1. MEETING MINUTES

The minutes are organized by topic per the agenda.

1.1 INTRODUCTIONS & MEETING GOALS AND OBJECTIVES

Brad Schmidt (CoE) opened the meeting by thanking everyone for attending and participating. Brad then discussed the topics and objectives of the meeting which are captured in the agenda. We also went around the room and did self-introductions.

Brad started the meeting by using the live CO-FPS to initialize a wildfire simulation via the CO-WIMS interface for the Green Mountain wildfire that began on 28 November 2016. Brad also started two other simulations as a test of a system requirement for the initial operating capability system to have the capability to run three simultaneous wildfire simulations. This three simulations were run and the first couple hours of output were displayed towards the end of the meeting.

1.2 UPDATE ON CO-FPS DEVELOPMENT SINCE SEPTEMBER

Jim Cowie (NCAR) gave a presentation on the CO-FPS development activities since the 27 September Stakeholder meeting. The major enhancements included:
- Improving the stability of the connections between CO-FPS and CO-WIMS
- Testing the ability to run three simultaneous wildfire simulations
- Improving CO-FPS data management processes
- Improving system cyber security
- Adding the Aviation Hazard products (more below)

Jim Cowie and Branko Kosovic provided an overview on the CAWFE® model improvements. **A significant model upgrade was installed on 26 October 2016**. The significant improvements included:
- The simulated wildfires are now driven by the wind at 1 meter above ground (previously it was set to 3 meters) which results in a slower and more realistic fire spread rate.
- A bug related to the fire propagation direction under certain wind directions has been fixed. The odd behavior was noted by stakeholders during the 27 September meeting.
- If the simulated burn area reaches any part of the model domain boundary, the simulation now stops. This will save computational resources and remove the possibility that the modeled fire will exhibit odd behavior at the model domain boundaries.
- Improvements to the active/burned area parser code were made to handle crossing polygon lines. Previously, if a user drew an active fire polygon that had crossing edges, the system would fail. The system is more resilient to this error now, but some additional testing is needed.

- Worked on a third party computer process scheduler called Torque that, when used, could take advantage of additional compute resources and allow the fire simulations to run faster. There are still some problems with the Torque application that need to be resolved.

During and after the briefing, the stakeholder provided the following feedback.

- Can we add the HRRR simulated radar products to the "weather" product set?
    - NCAR Response: This is possible and we will discuss it with the CoE.
- Will the pilots actually go to CO-WIMS to view the aviation products? More feedback is needed from the fire aviators to see how they may utilize the output.
    - NCAR Response: The CO-FPS Aviation Hazard products are based on aviation weather products that NCAR has developed for the Federal Aviation Administration (FAA) and commercial airlines over more than 35 years, but the version on the CO-FPS takes advantage of the high-resolution HRRR prediction grids. It is possible that the aviators access similar products (at lower resolution) on the NCAR-developed Aviation Digital Data Service (ADDS) or through commercial websites. More discussion and feedback from the fire aviators are needed to tailor the products for them.
- There is also a need to assess the whether the pilots want the CO-FPS to calculate the fire influenced aviation hazard threats.
    - NCAR Response: The wind shear, turbulence, and up-down draft products from the fire grids could be generated. More feedback is needed on this topic.

1.3 PRESENTATION AND DISCUSSION ON CO-FPS USAGE DURING FALL WILDLAND FIRES

Brad Schmidt showed some fire incidents to discuss the performance of the CO-FPS. The Beulah Fire (3 October start) was the first case. The modeled fire moved too quickly for this case. This was when the model was using the 3 meter height winds (not the 1 meter winds as it does now). The simulated fire hit the model boundary too quickly. Some parts of the fire were modeled well for this case. CO-FPS is not able to model fire suppression actions at this time.

The second case study was the Junkins Fire (17 October start during late morning) during a wind event. The fire moved into several fuel types and crossed a road. The modeled fire also moved too quickly for this case likely due to the wind heights used for forcing during that time. The modeled fire did move in the right direction.

Note: The CO-FPS model was upgraded on 26 October (per the change-log) and this included the use of the 1 meter winds for the fire forcing and a bug fix to handle the wind direction error that was in the system prior to the 26th.

A burn-out operation of the Junkins fire was done on 28 October. Brad ran the model on the ridgeline. The model did a pretty nice job of predicting this fire based on a subjective assessment. The rate of spread was close to actual event and was only off by a couple hundred feet. The bug fix and wind height adjustment improved the performance.

User Feedback

- We may need to investigate allowing users to pick the model domain size for large fires. The model domain size is currently fixed.
    - NCAR Response: This is being considered as an upgrade. We hope to have a small, medium, and large domain selection. Using a large domain for a small fire will slow down the run-time, so optimizing the match will be useful.
- It may be useful for the system to automatically offset the domain based on the predominant wind direction.
    - NCAR Response: This may be technically possible, but it needs more discussion since the wind speed and direction vary over the 18-hour prediction period.
- Does the CAWFE® model handle spotting?
    - NCAR Response: The CAWFE® model currently does not predict spotting. This is a stochastic process and more research is needed to determine the best approaches for handling these situations.

1.4 PRESENTATION ON PLANS FOR VERIFICATION OF CO-FPS DURING THE 2017 FIRE SEASON

Brad emphasized the importance of performance assessment for the CO-FPS, particularly now that the initial operating capability has been developed. NCAR created a comprehensive document on the verification plans, but the quantity and quality of wildfire verification data are limited in practice. There are some federal projects such as the Aerial Firefighting Use and Effectiveness (AFUE) project that is being designed to capture more robust verification datasets and the CoE wants to participate in that effort. If there are good verification dastasets outside of Colorado, NCAR can use these as well and run the CAWFE® model on those test cases (outside of the CO-FPS) and use the results for model refinement.

Bill Mahoney spoke briefly on the benefits of using an object based verification methodology vs. a point (hit or miss) verification process as described in the CO-FPS Verification and Metrics Plan. This topic was covered in more detail by Barbara Brown during the 16 June 2016 stakeholder meeting.

Brad covered the various data sources that may be available for verification (see slides). The ideal dataset would be hourly rate of spread, flame length, and fire perimeter data during the entire lifecycle of the wildfire.

NCAR plans to hire an intern in 2017 to analyze MMA video data and digitize fire perimeters from the MMA video data. This will provide better spatial and temporal data for the performance assessment process. A new ESRI tool called [Full Motion Video](#) will be used for this purpose.

1.5   PRESENTATION ON CO-FPS DEVELOPMENT WORK SCHEDULED FOR 2017

Bill Mahoney (NCAR) gave an overview of the work planned for 2017. The focus is on the following items:

- Assessing the performance of CO-FPS products with a focus on fire perimeter and rate of spread using MMA and other datasets.
- Upgrading the fuel datasets to include the Scott & Burgan (40) fuel models.
- Implementing a rapid simulation capability (10x faster) for initial attack decision support.
- Analyzing the applicability of cloud computing to speed-up run-time and output generation.
- Expanding the CAWFE® model boundary condition data retention period to 72 hours so simulations can be run for ignition times up to three days prior.
- Beginning work to create a training function whereby historical weather and wildfire datasets will be available for analysis.

1.6   OPEN QUESTION AND ANSWER SESSION

- For the AQ products, it would be beneficial to have a meeting early 2017 with the CoE, NCAR, and the CDPHE folks to talk about user needs and desires to advance that product.
- It is desirable to have the movies synchronized across the difference parameters.
- For smoke concentration, it would help to be able to overlay both wind speed and direction data.
- The HRRR wind data should be blended so we have progressive discloser based on zoom level instead of having to select all three products separately.
- The wind speed should be shown with the wind arrows for all the wind products.
- There is a need for an email address or other mechanism to submit suggestions and feedback.
  - Response: Intterra noted that CO-WIMS will have a new user interface in January that will make is easier to submit input. At this time, the best approach is to email user feedback to Brad Schmidt.

2. ACTION ITEMS

The following actions items resulted from the meeting.

- These minutes and presentation materials will be posted to the [CoE CO-FPS project website.](#)

- The next meeting will be held in January 2017.

Appendix A – Meeting Agenda

COLORADO
Center of Excellence for Advanced
Technology Aerial Firefighting
Department of Public Safety

Colorado Fire Prediction System November Meeting Agenda
November 29, 2016: 10 a.m. - 12 p.m.

10:00 a.m. – 10:15 a.m.	Introductions & meeting goals and objectives
10:15 a.m. – 10:30 a.m.	Update on CO-FPS development since September
10:30 a.m. – 10:50 a.m.	Presentation and discussion on CO-FPS usage during fall wildland fires
10:50 a.m. – 11:00 a.m.	Break
11:00 a.m. – 11:30 a.m.	Presentation on plans for verification of CO-FPS during the 2017 fire season
11:30 a.m. – 12:00 p.m.	Presentation on CO-FPS development work scheduled for 2017