

Turbulence Impact Mitigation Workshop IV

November 8-10, 2021

Day 3, November 10, 2021

[9:58 AM] AAL - CA Tim Miner (Guest)

Good morning...

[9:59 AM] Grahn, Gail S (FAA) (Guest)

Good morning!

[10:00 AM] Matt Fronzak

Good day, folks. When you post a question or comment in the Chat room, please start it with the name of the person to whom the question or comment is directed. This will help our Chat room king, Mr. Steve Abelman, connect the dots.

[10:02 AM] Ulrich.Schumann (Gast) (Guest)

Hello, where can I look for a video copy of the "late-night show" of yesterday?

[10:03 AM] Matt Fronzak

Hi Ulrich.Schumann. We will post videos of all three sessions on a TBD site in the coming days.

[10:03 AM] Lauren Donohue

Apparently they will be released once all the workshops are complete

[10:11 AM] Polderman, Nathan

Doble Nathan - what about carriers who do not have EWINS programs? Isn't sharing PIREPs a universal requirement?

[10:12 AM] Ulrich.Schumann (Gast) (Guest)

Nathan, can you discriminate between wake vortex encounters and clear air turbulence? - Ulrich

[10:12 AM] Eckstein, Matthew D (Guest)

Nathan - There are other automatic, objectively-based turbulence report capabilities deployed in the 121 world beyond those that calculate EDR. Were they intentionally omitted from the recommendations? (ex: iPad accelerometer based)

[10:13 AM] Matt Fronzak

@Steve Abelman - I think you are going to have your work cut out for you today.

[10:14 AM] Dr. Brian Pettegrew

Is the requirement for a nowcast limited to an nws gridded product?

[10:15 AM] Steve Abelman

@Matt Fronzak, good for my brain to be challenged every now and then

[10:16 AM] Judy Reif (Guest)

Great recommendation for Part 91 and 135 operations as well! Have FA's buckle in sooner!

[10:18 AM] Polderman, Nathan

Doble Nathan - to clarify my question above, it is my understanding that carriers can implement an automated turbulence detection software/application without requiring EWINS-specific approval. Will these 3rd party technologies now require an airline to develop and receive approval for a full-blown EWINS program if they do not already have one?

[10:18 AM] Jason Prince (IBM) (Guest)

RMS-G was mentioned as one of the two established approaches for objectively reporting turbulence today but largely left out of the remaining report and equated to a measure of vibration. Automated RMS-G reporting via solutions like TAPS, which also reports an EDR, has been implemented on commercial aircraft for almost two decades now. Just curious why this approach wasn't considered more in the study given that it aligns well in the context discussing that turbulence intensity guidelines are based on the aircraft response and reaction inside the cabin, or how turbulence was experienced within an aircraft specifically references accelerations.

[10:18 AM] Tim Rahmes (Guest)

Nice presentation Nathan. Does NTSB plan any follow-up from this study?

[10:21 AM] Paul Williams (Guest)

Why is seatbelt wearing not made mandatory for all passengers whenever they are seated? I cannot see any downside to that, and it would virtually eliminate passenger injuries from turbulence.

[10:23 AM] Matt Strahan (Guest)

Have there been any recent studies about the monetary cost of turbulence?

[10:24 AM] Matt Fronzak

Paul Williams - it would virtually eliminate "seated" passenger injuries from turbulence. Unfortunately, I think that most passenger injuries involve those who are up and about...

[10:25 AM] Matt Strahan (Guest)

And Paul W, I've always heard that a majority of injuries are from flight attendants and their carts landing on people, often people wearing seatbelts. Seems like better ability to forecast turbulence on climb/decent would help get those attendants seated and carts stowed.

[10:26 AM] Bob Avjian

Doble Nathan, on slide 12, do you have anyone in Air Traffic or NATCA that supports and formally recommends the 1st bullet? ...and would that recommendation be documented in your report? Thanks!

[10:29 AM] Polderman, Nathan

Paul Williams I would say that it is mandatory, but it's unrealistic to expect flight attendants to be able to fully enforce compliance, especially when they also have to take their own safety into account and be seated and buckled in the jumpseat. If we treated seat-belt usage like we currently treat mask wearing, we would probably reduce passenger injuries but then also likely would have thousands of FA's simply resign and find something else to do (wink)

[10:31 AM] Eckstein, Matthew D (Guest)

We need to get you a new screenshot Greg. That one is archaic

[10:31 AM] Steve Abelman

@Randy Bass. Your hand is raised...can you type question into chat

[10:33 AM] Matt Fronzak

Bass, Randy (FAA) - FYI, I just lowered your hand (but it's nothing personal).

[10:34 AM] Walter Rogers (Guest)

Can latest EDR output environment aircraft derived vertical velocity. Would be great for MW detection

[10:35 AM] Bill Holtzman, Mosaic ATM (Guest)

What does vertical-wind based mean? Does the system maintain some kind of vertical wind model similar to traditional wind models?

[10:35 AM] Jason Prince (IBM) (Guest)

Does the 65K daily reports include null reports? If so, what percentage of the daily reports are null?

[10:36 AM] Suffern Paul

Bob Avjian see page 27 to 29 of NTSB report, page 43-44, 46-49

[10:36 AM] Ulrich.Schumann (Gast) (Guest)

Greg, we see for our research aircraft that aircraft acceleration and EDR are only weakly correlated. So one should note that any EDR indicator derived from aircraft response or angle of attack data can at best be only a proxy for given EDR. Do you have comparison between different EDR measurement systems on the same aircraft? Ulrich

[10:37 AM] Bob Avjian

Thanks Paul!

[10:44 AM] larry cornman (Guest)

Ulrich: you need to filter the accelerations into the same band within which the EDR is calculated. Then you'll see the correlation...

[10:45 AM] Ulrich.Schumann (Gast) (Guest)

Larry, that is what we do. Ulrich

[10:45 AM] larry cornman (Guest)

Ulrich - let's take this offline & discuss further...

[10:46 AM] Walter Rogers (Guest)

up arrow

[10:50 AM] Doble Nathan (Guest)

In the [report](#) (Section 3.1.2), we tried to characterize where passengers were and what they were doing when seriously injured. We were only able to document that for half of the injured passengers, and the largest category was using/going to/from the lav. We also asked flight attendants about passenger compliance with the seatbelt sign. Although there was no quantitative data, the general feeling seemed to be that compliance wasn't a large problem.

[10:56 AM] AAL - CA Tim Miner (Guest)

Tim R ... So the software for the MAX is now working and useable? We heard that there were issues in the past. Thanks.

[10:57 AM] Jason Prince (IBM) (Guest)

Anecdotal evidence from airlines noted an increase in PIREPS and reported intensity at the onset and early months of the pandemic. Was this observed in any normalized month to month or year to year comparisons from your viewpoint?

[10:58 AM] Greg Meymaris (Guest)

Hi Ulrich, to see good comparisons, one needs to a) filter out maneuvers, b) limit to a certain flight condition (airspeed, altitude, weight), c) compare standard deviation of vertical accel and compare to EDR with the calculation windows well matched. You are still going to see some variation, but it should look well correlated.

[11:00 AM] Doble Nathan (Guest)

Tim Rahmes (Guest) For the next year or so, we'll be giving presentations at forums like this to get the word out and advocate for our recommendations. We don't have any formal follow-up work planned yet, but it's not unusual for us to revisit past topics (e.g., our [2014 report on drug use in aviation](#) and the [2020 update](#); or our [2001 report on Part 121 accident survivability](#) and the [2020 update](#)).

[11:17 AM] Doble Nathan (Guest)

Bob Avjian (External) I'm not aware of a formal NATCA position on that recommendation (A-21-31), and the FAA hasn't sent their initial response yet (they have 90 days). The idea of providing graphical hazardous weather advisories directly on controller radar displays was broadly supported by controllers in stakeholder interviews if they could be toggled on/off to address clutter concerns.

[11:18 AM] Walter Rogers (Guest)

Would Vertical Rate (VR) sustained over a certain distance and value (say 500fpm ~2.5 m/s) be a good proxy for MW situations or sustained non-MW lift (thermals/convergence regions). I'm talking in terms we use for gliding.

[11:27 AM] Bob Avjian

Ok...understand Nathan. The Report pages that Paul indicated were helpful in understanding the issue. Thanks!

[11:29 AM] Clark, Ivan O. (LARC-D319) (Guest)

Will the version of ADS-B WX currently in draft significantly improve the utility of of ADS-B for this use?

[11:30 AM] John Williams (Guest)

Larry, can you use aircraft-to-aircraft comparisons in a region (assuming sufficient flight density) to help improve accuracy?

[11:30 AM] Jung-Hoon Kim (Seoul National Univ., South Korea) (Guest)

Great talk Larry, I'm wondering how to determine whether it is quiescent or turbulent?

[11:32 AM] Steve Darr (Guest)

ADS-B Wx is published, not in draft. It allows direct reporting of EDR. It does not change the parameters that Larry's approach uses.

[11:33 AM] Clark, Ivan O. (LARC-D319) (Guest)

thanks Larry & Steve

[11:35 AM] Walter Rogers (Guest)

Does ADS-B WX include a field for vertical velocity of the atmosphere... in the gliding world we call it netto. removing aircraft rate of sink.

[11:36 AM] Jung-Hoon Kim (Seoul National Univ., South Korea) (Guest)

Great! Thank you Larry.

[11:36 AM] John Williams (Guest)

Larry, I was getting at whether you might use multiple noisy measurements to identify outliers and build a more accurate consensus, or even adaptively adjust filtering, etc.

[11:40 AM] Steven Silberberg (Guest)

Yes I see the slides

[11:51 AM] Nick Craine (Guest)

Is this workshop being recorded? I have to leave for a period of time today but I don't want to miss any of this. It's a fantastic workshop!!!

[11:52 AM] Matt Fronzak

Nick Craine (Guest) - yes it is. Recordings, chat logs and relevant material will be made available to the general public on a TBD location after the workshop is concluded.

[11:53 AM] Nick Craine (Guest)

Awesome Matt. Thanks very much. You're doing a great job in this, the new COVID reality.

[11:54 AM] Matt Fronzak

@Nathan Polderman - Relegated? What relegation? He's been promoted to an even more important role!!

[11:55 AM] Steve Abelman

Does Nathan know that I get to ask him questions soon? (laugh)

[11:56 AM] Eden, Mark, FFTMEC ASAP Chairman & ERC (Guest)

I'm guessing he will find out soon! Lol

[11:57 AM] Björn Sævar Einarsson
iPad app available to others? Name?

[11:57 AM] AAL - CA Tim Miner (Guest)
Yamazee's SkyPath app

[12:00 PM] Matt Fronzak
@Nathan Polderman: A very wise pilot I know used to make his junior cockpit crew members go to the very back of the airplane for their crew rest at least once, so that they got to experience what it's like back there.

[12:01 PM] AAL - CA Tim Miner (Guest)
Matt Fronzak not possible post 9/11

[12:02 PM] AAL - CA Tim Miner (Guest)
Matt Fronzak: ... maybe they can do it while deadheading or as a passenger.

[12:03 PM] Eick Donald
we occasional see the difference with deadheading pilots in the back during turbulence encounters, captain says moderate, deadheader in back (captain) indicated severe!

[12:04 PM] Eckstein, Matthew D (Guest)
Great job Nathan

[12:04 PM] Nick Craine (Guest)
When is your March proposal announced? And are you using the EcoDemonstrator aircraft in your work?

[12:04 PM] Matt Fronzak
Good stuff, @Nathan Polderman!

[12:05 PM] Matthias Steiner (Guest)
A shoutout to Nathan and the Industry Turbulence Safety Action Team for all they are trying to accomplish!

[12:08 PM] Walter Rogers (Guest)
Ok here...

[12:08 PM] Patrick Vrancken (DLR) (Gast) (Guest)
it looks ok

[12:08 PM] Clark, Ivan O. (LARC-D319) (Guest)
others had the problem

[12:09 PM] Matt Fronzak
Interesting that it was split the way it was. I'm old enough to be totally unconcerned about putting my foot in my mouth.

[12:17 PM] Steven Silberberg (Guest)
Thank you Martin.

[12:17 PM] Walter Rogers (Guest)
Martin, very good presentation... focused on operations

[12:17 PM] Bob Sharman (Guest)
Do you use WAFS forecast?

[12:18 PM] Shelton-Mur, Karen (FAA) (Guest)
I am wondering if this turbulence data might be made available to the World Area Forecast Centers (there is one in the UK and one in the US. they can use it for their models?)

[12:18 PM] Steven Silberberg (Guest)
B&W diagrams are UKMET WAFS forecasts

[12:18 PM] Polderman, Nathan
Nick Craine (Guest) The proposal was submitted to the FAA in March, but no formal effort or project has been commissioned or announced yet.

[12:20 PM] GERBER, MARTIN (Guest)
Shelton-Mur, Karen (FAA) This turbulence data is the EDR data available from the IATA platform

[12:20 PM] Dr. Brian Pettegrew
Shelton-Mur, Karen (FAA), the US WAFC has been actively engaged for the last couple of years on trying to gain real-time access to the IATA database

[12:23 PM] Turp, Debi (Guest)
Shelton-Mur, Karen (FAA) We (at Met Office/WAFC London) are trying to pursue access to the IATA data for use in forecast verification.

[12:24 PM] Matt Strahan (Guest)
I can see this tying into the ICAO's Hazardous Weather Information Service, which is meant to comprise the best turbulence obs, nowcasts and forecasts.

[12:25 PM] Walter Rogers (Guest)
The Global Weather Notification System (GWNS) would complement In-Flight-Weather-Advisories reference very well regarding MW's. If a Mountain Wave Advisory (MWA) automated product were created, the GWNS notification would target only a few aircraft based on altitude and hazards. MW area are very localized.

[12:25 PM] Axel Barleben(DWD) (Gast) (Guest)
@Tammy answer: DWD Nowcasting based on Satellite data : <https://www.mdpi.com/2072-4292/12/14/2255/pdf>

[12:25 PM] Mark Phaneuf - ALPA (Guest)
Jason- what platform is being used to transmit the notice to the flight crew?

[12:28 PM] Matt Strahan (Guest)

South African airways notifies pilots based on WAFS forecasts. They've tuned the forecast thresholds to individual aircraft types, using studies of what the forecast value was when the pilot flips on the seatbelt light. You can then proactively turn on the seatbelts before approaching an area with forecast turbulence that usually triggers the seatbelts.

[12:28 PM] GERBER, MARTIN (Guest)

Turp, Debi From an airline perspective, it would be highly desirable for weather services to have easy access to IATA turbulence data when it is used for publicly available weather products such as WAFS forecasts.

[12:28 PM] AAL - CA Tim Miner (Guest)

Given the injury data below 20k, it would be critical to have climb/descent data.

[12:31 PM] Matt Fronzak

Jason Craig (Guest) - wouldn't the system be more effective if it could get actual trajectory information from the ATC source (i.e., ERAM)?

[12:32 PM] Suffern Paul

Jason Craig (Guest) does the box change size depending on what type of "weather" is causing the turbulence? MCS, versus isolated TS, versus mountain waves over whole mountain range...

[12:36 PM] Polderman, Nathan

Jason Craig (Guest) - at least in the US for Part 121 airline ops, licensed Aircraft Dispatchers are solely responsible per 14 CFR 121.601 to provide the PIC with updated weather information relevant to safety. Have you worked with any dispatch offices or dispatch industry reps as part of this project?

[12:37 PM] Tahereh Behbehani (Guest)

Polderman, Nathan I was thinking the same question.

[12:38 PM] Klipfel, Stephanie (Guest)

I was wondering on use case for this too. Is the FAA expecting to take responsibility for sending weather updates directly to pilots?

[12:40 PM] Walter Rogers (Guest)

GWN is a really Great Idea! Thank you for your work and this presentation

[12:40 PM] Eden, Mark, FFTMEC ASAP Chairman & ERC (Guest)

SUPER COOL!

[12:46 PM] Frazier, Eldridge (FAA) (Guest)

Good Job Jason!

[12:46 PM] Walter Rogers (Guest)

No

[12:50 PM] Jason Craig (Guest)

Polderman, Nathan - I do agree, any implementation would have to include a way for the Aircraft Dispatchers to see either the notification and/or the nowcast grid that the notification is generated from.

[12:54 PM] Flowe, Tammy (FAA) (Guest)

Steph - Do you find most injuries during descent?

[12:54 PM] Matt Fronzak

Klipfel, Stephanie - it seems to me that it is rare to see FAs up shortly after the 10,000' ding nowadays. Is this as a result of policy change, better turbulence forecasts, better understanding of the impacts of turbulence, or all of the above?

[12:56 PM] Polderman, Nathan

Klipfel, Stephanie or Eckstein, Matthew D - how do you blend the domestic high res GTG-N and global GFS-based GTG grids on the display for pilots/dispatch when evaluating a long-haul flight?

[12:59 PM] Bob Avjian

Question for Tammy or others: The Global Weather presentation reminded me of the previous Turbulence Avoidance Model/Polygon work. Does anyone know if FAA is planning to continue funding that research?

[1:01 PM] Tahereh Behbehani (Guest)

Klipfel, Stephanie Interesting presentation! How are the Pilot and Flight Attendant surveys done? Phone, electronic form, etc.? What triggers the survey - is it done by a human in Flight Safety that is reviewing events?

[1:02 PM] Eckstein, Matthew D (Guest)

No change, agreed

[1:02 PM] Matt Strahan (Guest)

Nathan, the blending question is a good one. There are examples of blending with other non-aviation parameters, such as the NWS's National Blend of Models. However, that blending is made possible through the use of obs, which lets us weight the inputs according to accuracy. We don't get enough turb obs yet to do it for turb.

[1:04 PM] Bob Avjian

Ok Steve - wilco

[1:06 PM] Polderman, Nathan

Great job Klipfel, Stephanie!

[1:06 PM] Bob Avjian

ok - thanks Tammy

[1:06 PM] Klipfel, Stephanie (Guest)

Polderman, Nathan Thanks..you too!

[1:11 PM] Flowe, Tammy (FAA) (Guest)

My neighbor decided to mow his lawn right now. Audio is challenging.

[1:11 PM] Matt Fronzak

Flowe, Tammy (FAA) - What? I can't hear you.

[1:12 PM] Dr. Brian Pettegrew

Flowe, Tammy (FAA), I have that same issue every Wednesday morning out my window

[1:18 PM] Peter Bechtold (Guest)

slide 6: can add ECMWF IFS to list of operational models providing gridded products (including convection)

[1:22 PM] hansen americandaedalus.com

Are there any references (published or otherwise) describing the location of observed CAT to convection as Dr. Sharman described (shown north of convection in slide)?

[1:24 PM] David A Strand

Hey Tim - Long time no see. Hope you're well. Understand and agree on your comment about post-9/11 on 2 pilot operation. Reference was on 777/787 where we had 4 pilots on 14-17 hour flights. Not unusual for check airman to do that with new pilot while they were on their 3 hour break, especially on the longer 777-300. Even continuous light in front of -300 could be challenge to back of 240 ft long airplane if they were trying to do a service.

[1:28 PM] Peter Bechtold (Guest)

@hansen there are several publications of gravity waves generated by convection in convection literature ... not many on CAT

[1:28 PM] Steven Silberberg (Guest)

Richard DiMaio published CIT turb PIREPS wrt USA mesoscale convective systems.

[1:30 PM] Ulrich.Schumann (Gast) (Guest)

Bob, very nice review and summary, What is over-forecasting? Ulrich

[1:30 PM] Bass, Randy (FAA) (Guest)

No reason for the panel session on future challenges, Bob has done an excellent job of identifying them already!

[1:31 PM] Matthias Steiner (Guest)

Yes, we better start identifying needed funds to conduct all that!

[1:32 PM] Jung-Hoon Kim (Seoul National Univ., South Korea) (Guest)

Thank you Bob for excellent summary for the workshop. Thank you again for teaching me a lot for GTG and turbulence in general. I hope to see you and others again in person after the COVID! Thank you all for organizing this wonderful workshop. For me it is time to sleep. Good bye!

[1:35 PM] Matt Fronzak

Over-forecasting was personified by at least one former turbulence forecasting colleague, now deceased, who was famous for issuing CYA forecasts to make sure he got every possible instance of MOGR turbulence.

[2:13 PM] Eckstein, Matthew D (Guest)

That picture is awesome

[2:21 PM] Eick Donald

Had a B2 bomber report severe turbulence at FL340 in the vicinity of developing convection over Kansas, at 180Z today impacts all!

[2:25 PM] Matt Strahan (Guest)

they already disrespect the seatbelt sign.

[2:26 PM] Eick Donald

Thanks Tammy and Bob Sharman, great information and presentations! NTSB thanks you for your hard work and efforts to improve flight safety!

[2:26 PM] Matt Fronzak

Former NWA Captain Pat Kline once used the acronym DRIP for the state of the NOTAM system. DRIP stands for Data Rich, Information Poor. We need to make sure that, in our zeal to get more data (which we certainly need), we don't use it to bury the needed information.

[2:27 PM] Matt Fronzak

Matt Strahan (Guest) - agree 100%

[2:36 PM] Polderman, Nathan

Matt Fronzak - the difference in time of FAs being seated is largely due to dramatic reductions in onboard service induced by COVID. We have seen a dramatic reduction in FA turb injury rates that continues to be well below long-term averages even as the amount of flying has recovered

[2:36 PM] Matt Strahan (Guest)

A good turb climo would let you set rules based on time of day, time of year and location for when to sit the flight attendants

[2:38 PM] Matt Fronzak

@Nathan Polderman Klipfel, Stephanie AAL - CA Tim Miner (Guest) - the reduction in service/reduction in FA injuries relationship certainly sounds like something that could/should be used to keep things the way they are right now, even post-COVID.

[2:42 PM] Bauman, William (FAA) (Guest)

Can we focus research funding on improving light-mod turbulence as well as improving lower levels - not just focused on cruise altitudes. Something we could focus on in AWRP.

[2:43 PM] Matt Strahan (Guest)

what about a probability of NIL turbulence? Would that be useful?

[2:43 PM] Shelton-Mur, Karen (FAA) (Guest)

Agree Tammy. Data Sharing is key. In my short time in the AWD, I have been surprised to hear of these roadblocks.

[2:44 PM] Matthew Wandishin (Guest)

The triggering approach to EDR reporting makes research/verification of light to moderate turbulence very difficult.

[2:46 PM] Steve Darr (Guest)

With the advent of ADS-B Wx, there won't be a trigger associated with EDR reporting. It will report from null on up

[2:46 PM] Klipfel, Stephanie (Guest)

On issues with sharing - I think all airlines are willing to share data to met offices that are tasked with providing safety products for aviation. The sharing is an issue for commercialization of safety related products.

[2:47 PM] Matt Strahan (Guest)

If we could tell you there's a high probability of not having to do anything because the air is expected to be smooth, that seems worthwhile.

[2:47 PM] Greg Meymaris (Guest)

the threshold for triggered events came about to mitigate the expensive downlink costs.

[2:47 PM] Kory Gempler (Guest)

The topic of data sharing is well above the pay scale of airline meteorologists or dispatchers. Needs to be raised to a different audience.

[2:49 PM] Walter Rogers (Guest)

The cost sharing idea relates to a MW aviation forecast. Severe cases are just as hazardous to the public because of surface wind damage. Those forecasts come from NWS public category

[2:51 PM] larry cornman (Guest)

I'd be more specific about the light/mod we're talking about: it's an extended period of that that relates to operational impact - not just a 5 sec blip...

[2:52 PM] GERBER, MARTIN (Guest)

Klipfel, Stephanie Thank you, Stephanie, for this comment, with which I couldn't agree more. The only problem for airlines is sharing turbulence data with commercial weather product providers who would use the data for free but sell derived products in the market. In such a case, airlines would pay twice: for the implementation of the reporting function and for the use of commercial products enriched with observational data.

[2:53 PM] Matthias Steiner (Guest)

Maybe the industry safety action team could work towards standardizing the injury reporting?

[2:53 PM] Steve Abelman

Matthias, that was one of the initial charters pre covid

[2:54 PM] Jason Prince (IBM) (Guest)

There are a lot of turbulence encounters that don't result in an injury as well. It's hard to resolve some consistency in conditions which cause an injury. Especially now that we see injuries regularly occurring in Light to Mod turb.

[2:54 PM] Matt Strahan (Guest)

And all research to operations funding for aviation was cut in the NWS a couple of years ago. Talk to your congressperson.

[2:55 PM] Nicolás Rivaben (Invitado) (Guest)

I think the key is to convince high level management of the airlines (and stakeholders) around the world. Most of airlines undervalue MET aspect and they only require us when the last straw that broke the camel's back. It could be Climate Change and CORSIA help us: we could convince airlines saying that sharing MET data as a 'contribution against CC' (an strategic marketing slogan perhaps)

[2:58 PM] Matthias Steiner (Guest)

Thank you Tammy, Wiebke, Bob & Matt & many others for a terrific workshop!!! :-)

[2:58 PM] Sintija Moldengauere (Guest)

Thanks for this week :)

[2:58 PM] Polderman, Nathan

Thanks everyone...great conference! Let's not wait another 3 years for version 5!

[2:59 PM] jeannine (Guest)

Thank you for a great workshop

[2:59 PM] Walter Rogers (Guest)

Great workshop! got a lot out of it

[2:59 PM] Shelton-Mur, Karen (FAA) (Guest)

thanks all!

[2:59 PM] Kowalewski, Debbie

Thank you!

[2:59 PM] Nicolás Rivaben (Invitado) (Guest)

Thank you everybody!

[3:00 PM] Eden, Mark, FFTMEC ASAP Chairman & ERC (Guest)

Thanks and "Well Done!"