



MEETING MINUTES

ASHRAE TECHNICAL COMMITTEE 9.9 Mission Critical Facilities, Data Centers, Technology Spaces and Electronic Equipment

2025 Annual Meeting

June 22 & 23, 2025

Phoenix, Arizona



1791 Tullie Circle, N.E./Atlanta, GA 30329
404-636-8400

TC/TG/MTG/TRG MINUTES COVER SHEET

(Minutes of all Meetings are to be distributed to all persons listed below within 60 days following the meeting.)

TC/TG/MTG/TRG No. T.C. 9.9 DATE June 22, 2025

TC/TG/MTG/TRG TITLE Mission Critical Facilities, Data Centers, Technology Spaces and Electronic Equipment

DATE OF MEETING Sunday June 22, 2025 LOCATION Phoenix Convention Center North Building, 230 (Level 2)

VOTING MEMBERS PRESENT	VOTING MEMBERS ABSENT
Matt Koukl	Joe Prisco
Mark Steinke	Nick Gangemi
Jason Matteson	Mark Seymour
Rick Pavlak	Lixia Wu
Bob McFarlane	Paul Finch
David Quirk	

CORRESPONDING MEMBERS PRESENT	PROVISIONAL MEMBERS PRESENT
John Gross	Santosh Shekar Mudunur
Ed Eaton	Matthew Kaufeler
Mohammad Alkisiwani	Amir Ibraheem
Andrew Jenkins	Alireza Behfar
Wangda Zuo	Thomas Kolpasky
Jonell Watson	Eric Self
Brad Cochran	Sankar Padhmanabhan
Chris Campbell	Roger Huggins
Alexandre Kontoyanis	Alkesh Solanki
Vali Sorell	Stephen Mathai
Don Besty	Gregory Alexander
David McGlocklin	Will Martin
Michael McKenna	Russell Tipton
Pardeep Shahi	Alan Neely
Ecton English	Nitin Karwa
Timothy Startt	Joe Furman

Jerrod Buterbaugh	CJ Tang
Carlos Lisboa	Donovan Aguirre
Jim VanGilder	
Shlomo Novotny	
Dustin Demetriou	
Ashwin Siddarth	
Gerardo Alfonso	
Ben Dolcich	
John Groenewold	

GUESTS PRESENT	
Jie Cai	Ashley August
Daud Nosham	Justin Todd
Chris Newton	Dan Holley
Krista Hubbs	Anke Beyer-Lout
Georges Saade	Eric Peterson
Viswanathan Ganesh	Inderjit Singh Bahadur Singh
Donghun Kim	Pooya Navid

ATTENDANCE RECORD	
In Person	47
Virtual	15

PUBLISHED AGENDA

Sunday, June 22, 2025

TC 9.9 Programs, Research, and Handbook & Publications

4:00 PM – 6:00 PM MST

Location: Phoenix Convention Center North Building, 230 (Level 2)

Microsoft Teams Meeting

<https://www.microsoft.com/microsoft-teams/join-a-meeting>

Meeting ID: 294 073 962 708

Passcode: cr7ze3Ce

Attendance

<https://forms.gle/A66jXpHBeyn3HRnb6>

Topic		Time	Presenter	In-Person or Virtual
Introduction	Welcome and Introductions	10	Matt Koukl	IP
Programs	2025 Summer (Phoenix) & 2026 Winter (Las Vegas)	20	Eric Yang	IP
Handbook	Handbook Update	15	Robert McFarlane/ Jonell Watson	IP
Research	Research Committee Update	30	Brad Cochran	IP
	Research Workshop - Topics Working Session	5	Brad Cochran	IP
Publications	Encyclopedia	15	Dustin Demetriou	IP
Voting Session	Closed Voting Member only Session	30		IP
Total Time:		125	Minutes	

CALL TO ORDER: 02/09/2025 6:01pm EST – Matt Koukl

INTRODUCTION – Matt Koukl

- MK call to order
- Record your attendance via the link or QR code. This attendance record is how we determine your participation for consideration of your membership.
- If you are virtual, raise your hand in the chat.

AGENDA REVIEW – Matt Koukl

PROGRAMS – Eric Yang

- 5 sessions in Phoenix sponsored by TC9.9
- 1 session co-sponsored by TC9.9 and TC4.10
- One of the largest programs for TC9.9 in a long time
- Proposed session that was not accepted - Best Practices to Reduce Carbon
- Las Vegas
 - Tracks
 - Fundamentals and Applications
 - HVAC&R Systems and Equipment
 - Research Summit
 - a. Dedicated Conference Paper Session
 - b. OCP & TC9.9 Collaboration
 - Energy Storage and Grid Resiliency
 - Pathways to Building Decarbonization
 - Artificial Intelligence
 - Indoor Environmental Quality for Healthy Buildings
 - Future-Proofing the Built Environment
 - Important dates
 - August 1, 2025 - Debate, Panel, Seminar, Forum, Workshop proposals due for Las Vegas (Winter Conference) 2026
 - September 3, 2025 - Conference Papers for Las Vegas (Winter Conference) 2026
 - Ideas
 - J. Matteson - consider panels or seminars expanding upon the Tech Bulletins that have been recently issued
- Co-sponsored sessions have a higher success rate for acceptance

HANDBOOK UPDATE – Bob McFarlane & Jonell Watson

- TC9.9 Chapter is Chapter 20 in "Applications" handbook published every 4 years
- Tutorial for New Engineers
- Reference for Experienced Engineers
- Design Guideline for those new to data centers
- To alert people to "what you don't know" and encourage people to retain SMEs
- Encourage manufacturers to standardize
- Status
 - Chapter has 120 topics
 - 37 initial reviewers assigned. 29 responded
 - 19 topics require major revision or rewrite

- 31 require minimal revision
- 21 are "fine as is"
- 46 still not reviewed
 - 30 of those were assigned but not reviewed and will be reassigned
- 3 New topics suggested
 - Heat pipe technology
 - Above hot aisle air delivery
 - Controls
- Looking to consolidate certain topics which are currently spread around
- We have 1 year remaining to review and approve the updated chapter. It must be voted by the Annual Meeting next year
- Initial draft must be completed by Nov 15, 2025
- Secondary edits due by Feb 28, 2026
- HB chair draft revisions must be completed by April 1, 2026
- Will require acknowledgement and acceptance by PR's within 2 weeks or will be reassigned
- Provision access for PR's to the Authoring Portal next week
- Today's priorities are to get Primary Reviewers assigned to remaining topics
 - Get BM and JW added to your safe senders list
- Need to align the content updates for the handbook with the online encyclopedia. This will be handled in offline working sessions.
- Assigning primary editors for content requiring change - may not be the same people as the reviewers
- When you receive access to the Authoring Portal, you'll receive an invitation email from Heather Kennedy from ASHRAE
- Authoring portal used for all revisions, and is supposed to work on all computer platforms
- All work must use Track Changes, but don't Accept Changes
- All new or revised illustrations must be accompanied by written permission, preferably in perpetuity
- Handbook can be used in court trials as exhibits, and therefore accuracy is imperative

RESEARCH COMMITTEE – Brad Cochran

- RAC only had 1 RTAR to review for Spring, and none right now.
- RAC is flush with cash right now
- TRP-1913 - Study of Corrosion Impact on Information Technology Equipment
 - Received 4 bids
 - RAC has given a Tuesday 6/24 deadline for submitting paperwork to move forward with recommendation of the PMS. Must be voted out of the main TC before it goes to RAC
- TRP-1972 - Data Center Direct-to-Chip Liquid Cooling Resiliency - Failure Modes and IT Throttling Impacts
 - \$350k maximum approved, with additional \$51k corporate support
 - RFPs go out to bids this fall
 - Additional letters of intent from additional co-sponsors are welcome
 - U. Maryland has some DOE funding to look at this issue as well
- WS-1956 - Compact CFD Modeling Guidance for Thin Flow Resistance
 - TC4.10 is the primary sponsor, so it's in their court
 - RAC had questions that haven't been answered yet

- PES concerned RAC didn't understand the purpose of the work
- Working on 3 RTARs
 - Study of Height Limitations in U101.DVN.8.1 (1:33)
 - Vote to accept RTAR was delayed pending feedback from SSPC 15 and has now agreed to review. Unclear if this was brought up in their conference meeting on Saturday
 - Rick Pavlak (virtual): Study of height limitation RTAR Std 15 is taking up the topic at Tuesday's meeting. Bill Kinas from Vertiv will present.
 - Guidelines for Data Center External CFD Modeling
 - Skipped the update
 - Flow Velocity Limits for Erosion Control
 - Will be a working session during the back half of the IT Subcommittee meeting to flesh out the RTAR
- Additional recommendation for Digital Twins for datacenter environments for liquid cooling and how that might be developed raised by Ali Heydari in Orlando
 - Looking for volunteers to help Ali assemble the RTAR
 - AH views a future "digital blueprint" for data center design and operations
- Additional Ideas
 - Kris/Castrol Implications of mixing different fluid manufacturers products in Direct-to-Chip deployments
 - Not currently part of TRP-1972
 - There are several issues associated with mixing fluids in a system, including liability, no MSDS for the mixture, etc.
 - Discussion around how closely a TTV simulates the performance of actual processors during testing
 - Transient nature of AI workloads and means for predicting the power draw and effect on mechanical systems
 - After much discussion, it appears the output of 1972 will address the issues associated with load transients

ENCYCLOPEDIA – Dustin Demetriou

- Vision for the Encyclopedia to be a Wiki-style format
- Will spend much more time on this in tomorrow's meeting
- Currently on track to have encyclopedia fully transitioned by the end of this summer
- Thermal Guidelines, Design Considerations, and Liquid Cooling Book converted
 - Will look different around noon tomorrow
- Need feedback and help from committee. Will be a workshop tomorrow of at least 1 hour
 - Send email to datacom@ashrae.net
 - Need feedback on the new version of the encyclopedia
 - Ease of navigation of the site
 - Topics that could be subdivided
 - Usability on different devices
 - Navigation that doesn't work or go where expected
 - Wiki style vs books
 - Do NOT want feedback on:
 - Missing content - remember more content will be coming as this is BETA
 - Changes to the technical content - all content is from the books and approved by the TC at this point in time. Contact TC Chair to discuss need to change content

- Word document exists on all topics identified on the worksheet. Need to help consolidating the information.
- Do not need to be a Subject Matter Expert - this is about editing, not updating
- Expected commitment is 30-120 minutes depending on topic
- Tasks
 - Read and rearrange content into readable format
 - Determine if topic should be subdivided
 - Edit the content following guidance
 - Provide the edited document

IT SUBCOMMITTEE meeting tomorrow morning 9-11:30 in the Sheraton

MAIN MEETING for TC9.9 is tomorrow 1:30pm to 6pm in Phoenix Convention Center, 232ABC

VOTING SESSION - after the meeting. Voting members please remain

MEETING ADJOURNED: 06/22/25 5:43 pm AST – Matt Koukl



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TC/TG/MTG/TRG TITLE Mission Critical Facilities, Data Centers, Technology Spaces and Electronic Equipment

DATE OF MEETING Monday June 23, 2025 LOCATION Phoenix Convention Center, Room 232ABC

VOTING MEMBERS PRESENT	VOTING MEMBERS ABSENT
Paul Finch	Joe Prisco
Matt Koukl	Nick Gangemi
Jason Matteson	Mark Seymour
Bob McFarlane	
Rick Pavlak	
Mark Steinke	
Lixia Wu	
David Quirk	

CORRESPONDING MEMBERS PRESENT	
Don Beaty	Guillermo Massucco
Jerrold Buterbaugh	Dave Meadows
Chris Campbell	Don Mitchell
Fabio Clavijo	Dave Moss
Brad Cochran	Pooya Navid
Thomas Davidson	Michael Ohadi
Dustin Demetriou	Mark Pavol
Ben Dolcich	Craig Petersen
Art Giesler	Benjamin Petschke
John Gronewold	Terry Rodgers
Ali Heydari	Justin Seter
Andrew Jenkins	Mark Seymour
Mustafa Kadhim	Tim Shedd
Alexandre Kontoyanis	Vali Sorell
Sang Lee	Jonell Watson
Mark Malkin	Eric Yang

PROVISIONAL CORRESPONDING MEMBERS PRESENT	
Yussef Awin	David McGlocklin
Juan Burboa	Santosh Shekar Mudunur
Salvatore Cataldi	Chris Newton
Peter de Bock	Marelle Paas-O'Brock
Ken Duncan	Pedro Perez
Kristin Fletcher	Cory Plunk
Liyang Guo	Ali Salimshirazi
Steve Harrington	Alkesh Solanki
Matt Hatley	Ruizhi Song
Darrell Hillukka	Justin Todd
Amir Ibraheem	Willem Van Der Meer
Vimaldoss Jesudhas	Lixia Wu
Matthew Kaufeler	Philip Yu
Nicholas Kelly	George Zhang
Tom Kolpasky	
Carlos Lisboa	
William Martin	
Eric Martinez	

GUESTS PRESENT	
Sam Abdelfattah	Luke Klusmeyer
Joy Altwies	Jack Kolar
Karla Alvarez	Navin Kumar
Yussef Awin	Jeremy Lerond
Anke Beyer-Lout	Bryan Mcquary
Thomas Bise	Cosimo Pecchioli
Alamelu Brooks	Kaustubh Phalak
Yan Chen	Abdur-Rahman Quadri
Robert Coleman	Georges Saade
Tom Corrigan	David Sickinger
Ashley DeHope	Gerald Singer
Cary Faulkner	Nathan Thomson
James Frey	William Truong
Viswanathan Ganesh	
Galen Gerig	
Raymond Good	
Jungho Kim	

ATTENDANCE COUNT	
In Person	125
Virtual	53

PUBLISHED AGENDA**Monday, June 23, 2025**

TC 9.9 Main Meeting, IT & Publications Workshops

1:30 PM – 6:00 PM MST

Location: Phoenix Convention Center North Building, 232ABC (Level 2)

Microsoft Teams Meeting<https://www.microsoft.com/microsoft-teams/join-a-meeting>

Meeting ID: 260 212 501 636

Passcode: PL9AP9FD

Attendance<https://forms.gle/A66jXpHBeyn3HRnb6>

Topic		Time	Presenter(s)	In-Person or Virtual
Welcome	Welcome, Agenda Review, Hybrid Meeting Etiquette	5	Matt Koukl	IP
Introductions	Introductions of All In-Person Attendees, Officers, Voting Members and Subcommittee Chairs	10	Matt Koukl	IP
TC Activity	Status of Voted on Topics	5	Matt Koukl	IP
Membership	Details of TC 9.9 Membership	5	John Groenewold	IP
Webmaster	Website	5	Ecton English	V
Publications	ASHRAE TC 9.9 Datacom Encyclopedia	15	Dustin Demetriou	IP
	Workshop	60	Dustin Demetriou	IP
Break		20		
Handbook	Handbook Update Summary	5	Robert McFarlane/ Jonell Watson	IP
Liaison Reports	Standard 90.1	5	Rick Pavlak	IP
	SPC-127 / AHRI 1360	10	David McGlocklin	IP
	Standard 90.4	5	Marcus Hassen	IP
	90.4 Addendum D Discussion	30	Dave Quirk	IP
	OCP	5	Matt /Mark/John	IP
Research	Research Highlights	5	Brad Cochran	IP
IT Subcommittee	CDU Critical Role Tech Brief	10	Tim Shed	IP
	S-Class Definition (S20/25)	10	Paul Artman	IP
	Filtration Recommendations	10	Dustin Demetriou	IP
	TCS/FWS Coolant Quality	10	Dustin Demetriou	IP
	Tech Brief Roadmap	10	Dustin Demetriou	IP
Committee Updates	Incoming Committee Officers and Voting Members	10	Matt Koukl	IP
Total Time:		250	Minutes	

CALL TO ORDER: 06/23/25 1:35 pm MST – Matt Koukl**WELCOME** – Matt Koukl

- Welcome
 - MK reviewed etiquette (mute, no screen share, etc.)
- Housekeeping
 - Mark Steinke, Vice Chair – monitor virtual chat

- John Gross, Secretary – unable to attend, will produce meeting minutes after meeting
 - Chris Campbell – Will record meeting minutes as stand-in for JG
- MK notified the attendees the meeting is being recorded for the purpose of taking Minutes.
- MK reviewed officer roles
- MK clarified meeting agenda available on website, along with encyclopedia and other references
- MK reviewed attendance recording
- Attendance Form
 - Link: <https://forms.gle/A66jXpHBeyn3HRnb6>
 - Both in person and virtual attendees to click and fill out the attendance form
 - Must fill out for each meeting (Sunday/Monday)
- Reviewed the TPS for the TC

INTRODUCTIONS – Matt Koukl

- Introduction
 - Call to join TC9.9. Link in PPT deck. Explanation on process to join. Explanation on process to move from PCM to CM to Voting Member and/or TC leadership
 - Must participate to move from PCM to CM
 - Must be CM to serve as leadership (TC or subcommittee). Can be voting member.
 - Call to keep profile updated (new jobs, contact info, etc.)
 - Explain "how to get involved" (handbook, encyclopedia, develop a program (eric yang) or research topic (Brad Cochrane))

RECOGNITION – Matt Koukl

- Presentation of current leadership. Thanks to past chairs
- Presentation of voting membership (Current; about to change)
- Voting Members – refer to slide deck

TC ACTIVITY – Matt Koukl

- Recently Voted to Approve:
 - Summer 2024 conference minutes
 - Winter 2025 conference minutes
- Recently Released:
 - TC9.9 Technical Alert Publication
 - S-Class updates to online encyclopedia

MEMBERSHIP – John Groenewold

- Overall Membership
 - Corresponding – 357 (consistent)
 - Provisional (259) - up
 - YEA (100) – up
 - Leadership stayed consistent
- Attendance
 - Reviewed the conference attendance from Summer
 - Is used as an indicator to advance members to Corresponding
 - US v International
 - 72% v 28%

WEBMASTER – Matt Koukl (Stand-In for Ecton English)

- Our website visits have almost doubled over the past 6m
- Peaks of webpage visits have increased over time
 - 500 visits/day peak, 200 visits/day average
- Total views are relatively flat overall

PUBLICATIONS – Dustin Demetriou

- Encyclopedia focus for this update
 - Explanation about TC9.9 encyclopedia "backstory" evolution
 - Faster updates and speed to market
 - Previously ≥ 2 years to get a book out (now real time)
 - Explanation about the value prop of the encyclopedia (compared to books)
 - Explanation about the most recent developments on the platform
 - V2 BETA on the page released TODAY
 - May 10, 25 - Published S20/S25 classes & clarification on S&W class relationship
 - March 5, 25 - Tech brief published on "CDUs critical role..."
 - Goal = quarterly updates on the platform
 - Originally started with "books" published on the platform still in "book form". Even in initial form, we had full revision control.
 - New update is separating by topic in "Wikipedia style" format. Goal was to transition to this format by Summer 2025 conference: hence done today.
 - We still have 8-9 other books that were previously published as physical books. Our goal is to pull all relevant content from those books into the encyclopedia by end of 2026
 - Call to action to get feedback on the new format. There is no more reference to any books. All content is realigned by subject. You can still get to it in book format for historical reference.
 - Goal was to be able to get to relevant content within 2-3 clicks.
 - Tech alerts also show up on the first page
 - There is also a search function that is available
 - After 1st click, there is a list of subjects that can be expanded. 2nd click to expand relevant topic.
 - After 2nd click, there are a list of hyperlinks.
 - Not ALL content is linked. Goal is to get you close. You can always use search function for very specific content details
 - There are direct links to old books, figures, images, other topics, etc.
 - On the BETA version, all GRN highlighted items will be converted to links.
 - Explanation about "how we got here" with volunteers transforming sections of content. Divided into a list of topics, divide each book into sections that can fit within the topics. All topics can be updated independently, no cross linking
 - Show table of topic status. Update about how almost all non-complete topics have updaters assigned. Only ancillary spaces remain.
 - Acknowledgement of major contributors
- Question: Terry Rodgers - How are we tracking updates? How do we archive old versions? How do we know something needs updated?
 - Answers: Everything's rev controlled, members need to identify outdated material. Expectation that there will be people attached to each topic to help identify and drive updates.
- Plan to break into workshops for 1 hour.
 - First workshop - Open the BETA encyclopedia and provide feedback (30m)
 - Feedback to datacom@ashrae.net (include data on HW, OS, device, etc.). Seeking feedback on automatic language translation in the encyclopedia (MS SharePoint platform).
 - Second workshop - If you signed up to edit content, meet up with leadership
- Question: Jonell Watson - Exactly what type of feedback do we want?
 - PPT slide shown that outlines exactly the type of feedback wanted
 - Also shows what we don't want - comments on content
- Question: Jonell Watson - BETA for topic search. What is the end goal? Will everything go under the search?
 - Each topic will remain to be searched. All same content as before, just reformatted into new style

HANDBOOK – Robert McFarlane and Jonell Watson

- TC9.9 is covered in Chapter 20 of Applications handbook
 - 120 total topics for revision, 37 initial reviewers, 29 have responded
 - All edits must be submitted by TC99 by mid-2026 to ASHRAE handbook team
 - Action: Find primary reviewers for 46 remaining, unassigned topics

- Any sections requiring significant changes require access to Authoring Portal
 - All edits must be completely finalized by November 15 (by reviewers)
- Showed the TC the list of unassigned topics that need reviewers with request for volunteers to email Bob & Jonell with the ID of the topic they wish to review
- Inform TC that authoring portal access will come via email
- From November 15 to the end of February, SECONDARY reviewers will have to complete the secondary review of all content
- Handbook committee is planning to ask whether yearly updates COULD become the norm instead of 4-year updates. Communication about difficulty to do this based on the level of support given by volunteers to date.

LIAISON REPORTS

- Standard 90.1 – Rick Pavlak
 - There are currently about 21 addenda within 2 months
 - In previous 2 years, there were ~45 addenda
 - Could be over 100 addenda total to 90.1 total (if all publish)
 - New addendum 'd.o.' changes the reference in 90.1 to 90.4-2022 with addenda a/b/c/g
- SSPC127 / AHRI 1360 – Dave McGlocklin
 - 127
 - Liquid sub has released addendum 'b' on L2L CDU MOT. 37 public comments. Plan to vote out for another public review this week.
 - Next CDU topology will be L2A for method of test. Air sub will join on L2A effort.
 - 1360
 - AHRI1360 will begin again soon with Ben Dolcich as chair.
 - New work plan for 1360 to develop rating for liquid cooling.
 - Meeting tomorrow 8:00-12:00 (Sheraton Deer Valley, 2nd level)
- Standard 90.4 – Marcus Hassen
 - Committee has been working to finalize what addenda and other updates will make it to the 2025 version.
 - Three primary addenda.
 - TPS change (approved Jan 25).
 - Addendum 'd' was issued for public review with 93 comments received. [This is 27% of all public review comments for all of ASHRAE in first half of 2025; lots of engagement]. Committee reviewed responses and voted out of committee today; those go to commenters. Now will have to see how many commenters get resolved and decide where the addendum goes.
 - ASHRAE COE with building decarbonization; both TC9.9 and SSPC 90.4 involved (kickoff yesterday). Both TC9.9 and 90.4 were asked to present on congressional briefing Q4 2025.
 - Green Building Initiative (GBI) has launched Green Globes for Data centers certification program, which includes 90.4 as path to compliance.
- OCP – Matt Koukl, Mark Steinke, John Gross
 - Developing MOU - Will be headed out for signature this week. This means the groups will be able to share info freely. This is a significant benefit to the industry. Plan to bring alignment between the OCP and ASHRAE.
 - Proposals and abstracts submitted to both to explain how they will collaborate moving forward.
 - There will be subcommittee formed to collab between the two. Develop the framework. Start cranking through work product. No goal to change either entity, just want to harmonize.

RESEARCH PROGRAM WORKSESSION

- Research Highlights – Brad Cochran
 - Very low RTAR going through RAC now. Good time to submit more RTARs.
 - Fundraising at \$2.7M this year; goal to hit \$3M
 - Only 8 Tentative research projects right now
 - TC9.9 active (3)
 - TRP-1913 - 4 bids received and reviewed by PES

- TRP-1972 - WS approved by RAC in spring, should go out to bid in fall
- WS-1956 - TC4.10 is cognizant, TC99 is co-sponsor. WS returned with comments from RAC; plans to get clarity with RAC
- Potential proposed
 - Study of height limitations
 - Guidelines for data center ext. dispersion modeling
 - Flow velocity limits for erosion control
 - Digital twin for DCs
 - Commissioning/flushing requirements for fluid mixing in D2C
 - Comment not to limit this to commission/flushing
- RAC is developing a new online RTAR process. Currently looking for BETA testers. Email bcochran@cppwind.com. Link provided to the RTAR form (old process)
- Tom Davidson offers to share an RTAR example from 1972 that went through without comment. To help others avoid complications.
- RAC has a plan with (6) research initiatives [shared]. RTARs have a better chance if they're tied to one of these. Find the initiatives in the slide deck.

IT SUBCOMMITTEE

- Technical Bulletin Update – Dave Quirk
 - Getting ready to publish another technical bulletin to solve two identified issues.
 - Mechanical systems cannot respond at the speed of the electrical. We don't currently have a good platform interface spec between the liquid cooled systems and the liquid cooled ITE. We don't have transient rate of change and other critical metrics. Strongly consider putting out content before the research (1972) is done; because the industry is resolving this by putting buffers in SLAs to leave room. On air cooled IT, the IT fans and compute is close-coupled, and there is an acceptable rate of change. In liquid cooling, we've decoupled cooling and SW. Plan by IT sub to "throw a dart at the wall" by providing a rate of change allowance for liquid cooling systems.
 - Secondly "TCS is not FWS". Need to release guidance on this as well.
 - Guidance on S & W classes how to use
 - IT racks are now integrated into the mechanical infrastructure
 - TES integration strategies
- Subcommittee Evolution - Dustin Demetriou
 - Going to move face-to-face meetings as working meetings and spring/fall meetings will be update meetings. Going to re-institute some closed door meetings for ITE vendors in addition.
 - CDU Critical Role Tech Brief - Released ~Mar '25, available on encyclopedia and on TC99 website, purpose to communicate that creating huge TCS loops with multi-vendor equipment is a bad idea. Communicate that TCS loop is a critical process loop. Explain why recommend dedicated CDU by platform. This includes material and fluid differences; and may even be different by server model even from same vendor. High level audience; executives.
 - S-Class (S20/25) - Published May 10, '25 new S-Classes, focused at some high-power equipment and future proofing, Ch 6 in liquid cooling book and new S-Class topic on encyclopedia, also added info on why not to design to both S & W classes. Should not be used together for CDU ATD.
 - TC9.9 is getting a lot more engagement; especially with our increased pace of info release. S-class update was posted on LinkedIn and got highest engagement ever. We may consider releasing more to LinkedIn. Call to action to engage with that platform.
 - IT subcommittee publishing is focusing on tech bulletins for speed to market. 1-week review within IT Sub, and 1-week review by the TC. Within 1 month should be able to get something out.
 - Tech Brief Roadmap - Showed a list of (5) potential new tech bulletins that we should try to have by end of 2025. Same as shared in IT subcommittee
 - Call to action to participate or lead any of the proposed tech briefs
 - TCS Filtration Recommendations - Questions about data to support assertions, needs to update guidance, and alignment with OCP. Some outcomes from IT sub today were to progress to 25-

micron full flow recommendation, need to include beta value for filter efficiency, side stream filtration is needed however the level of filtration and bypass flow fraction varies by application

TC9.9 COMMITTEE UPDATES

- Leadership & Membership Changes – Matt Koukl
 - Announcement of new TC9.9 leadership starting after PHX
 - Announcement of changes to voting membership

CALL TO CLOSE: 02/10/25 5:00 pm MST – Matt Koukl