The Enchanted View
— Thinking About Systems —

Published quarterly and sent to all INCOSE Enchantment Chapter members. 2013 Q4
www.incose.org/enchantment

Hope for the Best, Plan for the Worst

Ann Hodges, Chapter President, Sandia National Labs

I participated in the Durango & Silverton Narrow Gauge Railroad's photography events the last weekend in September – both Saturday and Sunday runs as well as a night photo shoot at the train yard. Unique about the photo train runs, the photographers deboard the train at various eye-poppingly beautiful spots, the train backs out of sight, everyone readies their cameras and related gear, the train toots its signal that it's about to roll forward, and then it comes barreling by with its whistle blaring and the engine billowing smoke and steam to the delight of every eager photographer. I don't know which was louder – the train or all of the camera shutters! We had *hoped for the best* and the combination of Mother Nature and the D&S Narrow Gauge RR delivered! I've included a picture I took on one of the trips.

Over the 131 years that this railroad has been in continuous operation, there have been numerous "events". One of the recent events has to do with rock slides. During the day previous to the photo trips, a boulder the size of a mid-sized car crashed down on a section of track. There were 2 trains that were stranded temporarily in Silverton until the track could be repaired. What's amazing is that the trains were only delayed a little over 3 hours – the railroad had the spare tracks and railroad ties staged and available, a way to deliver the materials and the personnel with the knowledge and tools to make the repair.

The RR also took the precaution of sending a single-person rail runner both ahead of and behind the train to check for rock slides, track condition, etc. The last part of this mix is the pride and passion that the D&S Narrow Gauge RR staff exhibits for the trains and the company – the volunteers, Conductors, Brakemen, Engineers and sales people. Even the residents along the way all waved as our train went by.

How much luckier an organization is when it *plans for the worst* and then takes the next step to prepare. I think the motto of "hope for the best, plan for the worst" followed by plan execution and esprit de corps is foundational to the practice of systems engineering.

Speaking of planning, the Enchantment Chapter Board of Directors has been planning some awesome tutorial opportunities coming up in the next 6 months, ranging from systems engineering basics to more advanced topics (e.g., trade studies, risk cubes, transformational SE). We'll announce the details as we work out the logistics. If there are any topics you'd be interested in hearing, or you have a topic to present, please let me know. ∞

Initiative at Student Division: Closer Ties to Enchantment Chapter

Juan Carlos Armenta, UTEP Student Division President

The University of Texas at El Paso (UTEP) has just announced the reinvigoration of the INCOSE Enchantment Chapter Student Division this month. Juan Carlos Armenta, a Graduate Systems Engineering Candidate at UTEP, has taken the initiative to lead the organization and create a working relationship with the Enchantment Chapter.

The main goal of the INCOSE Student Division is to incline UTEP students toward building a career in Systems Engineering and to build exposure for the Systems Engineering Program for the benefit of more students. With 30 members (and rising!), the Student Division, advised by Dr. Eric Smith, Faculty and Graduate Program Coordinator, will host a variety of events, including invited guest speakers, hosting the Green Systems of Systems Symposium that is done annually at UTEP, and organizing trips to Albuquerque to further connect with the more experienced counterparts in the Enchantment Chapter. Our 30 members are not all INCOSE members as yet, but that will change. The Student Division at UTEP will allow students to have great networking opportunities with several affiliates of the Enchantment Chapter, as well as allow them access and exposure to current industry standards and processes. University students, the UTEP Community, and the Enchantment Chapter as a whole will benefit greatly from this newly affirmed partnership and it will be something to look forward to during the coming months.

For more information about the organization, or if you would like to contact the Student Division, please email Juan Carlos Armenta at jcarmentahernandez@miners.utep.edu. ∞

Why You Want to Meet David Ackley—December's Speaker

Mary Compton, Sandia National Labs

This year's INCOSE Holiday Social will be held at El Pinto Restaurant on 4th Street in Albuquerque's North Valley on December 6, 2013. Cocktail hour begins at 5:30 PM, followed by dinner at 6:30 PM. A talk by UNM Computer Science professor David H. Ackley will begin at 7:00 PM. Cost for members and their guests will be $25/person, and the cost for non-members will be $35/person. Additional details, including the menu and how to RSVP, will be sent in future emails from the Chapter.

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Dave Ackley will be our speaker at the Chapter's annual December holiday social dinner meeting. If you've read the abstract of the meeting talk on page 3 you'll sense a more technical discussion might be in store than usual. We debated that before deciding to ask Dave to speak in December, when many of us bring our significant others … if you can call a unanimous set of opinions a debate. As one wag put it: "I wouldn't have married him if he couldn't follow a technical discussion," or words to that effect.

But why the unanimous acceptance for the December event? We could have had Dave speak at any of the other monthly meetings. Usually for December we are looking for something of broad interest, maybe with some entertainment value.

Dave is an associate professor of computer science at UNM, and an external professor at Santa Fe Institute. You don't get to be either if you don't spend a lot of time diving deeply into narrow subject areas. But then, in 2011 he won the "most outrageous opinion" prize for his wild-eyed thoughts on computer architecture. And let's face it, today computers are main stream broad topics (at least for those of us perpetually under 25).

Google's Matt Welsh, who organized the Hot Topics in Operating Systems conference, had this to say about that "outrageous" prize: "Dave Ackley from UNM gave the wackiest, most out-there talk of the conference on 'Pursue Robust Indefinite Scalability.' I am still not sure exactly what it is about, but the idea seems to be to build modular computers based on a cellular automaton model that can be connected together at arbitrary scales. This is why we have workshops like HotOS -- it would be really hard to get this kind of work into more conventional systems venues. Best quote from the paper: 'pledge allegiance to the light cone.'" That's starting to sound like some entertainment.

The "outrageous" 5-page paper is at www.usenix.org/event/hotos11/tech/final_files/Ackley.pdf. A longer 2012 Computer Journal paper, titled "A Movable Architecture for Robust Spatial Computing", is at http://comjnl.oxfordjournals.org/content/early/2012/11/05/comjnl.bxs129.full.pdf+html. From the abstract: "For open-ended computational growth, we argue that: (1) instead of hardwiring and hiding component spatial relationships, computer architecture should soften and expose them; and (2) instead of relegating reliability to hardware, robustness must climb the computational stack toward the end users. We suggest that eventually all truly large-scale computers will be *robust spatial computers*—even if intended neither for spatial tasks nor harsh environments. This paper is an extended introduction for the spatial computing community to the *Movable Feast Machine* (MFM), a computing model in the spirit of an object-oriented asynchronous cellular automata."

In Dave's own words: "Over the last 70 years, ever more powerful computers have revolutionized the world, but their common architectural assumptions—of CPU and RAM, and deterministic program execution—are now all hindrances to continued computational growth. The common communications assumptions—of fixed width addresses and globally unique node names—are likewise only finitely scalable. **Seriously** scalable computing requires a robust spatial computer. Resilience, survivability, and graceful degradation must be inherent not just in the hardware but upwards throughout the computational stack. Low level communications and naming must be based on relative spatial addressing. The Movable Feast Machine (MFM) is a robust indefinitely scalable computer architecture we are using to explore such issues."

But more to the point of December's talk: "Next to the wary toughness of living creatures, modern mass market computers are shamefully brittle and frighteningly insecure. We blame clueless users and lazy programmers. We blame tech companies, terrorist countries, and computer criminals. We *must also* blame the decades we in computer science have spent optimizing efficiency at all costs. For the exploding population of computers in the wild—in our cars, smartphones, medical equipment—we need to elevate **robustness** to be their primary design criterion. This impacts the *entire* computational stack. Because efficiency costs robustness."

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SE Conference Calendar

- CSER 2014—Conference on Systems Engineering Research, 21-22Mar, Redondo Beach, CA. www.incose-la.org/cser2014.
- IW14—INCOSE International Workshop, 25-28Jan, Los Angeles, CA. Details in late October 2013, http://www.incose.org
- SysCon 2014—IEEE Systems Conference, 31Mar-03Apr, Ottawa, Canada, Abstracts due 22Oct, http://ieeesyscon.org
- ISSS 2014—International Society for the Systems Sciences, 27Jul-01Aug, http://isss.org/world/ISSS_2014_Conference
- IS14—INCOSE International Symposium, Location and dates TBD mid-October. www.incose.org/symp2014 ∞

Recent Meetings

Jeni Turgeon, Sandia National Labs
Available presentation slides are posted on the Enchantment Chapter website.

July 2013—Richard Martin, president of Tinwisle Corporation in Bloomington, Indiana, and member of the Systems Science Working Group, spoke to us through GlobalMeet about Leveraging System Science When Doing System Engineering.

Richard suggested that every System Engineer has a bit of the scientific experimenter in them, and we apply scientific knowledge to the spectrum of engineering domains that we serve. He then shared details about what the INCOSE System Science Working Group is examining and promoting. Key projects include: advancement of Systems Science principles and concepts as they apply to Systems Engineering; promoting awareness of Systems Science as a foundation for Systems Engineering; and illuminating the linkages between Systems Science theories and empirical practices of Systems Engineering.

August 2013—Our August meeting featured a field trip to Honeywell's Bendix King division in Albuquerque.

Bendix King specializes in products for light aircraft owners, such as apps and handhelds, displays, communication equipment, flight controls, indicators, and various safety, terrain, and weather monitoring equipment.

The tour was led by David Boren, Chief Engineer at Bendix King. GlobalMeet provided remote attendance for the first 30 minutes of opening discussions about Bendix King and the systems processes and tools they employ, with examples using Enterprise Architect and Contour.

The final 30 minutes was a tour of the facility with lab demos, which unfortunately could not be broadcast with GlobalMeet. You shoulda been there.

Chapter president Ann Hodges noted afterwards that "There was a lot of discussion on the tour, and the INCOSE attendees practically had to be kicked out of the building!"

September 2013—Rick Dove, chair of the INCOSE Agile Systems and Systems Engineering working group, previewed the INCOSE webinar given to the membership at large a week later: Agile 102—Agile Systems and Processes—Driving Architecture with ConOps and Response Situation Analysis.

He began with a quick review of the Agile 101 INCOSE webinar given a year earlier, which had focused on a necessary and sufficient common architecture for enabling agility in systems and processes of any kind. This talk focused on tools and methods for developing a concept of (agile) operations, conducting response situation analysis, and identifying reality factors that must be dealt with in the operational environment. He explained these tools as precursors used to inform thoughtful development of an agile system or process architecture. The slides for Agile 101 and Agile 102 can be downloaded from www.parshift.com/s/AgileSystems-101.pdf and www.parshift.com/s/AgileSystems-102.pdf respectively. ∞

Next Meetings

Jeni Turgeon, Sandia National Labs

October 9: Systems Engineering Competency Model
Ron Lyells, Honeywell Aerospace Group, Engineering Manager
Abstract: The Honeywell Aerospace organization has embarked on a path to implement the INCOSE System Engineering Competency framework. This journey that is not yet completed, but like all stories, some insights and lessons learned have surfaced that may be useful to other Enchantment members to see and hear. This presentation will briefly review the INCOSE SE Competency framework and Honeywell's approach to implementation (including the training approach and mechanisms for large scale capture of competency information), progress to date, and lessons learned.

November 13: Service Systems Engineering Applications
Dr. Ricardo L. Pineda, Systems Programs Director at Stevens Institute of Technology
Abstract: A Service System is defined by its value co-creation chain in which stakeholders openly collaborate to deliver high quality service according to the business, service, and customer goals. Service systems can be viewed as a system of systems (SoS), where individual, heterogeneous, functional systems are linked together to realize value creation through new features/functionalities/capabilities and/or to improve robustness, lower cost, and increase reliability. The evolution toward SoS thinking is driven by the need to analyze, design, and implement modern large complex systems which, in most cases, are composed of independently developed, operated and managed systems according to predefined stakeholder's needs. This presentation illustrates how SSE can help define, and discover relationships among Service System entities and addresses the service-oriented, customer-centric, holistic systems view in order to plan, design, adapt or self-adapt to co-create value. In SSE, traditional systems engineering practices need to be extended to include service systems entities relationships (e.g., interface agreements among people, organizations, processes, and technologies) through information flows, technical interoperability, governance, and access rights within the meta-system. In this presentation, these SSE concepts and methodologies are applied across various SSE stages to realize an efficient emergency transport operations system and an energy service provider system.

December 6: Robust-First Computing: Beyond Correctness and Efficiency—at the chapter's annual Holiday Social Event
Dr. Dave Ackley, associate professor of Computer Science at the University of New Mexico
Abstract: Traditionally, computer science and engineering has valued efficiency highly, but efficiency and robustness are at odds over redundancy, which robustness requires, but efficiency eliminates. This talk argues we could do better, and should, by recognizing and managing that tradeoff explicitly. An illustration of efficiency's costs is discussed, along with implications for computer security and system design when robustness is emphasized even over correctness. ∞

IS14 Will Not Be Held in Korea—Venue & Date Change in Process

The dates and location for IS2014 are under review and USA-based sites are currently under consideration. Additional information will be forthcoming by mid-October. The submission deadline for papers, panels and tutorials has been extended while all other dates for technical program review and final submissions remain unchanged. www.incose.org/symp2014

- Latest Submission Date for Review: **24 November 2013**
- Acceptance Notification of Review Results by: **24 February 2014**
- Final Manuscript Submission Due: **23 March 2014** ∞

Where in the World is Ricardo Pineda?

(...after resigning as Chapter president in June)

Stevens Institute of Technology announces: Joining the School of Systems and Enterprises at Stevens this Fall Semester—Ricardo Pineda, Director of Systems Programs, joins Stevens from the University of Texas at El Paso, where he was the AT&T Distinguished Professorship in the college of engineering, chair of the manufacturing and systems engineering department, and director of the Research Institute for Manufacturing & Engineering Systems. He had a 20 year career in industry as AT&T, ITESM and Siemens. His research interests include next generation networks and network centric systems, service systems engineering and model based systems engineering. He holds a Ph.D. in nuclear physics from Lehigh University. ∞

Clinical Professor in Systems Engineering

THE UNIVERSITY OF TEXAS AT EL PASO, College of Engineering
Department of Industrial, Manufacturing, and Systems Engineering

Position Description: The University of Texas at El Paso (UTEP) is seeking to fill a non-tenure Clinical faculty position at the Assistant, Associate, or Full Professor level for its growing, dynamic Department of Industrial, Manufacturing, and Systems Engineering. Applications are solicited from candidates whose professional experience and interests are focused on Systems Engineering. Responsibilities include teaching two or three classes per term at the graduate and undergraduate level and coordinating student industry projects. The successful candidate will be expected to secure funding (industry or otherwise) for practice-based projects for students. The successful candidate must be able to work effectively with faculty, staff, students, and industry members from diverse ethnic, cultural, and socioeconomic backgrounds. Anticipated appointment date is in 2013.

Qualifications: (1) an earned doctorate (not required, but is highly desired) in Industrial/Systems/Software Engineering preferably, or a closely related field at the time of appointment, (2) a record of significant industry experience or at least significant experience working with industry and ability to secure extramural funding (Required); and (3) a commitment to and potential for teaching excellence or a record of successful college or university teaching.

Salary: Rank and salary are commensurate with qualifications and experience.

Application procedure: Review of applications will begin immediately and will continue until the position is filled or the search is closed. For consideration please include the following when applying: 1) a letter of interest, 2) detailed curriculum vitae, and 3) names of at least three references. Applicants should submit (electronic submission only) a single PDF document to: Search Committee at IMSEclinicalfaculty@utep.edu NOTE: Please use "Your Last Name" only in the "Subject" block in your e-mail and name your PDF file with the following convention "LastName_FirstName.pdf".

IMSE: Industrial, Manufacturing, and Systems Engineering (http://imse.utep.edu)

RIMES: Research Institute for Manufacturing and Engineering Systems (http://rimes.utep.edu/), College of Engineering: http://engineering.utep.edu

UTEP: University of Texas at El Paso: http://www.utep.edu/ http://en.wikipedia.org/wiki/Utep

Human Resources webpage: https://admin.utep.edu/Default.aspx?tabid=13399

The University of Texas at El Paso does not discriminate on the basis of race, color, national origin, sex, religion, age, disability, genetic information, veteran status or sexual orientation in employment or in the provision of services. ∞

Weekend SE Instructors for Veterans Wanted

A 10-unit course preparing veterans for jobs in SE project management processes needs instructors starting 2014 Q1. Students are officers with bachelor's degrees. Two-day units taught on the weekends by professionally accomplished SEs. Simultaneous student self-study for ASEP/CSEP certification. Choose a unit to teach. Help a vet and hone your knowledge. Reasonable compensation. Inquire with interest at instructors@vinewyck.com. ∞

TEDxABQ—What Just Happened?

Rick Dove, Paradigm Shift International

Each issue of this newsletter typically publishes a few links to TED Talks of potential interest to Chapter members, generally on the last page. Without the clutter of quotation marks, portions of what follows are lifted verbatim from both the TED and TEDxABQ web sites.

TED is a nonprofit devoted to *Ideas Worth Spreading*. It started out in 1984 as a conference bringing together people from three worlds: Technology, Entertainment, Design. Since then its scope has become ever broader. Along with two annual conferences -- the TED Conference and TEDGlobal -- TED includes the award-winning TED Talks video site.

On TED.com, all the best talks and performances from TED and partners are available to the world, for free. More than 1500 TED Talks are now available, with more added each week.

Hello Albuquerque! The TEDx program gives communities, organizations and individuals the opportunity to stimulate dialogue through TED-like experiences at the local level. TEDx events are planned and coordinated independently.

In 2009 Tim Nisly, Curator of TEDxABQ, heard there was a chance to be a part of one of the first TEDx events. Tim and some friends pulled together six local speakers and five from around the country. "It was a powerful event," says Tim. He was encouraged to keep this going and applied for a TEDx license. Meetings continued and TEDx grew organically.

TEDxABQ 2013 just happened September 7 at the University of New Mexico's Popejoy Hall. This year the event highlighted 17 remarkable homegrown ideas from New Mexico's most passionate engineers, authors, farmers, scientists, artists, and doctors, among others.

The speaker lineup is here: http://tedxabq.com/2013-speakers

All of it was filmed and you can watch it here http://tedxabq.com/livestream. This is a six hour streaming video that you can quickly jump around in to find the speaker you want to hear.

TEDxABQ has happened for five years running now, showcasing New Mexico's biggest ideas and fascinating thinkers to sold-out audiences.

These talks are not focused on systems engineering. But I find, except for a few, most are examples of systems thinking, many with transferable ideas. For example, starting 2 and a half minutes into the video stream, Dr. Ann Taylor talked for 12 minutes about how school architecture affects learning. What I heard was how system architecture can amplify the functional user experience. I heard that because she gave poignant examples, like suggesting that elevators should be glass-wall enclosed so students see the gears and pulleys as physics in action. From UNM, Dr. Taylor is author of *Linking Architecture and Education: Sustainable Design of learning Environments*.

TEDxABQ somehow flew under my radar—but I'll be there next year for sure.

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COFES—Congress on the Future of Engineering Software

Rick Dove, Paradigm Shift International

April each year in Scottsdale, Arizona, since 2000, for four+ days, the subject of engineering software and its future is explored by people who care, and people who make that future happen. But it's not an exploration of engineering tool esoterics and features, but rather invigorating, collaborative, lots of small round table discussions, and lots of big thinking presentations.

The small-room discussions and big-room presentations are systems thinking at its finest, laying new perspectives in place for looking at the world of engineering and the environment it occurs in.

Virtually all that occurs is recorded and available free of change. Generally this is video for the big-room presentations, and audio for the small room subject-matter-expert-led discussions.

Like the annual TED Conference discussed above, free videos are great, but no substitute for being there and being part of the mix. The annual COFES event is organized for one-on-one mixing and mingling, punctuated by stimulating ideas that compel conversation.

The theme for the 2013 event was Design for Resilience in Product and Strategy.

A jaw dropping presentation by Zander Rose walked us through a project that is building a system intended to function for 10,000 years. Or at least that is the goal. And the financial commitment, expert resources, understanding of the problem, unique engineering solutions, and progress to date suggest they may succeed.

This project is producing an eighth wonder of the world: "Resilient by Design – How do you build a monument scale sculptural machine that will last as long as civilization? For the last fifteen years The Long Now Foundation and Alexander Rose have been working on building this icon of long-term thinking. Rose is currently managing the 10,000 Year Clock project underway in West Texas where they have used purpose designed robots and explosives to excavate over 500 vertical feet through solid rock to house the Clock. Alexander discusses the research and design process. He shows the building process now underway for the 10,000 Year Clock that includes fabrication of the massive Clock itself." You have to see it to believe it; and you can, by looking for the Zander Rose video at www.cofes.com/Video/COFES-2013.

There are of course many more videos for you to sample there, as well as the audio recordings at www.cofes.com/Audio. Among others there, you will find a discussion by Chris Wood, Vice President of the Santa Fe Institute, on What Kind of Computer is the Brain?

The COFES site is so rich in stimulating video and audio that I'll not even start to entice you. Do it yourself.

And while you're at it, consider being a part of this event next year. Don't be put off by the "Apply for Invitation" link if you have true and relevant interest.

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Watch TED Talk: Political theorist Benjamin Barber explores solutions for dysfunctional systems and political paralysis. Who's actually getting bold things done? City mayors. So Barber suggests: Let's give them more control over global policy. And he shows how city mayors are solving pressing problems on their own turf -- and some now even at the global level.

Watch TED Talk: There is a corruption at the heart of American politics and the US' broken political system, caused by the dependence of Congressional candidates on funding from the tiniest percentage of citizens. With rapid-fire visuals, this blistering talk by legal scholar Lawrence Lessig shows how the funding process weakens the Republic in the most fundamental way.

Watch TED Talk: A well-connected venture capitalist in Shanghai, Eric X. Li studied in America (and even worked for Ross Perot's 1992 presidential campaign) before returning home, where he started doubting the idea that China's progress could only follow the path of the West's free-market principles. In this provocative, boundary-pushing talk, he asks his audience to consider that there's more than one way to run a successful modern nation.

www.ted.com/talks/benjamin_barber_why_mayors_should_rule_the_world.html
www.ted.com/talks/lawrence_lessig_we_the_people_and_the_republic_we_must_reclaim.html

www.ted.com/talks/
eric_x_li_a_tale_of_two_political_systems.html

New Chapter Members

Francis Peter, Management Sciences

Enchantment Chapter now has 101 active members. We would like to welcome the following new INCOSE members to Enchantment Chapter:

Francis Griffin	Sandia National Laboratories
Kevin Marbach	Sandia National Laboratories
Nicholas Noonan	Sandia National Laboratories
Jason Padilla	Sandia National Laboratories
Jeffrey Porter	Sandia National Laboratories

The Enchantment sponsored Student Chapter of the University of Texas at El Paso currently has 7 active members. We welcome the following new student member:

Luis Berumen

Watch Systems that run forever, self-heal and scale: With excellent clarity, Joe Armstrong, chief architect of the Erlang/OTP system developed at Erickson, outlines the architectural principles needed for building scalable fault-tolerant systems built from small isolated parallel components which communicate though well-defined protocols. www.infoq.com/presentations/self-heal-scalable-system.

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Connect to Your Community of Practice

Chapter meetings with a focus on systems engineering are held monthly on the second Wednesday, except in December. The December meeting is an annual social event, with mingling, dinner, and a speaker chosen for enjoyment by systems engineers and guests alike.

Monthly meetings feature speakers from out-of-town as well as local (more or less) subject matter experts on topics of relevance.

On occasion special facility tours are arranged, sometimes as the monthly meeting, and other times on a separate schedule.

Chapter meetings begin at 4:45 pm. After chapter news, announcements and introductions, the presentation and discussion generally lasts until 6:00 pm, carried on GlobalMeet for chapter members who can't attend. Recordings are not made.

Tutorials with coverage on topics of interest are arranged approximately twice a year. Delivered by experts in the field, tutorials range from 1/2 day to day+ durations, and generally involve a tuition.

Mix with people who have the same professional interests as you do, but with a diversity of perspective beyond daily workmates. It comes in handy when you need help or answers to questions outside your accumulated experience, need a connection at another organization, or simply want some mind stretching thought.

Meeting announcements, event notices, and GlobalMeet links routinely go to all INCOSE members within the Chapter's geographic territory; as well as to names on a special *information* list open to one and all. Sign up for the *information* list with a request to the Chapter secretary listed below.

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Published quarterly by

INCOSE Enchantment Chapter,
New Mexico.
Published material
does not necessarily reflect the views and
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or the Editor of the publication.
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