

Report of the NOAA Testbed and Proving Ground Coordinating Committee 2021 Annual Meeting

Held virtually April and May 2021



Virtual participants in a session at the 2021 Meeting

Contents

Introduction	3
Keynote Presentations	4
Peter Stone, Previous TBP GCC Chair, How We Got to Now	4
Gary Matlock, OAR DAA for Science, and the Chair of the LOTMC	4
Fiona Horsfall, Director OAR Office of Research, Transition, and Application (ORTA)	5
Dorothy Koch, Director of OAR Weather Program Office (WPO)	6
Kim Runk, Former OPG Manager, The Evolution of the TBP GCC and the OPG	6
Steve Smith, Director of the NWS Office of Science and Technology Integration	7
Testbed or Proving Ground Collaboration Sessions	8
Operations Proving Ground (OPG)	8
Satellite Proving Ground	9
Developing a Fire Weather Testbed	10
Topical Sessions	11
NOAA S&T Focus Areas and the TBPGs - AI and Cloud and a Shared Vision for Application and Transitions	11
Advancing the UFS through Testbed and Proving Ground Engagement	11
Social, Behavioral & Economic Sciences and User Engagement	12
Strategies, Challenges, and Successes in the Virtual Environment	14
Transitions and Metrics of Success (including Readiness Levels)	15
Testbed Funding Opportunities, Successes and Challenges	16
Annual Meeting Key Takeaways - PLACE HOLDER NEEDS WORK	16
Appendix A: Recordings, Transcripts, and Chat Logs	17
Appendix B: Acronym Decoder	18

Introduction

The 2021 Testbeds and Proving Grounds Coordinating Committee (TBPGCC) Annual Meeting was held on April 13th, April 19th, May 4th, and May 5th with a wrap-up session on May 11th. The virtual meeting included seven sessions in a speaker plus panel discussion format focusing on the challenges facing all of the NOAA Testbeds and Proving Grounds (TBPGs). The event objective was to identify new pathways for coordination and collaboration to ensure continued TBPG success. The 2021 Annual Meeting was primarily focused on conversations within and among the Coordinating Committee with some outside presentations and invitees. The meeting program included seven sessions and four leadership keynote presentations.

- Session 1) NOAA S&T Focus Areas and the TBPGs - AI and Cloud and a Shared Vision for Application and Transitions
- Session 2) Advancing the UFS through Testbed and Proving Ground Engagement
- Session 3) Social, Behavioral, & Economic Sciences
- Session 4 A - C) Collaboration Among TBs or PGs
- Session 5) Strategies, Challenges, and Successes in the Virtual Environment
- Session 6) Transition Plans and Metrics of Success
- Session 7) Testbed Funding Opportunities, Successes, and Challenges

All keynotes and sessions were recorded. Presentation slides and recordings can be found in the [Annual Meeting Google Drive here](#). A Google Chat Room was used for internal communications during the 2021 TBPGCC Annual Meeting - to access the Chat Room you can use [this how to guide](#). The Chat Room will be open for continued discussion.

Meeting organizers included the TBPGCC chair, Andrea Ray (OAR/PSL), TBPGCC executive secretary, Joe Fillingham (OAR/OSS), and Line Office (LO) focal points Peter Stone (NOS/CO-OPS), Satya Kalluri (NESDIS), and John (JJ) Brost (NWS/OPG), with input from the coordinating committee members and session co-chairs. Please contact Andrea Ray (andrea.ray@noaa.gov) or Joe Fillingham (joseph.fillingham@noaa.gov) for additional information.

Keynote Presentations

Peter Stone, Previous TBP GCC Chair, How We Got to Now

[[Recording](#)] Peter Stone provided an overview ([slides here](#)) of recent TBP GCC annual meetings starting with 2018 with the goal of highlighting how the TBP GCC meetings have evolved to where they are in 2021. Prior to 2018 the annual meetings were mostly science focused. Starting at the 2018 meeting in Kansas City, the Line Office Transition Managers (LOTMs) were invited. This represented a major change in the annual meeting and initiated a trend towards cross Testbed and Proving Ground (TBP Gs) themes beyond science. In 2019 the annual meeting in Boulder, CO addressed three themes: 1) highlighting successes and challenges of the TBP Gs to committee members and NOAA leadership; 2) create a collaborative environment and identify potential pathways to address common challenges; 3) identify strategic or tactical management priorities for the TBP GCC to work through the follow year.

During the [2019 annual meeting](#), the TBP GCC identified [twenty five best practices](#). Spirited discussions on research transitions to operations, commercialization and applications including stalled transitions led to identifying the importance of early communication between principal investigators (PIs) and operators. A critical discussion topic was infrastructure and how it is difficult to identify funding for infrastructure and how important that is for the TBP Gs. Goals that emerged from the 2019 annual meeting included improving TBP GCC engagement with the LOTMs, provide input on updates to NAO 216-115A and NAO 216-105B, increase awareness of the need for greater infrastructure funding within the TBP Gs, develop solutions for technologies that successfully tested, but not transitioned, and develop pathways beyond operations for transition of technologies.

The 2020 annual meeting was the first meeting held in the virtual environment due to the COVID-19 pandemic. The summary report can be found [here](#). Priorities were shared by the NOAA leadership with a focus on the Unified Modeling System (UFS). “New words” or concepts discussed included: community modeling, GitHub, unification, incremental releases, cloud computing, not all transitions go to Readiness Level (RL) 9, intellectual property. Peter concluded that a number of these topics from the 2019 and 2020 meetings continue to be a priority and will likely be addressed throughout the 2021 annual meeting.

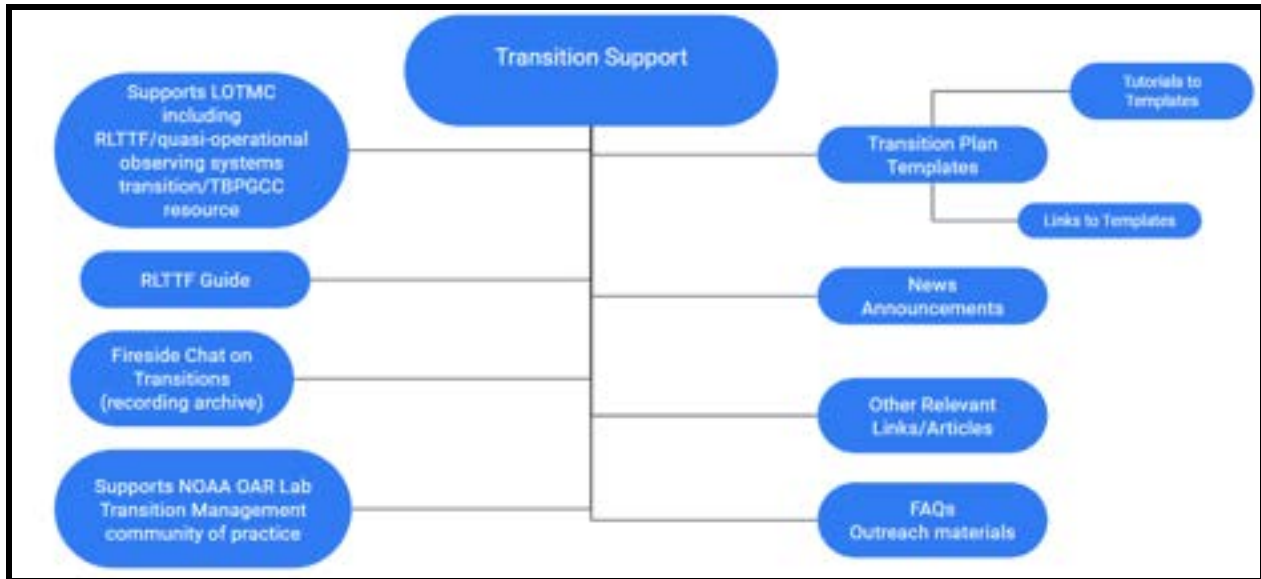
Gary Matlock, OAR DAA for Science, and the Chair of the LOTMC

[[Recording](#)] Gary Matlock began by highlighting a critical question for the TBP Gs: how does one go about deciding what to test under both “operations pull” and “research push” influences, stating that he is looking forward to how all of the sessions during the 2021 meeting will address that question. Gary highlighted the importance and value of the TBP GCC annual meeting and provided remarks on four areas. First, the formalization of the TBP GCC under the leadership of Paula Davidson starting in 2014 has led to a reliable structure for addressing critical NOAA

questions like the need for and implementation of a new Fire Weather Testbed. Second, the NOAA Science Report and its importance in communicating how NOAA's research and development activities are meeting NOAA's mission objectives including the role of the TBPGs in that process. Third, the overall role of the TBPGs in NOAA, the importance of coordination between research, operations, and the TBPGs, and how NOAA has not yet realized the goal of recognizing the institutional importance of the TBPGs offering that there is a need to formalize permanent funding for the TBPGs as well as performance measures that capture the success of TBPGs testing. Fourth, he discussed Readiness Levels and the critical input provided by the TBPGCC annual meetings which resulted in a 2020 workshop on RLs and a series of fireside chats that seek to address questions and concerns about RLs raised during that workshop. The creation of the OAR Office of Research Transition and Application (ORTA) and hiring Dr. Fiona Horsfall as the director is a critical step forward in providing a place where transition challenges can be addressed in a better way than they are now. Gary concluded that NOAA can do a better job focusing on the transition of research specifically into operations by examining the many requirements that come with moving technologies into an operational environment. Gary offered a request that the role of the TBPGs be part of the discussions during this meeting and that the outcome of those discussions should be offered to the LOTMC.

Fiona Horsfall, Director OAR Office of Research, Transition, and Application (ORTA)

[[Recording](#)] Fiona Horsfall, the new Director of the NOAA/OAR Office of Research, Transition, and Application (ORTA) provided an overview of that office ([slides here](#)). Within OAR, ORTA is under the purview of the DAA for Science and is the sister office of the Office of Science Support. ORTA's functional statement is "ORTA works to accelerate the transition of Research and Development at OAR to operations, applications, commercialization, and other uses (R2X) to serve NOAA's mission and benefit the American people." ORTA focuses on three key areas: developing and implementing policies that guide and manage transition in OAR, reporting on transitions in OAR, and supporting the development of transition plans. The two offices within ORTA include the Uncrewed Systems Research Transition Office (UxSRTO) and the Technology Partnerships Office which includes the Small Business Innovation Research (SBIR) program and the Technology Transfer program. Details on the transition functions have been proposed and are in progress including, for example, transition plan templates and outreach. Fiona encouraged anyone to reach out to ORTA with their transition questions.



Transition resources on the [Office of Research, Transition and Application \(ORTA\) Webpage](#)

Dorothy Koch, Director of OAR Weather Program Office (WPO)

[[Recording](#)] Dorothy Koch recently joined OAR from NWS as the new director of the Weather Program Office (WPO). Dorothy focused her remarks on the WPO and the support provided by WPO to the TBPGs. Funding support comes from the Testbed program, JTTI, the S2S program and more recently EPIC. There has been quite a bit of effort to increase social science involvement in TB/PG activities promoting interdisciplinary partnerships and social science development needs. WPO’s FY22 notice of funding announcement will provide infrastructure support. Dorothy highlighted that there are a number of topics within the TBPGCC that resonate with her perspectives, including working together to share lessons learned as well as linking end to end value chain connections within TBPGs. It is important to prioritize the goals of the TBPGs with the forecaster's requirements and needs and with societal benefits. Dorothy discussed two points on infrastructure: moving in the direction of open source and robust approaches, including moving to the cloud, to ensure infrastructure can be multipurpose and serve multiple TBPGs as appropriate, and the EPIC program that will be prioritizing these topics.

Kim Runk, Former OPG Manager, The Evolution of the TBPGCC and the OPG

[[Recording](#)] Kim Runk is the Senior Planning Advisor in the NWS Office of Science & Technology Integration, and the former OPG Manager. Kim’s remarks focused on offering encouragement to continue on the impressive progress towards a commitment to working together and on two areas where there have been a lot of discussion: building community and fostering collaboration. Kim highlighted that the changes in format to the TBPGCC annual

meetings have had a big impact on collaborative problem solving and open and honest discussion between TBPGs. Three areas of opportunity were highlighted focusing on collaboration through sharing. First, building on lessons learned. Kim suggested that it would be valuable to include a session in a future annual meeting focused specifically on errors or failures to encourage discussion on lessons learned. Second, conducting experiments particularly leveraging recent investments in the cloud which present opportunities to include remote users, multiple TBPGs, and partners more broadly. Third, planning and specifically the process of making plans together, increasing awareness of opportunities and obstacles, and identifying, through the process, a set of shared priorities. Kim suggested that it could be valuable to host a specific meeting where you only address planning, coordinating plans, and collaboration opportunities with a two to three year time horizon. In closing Kim told the TBPGCC to consider how the TBPGCC can function as an authoritative policy guidance body and highlighted that we need to engage to ensure that TBPGCC can be effective as that body.

Steve Smith, Director of the NWS Office of Science and Technology Integration

[\[Recording\]](#) Steve Smith focused his remarks on four critical use cases for TBPGs. The first use case is exploratory science and technology. Steve described this use case as bringing people together to show the art of what's possible in the right environment including tools and models that help to improve the services NOAA provides. This example focuses, generally, on the top of the funnel such as exploration of science issues in the domain of the TBs by looking into new techniques and how they can be used. The second use case is to explore concepts. Steve described this as how to take light "bulbs going off" or innovation and fit them into an operational concept or find a new concept for use. In this space there is a lot of overlap between TBs and PGs in terms of concept validation. The third use case is demonstration. Once a concept is validated it's time to be more rigorous and move toward a Proving Ground environment which is often closer to operations. Steve highlighted that ideas and prototypes often appear to have value in a research and testing environment, but when they are put in front of operational staff that same value is not always realized, but there may also be value in another space than originally intended. Steve described the "Last Mile" as the fourth use case that exclusively applies to Proving Grounds. This is when testing is done in a near operational environment, ensuring there are no surprises on the engineering side and things are scalable. The "Last Mile" is the final check on the R2O process, but there may be additional steps operators require after that.

Steve reinforced that as you go through the four use cases the expenses go up. Legitimate staging in demonstration with quantifiable results is something NOAA should do more of. Throughout all four use cases, Steve highlighted that there is a need for stakeholder and/or customer engagement. The NWS has the increasing need to include external stakeholders and/or customers in these four stages. Neglecting that engagement can result in less comprehensive tests and demonstrations.

In conclusion Steve spoke about the years to come and how NOAA needs to look more at the demonstration step to improve success and ensure that what we are implementing plans out in the ways we anticipate. Steve discussed the recent boom in the use of the Cloud and cloud computing and what that means for NOAA and the TBPGs. Specifically, shared cloud infrastructure for TBPGs between OAR/NESDIS/NWS and maybe NOS was identified. There is every reason to expect there could be benefits from using the cloud including cloud computing which is very well suited to TBPGs that do not operate in a 24/7 operational environment.

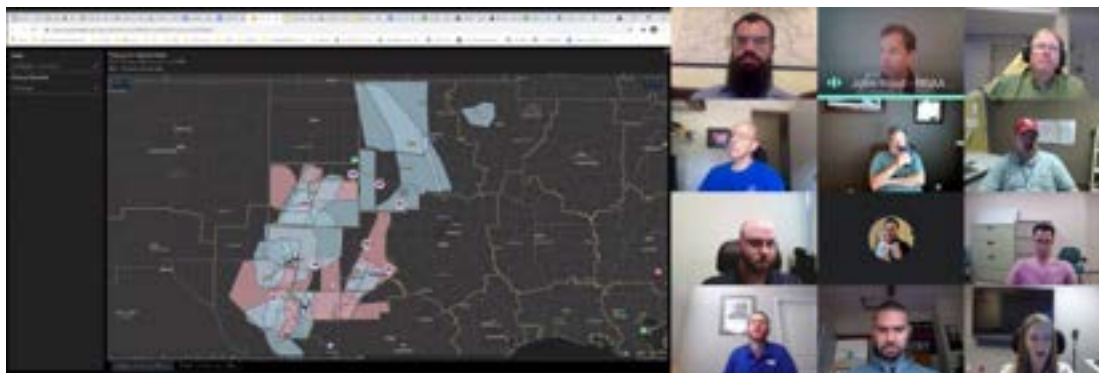
Testbed or Proving Ground Collaboration Sessions

Operations Proving Ground (OPG)

Session Chair: John Brost (OPG)

Session Panelists: Jimmy Correia, Nicole Kurkowski, and Alan Gerard

[\[Recording\]](#) OPG is the place where new tools, data sets, forecast techniques, or decision aids can be integrated into a WFO production environment (e.g. AWIPS) to evaluate whether it adds value to the forecast process with no appreciable negative impact on existing systems and practices. OPG has the capability to configure itself as any NWS Weather Forecast Office (WFO), or to emulate operational practices for up to several different WFOs simultaneously. The OPG is fortunate to not operate on grants - but that's also a struggle because we would love to work with Universities/researchers which often need funding to work with us. OPG is interested to learn how collaborative projects typically work and how we resolve any funding challenges. In short, OPG is seeking to collaborate with testbeds on all sorts of projects requiring planning and advanced scheduling. OPG would like to know what kinds of things are being tested in other TB&PGs that may need to go through the OPG process on its way to use in WFO's, and the timeline for testing in that testbed. [The OPG charter can be found here.](#)



Satellite Proving Ground

Session Co-chairs: Dan Lindsey and Mitch Goldberg (SPG) - [[Presentation](#)]

Session Panelists: Becca Mazur (ATPG), Kristin Calhoun (HWT), Jim Nelson (HMT), JJ Brost (OPG)

[[Recording](#)] This session began with the NESDIS Chief Scientist Mitch Goldberg providing a high level overview of the various activities associated with the Satellite Proving Ground (SPG), including the new NESDIS vision for enterprise satellite research and user engagement. SPG activities cut across other testbeds and proving grounds, participating in the Hazardous Weather and Hydromet Testbeds, and liaison positions with several testbeds and NCEP centers. Originally called the GOES-R Proving Ground, NESDIS has combined the efforts of the Geostationary and Polar-Orbiting programs into a single “Enterprise” Satellite Proving Ground. The presentation was followed by a panel discussion with representatives from other NOAA Testbeds and Proving Grounds, all of which use satellite information and collaborate with the Satellite PG. The primary goal of the panel discussion was to discuss ways in which NESDIS can better work with and support the other Testbeds. The original proving ground webpages can be found here: [GOES-R](#) and [JPSS](#).

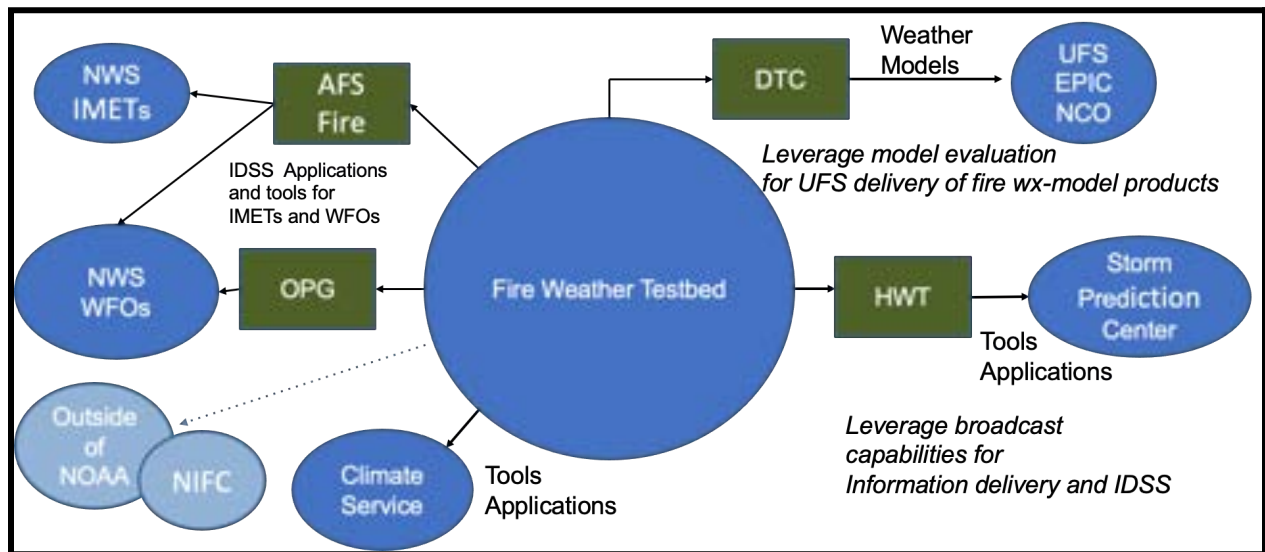


Developing a Fire Weather Testbed

Session Co-chairs: Jennifer Mahoney (OAR/GSL), Mitch Goldberg (NESDIS/JPSS), and Robyn Heffernan (NOAA/NWS) - [[Presentation](#)]

Session Panelists: Daniel Nietfeld (GSL liaison to NWS), Nick Naulser (Fire Meteorologist, BLM)

[[Recording](#)] A cross NOAA LO team is working to propose a new Fire Weather Testbed. Jennifer Mahoney (OAR), Mitch Goldberg (NESDIS) and Robyn Heffernan (NWS) discussed the plans, and lead a brainstorming discussion with input from Daniel Nietfeld (GSL liaison to NWS), Nick Naulser (Fire Meteorologist, BLM) collecting feedback on creating a successful testbed. Other TBPGs provided recommendations and lessons learned while others expressed concern about how NOAA TBPGs are funded and the impact of adding new TBPGs might have on existing ones. There are exciting opportunities ahead for a Fire Weather Testbed with considerable interest from across NOAA. Collaborations with other testbeds should be considered and will enable links to operations. Sustained funding will be a critical issue to consider as planning advances. A virtual framework for conducting experiments will allow greater participation.



Connections to operations of the proposed Fire Weather Testbed, and to multiple other TBPGs, not all shown here. Needs include NWS IDSS tools and AWIPS for testing and delivery of capabilities to IMETs. HMT leveraged to deliver new products to SPC, DTC leveraged for testing and delivery of model-based products to NCO and Weather community, new products delivered to NWS Climate Service via applications

Topical Sessions

NOAA S&T Focus Areas and the TBPGs - AI and Cloud and a Shared Vision for Application and Transitions

Session Chair: James Yoe (JCSDA)

Session [Presentations](#): [James Simms](#) (NWS) and [Jebb Stewart](#) (OAR/GSL)

Session Panelists: Alan Gerard (HWT), Matt Rosencrans (CTB), Vijay Tallapragada (NOAA/NWS/NCEP)

[\[Recording\]](#) This session included presentations on the [NOAA Science and Technology Focus Areas](#), including Cloud computing and the Artificial Intelligence Strategic Plan and a panel discussion that explored the challenges TBPGs are facing with AI and Cloud transition to applications. Key questions presented for discussion focused on the pace of AI and Cloud R&D versus operational use, requirements, adequate support models, and properly scaling these technologies throughout NOAA. TBPGs are also using AI and Cloud resources which leads to unique and important insights at the intersection between R&D and applications.



Advancing the UFS through Testbed and Proving Ground Engagement

Co-chairs: Jessie Carman (CTB), Louisa Nance (DTC)

Presentation: [Hendrik Tolman](#) (NOAA/NWS, Senior Advisor for Advanced Modeling Systems)

Panelists: [James Correia \(HMT\)](#), Matthew Rosencrans (CTB), James Yoe (JCSDA)

[\[Recording\]](#) The Unified Forecast System (UFS) is a community-based, coupled, comprehensive Earth system model-based analysis and prediction system designed to meet NOAA's operational forecast mission to protect life and property and improve economic growth. NOAA views the UFS as the common source system for NOAA's operational NWP applications--spanning local to global domains and predictive time scales from sub-hourly analyses to seasonal predictions--benefitting from promising community-based research innovations; this vision requires a more formalized, organized, documented, and transparent transition of research to operations (R2O). The UFS Steering Committee defines R2O functions for the UFS in its document [Organizing Research to Operations Transition](#). A key aspect of this R2O process is evidence-based decisions following from testing, verification and validation, and acknowledging that NOAA TBPGs have the capacity to support the R2O process. The details of how the various NOAA TBPGs will engage in this process is yet to be defined. Discussion focused on the best pathways for engaging the existing NOAA TBPGs to support the R2O process and accelerate the improvements in the forecast skill of NOAA modeling suite.

Social, Behavioral & Economic Sciences and User Engagement

Co-chairs: Katherine Hawley (NESDIS/STAR, affiliated with SPG), Kodi Berry (HMT), Matthew Mahalik (OAR/WPO), John Brost (OPG)

Panelists: [Gina Eosco \(WPO\)](#), [Stephanie Avey \(AWT\)](#), [Vanessa Escobar \(Lead Scientist for NOAA/NASA GEO-XO User Engagement, affiliated with SPG\)](#), [Daphne LaDue](#) (Univ. of OK/CAPS) and [Kim Klockow-McCain](#) (Univ. of OK/CIMMS, affiliated with HWT)

[\[Recording\]](#) This session presented a discussion on how social, behavioral, and economic sciences (SBES) are being used in Testbeds and Proving Grounds. Presentations provided an overview of SBES funding opportunities from the OAR WPO and highlighted ongoing work using SBES in the AWT, Satellite Proving Ground, and HWT. The presentations included the use of SBES to design experiments, ways to integrate SBES methods into experiments, and collaborations with the Federal Aviation Administration (FAA), NWS, emergency management, and broadcast media. Session discussions focused on how TBPGs like HWT have seen an evolution in integration of social sciences over the last decade. Prior to social scientist involvement, projects collected forecaster feedback via surveys written by meteorologists, participant-written blog posts. Early social science integration started with leveraging existing

tools (e.g., NASA-Task Load indeX) and creating new tools (e.g. Confidence Continuum, see Fig 4 in Heinselman et al. 2012¹) to begin to understand how experimental software and work processes impact forecaster decision making — and how their use is impacted by things like forecaster expertise. HWT now also has projects that are created by social scientists and centered on social science priorities; e.g., a study of the Brief Vulnerability Overview Tool, to understand when/how it might be used by forecasters to support core partner decision-making.

Social science in the HWT has provided qualitative insights regarding perception of probabilistic information in severe weather information, including the existence, severity and trajectory of tornadoes. Dr. Klockow-McCain described that for the Public, uncertainty is already inferred; offering explicit estimates can improve decisions, For emergency managers, uncertainty information is desired but their procedures would be challenged, so their warning and response systems would need time to adapt. For broadcasters, uncertainty information is desired, but too much information gets overwhelming quickly, especially in visual display. They desire simplified renderings to pass along and lower-frequency updates to connect with systems.

Social science in the SPG has used the value of information analysis to assess how new information has influenced decision maker actions and outcomes, compared to previous information, linking observations to areas of societal benefit. This has led to traceable impacts from the user to the GEOXO Instruments, which link observations to areas of societal benefit, potential products and services while also providing quantifiable value for the GEOXO System.

TBPGs should be aware that there are many possible study designs to assist with bringing more science into physical science projects, ranging from experiment-control group design to talk-aloud protocols, cognitive task analysis, decision modeling, and practitioner cycle. The session participants concluded with a question: What is the objective of your project/experiment/evaluation? This should drive project design. Realism in the testbed results in software/techniques/tools that are useful and will work in the real world. Controlled Experiments let you isolate factors to test/understand them and their potential impacts.



¹ DOI: 10.1175/WAF-D-11-00145.1

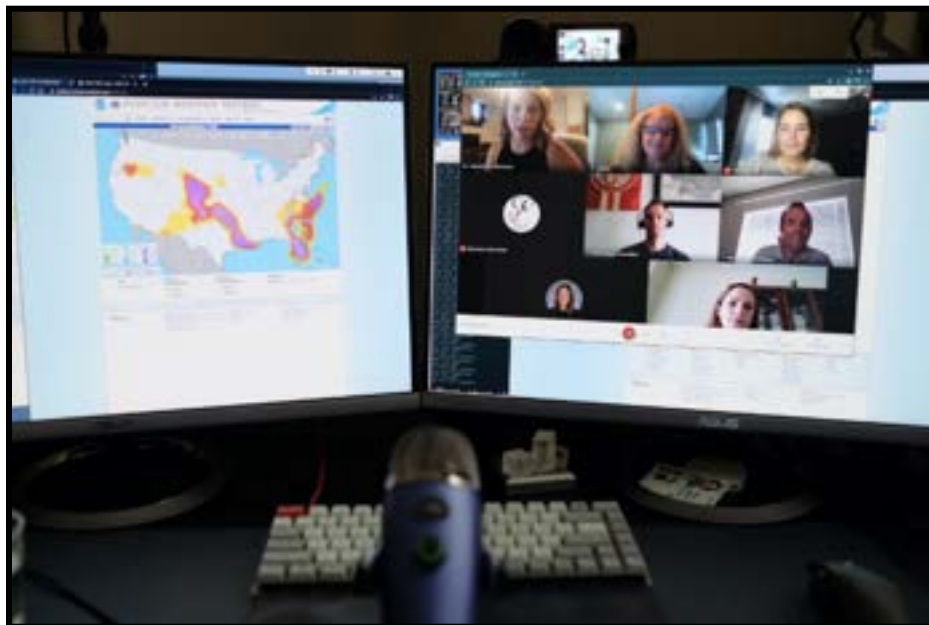
Strategies, Challenges, and Successes in the Virtual Environment

Chair: John Brost (OPG)

Panelists: Katie Crandall Vigil (OPG), [Stephanie Avey](#) (AWT), [Jimmy Correia](#) (HMT), Jim Yoe (JCSDA), [Bob Heitsenrether](#) (NOS/CO-OPS/OSTEP), Becca Mazur (ATB)

[\[Recording\]](#) The COVID-19 pandemic and the global shut down has led to expanded telework and use of the virtual environment. The virtual environment has presented unique challenges to the TBPGs, but has also presented unique opportunities to advance strategies and techniques for continuing work that would have otherwise been conducted in person. This session included presentations and a panel discussion that explored some of the challenges and successes of operating TBPGs in the virtual environment and identified some of the key lessons learned that can be utilized and expanded going forward.

While the virtual environment has had benefits, such as allowing people to participate who might not be able to travel or to leave their positions for a week, it has also had challenges. Inherently face-to-face interactions, including experiments (especially ones that involve using and sharing equipment and facilities), code-sprints, etc., have been seriously hampered, both by the physical hindrance (lack of direct access) and by the dilution of effort (inability of participants to detach from their day-to-day work environments for concentrated efforts) while working virtually. Building personal relationships and the trust and efficiency they engender, is much slower in a purely virtual environment. This is especially true with and for newcomers to a working community, such as one of the testbeds. There are practically no opportunities for short, informal interactions - drop-bys, etc. leading to missed opportunities for exchange, and more formal meetings called to compensate for this are leading to Zoom burn-out.



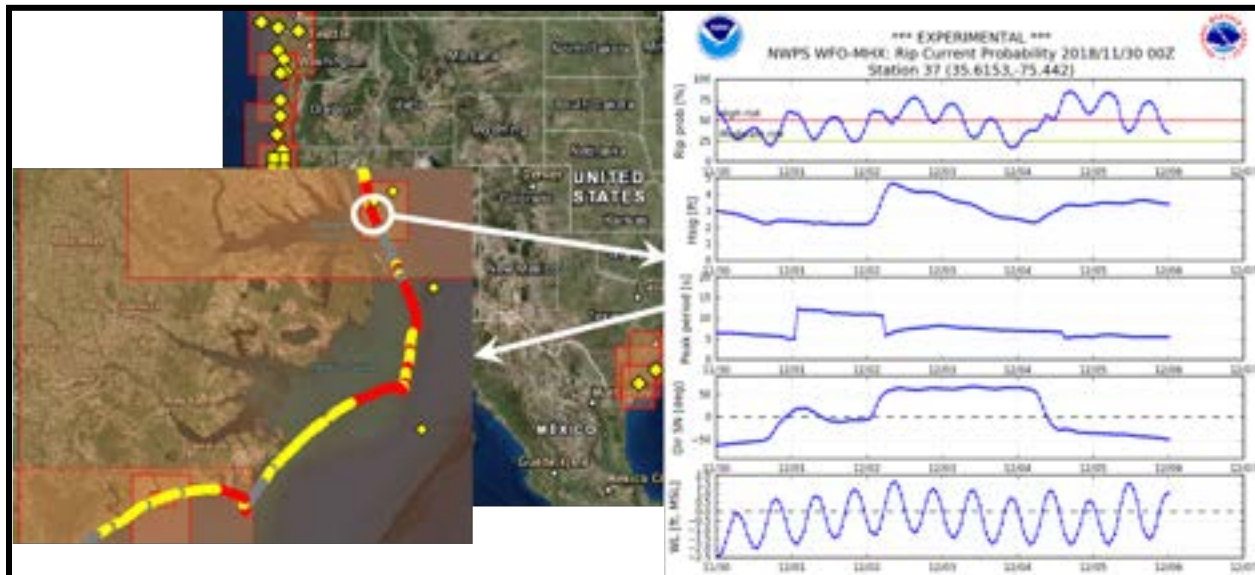
Aviation Weather Testbed's 2020 virtual Summer Experiment included 26 participants from 16 NWS offices and aviation organization groups. FAA Aviation Weather Demonstration and Evaluation (AWDE) social scientists also conducted 21 interviews with pilots and aviation decision makers.

Transitions and Metrics of Success (including Readiness Levels)

Co-chairs: Jessie Carman, Andrea Ray

Panelists: [Matt Mahalik](#) (WPO); [Annette Hollingshead](#) (AOML and Lead, LOTMC Readiness Level Task Force); [Brian Zachry](#) (JHT and AOML); [Greg Dusek](#) (NOS and COMT); Matt Rosencrans (CTB and CPC)

[[Recording](#)] Panelists in this session discussed new and hot topics in the transitions space in NOAA including innovations in how transitions and transitions plans are being managed at WPO, the LOTMC Readiness Level Training Task Force, and the National Hurricane Center's process for accepting transitions. Transitions efforts and challenges with the NOAA rip current model were highlighted and transitions at the CTB were discussed.



Transition success: the first national probabilistic rip current model, operational in the NOAA/NWS as of February 2021. After initial research led by NOS, the model was collaboratively developed by NOS and NWS. The model predicts the hourly likelihood of hazardous rip currents every kilometer along the coast up to six days out.. See <https://polar.ncep.noaa.gov/nwps/para/viewer.shtml>

Testbed Funding Opportunities, Successes and Challenges

Co-chairs: Kodi Berry (HWT), Jim Nelson (HMT)

Panelists: [Mark Vincent \(OAR/WPO\)](#), [Jordan Dale \(OAR/WPO\)](#), Dan Lindsey (SPG), Patrick Marsh (NWS/SPC and HWT), [Derrick Snowden \(NOS/IOOS\)](#)

[\[Recording\]](#) This session discussed current, or possible, TB/PG funding and strategies to increase or broaden avenues of funding. Questions such as whether TBPGs feel they play a large enough role in the selection of which projects get funded were posed with a focus on determining science priorities that are addressed in funding competitions. Panelists discussed WPO streams of funding, Supplementals, the balance between internal operational needs and external funded projects, how COMT brings in various streams of funding, and NESDIS PG funding.

Annual Meeting Key Takeaways

Several areas that are ripe for cross-testbed/proving ground collaboration both in the short term (1 to 2 years) and the long term (3 to 5 years). Coordination with four specific TBPGs was highlighted in four sessions, but it was recognized that this is just the tip of the iceberg in what is or might occur. Among these are the subseasonal to seasonal area (S2S), in which CTB might collaborate with HWT & HMT in particular on products where CPC time lines intersect with HWT & HMT phenomena.

Another is in the Arctic, for example Hazard Services testing w/ Arctic Testbed and Coastal operational oceanography in the Arctic and how it affects climate (collaboration between COMT, Arctic and Climate TBs). ATB covers. Finally, and most general across TBPGs, the group could identify some risk/prediction areas that several TB's could collaborate on. However, this may be difficult in how budgets are constructed and priorities set, e.g. specific Hazard Services.

Participation in the S&T focus areas of Data, Cloud, AI is of interest across TBPGs. The group recognizes opportunities, such as the potential for TB experiments to provide a place to expose forecasters and train on AI. But they also foresee additional demands and changes in how they receive data, and new data. The group expressed concern about how these S&T Focus areas will be resourced, particularly for TBPGs, because these are not funding programs.

The TBPG community also sees opportunities in the Unified Forecast System, but have concerns on how to bridge between old modeling systems and the new. For example, a number of



successfully tested efforts were begun before UFS came into being, and now need to be converted into the new framework, requiring additional funding to do this. The group also has concerns about how to fund expanded development, testing and evaluation efforts that the UFS may require. In particular, several TBPGs are focussed on a particular hazard, e.g. severe (HWT), extreme precipitation (HMT), hurricanes (JHT), convective systems (AWT), coastal waves, surge and inundation (COMT), and may need to confirm that an innovation tested in one testbed to improve one or more types of hazard does not make things worse for another.

Several TBPGs are already engaged with SBES, including using the understanding developed by SBES projects outside their own TBPG. They recognize the potential for SBES to provide guidance on user needs and how to communicate especially probabilistic forecasts and multi-hazard forecasts. As with other topics, there was concern on how to resource these emerging efforts both within TBPGs and as collaborative activities.

TBPG funding was a topic not only of that session, but across others as well. An overall observation is that currently the push of research funding exceeds the capacity of TB/PGs to evaluate efforts, especially those not funded from a specific WPO or STI grant. While TBPGs are excited about the advent of UFS and opportunities to use Cloud and AI, and to incorporate social and behavioral sciences into their work, generally flat funding limits the potential to take advantage of these for R2X, especially during the transition period from current NCEP production suite to the Unified Forecast System (UFS).

There are also functional/structural/technical things that would benefit the TB/PGs (or a subset) in getting their work done in the next 1-2 years, e.g. developing common data storage or formats in the cloud? In addition, most TBPGs have little base funding. For a number of TBPGs, “infrastructure” is people to do the work to set up testing and experiments, coordinate with operations, and other entities. Often these are contractors or cooperative institute employees because there is little base funding, and these people often move on to more secure positions, resulting in a loss of experience. Furthermore, the lack of base funding limits most TBPGs in being strategic, for example, to pursue a topic that comes up between award funding cycles, or to coordinate with another TBPG beyond the award-funded efforts.

Finally, the TBPGCC has the potential to function as an authoritative policy guidance body and highlighted that we need to continue engaging with the LOTMC and other entities to ensure that TBPGCC can be effective as that body.

Appendix A: Recordings, Transcripts, and Chat Logs

- [Day 1, April 13th, Recording](#)
 - [Day 1 GoToMeeting Chat Log](#)
 - GoToMeeting Transcript Not Available
 - Peter Stone: How we got to now [[Recording](#)]
 - NOAA S&T Focus Areas and the TBPGs - AI and Cloud and a Shared Vision for Application and Transitions [[Recording](#)]
 - Gary Matlock, OAR DAA for Science, and the Chair of the LOTMC [[Recording](#)]
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 - Advancing the UFS through Testbed and Proving Ground Engagement [[Recording](#)]
 - Social, Behavioral & Economic Sciences and User Engagement [[Recording](#)]
 - Operations Proving Ground (OPG) [[Recording](#)]
- [Day 3, May 4th, Recording](#)
 - [Day 3 GoToMeeting Chat Log](#)
 - [Day 3 GoToMeeting Transcript](#)
 - Strategies, Challenges, and Successes in the Virtual Environment [[Recording](#)]
 - Satellite Proving Ground [[Recording](#)]
 - Developing a Fire Weather Testbed [[Recording](#)]
 - Fiona Horsfall, Director OAR ORTA and Dorothy Koch, Director of OAR WPO [[Recording](#)]
- [Day 4, May 5th, Recording](#)
 - [Day 4 GoToMeeting Chat Log](#)
 - [Day 4 GoToMeeting Transcript](#)
 - Transitions and Metrics of Success [[Recording](#)]
 - Testbed Funding Opportunities, Successes and Challenges [[Recording](#)]
 - Kim Runk: The Evolution of the TBPGCC and the OPG [[Recording](#)]
- [Day 5, May 11th, Recording](#)
 - [Day 5 GoToMeeting Chat Log](#)
 - [Day 5 GoToMeeting Transcript](#)
 - Steve Smith, Director of the NWS OSTI [[Recording](#)]

Appendix B: Acronym Decoder

AWDE: Aviation Weather and Data Evaluation Services
AWT: Aviation Weather Testbed
ATPG: Arctic Testbed and Proving Ground
BLM: Bureau of Land Management (Dept of Interior)
CaRDS: Capabilities and Requirements Decision Support
CIMMS: Univ of OK-NSSL Cooperative Institute for Mesoscale Meteorological Studies
COMT: Coastal and Ocean Modeling Testbed
CO-OPS: NOS Center for Operational Oceanographic Products and Services
CPC: NWS/NCEP Climate Prediction Center
CTB: Climate Testbed
DOC: Department of Commerce
DTC: Developmental Testbed Center
EPIC: Earth Prediction Innovation Center
EMC NWS/NCEP Environmental Modeling Center
ESRL: OAR Earth System Research Laboratory
FAA: Federal Aviation Administration
FFO: Federal Funding Opportunity
GFS: Global Forecast System
GOES-R PG: GOES-R Satellite Proving Ground
GEO-XO: NOAA's Geostationary and Extended Orbits satellite system
GPRA: Government Performance and Results Act
GSD: OAR/ESRL Global Systems Division
HFIP: Hurricane Forecast Improvement Project
HREF: High Resolution Ensemble Forecast
HRRR: High Resolution Rapid Refresh model
HWT: Hazardous Weather Testbed
HMT: Hydrometeorological Testbed
IDSS: Impact-Based Decision Support Services
IOOS: [U.S. Integrated Ocean Observing System](#)
JCSDA: Joint Center for Satellite Data Assimilation
JHT: OAR-NWS Joint Hurricane Testbed
JPSS: [Joint Polar Satellite System](#)
JTTI: OAR-NWS Joint Technology Transfer Initiative
LO: Line Office
LOTMC: NOAA Line Office Transition Managers Committee
NCEP: NWS National Centers for Environmental Prediction
NGGPS: Next Generation Global Prediction System
NHC: NWS/NCEP National Hurricane Center

NIFC: National Interagency Fire Center
NOS: National Ocean Service
NSSL: National Severe Storms Laboratory
NWC: NWS National Water Center
NWM: National Water Model
OAR: NOAA Office of Oceanic and Atmospheric Research
OPC: NCEP Ocean Prediction Center
OPG: Operations Proving Ground
ORTA: Office of Research, Transition, and Application
OWP: NWS Office of Water Prediction
PSL: OAR ESRL Physical Sciences Laboratory
S2S: Subseasonal to Seasonal
SSD: NWS Scientific Services Division (one for each region)
STI: NWS Office of Science & Technology Integration (STI)
SBES: Social, Behavioral, and Economic Sciences
SPC: NWS/NCEP Storm Prediction Center
SPG: Satellite Proving Ground
SSD: NWS Scientific Services Division (one for each region)
STI: NWS Office of Science & Technology Integration (STI)
S&T areas: [NOAA Science and Technology Focus Areas](#)
SWT: Space Weather Testbed
UFS: Unified Forecast System
USWRP: U.S. Weather Research Program
WFO: NWS Weather Forecast Office
WPC: NWS/NCEP Weather Prediction Center
WPO: OAR Weather Program Office
WWE: HMT Winter Weather Experiment