people. Overall, his experiences were different but both very valuable and immersive.

Being a member of AACE International has opened Dan up to many ideas, programs, and procedures that he had not been exposed to before. He has gained a greater perspective on the landscape of project controls and has taken ideas and concepts onto his past and present projects. As a media member for the Rising Professionals Committee, Dan has written pieces on current AACE members, lead discussions, and promoted youth and new members in the AACE community. It has also opened-up the opportunity for certifications and ways to promote both his company and his personal career. Dan believes that there is an opportunity and a purpose for any engineer who wants to join AACE International. He sees many opportunities to gain valuable experiences, connections, knowledge, and understanding of where the industry is on a macro level. The amount of connections that someone can make, especially rising professional engineers, are invaluable. There are so many opportunities to serve, learn, and find your passion within AACE.

At the end of the day, Dan is someone who desires to grasp a greater view of the world and how it works. As a civil engineer, he is always learning and listening to understand how people are building the world, through both infrastructure and ideas. As an avid traveler, he enjoys immersing himself into as many cities and cultures as possible, where he believes there are infinite ways to grow as a person. There are so many opportunities out there to learn and expand horizons, and he encourages anyone who has those chances to take advantage of them, because you never know who you will meet and what you learn along the way.
The South India Section's second national conference was hosted by the Indian Institute of Technology Madras, one of India's premier institutions.

The South India Section successfully conducted its second national conference at the Indian Institute of Technology Madras (IITM), India. IIT Madras, one of India's highly respected premier institutions, agreed in 2017 to be an academic partner for the India Section. It extended its support for the second IITM National Conference at the IC &SR building, IIT Madras, on Aug. 4, followed by one-day workshop on Aug. 5. The theme of the second conference, “Mega Projects: Managing Risks and Uncertainty,” was a huge success with more than 210 professionals attending the conference.

Professionals from Woods PLC, Petrofac, KBR, Saipem, Kalre Infra, Engineers India Limited, Shell, Capacite, Alpha Three, WTP Cost Advisory, various divisions of Larsen & Toubro, IB Thermal Power Station, AMEC Foster Wheeler, Tern Engineering, Jones LaSalle, research students of IIT Madras, graduate students of Thiagarajar College of Engineering, Vellore Institute of Technology, SRM University, etc., participated in the conference.

Sankar Subrahmaniyam, Chair of the India Taskforce, welcomed the delegates on behalf of the South India Section. The conference was inaugurated by Ulysses Goree, Country Head of KBR, in the traditional South Indian style by lighting the lamp. Other participants included: Marion Terrill, Director of the Grattan Institute; Prof. Ashwin Mahalingam, IIT Madras; Ben Du Bios, Director Department of Transportation, government of Australia; and Mohammad Rafuuddin, VP Membership Board of AACE International. Ulysses Goree, in his brief talk, mentioned how the AACE International TCM Framework helped large organizations across the world to deliver successful projects.

Prof. Ashwin Mahalingam, Associate Professor IIT Madras, introduced mega projects to the participants, mentioning that they are extremely expensive, controversial, and very complex in nature. He mentioned the challenges faced by mega projects in India. These challenges include land acquisition, resources shortage, fast changing technologies, long gestation, payback period etc. He mentioned that the mega project participants should shift their focus from the traditional monitoring and control mindset to stakeholder management for successful delivery. He highlighted the impact of law and order and political issues as typical headaches for big infrastructure projects, drawing attention toward optimism bias, strategic misrepresentation, lack of planning and rigid contracts as possible derailers of mega projects. He advocated for the necessity for de-centralized project management processes and collaboration and move from traditional regulatory mindset to development mindset as essence of Project Management 2.0.

Aman Bajaj, from Palisade, gave a brief introduction to “@Risk” and mentioned that anyone who faces uncertainty in their quantitative analyses can benefit from @RISK. Ben DuBois, from the Australian government’s Department of Infrastructure, Regional Development and Cities, delivered a lecture titled, “Managing Risk of Australian Government’s $75 Billion Infrastructure Investment Program.” The presentation outlined how governments in many countries around the world struggle with cost overruns and delays on public sector investment projects. DuBois outlined how public sector projects must balance the conflicting needs and priorities of different stakeholders in society. In addition, governments have to make decisions all the time where the outcome is uncertain. While the politics are likely to remain, understanding the uncertainty can help decision-makers come to a much better decision. He then outlined some of the department’s specific policy settings and recommendations for cost estimates, as well as initiatives that aim to improve cost estimates over time including benchmarking and data collection.

Finally, attention was drawn to some of the challenges when it comes to predicting the costs and outcomes of mega projects, specifically how some of the flaws in our thinking processes cloud our judgement and ability to assess uncertainty. DuBois’ presentation and contribution to the panel discussion was received very well by the 200+ audience.

Jaimin Mehta, Director AECOM, presented a case study of Mega Greenfield Smart City Projects. He spoke about the USD 100 billion Delhi-Mumbai Industrial Corridor(DMIC), the ambitious global manufacturing and investment destination initiative of the government of India. He mentioned that DMIC will include the development of the 1540 km long Western Dedicated Freight
Corridor (WDFC), with 24 nodes (investment regions and industrial areas), including six large investment regions of 200 square kilometers, and will run through six states of India. AECOM is appointed as project management consultants for the Dholera Industrial City in an area of 920 Sq.Kms with the developable area of 422 Sq. KMs with the expected residential population to be 2.0 million and generating employment for 827 thousand people. He briefed the development strategy along with timelines, development strategy, engineering challenges, smart infrastructure etc.

The conference had a panel discussion by eminent panelists from India and Australia. The discussion covered “Digitalization and technology adoption in mega project execution to project performance.” The panel discussion was moderated by Chandrasheker Rao, Dean L&T Institute of Project Management, and the panel included: Varghese Daniel, CEO Wrench Solutions; Mohammad Rafuuddin, VP Membership; Mr. Ananthasayana, Larsen and Toubro; and Ben Du Bios from the government of Australia. The panel agreed that digitalization is one of the most important solutions to removing delivery bottle necks. Project owners are a cornerstone of this solution and have the responsibility to influence and get others on board. Daniel pressed that project owners to play a key role in raising efficiency and productivity across the board.

Daniel focused on factors that slow down digitization, including the industry’s misplaced reliance on excel and worksheets and shared customer stories about how EPC companies underestimate the benefits of IT and digitization. He also shared how in his early years in the manufacturing industry, which like EPC is process-driven and governed by stringent quality control measures, helped him convince his EPC customers that intelligent integration of the project lifecycle is the only way to avoid delay and overrun, and that this kind of integration is possible only through digitization.

Craig Muir, Chief Commercial Officer of Petrofac, presented the contractors perspective of managing mega projects’ risks and uncertainty. He mentioned major influencers of project outcome and touched risks in theories from enterprise level risks to exogenous risks. He touched upon the risk hierarchy, processes elements, the positive opportunities and threats risks pose. He introduced the participants the mega project gate processes and real-time management through digital, the role of various stakeholders rights from board up to risk owners, and understanding the importance of engagement. He mentioned that organizations must invest on the right people, developing right skills and appropriate experience, promoting a culture of transparency and integrity. He suggested a bottom up approach for risk aggregation from the project level to enterprise. He cautioned, in decision making, one should be an informed risk taker not a gambler.

Marion Terrill, Director of the Grattan Institute, an institution dedicated to developing high quality public policy for Australia’s future, pointed out that similarities among various countries were quite striking. One of the key points of similarity is difficulties in governance of large infrastructure projects. Terrill agreed, and provided empirical evidence from the Australian context that infrastructure decision-making is often poorly informed. This is due in part to the fact that politicians, public servants, and private sector advisers gain benefits from having projects approved and built, without limited penalties if costs overrun or the benefits do not materialize.

She mentioned that Jaimin Mehta’s description of a new Greenfields smart city provided a fascinating glimpse of a project that dwarfs even current record-breaking Australian projects, such as the $17 billion WestConnex freeway in Sydney or the $11 billion Melbourne Metro Rail project. Marion Terrill emphasized that in Australia, cost estimation guidance does not make use of historical performance data to improve the accuracy of estimates. Official guidance does not even highlight that cost overruns are much more likely than underruns, nor the difference between road and rail in the size and timing of cost overruns. Better availability of historical data would allow cost estimators to make better provision for relatively unlikely outcomes that can be so expensive when they occur.
Laurie Bowman, Director Region 8 of AACE, provided an overview of AACE International including its vision: “To be the gathering place and source of thought leadership for professionals to drive successful project and program delivery” and its Mission for: “AACE members to drive projects to complete on time, on cost, and meet investment and operational goals. We arm our members with the technical tools and expertise to support successful projects and programs” and then reflected on the conference and thanked the audience and speakers for helping us achieve these objectives through the India Section’s National Conference.

Bowman then provided a summary of AACE International’s global network across 91 countries and highlighted the strong growth in membership of 20 percent in Region 8 over the last 12 months. He explained two key areas in which AACE membership can be very valuable for those involved in mega projects – improving processes and developing people.

He described how members get access to AACE International’s Total Cost Management (TCM) Framework which provides member organizations with an ‘out of the box’ tried and proven integrated set of processes for strategic asset management and project control that can be adapted to suit their own organization. He mentioned that AACE International also has a suite of Recommended Practices that provide members with a wide range of practices that can be applied to solve problems on their projects.

He then described how AACE International supports professional development. AACE International allows for recognition and development of people’s skills formally through the AACE International certification program and informally as a result of being part of an international community of likeminded professionals. Bowman explained the relationship between project costs and maturity in cost engineering and encouraged employers and employees to consider certification as way to help ensure that investment outcomes are realized on projects. He explained the different levels of certification programs available and the increasing emphasis being placed on AACE certification by government and employers.

Lastly, Bowman explained the AACE International Rising Professionals Committee (RPC) and encouraged early career professionals to consider joining this group. He also called for the audience members to consider the opportunity to volunteer for their local section and support section programs.

Mr. Sivakumar, the newly elected president of the South India Section, delivered the valedictory address. He thanked the speakers from India and overseas and AACE Regional Directors and international members for coming all the way to Chennai to participate in the conference, share their knowledge, experience and interacting with participants. He thanked the conference sponsors Karle Infra, Capacite Projects, Alpha Three Inc, Palisade UK, Synchrony Australia, and the workshop sponsor, Wrench Solutions, for coming forward to support the conference. He thanked IIT Madras for supporting the section as its academic partner with special mention of Prof. Koshy Varghese and Prof. Ashwin Mahalingam who are instrumental in extending the support. He thanked the volunteers Srinath and Ezhil, research scholars of IIT Madras, Nambiappan, Bhagya, Rajan, Karthik Murthy, Kalpana, Kavitha Kumar, Suhas, Sankalp, Harish Varma, Fathima Sara, Rachitha, Manjunath, Cheethan who contributed to the success of the conference from behind the scene. Siva mentioned that PMI Bangalore and Chennai chapters consistently support the section as both are complementing each other in the various areas of project management. Special thanks to Mr. Krishna of Petrofac, Rakesh Jain for volunteering to be the master of ceremonies for the event and Mr. Ranganatham for his support. He thanked the conference committee comprising of Mr. Sankar, Laurie Bowman, Parthasarathy Sura and Mohammad Rafiuuddin for their tireless work in putting on a successful program.

Siva mentioned that Karle Infra’s support as sponsor for India Section, until it can stand on its own, is a great gesture and that helped the section in coming to this stage in India. He mentioned that the Karle Board has agreed to extend their support for the next two years so that the section can stabilize in North, West and East India and thanked them for that.

The conference was concluded with playing Indian National Anthem. The conference was followed by workshops on 5th August 2018 at IIT Madras IC & SR Halls. The track 1 “Introduction to Forensic Schedule Analysis” was handled by Mark. C. Sanders. The workshop was attended by around 25 candidates. He provided the background and history of forensic scheduling, overview on industry consensus documents of AACE, SCL and ASCE, basic principles of forensic analysis, AACE taxonomy of forensic analysis methods, example implementation and a hand-on-exercise and discussion on selecting appropriate method. The workshop provided valuable insight to forensic analysis as the PM community in India is not very familiar with forensic analysis.

Track 2 of the workshop was “Governance and Risk Management - Making Complex Projects More Predictable” handled by Laurie Bowman. He provided the return on investment in risk management to organizations, dealing with uncertainties, improving risk management on mega projects by development of people and organizational maturity, governance and processes, application of tools and technology. The workshop was attended by around 30 participants.
From Activity-based Ranging to Risk Driver Approach

By Craig Veteto

Abstract
This article focuses on the ranging techniques applied to cost and schedule risk analysis. More specifically, it will explore the risk driver approach and activity-based ranging when conducting cost and schedule risk assessments. There will be a brief overview of the two approaches with a comparison of the key aspects of each. There will be an in-depth discussion of the reasons for a shift in approach from activity-based ranging to risk driver approach. The challenges faced from a practitioner perspective, as well as those experienced while persuading other stakeholders within the organization will be presented. There will be a discussion of the real-world results of the newly adopted approach. The risk driver approach is not a wholesale revamp of the cost and schedule risk analysis method, but a change in the ranging technique that produces an improved end product. The risk driver approach is not new, and papers published previously have described the technique. This article will reinforce the benefits and provide insight to the challenges of converting from a legacy approach. This article was first presented as RISK.2470 at the 2017 AACE International Annual Meeting.

Introduction
The approach to risk ranging in cost and schedule risk analysis techniques is changing. Improvements are providing better value to the end users of the risk analysis output. This article is intended for the risk practitioner with a common knowledge of the subject matter. It is also aimed at business and project management that are decision makers regarding how risk analysis is conducted within their organizations. It will not delve into complex theories or algorithms.

Two techniques will be discussed. The first is activity-based ranging which involves assigning risk distributions, or ranges, to schedule durations and estimated costs. The second technique is the risk driver approach. While similar to activity-based ranging in many regards, this technique focuses on the cause of the impact. The probability range is applied to the risk, and the risks are then mapped to the affected activities and cost items.

This article proposes moving from activity-based ranging to the risk driver approach. This involves a change to one piece of the risk assessment process, not a wholesale change to the methodology. That still means change, which is often met with resistance. Some ways to smooth the process will be discussed.

There are seemingly endless definitions of risk, uncertainty, and opportunities and the terms are used in varying combinations.
In this article, risk refers to threats, opportunities, and uncertainties; anything that may have an impact on project outcomes.

**THE CHALLENGE**

**PROBLEM**
Activity-based ranging is not sufficiently actionable. The output focuses on the effect rather than the cause. The output is presented in terms of activities and costs affected by risks rather than the risks that affect the outcome. When presented with a list of activities that have the greatest effect on the completion of the project, the project team will find it difficult or impossible to craft a meaningful mitigation plan. This results from a lack of clarity about what causes those activities to be on the list.

The problem is compounded because many software applications built to support activity-based ranging produce the output in the form of tornado charts, as shown in Figure 1 and Figure 2, that represent the correlation of each item listed to the outcome of the project objective. In other words, the chart shows the relative ranking of each item in relation to others on the list, not the impact in terms of days and dollars, as shown in Figure 5.

Because the probability ranges are assigned to the cost and schedule objects in the model, the relationship of the individual risks to the model is unclear. If multiple risks are associated with a single item, the probability range must reflect a composite of the individual impacts. Determining the proper composite probability range can be very difficult and nearly impossible to accomplish in a live risk assessment. The lack of clearly identifiable linkages prevents the team from knowing which risk is having the most or least impact on a given activity. Keeping track of which risks are included in a probability range is practically impossible.

The use of a risk register, hopefully, developed earlier during a qualitative assessment of project risks, is often a passive effort. Some teams refer to the risk register during the assessment, and some do not. The activity-based ranging process can be conducted without a risk register, using anecdotal data from the participants. As a result, it does not provide an incentive to the project team to conduct a qualitative risk assessment.

**GOAL**
At the most basic level, the purpose of risk management is to improve the predictability and performance of projects. To support this goal, the risk assessment process must produce the most meaningful information possible. The objective is to improve the value to the end user of the risk analysis product. The end users include the project owner and the project team, both primary customers of the process. The owner seeks to know the contingencies required to assure completion of the project along with a range of probable outcomes in terms of days and dollars. The project team wants to know what risks are likely to have the greatest impact on project objectives. To enable high decision quality, the team will need to know the impacts in terms of days and dollars. This information will allow them to weigh the cost and schedule trade-offs of
mitigating particular risks and select the best combination for their specific project.

This objective requires the output to be actionable. It must clearly identify the cause of the impact. The impact must be quantified in terms of days and dollars and prioritized to show the importance of individual risks.

The process needs to build upon the proper progression of risk assessment. Data from a qualitative risk assessment is a primary input to the process. Highlighting the value of qualitative risk identification workshops is an added benefit that increases the project team’s and stakeholder’s awareness of the project risk and uncertainty [1].

The approach used needs to provide a transparent process that allows the participants to understand the basis, content, and linkages of the risks and the cost and schedule elements they affect. The relationship between each risk and one or more elements, and in turn the relationship between each cost and schedule element and one or more risks must be clear to the participants in the assessment.

The process must remain flexible and scalable while accomplishing each of the items above. This means the process must be capable of working with both detailed risk models, as well as rolled up summary versions. The process must be able to produce meaningful output for various types of projects, including major capital, small capital, turnarounds, and joint venture projects operated by others.

**THE SOLUTION**

The risk driver approach addresses all the points highlighted in the goal. It makes efficient use of existing qualitative risk data, provides a transparent process, is flexible and scalable, and provides actionable results.

**QUALITATIVE ASSESSMENT**

The process begins with the qualitative risk assessment. This is an iterative process throughout the life of the project, so the most recent analysis should be used. The qualitative process identifies the potential risks to project objectives. A noteworthy aspect of qualitative risk assessment is that the critical path is often not well understood at the time of the initial assessment. The key product of this effort that supports quantitative risk analysis is the risk register. This document includes all the risks identified, an assessment of impact, the aspect of the project affected, any assumptions made during the assessment, and other useful information.

**MODEL**

The quantitative analysis begins with the development of the risk model. The risk register, project schedule, and cost estimate are the key inputs to the risk driver model. A major difference from the activity-based ranging technique is the importance of the risk register. The risk driver approach simply cannot be performed without it.

**SCHEDULE**

The project schedule provides the time component of the risk model. It can be rolled up to a summary level if appropriate or used in its full detailed form. If the full schedule is used for the model, it must be risk-ready to support Monte Carlo Simulation. That means in additional to normally recommended practices for planning and scheduling, it should have as few constraints as possible, no hard constraints, two open ends, and avoid all relationship types other than finish-to-start whenever possible.

In practice, unfortunately, this is not as common a situation as would be preferred, so a thorough review of the schedule at the outset is strongly recommended.

There are factors to consider when deciding whether to use the full schedule or summary. The intricacies of the critical path may be lost when summarized. The full schedule may prove too cumbersome when mapping risks. The existence of long chains of short-duration activities in the full schedule can affect the Monte Carlo calculations. Moreover, one project found that the summary schedule, focused on the critical and near-critical paths, did not provide the activities needed to map some of the risks. Using the full schedule allowed the project team to identify risks on the register. The project team found that simply did not affect the likely outcome of the project. This lets the team sharpen their focus to the things that matter most.

**COST ESTIMATE**

The cost estimate provides the financial component of the risk model. The level of detail should match the needs of the project. The line items in the cost model need to be designated as time-dependent or time-independent to allow for proper representation in the model. In theory, the schedule should be cost-loaded to support the risk analysis. In practice, cost loaded schedules are not all that common. One of the reasons is that there are costs, such as freight and insurance, that have no activity they to which they can be applied. A common technique is to add the cost estimate to the schedule model under a separate WBS hierarchy. This allows the time-dependent cost elements to be linked as hammocks to the schedule activities that drive their value. It also provides surrogate activities for the time-independent costs. The result is an integrated cost and schedule risk model.

**RISK REGISTER**

The risk register provides the probabilistic component of the risk model. The project schedule and cost estimate determine the risk model. The inability to incorporate uncertainty in activity durations is a significant issue for critical path method scheduling. The probability ranges of the risks, when mapped to the schedule and estimate, provide the variability in the risk driver model.

Because the risk register is the main focus of a risk driver approach assessment, attention to detail is in order. As much meaningful information as the risk software allows should be transferred to the risk model. Cross-referencing risks between the register and the model has proven useful when following up after an assessment.

Updating the risk register in real time during the risk assessment also has been a useful practice. New risks are often identified through the dialog of the assessment and interpretation or understanding of existing risks on the risk register sometimes changes as well. By updating the risk register as you go, it stays in sync with the risk model, making it more useful in tracking the status of risks and their mitigations.

**TEAM INPUT**

Gathering input for the risk assessment can be accomplished by conducting a workshop, interviewing the appropriate people, or a combination of the two. The best way may depend on the current situation within the project. For example, if the project team is focused on a critical portion of the project it may not be possible to bring everyone needed into a workshop for an extended period. In that case, interviews would be the better option. Another consideration is the culture of the organization. Some groups are comfortable with open discussion among participants in a workshop setting. In other groups, interviews work better because individuals feel safer making their views known in a one-on-one setting.

For the results of a risk assessment to be successful, you need to have the right people involved. Of course, this includes the key
members of the project team. This could differ depending on the phase of the project, but usually includes the project manager, cost engineer, estimator, planner scheduler, design discipline leads, construction supervisors, contract administrators, and risk manager if the team has one. Other participants include operating business representatives and partner representation if the project is a joint venture. Including cold-eye subject matter experts that are not directly associated with the project has proven to be very beneficial. They bring a fresh perspective, lessons learned on other projects, and help to reduce the bias inherent within a project team.

The team input portion of the risk driver approach is where one of the greatest differences from activity-based ranging occurs. Rather than looking at the project schedule and cost estimate and assigning probability ranges there, the focus is on the risk register. Each risk is evaluated, and the probability of its occurrence established, allowing for risks that may or may not occur. This is different from activity-based ranging where risks assigned to activities have 100 percent likelihood of occurrence because they hit every iteration of the Monte Carlo Simulation. In comparison, a risk with an 80% likelihood of occurrence in a risk driver model would hit eight times out of ten and have no impact on the remaining two iterations.

The probability range is then assigned to the risk. This is similar to the ranges assigned in the activity-based ranging technique in that the same types of distributions are applied. The key difference is that they are assigned to risks rather than cost or schedule elements of the model. Another difference is that unique probability ranges can be established for both cost and schedule if the risk impacts both aspects of the project. Assigning probability ranges to the risks rather than the schedule and estimate allows the participants to consider both cost and schedule impacts of individual risks at the same time. The dialog that takes place during this step can expose impacts to cost or schedule that were not previously identified in risks thought only to affect one or the other. This is significantly different from most applications of the activity-based ranging technique where possible impacts to cost and schedule are considered separately. The result is a more balanced, cohesive view of the risks to the project.

An important challenge when using the risk driver approach is the lack of available risk-based benchmark data. Because activity-based ranging has been in use for a considerable time, benchmark data supporting activity-based ranges is more readily available. It is anticipated that, as the risk driver method becomes more common, the supporting benchmark data will be accumulated. Performing a close-out of the risk assessment at the end of the project would help to generate this data.

The risks are then mapped to the cost and schedule elements that may be affected. This can be one element or many. Another significant difference from activity-based ranging is that by mapping individual risks the relationship between the risk and the activity or cost item, cause and effect, is clear.

A comparison of the two approaches is shown in Figure 3. The added value to the project of knowing impacts in days and dollars is shown. This helps drive higher quality decisions about which risks to mitigate, and perhaps which projects to move forward. Integrating cost and schedule in the model enables determination of Joint

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**FIGURE 3. Process Comparison**
Confidence Levels (JCL) which provide a cohesive view of probable outcomes.

**RISK CORRELATION**

In the risk driver model, if a risk is mapped to two activities, the activities become correlated. If some risks affect one activity but not the other, the correlation is less than 100%. Since the cause of the correlation, the risk, has been identified and mapped to the affected activities, the correlation is properly modeled eliminating the need to correlate activities within the schedule.

**MONTE CARLO SIMULATION**

Running the Monte Carlo Simulation when using the risk driver approach is identical to that when using the activity-based ranging technique. Both approaches use the same mathematics. The output directed toward the business remains the same as well. It is the output geared for the project team that represents the biggest benefit of the risk driver approach.

The business-facing output identifies the contingency needed to assure the project is properly funded and the range of probable outcomes for the project. Also, this data enables informed decisions about which projects to move forward. A common means of presenting this data graphically is shown in Figure 4 - Cost Distribution Graph. The example indicates the need for $237 million in contingency to assure a P50 outcome. The P10 to P90 cost range is $3.837 billion to $4.132 billion, a spread of $295 million.

In addition to the data provided by the distribution graph, the business may be interested in why the contingency is needed. That information is available from the tornado charts.

The tornado chart, while providing some business-facing information, is aimed primarily at the project team. There is more than one way to calculate the impact of risks relative each other. The output shown in Figure 5 was created using a multiple pass process also known as risk prioritization. In this method, an initial pass is run with all risks included. The calculation is then repeated excluding one risk at a time to allow specific information on the impacts of each risk to be determined. Finally, the process is repeatedly run removing the top risk after each run to establish risk priorities.

The data in Figure 5 informs the business about the reasons they need to fund the forecast contingencies. It tells them the probable causes in order of importance and quantified in days and dollars.
However, the greatest value of this information is realized by the project team. It allows the team to determine which risks to develop mitigation plans for with a high degree of decision quality. They can establish realistic expectations for their mitigation efforts because the data is quantified in days and dollars. This integrated data allows the team to make more informed decisions based on cost versus schedule trade-offs.

Figure 5 displays the likely impacts from the top ten risks. The analysis output, of course, contains the likely impact of all risks considered, including those with little or no impact to project objectives. This data points out the risks from the qualitative register that are not likely to have an effect on the project objectives, enabling the team to focus their attention on what matters most.

IMPLEMENTING CHANGE

Changing the approach to any process is often met with challenges. That is due in part because not all change is positive. For the change to a risk driver approach to be accepted, the rationale behind the change must be communicated clearly to all affected parties. There should also be adequate opportunity for people to voice their concerns and contribute their thoughts, views, and opinions.

If possible, changing to the risk driver approach should be piloted before a full roll-out. This allows for collaboration on the change and helps to ensure buy-in from those involved. Piloting also provides an opportunity to fine-tune the approach to fit the organization and make improvements where needed. The piloting effort should be monitored to evaluate its success and determine its impact.

REAL WORLD EXPERIENCE

INTERNATIONAL JOINT VENTURE

This international joint venture was a project involving several partners from multiple nations. The capital cost was several billion dollars. The project end date had suffered significant extensions, and the team had struggled to accurately predict key events. A schedule risk assessment, using the risk driver approach, was undertaken late in the execution phase to better predict the timing of a major start-up milestone several months in the future. The project team was focused on starting up other portions of the facility at the same time the risk assessment was conducted, so an interview process was employed to minimize the impact to critical path activities currently in progress.

This was the first time the team had seen risk analysis output in the form of prioritized risks. There was some resistance from project management at first. This was because they had not been aware of the impact caused by the top-ranked risk. However, after discussion with front-line team members, the information was accepted. The project team focused its attention on the top-ranked risks, preparing plans to avoid or mitigate their impact. In the end, the team achieved the start-up milestone within two weeks of the predicted P50 outcome.

EARLY-PHASE CAPITAL PROJECT

This project was in a relatively remote location that the owner had not worked in previously. Geopolitical risks added to the difficulty of the project. As a result, the qualitative risk register was very robust. Initially, a summary level risk model was employed during the quantitative risk assessment. However, as the participants began mapping the risks to schedule activities, they struggled to find appropriate places to make the linkages. The summary model was swapped out for the detailed schedule allowing the mapping to proceed. When the Monte Carlo Simulation was run, it became clear that many of the risks identified during the initial qualitative assessment would be unlikely to affect project objectives. This is due in part to the fact that the critical path is often not well understood at the time of the qualitative assessment. After reviewing the results, the team was able to sharpen its focus to the potential risks that would be most likely to impact project outcomes.

REDEVELOPMENT PROJECT

This redevelopment project has a duration of more than three years. The project team wanted to monitor risks to the schedule throughout the project lifecycle. Using the risk driver approach in concert with the evergreen risk register, the team conducts quarterly updates of the schedule risk model. As the project progresses, the breakdown of activities and their durations changes between updates. With the focus on the risk drivers rather than schedule activities, this is a much more efficient process. The quarterly updates are allowing the team to monitor the risk profile across the lifecycle of the project.

CONCLUSION

An opportunity exists to provide better value to the end-user of cost and schedule risk analysis. By changing activity-based ranging to the risk driver technique, the overall process of cost and schedule risk assessment can drive better decisions and in turn more predictable project outcomes. A better understanding of the probable causes of impacts to the project enables the project team to take appropriate action to improve project results.

REFERENCE


RECOMMENDED READING


ABOUT THE AUTHOR

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Above: On Friday, June 29, eighteen Hawaii Section members and guests participated in a construction site visit of the new American Savings Bank Campus downtown headquarters location. Shown above from left to right, are: Paul Belshoff, Khalil Ibrahim, Harrison Saito, Jared Wakayama, Jian Zhou, Lisa Yu, Steven Wong, II, Maelyn Uyehara, Andrea Kiener, Kristy Kastner, PSP; Nicki Dockery, Meredith Wong, Christopher Kanae, Juhee Thorn, Misheel Batsaikhan, Terence Young. Not pictured, Tommy Uno.
HAWAII SECTION
The Hawaii Section had a technical meeting on Aug 31, featuring a technical presentation on Segmental Bridge Construction, by Taka Kimura, PE., Design Manager, Buildings & Infrastructure with Jacobs Engineering.

On Friday, June 29, eighteen Hawaii Section members and guests participated in a construction site visit of the new American Savings Bank Campus downtown headquarters location. Led by Paul Belshoff EIT, Project Manager and Construction Inspector at Rider Levett Bucknall, the section group toured the 10-story office building to experience and learn about its architectural and engineering features, such as the stunning interior central staircase and electronically controlled tinted windows. The ASB site area of 327,533 SF is comprised of 99,881 SF in office space, 11,000 SF of first level and lobby areas, and a parking garage to hold 520 vehicles. The building’s structure is valued at $56 million and the interiors at $15 million, and construction is expected to be completed in early 2019.

The Hawaii Section recently elected the following Officers to serve 2018-2019: President, Maelyn Uyehara; Vice President, Christopher Kanae; Secretary, Kristy Kastner; Treasurer, Cristo Rojas; and Director of Social Media, Joseph Uno, CCP. The Hawaii Section’s membership currently stands at 29 members. The membership has increased by 35% since the Section has been reinstated in September 2013.

Upcoming Hawaii Section events will include an October networking event and a December community service event.

MONTREAL SECTION
The Montreal Section ended the season on a very high note with a dinner meeting on May 31 at the Omni Hotel with special guest speaker, John Hollmann PE CCP CEP DRMP FAACE, Hon. Life. Over 60 attendees from owner firms, consultants, contractors and agencies enjoyed a thought provoking, informative and enthusiastic presentation entitled, Project Risk Quantification: Methods that Work.

John noted that decision makers depend on reliable cost and schedule risk analyses to give them confidence in their decisions and to deliver reliability and that cost engineers and risk analysts need to apply project risk quantification (PRQ) methods that work. The presentation reviewed research on cost growth, schedule slip and accuracy and presented an integrated set of PRQ methods “that work” for projects, programs and portfolios of every description for both owners and contractors. The presentation was based on the presenter’s recent book: Project Risk Quantification: A Practitioner’s Guide to Realistic Cost and Schedule Risk Management. This work represented a major evolution of risk methods since John’s last presentation on risk in Montreal in 2012.

John provided his top ten reasons why risk quantification fails along with subjects including parametric modeling for systemic risks, expected value for project specific risks, program and portfolio risks and tipping point analysis. The meeting concluded with an enthusiastic question and answer period that followed his May presentation to the section.

Below: Montreal Section Guest Speaker John Hollmann, PE CCP CEP DRMP FAACE, Hon. Life, shown above left, listens and then responds to a question during an enthusiastic question and answer period that followed his May presentation to the section.

Above: Guest speaker, John Hollmann, PE CCP CEP DRMP FAACE, Hon. Life, spoke at the May meeting of the Montreal Section with over 60 attendees. His presentation was entitled, Project Risk Quantification: Methods that Work.

Above: At the Montreal Section May meeting, attendees included, shown above from left to right: Prof. Osama El Sayed Moselhi, PEng., Maria Deniro, John Prizio, Marlene Rafia, Celina Ma, John Hollmann, PE CCP CEP DRMP FAACE, Hon. Life; Chantale Germain, Les McMullan, FAACE; and Marc Anthony.
SOUTHERN CALIFORNIA SECTION

On Aug. 18., the Southern California Section participated in a private site tour of the Gerald Desmond Bridge Replacement Project at the Port of Long Beach. The Gerald Desmond Bridge is a vital part of the nation’s infrastructure, with nearly 15 percent of the nation’s waterborne cargo trucked across the bridge. The tour explained the project and helped to reinforce how iconic the project is for California. The project is one of California Department of Transportation’s (Caltrans) first to use the “design build” delivery method to build the bridge faster and at a lower cost over traditional projects. Once completed, the new bridge will become the second tallest cable-stayed bridge in the US, with the highest vertical clearance of any cable-stay bridge in the US. Tour attendees saw construction progress to date and the expected progress upcoming. Topics also explored project funding, controls and delays experienced on the project. The tour had 26 attendees and a large number of college students, compliments of student outreach.

Right: On Aug. 18., the Southern California Section participated in a private site tour of the Gerald Desmond Bridge Replacement Project at the Port of Long Beach. The tour explained the project and helped to reinforce how iconic the project is for California.

DOES YOUR SECTION HAVE NEWS TO SHARE? See below for complete instructions for how to submit news and photos from your Section’s happenings to be included in the AACE® International Bulletin.

SUBMITTING SECTION NEWS: We invite all sections to submit news and updates to be included in the International Bulletin section of each Source issue. Please submit any and all text as a part of the e-mail or as a Microsoft Word file attachment. Please submit any photos as individual attachments in JPG formats. Do not embed photos in Microsoft Word files. Please include the names and titles of each person shown in any photos. Please list names from left to right or refer to those shown as being above left or right. For group photos please list names from left to right, beginning with the front row and working to the back. All submissions should be e-mailed to editor@aace.org. Please use the official name of the Section as approved by the AACE Board when the Section’s charter was approved. Within 2 to 3 business days of submitting a “Section News” item, you should receive a return confirmation e-mail that your submission was received at AACE headquarters.

MISSING SUBMISSIONS: Generally, all submissions received in the above scheduled times will be published in the listed issue. Items are not held because of space restrictions. There is no waiting list and no preference is given to one Section over another. Questions about incomplete submissions or failure to follow these submission guidelines could delay publication. Text will be published without submitted photos if the photo does not meet the listed quality requirements. AACE reserves the right to edit all submissions and/or to refuse to publish any submissions determined by the Managing Editor or the Art Director to not meet the standards of the journal. Any appeals of these decisions will have a final decision determined by the Executive Director.

If a submission is not included in the designated issue, please e-mail or call the Managing Editor to ensure that it has not been lost or misplaced. Call or e-mail if you do not receive a confirmation e-mail within 3 business days of submission.

Source has a submission deadline of two months in advance of the issue date.

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Any Section representative with questions is advised to e-mail editor@aace.org or call the Managing Editor during regular business hours, 9 a.m. to 5 p.m. Eastern Standard Time, Monday-Friday, except holidays and special closings.

Above: On Aug. 18., the Southern California Section participated in a private site tour of the Gerald Desmond Bridge Replacement Project at the Port of Long Beach. The tour had 26 attendees and a large number of college students, compliments of student outreach. Tour attendees saw construction progress to date and heard about the expected progress upcoming.
The AACE Canada meeting was held on Tuesday June 26th during the AACE Annual Conference and Expo in San Diego, California. Outgoing AACE Canada President, Les McMullan, called the meeting to order at 7:20 am and thanked all for attending. Doug Leo, AACE President Elect was also in attendance. A total of 31 signed the register with 6 from Vancouver, 10 from Chinook-Calgary, 5 from Edmonton, 4 from Toronto, 1 for Saskatoon, 1 for Bruce County and 3 from Montreal.

Copies of the 2017 AGM minutes were provided for review and motioned for approval and the motion was seconded and passed.

The following officers for AACE Canada were selected and endorsed at the meeting: Vice President: Michelle McMillan, Chinook-Calgary Section, secretary: Bryan McConachy, BC Section and treasurer, Shoshanna Fraizinger, Bruce County Section. These will provide assistance as may be required to the incoming President of AACE Canada and elected Regional Director for Region 1, Bindu Amin from the Chinook-Calgary Section.

Les McMullan provided an overview of the Region 1 highlights from the 2016-2017 year and commended the team on the high level of activity in the year as demonstrated at the Section Awards.

Following the discussion of AACE Canada business, the Sections provided a verbal report on their activities. One of the highlights of the meeting was the announcement of the newly formed section in Bruce County, Ontario with Shoshanna Fraizinger as President.

The next planned AACE Canada meeting will take place at the next Annual Conference and Expo in New Orleans.
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1. **CONSTRUCTION NETWORK VIP BREAKFAST**, 8 a.m. to 9:30 a.m.
   K-12 Capital Program Updates
   DoubleTree ONT Airport, 222 N. Vineyard Ave., Ontario, CA
   construction-network.net

2-4. **ROOFING INDUSTRY COMMITTEE ON WEATHER ISSUES**, RICOWI Conference
    Crowne Plaza Chicago Northbrook, Northbrook, IL
    ricowi.com/event_registrations/register/94

3. **CONSTRUCTION NETWORK VIP BREAKFAST**
   LA County Safe Clean Water Program
   City Club, 555 S. Flower, 51st Floor, Los Angeles, CA
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10. **CONSTRUCTION NETWORK, VIP BREAKFAST, LA SANITATION AND ENVIRONMENT**
    8 a.m. to 9:30 a.m., 555 S. Flower, 51st floor
    Los Angeles, CA
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11. **SEAOS ANNUAL STRUCTURES SYMPOSIUM**
    150 North Riverside Plaza, Chicago, IL
    seaoi.org/event/8th-annual-structures-symposium

12-15. **ASCE CONVENTION**
    Hyatt Regency at Colorado Convention Center
    Denver, CO
    registrations@asce.org

16. **CONSTRUCTION NETWORK VIP BREAKFAST**
    LA Metro Highway Programs
    555 S. Flower, 51st Floor, Los Angeles, CA
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19-20. **PERU SECTION COST ENGINEERING CONGRESS**
    Auditorio Sociedad Nacional de Industrias, Los Laureles 365, San Isidro – Lima Peru.
    presidente@aacei.org.pe or Carlos.daga@aacei.org.pe or david.chigne@aacei.org.pe

31. **CONSTRUCTION NETWORK VIP BREAKFAST**, City of Santa Monica Capital Program Overview
    8 a.m. to 9:30 a.m.
    555 S. Flower, 51st Floor, Los Angeles, CA
    construction-network.net

13. **CONSTRUCTION NETWORK VIP BREAKFAST**, March Joint Powers Authority
    Riverside Marriott, 3400 Market St., Riverside, CA
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28-29. **INDUSTRIAL ESTATES AND SPECIALIZED ECONOMIC ZONES**
    J.W. Marriott, Kuala Lumpur, Malaysia
    caseyl@trueventus.com

DECEMBER

3-5. **FOURTH AUSTRALASIA AND SOUTH-EAST ASIA STRUCTURAL ENGINEERING AND CONSTRUCTION CONFERENCE**
    Brisbane, Australia
    isec-society.org/ASEA_SEC_04/

2019

**APRIL**

30-MA Y 2. **AEC BUI LTTECH CONFERENCE & EXPO**
    Donald E. Stephens Convention Center, Rosemont, IL
    www.aecbuildtech.com

**MAY**

20-25. **THE 10TH INTERNATIONAL STRUCTURAL ENGINEERING AND CONSTRUCTION CONFERENCE (ISEC-10)**
    University of Illinois at Chicago
    isec-society.org/ISEC_10/topics.php

21-23. **SPAR 3D EXPO & CONFERENCE/AEC NEXT TECHNOLOGY EXPO + CONFERENCE**
    Anaheim Convention Center, Anaheim, CA
    Co-located with the AEC NEXT Technology Expo + Conference
    info@spar3d.com

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