



WELCOME

The ASQ Reliability Division is the largest group in the world promoting reliability training and education.

This newsletter covers professional development opportunities, plus division activities, information and news.

Chair's Note

In this edition

Trevor Craney

2014-2015 Chair,
Reliability Division of ASQ
trevor@asqrd.org

Happy Holidays! As the year draws to a close, I am very proud of the accomplishments of the division. We received an honorable mention for ASQ's PAR (performance and recognition) criteria. We had successful RAMS and ASTR conferences. We taught instructor-led 11 courses this year! We officially started our new website subscriptions, which has attracted the attention of many like-minded reliability professionals to join to gain access to our content. And we continued our highly attended webinars. All of this took the effort of a lot of RD volunteers. I thank all of you for your contributions.

As I pass the baton to Marc, I'm confident the RD will continue to thrive and produce meaningful content that contributes to member value. As with many of our volunteers and other past chairs, I am not leaving. I will continue to volunteer in other roles for the RD and look forward to seeing many of you at RAMS and other RD events.

Marc Banghart

2016-2017 Chair, Reliability Division of ASQ
marc@asqrd.org

2016 will continue the excitement! We plan on continuing to build on the successes under Trevor and will continue offering webinars every month, increase our offering of instructor-led courses and making them affordable! The webinars and instructor-led courses will cover fundamental topics in reliability engineering as well as more advanced topics to appeal to all segments of our membership. Please check out our website at www.asqrd.org for the full line up.

In addition to RAMS 2016 which we co-sponsor, we are also excited to continue co-sponsoring the Accelerated Stress Testing and Reliability (ASTR) conference which will be held in Pensacola, FL in September 2016. year.

Please join with me to say thank you to the excellent leadership Trevor has provided! I look forward to a very productive year!

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Division Budget Update

ASQ-RD Treasurer's Report Third Quarter

John Bowles, ASQ-RD Treasurer(bowles@cec.sc.edu)

The Division continues to have a strong balance sheet with over \$44,146 in our checking and ASQ Investment Program accounts at the end of the third quarter 2015. Investments in ASQ's Reserve Fund were also slightly more than \$96,300, down \$882 from the previous quarter. There is also a \$3,500 advance on the balance sheet for the RAMS 2016 seed money.

The accompanying table shows our 2015 budget, and actual revenues and expenses for the first three quarters of 2015. Income and expenses for the corresponding period of 2014 are also shown for comparison. Note, however that in some cases, the timing of some receipts and expenses can move them from one quarter to the next making exact comparisons difficult.

As shown in the table, total revenue for 2015 is well ahead of last year but considerably less than what was anticipated in the budget. Income from ASTR 2015 (\$5,722) was somewhat less than in 2014 (\$8,070). But income from workshops and tutorials was much higher than last year due mainly to the increased number of courses taught. However, as mentioned previously, it was still less than anticipated. Miscellaneous income was also greater due to the timing of certain receipts – seed money for both the 2014 and 2015 ASTR conferences was returned in 2015. We've also had 35 registrations for website access. Revenue from member dues continues to be down from the previous year.

Overall, expenses were considerably more than in the first three quarters of 2014. This was mainly due to the increased number of courses which affected honorariums, travel, meetings and banquets, and room rentals. We also did more advertising for the courses and printing of course materials. The fact that we had fewer courses than originally budgeted also made honorariums meetings and banquets, and travel considerably less than budgeted.

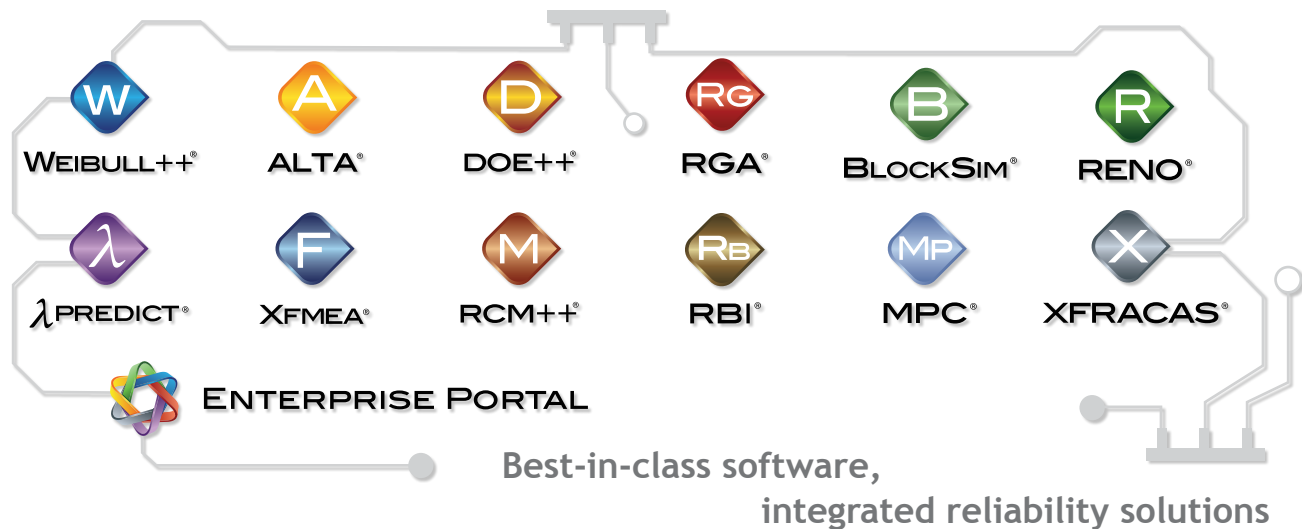
Overall, we ended the first three quarters of 2015 with a net loss of \$3,229, better than at the halfway point in the year, and we continue to have a strong balance sheet with considerable reserves.

Division Budget Update (continued)

		2015	2015 QTR 1	2015 QTR 2	2015 QTR 3	2015 3 Quar-	2014 3 Quar-
ACCOUNT	DESCRIPTION	Budget	Actual	Actual	Actual	Actual	Actual
	REVENUE						
4000	Dues	\$23,000	\$4,788	\$8,748	\$4,896	\$18,432	\$18,594
4100	Retail_Sales	\$1,000					\$245
4200	Advertising		\$960			\$960	\$3,773
4300	Registrations	\$30,000	\$5,722	\$9,405		\$15,127	\$17,641
4370	Workshops/Tutorials	\$100,000	\$11,297	-\$1,279	\$21,963	\$31,981	\$12,169
4990	Miscellaneous		\$7,015	\$340	\$3,760	\$11,115	\$3,680
	TOTAL REVENUE	\$154,000	\$29,782	\$17,214	\$30,619	\$77,615	\$56,102
		2015	2015 QTR 1	2015 QTR 2	2015 QTR 3	2015 3 Quar-	2014 3 Quar-
ACCOUNT	DESCRIPTION	Budget	Actual	Actual	Actual	Actual	Actual
	EXPENSES						
5100	Printing & Production	\$1,500	\$525	\$276	\$212	\$1,013	\$448
5280	Promotional Giveaways	\$1,000					
5400	Postage & Shipping	\$2,000	\$374	\$1,899	\$1,169	\$3,442	\$837
5500	Contract & Professional	\$26,000	\$3,050	\$4,179	\$8,687	\$15,916	\$6,652
5573	Advertising	\$2,500	\$300	\$2,774		\$3,074	\$359
5650	Equipment Purchases	\$5,000	\$1,171	\$202		\$1,373	\$705
5675	Equipment Rentals	\$2,000	\$592	\$157	\$460	\$1,209	\$1,116
5800	Meetings & Banquets	\$25,000	\$6,253	\$1,233	\$3,659	\$11,146	\$6,796
5900	Travel	\$70,000	\$10,701	\$18,331	\$7,037	\$36,068	\$21,769
6000	Supplies	\$200			\$50	\$50	\$90
6100	Telephone	\$2,500		\$766	\$862	\$1,628	\$319
6200	Partner Payment	\$10,500	\$3,500			\$3,500	\$10,203
6310	Awards & Gifts	\$3,000	\$600	\$500	\$1,000	\$2,100	\$2,333
6390	Other	\$3,000		\$325		\$325	
	TOTAL EXPENSES	\$154,200	\$27,065	\$30,642	\$23,137	\$80,844	\$51,628

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Advanced Accelerated Life
Testing Analysis



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Reliability and Maintainability
Analysis for Repairable Systems



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January 25-28, 2016
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The Annual Reliability and Maintainability Symposium (RAMS®) is the premier event in the reliability, availability, and maintainability engineering disciplines. Combining tutorials, presentations, CEUs, certifications, and networking into one week-long program, the RAMS® delivers cutting-edge information to all technical industries.

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- Tutorials - basic to advanced
- Technical paper sessions
- Panel sessions
- Exhibits program
- Certificate program
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2016 ASTR Conference

28-30 September, 2016

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2016 ASTR Committee



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2016 Accelerated Stress Testing and Reliability (ASTR) Conference

Delivering Reliability Effectively with Current and New Technologies

The 2016 Accelerated Stress Testing and Reliability (ASTR) Conference is focused on highlighting cutting-edge methods to deliver maximum cost-benefits from reliability testing. ASTR 2016 is relevant to manufacturers in the aerospace, automotive, consumer electronics, defense, medical, telecommunications and other industries where reliability is a key driver of operational and business success. If your company needs to improve product testing with a goal to improve reliability, reduce warranty costs, improve profits, gain market share, and be more competitive, then the 2016 ASTR Conference is for you.

You'll Use What You Learn at the 2016 ASTR Conference

Accelerated stress testing is a key tool within a well-structured development program—enabling timely opportunities for product improvement and delivering assured product performance.

ASTR 2016 will be comprised of short sessions, tutorials and will feature exhibits. Topics will include Accelerated testing, degradation methods, effective test, HALT, and field reliability.

Who should attend?

— Anyone who determines how to test for reliability

Send your abstract to

Marc Banghart

at

marc@asqrd.org

Bayesian Analysis by Markov Chain Monte Carlo (MCMC)

By: **Mohammad Pourgol-Mohammad, Ph.D, PE, CRE**

There are some classic methods for determining the unknown parameters in reliability analysis including probability plotting, least square, and maximum likelihood estimation (MLE). These methods provide a simple value for parameters based on experimental data. Bayesian approach is the method of choice employed widely in research for estimating and updating parameters values. The advantages of this method:

1. The Bayesian approach is an updating network which does not ignore the prior information in contrast with the classic methods, but updates the earlier estimations with new obtained knowledge to improve the estimated parameter.
2. The output of Bayesian network is a distribution instead of a simple value for the parameter.
3. In classic methods, a large sample size is required for convergence of the estimate. For analysis of cases restricted by limited data the Bayesian approach is a good approach for parameter estimation.

By considering X as the unknown parameter and E as the new knowledge of crack length, Bayesian theorem modifies a prior probability $\pi_0(X)$ yielding a posterior probability $\pi_1(X|E)$, via the expression:
$$\pi_1(X|E) = \pi_0(X) \frac{f(E|X)}{\int_{-\infty}^{+\infty} f(E|X)\pi_0(X)dX}$$

where $f(E|X)$ is the likelihood function and is constructed based on new available knowledge and evidence. The factor $f(E|X)/\int f(E|X)\pi_0(X)d(X)$ is the impact of the evidence on the belief in the PDF of the parameters. Multiplying the prior PDF of the parameters by this factor provides a theoretical mechanism to update the prior knowledge of the parameters with the new evidence.

A Bayesian network is a complicated method in practice. An analytical solution rarely occurs. However, it is possible to moderate the Bayesian difficulty by numerical method through Markov chain Monte Carlo (MCMC) solution. This numerical method is applicable for similar approaches which need to integrate over the posterior distribution to make inference about model parameters or to make predictions. MCMC is Monte Carlo integration that draws samples from the required distribution by running a properly constructed Markov chain for a long time. Gibbs sampling is usually used for taking samples. BUGs is an acronym stand for Bayesian inference using Gibbs sampling with WinBUGS as an open source software package for performing MCMC simulation.

ASQRD 2016 Sponsored Courses

Dates	Location	Courses	Instructor(s)
January	Tucson, AZ @ RAMS	-Gold of the Desert Kings -Introduction to Monte Carlo	Outside vendor Jim Breneman
March	Charlotte, NC	-New Product Development steps for Mission Effectiveness and Failure Prevention -Accelerated Life Testing	David Auda Jim McLinn
July	Portland, OR	-Introduction to Reliability Engineering/Statistics (two day course)	Trevor Craney Marc Banghart
August	Charlotte, NC	-CRE Preparation Course (two day)	Jim Breneman / Mohammad Pourgol-Mohammad
September	Pensacola Beach, FL @ ASTR	-Accelerated Life Testing	Jim McLinn.

To find out more about any of these courses and to register for one or more, go to url:

<http://www.asqrd.org/2016-courses/>

ASQ Reliability Division

Teaching Opportunities

The ASQ Reliability Division is looking for qualified professionals for teaching short courses in reliability, risk and failure analysis and related areas. Interested people contact ASQ Reliability Division at trevor@asqrd.org or marc@asqrd.org.



CALL FOR PAPERS

\$1000 Annual Award for Best RELIABILITY Paper

The ASQ Reliability Division is continuing with our support of publishing high quality articles on reliability.

We are continuing to review and accept papers into QE for focus on reliability and associated fields of study for consideration in the upcoming 2015-2016 award cycle.

Expect to see the winner of the 2015-2016 best paper announced in the third quarter newsletter. The award will be \$1000, as well as recognition at the annual ASQ-RD dinner banquet, held annually at RAMS.

Note – to be eligible for the award, at least one of the authors for a paper must be a member of the ASQ Reliability Division or hold a valid subscription to www.ASQRD.org when their paper is published.

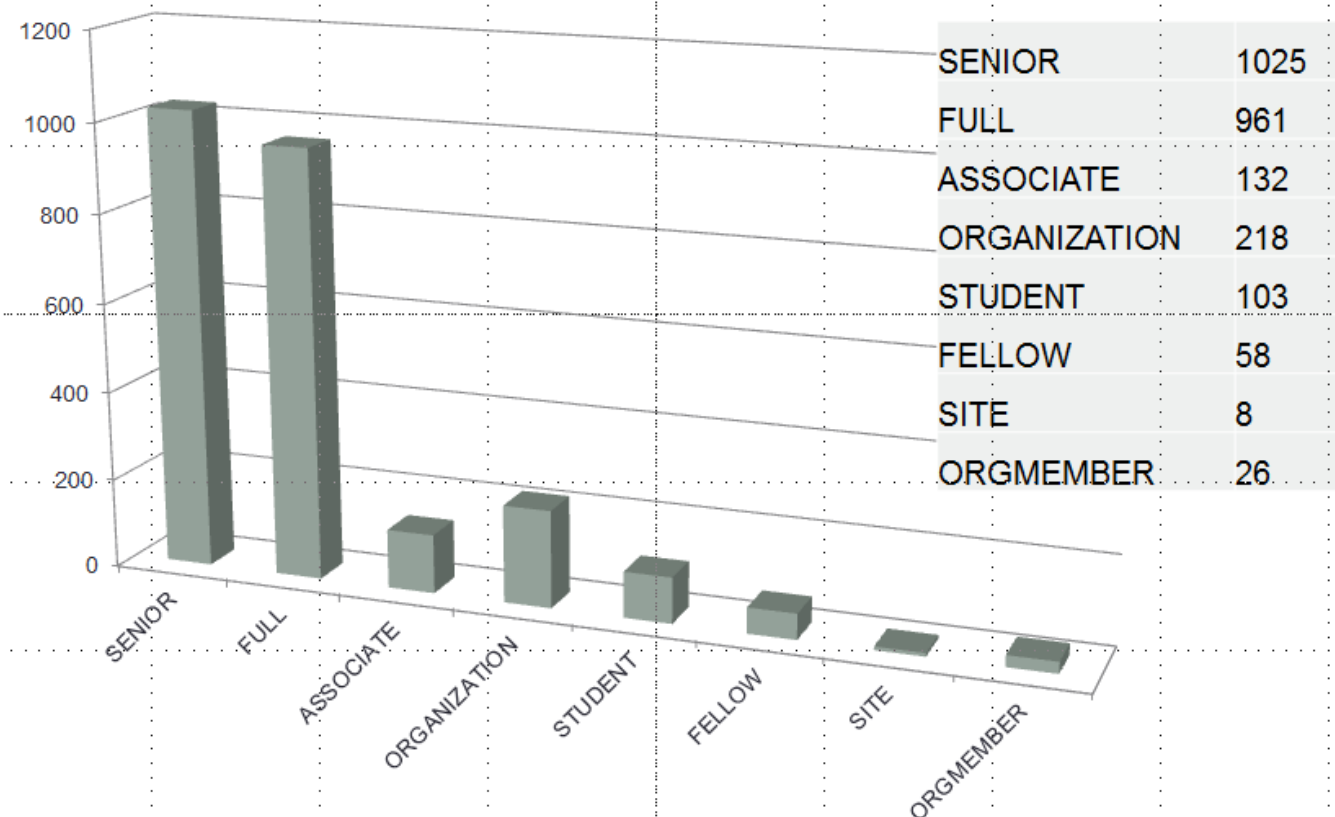
For more information: Rong.Pan@asu.edu

To submit papers for publication: <http://mc.manuscriptcentral.com/lqen>

RD Membership Trend (2531 total)



RD Membership by Type



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 - Reliability Review Journal (2006-2010)
 - Newsletters

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Benefits	ASQ Reliability Division	ASQRD.org
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Eligible to hold position of ASQ-RD appointed (DMC or RC) position	✓	
Eligible to hold position of ASQ-RD appointed position	✓	✓
ASQRD.org Members Only access	✓	✓
Discounts for ASQ-RD sponsored conferences & training events	✓	✓
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English webinars:

1. *"Designed Experimentation to Solve a Reliability Problem"*, Presenter: Allise Wachs
January 14, 2016
2. *"Accelerated Stress Testing for Robust and Reliable Design"*, Presenter: John Paschkewitz
February 11, 2016
3. *"Missing Tools in Performing & Predicting Impending Failures, Derived from Thermodynamic Models"*,
Presenter: Alec Feinberg March 10, 2016
4. *"Quality: A Loggies's Perspective"*, Presenter: Lloyd Muller
April 14, 2016
5. *"Why 400,000 Patients Die Each Year from Poor Practices in Hospitals: Proven Reliability
Strategies for Increasing the Survival Rate."*, Presenter: Dev Raheja May 12, 2016
6. *"Test Sampling & Retesting for Design Changes,"* Presenter: Andre Kleyner
June 9, 2016
7. *"System Theoretic Process Analysis,"* Presenter: Nancy Leveson
July 2016

ASQ- Reliability Division Webinar Series

Reliability division offers free Webinars in English, Spanish, and Chinese featuring leading international practitioners, academicians, and consultants. Enhance your reliability knowledge. For more information, click here: <http://asqrd.org/webinars/>

The ASQ Reliability Division Webinar Series remains popular. Since the Webinar and Short Course programs were first offered in November 2010, the Reliability Division has provided 130 webinars providing nearly 11749hours of professional development to its members at no cost. The most recent topics included webinars on:

- Finding Causes that Checklists Don't Find
- Effective Reliability Test Plan Development
- Empirical Limit Testing, The Benefits Of Discovery and Comparisons Instead of Assumptions and Predictions

In addition, to date we have provided Recertification Units RU's to over 5835 individuals.

Webinar Outreach

Executive Producer & Speaker Manager

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Webinar Scheduling

Elaheh Rabiei
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For previously recorded webinars on topics relevant to reliability engineers delivered by subject matter experts. Visit : <http://www.asqrd.org/past-webinars>

Other Information

LINKS

ASQ-RD new website:

<http://www.asqrd.org/>

For up to the minute news and reminders of what's going on in the Reliability Division world.

Tech Briefs

<http://www.linkedin.com/groups?about=&gid=3994573>

ASQ Reliability Division(1500+ members on LinkedIn)

<http://www.linkedin.com/groups?about=&gid=1875217>

Upcoming Events

Click on Reliability Calendar for a current calendar:

<http://www.asqrd.org/>

1. **RAMS** url: www.rams.org (page 6)

2. **ASTR** url:: www.ieee-astr.org (page 7)

ASQ Learning Institute™ Spring Training

The ASQ Learning Institute™ provides you with career enhancing training to help you make an impact in your professional path and your organization. Take advantage of member pricing, and register for one of these upcoming courses. To register, [click here](#) or call **800-248-1946** and provide promo code **MFGE**.

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[Failure Modes and Effects Analysis -- Process](#)

[Lean Six Sigma Black Belt Training](#)

[Lean Six Sigma Green Belt Training](#)

[2015 Learning Institute Training Catalog](#) (2016 catalog not available at go to press time).

International Courses

[See ASQ courses offered outside of the United States and Canada.](#)

CRE Exam Information and Facts

Current CRE statistics:

The total number of CREs as of the March 2015 exam was 5,961. Local ASQ Sections and international organizations host exams all over the world. You will be asked to designate a preferred examination site on your application. If you are not a member of ASQ, please [find the Section that is closest to your location](#). If you live in a country other than the United States, Canada or Mexico, international certification affiliates administer certification exams. [Find an international certification exam location](#). ASQ will make every effort to accommodate your request. ASQ offers some [translated certification exams](#).

The ASQ certification exam dates (by type of certification) is at :

<http://prdweb.asq.org/certification/control/dates>

“Did you know you could automatically generate Recertification Unit (RU) certificates by watching webinars on our website? Log into www.asqrd.org today!”

North America Regional Councilors

ASQ Regional Councilors

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Region 2	OPEN
Region 3	OPEN
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Region 5	Deniz Eroglu rderoglu@gmail.com Washington, DC
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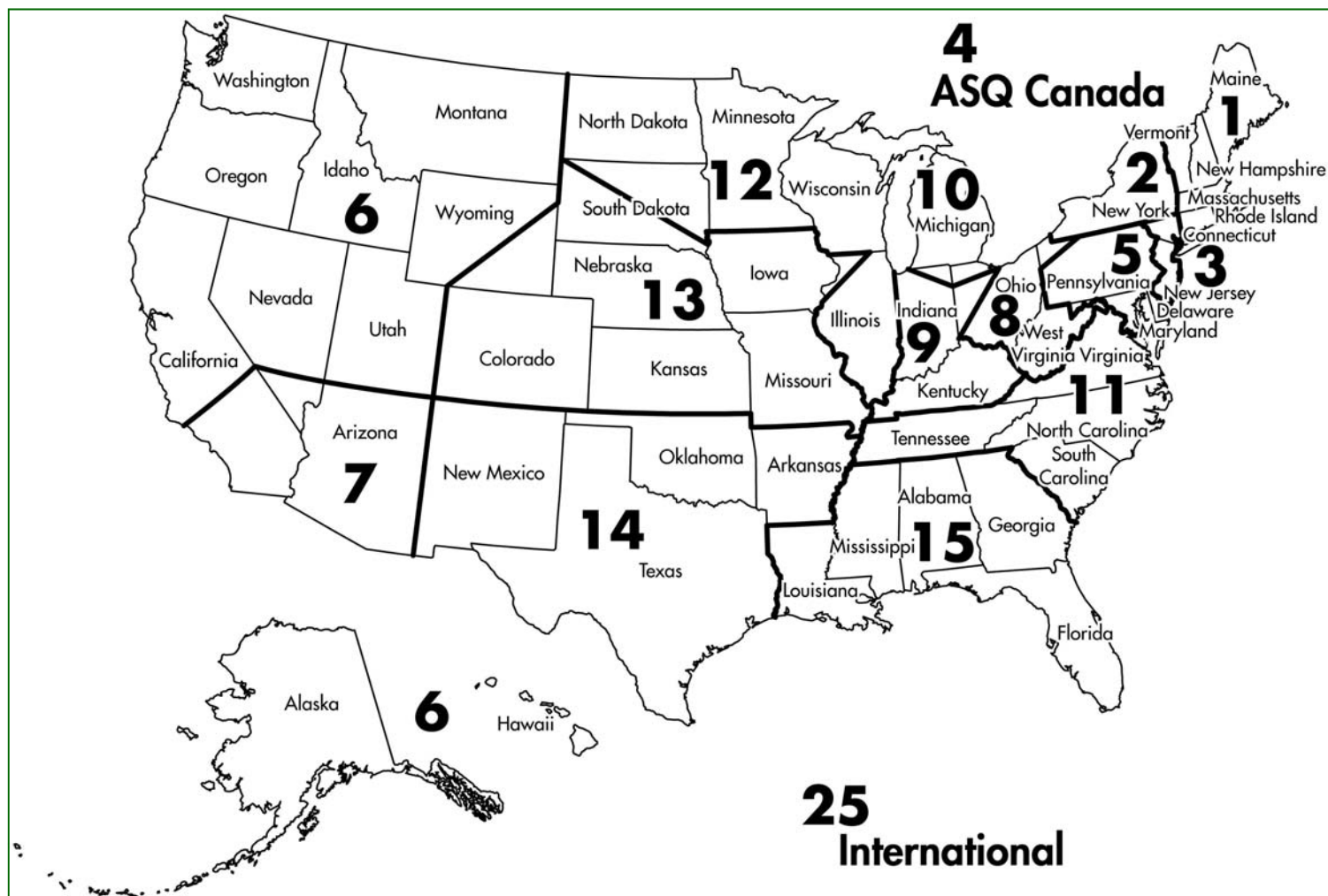
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Region 13	John Paschkewitz jjpengr@gmail.com St. Louis, MO
Region 13	OPEN
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Region 14A	Cheryl Tulkoff ctulkoff@dfrsolutions.com Austin, TX
Region 14A	Sidhartha Pingali pingalisidhartha@gmail.com Houston, TX
Region 14B	Brad Beaird bbeaird@enovationcontrols.com Tulsa, OK

North America Regional Councilors (continued)

ASQ Regional Councilors	
15A	Bill Barto bbarto@LCE.com Orlando, FL
15A	Tim Adams tim.adams@nasa.gov Melbourne (Kennedy Space Center), FL

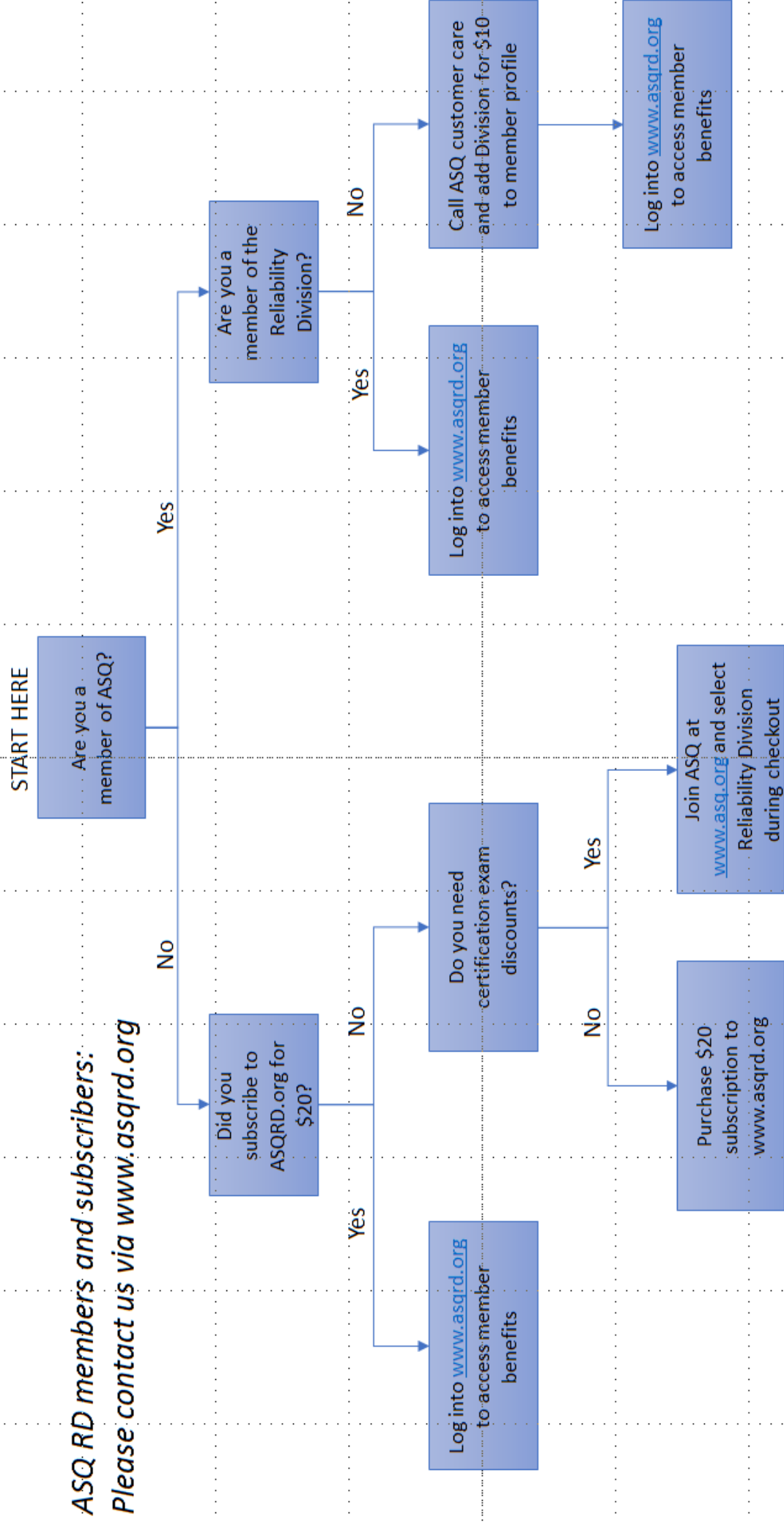
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15B	Angleat Shelikoff angleat.shelikoff@us.af.mil Eglin AFB/Ft. Walton Beach, FL



International Regional Councilors

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A Helpful Flowchart!!



*ASQ RD members and subscribers:
Please contact us via www.asqrd.org*

2016-2017 ASQ-RD Leadership Positions

Elected Positions

Chair

Marc Banghart
Marc@asqrd.org

Chair-elect

Mark Durivage
mdurivage@hotmail.com

Secretary

Dan Burrows (N. America)
d1c1b1@hotmail.com

Treasurer

Jim Breneman
weibullman@gmail.com

Past Chair

Trevor Craney
Trevor.A.Craney@shell.com

Appointed Positions Leadership Support Team

Division Audit Chair

Mark Durivage
mdurivage@hotmail.com

Communications Chair

Mauro Andreassa
mandreas@ford.com

Fellows Nominations

Charlie Plotkin
cplotkin@ford.com

Membership Chair

Tim Gaens
tim.gaens@gmail.com

Nominating Chair

Trevor Craney
Trevor.A.Craney@shell.com

Appointed Positions (continued)

Continuing Education and Networking

ASTR Tech Comm Reps
Marc Banghart
Marc@asqrd.org
Jim McLinn
jmrel2@aol.com

Education Chair

Trevor Craney
Trevor.A.Craney@shell.com

RAMS Board of Directors

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Trevor.A.Craney@shell.com

Awards

RAMS Best Paper Award Chair
Mingxiao Jiang
Mingxiao.jiang@medtronic.com

QE Best Paper Award Chair

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rong.pan@asu.edu

Outreach

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Regional Councilors Coordinator

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d1c1b1@hotmail.com

ASQ-RD Mission

The Mission of the Reliability Division is:

- * Provide a global forum for networking among practitioners of reliability engineering, management and related topics,
- * Facilitate growth and development of division members,
- * Promote reliability engineering principles and serve as a technical resource on reliability engineering for ASQ, standards agencies, industry, government, academia and related disciplines.
- * Sponsor, present and promote reliability, maintainability, and related training materials for courses, symposia, and conferences.

By: Mohammad Pourgol-Mohammad, Ph.D, P.E, CRE, mpourgol@gmail.com

Simulation based methods, especially Monte Carlo simulation based techniques, can solve these problems. According to the researches, complex systems which may be difficult to solve with analytical methods are simply solved with Monte Carlo simulation approach [3,4,7,12]. The reliability methods, which are based on Monte Carlo simulation approach, because of their ability in modeling the real conditions and stochastic behavior of the system, can eliminate uncertainty in reliability modeling [7]. The utilization of this approach is increasing for the calculation and estimation of reliability of dynamic systems.

DFT Versus SFT

Although, there are many rational reasons to utilize the dynamic methods in industrial field, the usage of these methods is not very common yet. Perhaps, the main reason for this problem is directly related to the owners. They do not bother to modernize existing static methods, such as RBD and SFT, which are extensively used in industrial field. It comes from two main causes [5]; First of all, static approaches are more simplified and aggressively tested. In addition, dynamic approaches are still too vague to apply to industrial applications. Also, from a technical point of view, a SFT can be translated in a RBD, but this conversation to a DFT has to be figured out.

A Simple Example of DFT and SFT

Fig. 3 presents a simple example of SFT (the left one) and DFT for a similar system. Let us consider the failure rate value of 0.01 (1/hrs) for all BEs. In this example, Top Event (TE) of SFT will occur if all of the BEs occur; that is occurring of A, B and C at a same time, all together, no matter the sequences of them.

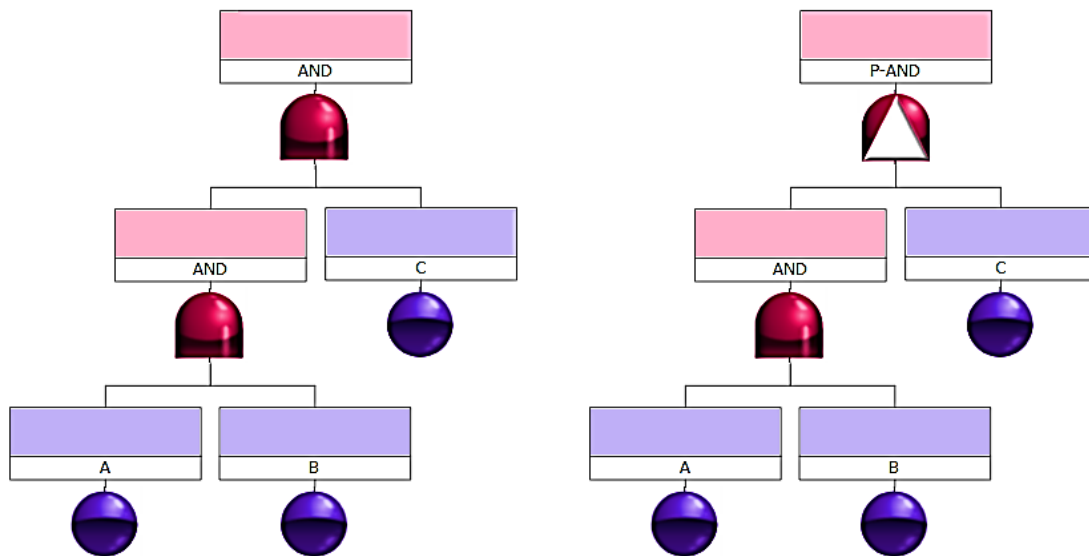


Figure 3: A simple example of SFT and DFT.

Now, Let us consider the DFT of this case. Also, for this DFT, Top Event (TE) will occur if all of the BEs occur, at a same time, all together, but the way how this configuration is reached, matters. In this case, due to the presence of the PAND gate, the sequences of events are important. In this case, to occurrence DFT's TE, A and B must occur before C. At the mission time of 1000 hours, unreliability value for SFT and DFT, are 9.99E-16 and 3.33E-16, respectively (numerical analysis was done by "PTC Windchill" software).



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