**AVIATION SIMULATION WEBINAR – Q&A SHEET**

**What computer hardware do you use to run P3D for the AAO in the projection system, i.e. is it a distributed system or does it run off one machine. What are the specifications of this? Can you give a run down on the computer hardware used for each station?**

Attached is the spec list by computer – hardware and software. Also attached is a summary of changes and simulator development/use the past 5 years



**Can you add in urban areas for encroachment fires and deconflicting aircraft approaches away from infrastructure/urban clutter?**

All real world “urban areas” are currently a part of the Prepare 3D map/graphics, although most of the base features (major roads, water courses, etc) are accurate, not every structure/house is provided in real life detail. We can however, provide realistic urban interface wildfire simulations

**What is the proportion of time spent respectively briefing the trainee, the trainee undertaking the simulation, and debriefing the trainee?**

A trainee briefing usually takes about 5 minutes, a simulation usually takes approximately an hour to an hour and a half, a trainee debriefing usually takes about 15 minutes

**Can we link our Prepare3d sim into your network and participate?**

That should be doable. We would simply have to get you a copy of Lorby wildfire Response and Lorby Comms client. That can be done on our current license, and we would be the host for the distributed scenario. There may be some compatibility issues pending the version of P3D you are trying to run, but the short answer is yes.

**Is the sim NVIS compatible?**

If you are talking about night vision, I don’t think so, although I haven’t tried. There are infrared filters built into P3D, but I don’t think it would recognize the Lorby addons.

**Did you notice a particular efficiency increase of AAO and aircrew in real firefighting mission, since you started to use simulation software for training purpose?**

The AAO’s remark on how much more prepared for fire season they feel after completing simulation training. While this is hard to quantify, the general increase in preparedness for the AAO’s as they action their first “real life” fire is noticeable. Their comfort level for actioning the first fires of the season has certainly increased

**What measurement has been done and on what basis to measure quality of outcome in terms of AAS performance? What have the results been?**

All air attack officers complete annual simulator check rides, and semi-annual real life check rides. A standard evaluation “check ride” is used (to ensure that all procedures are followed). We use the same “check ride” form for simulations and in real life. The check ride is reviewed with the trainee after each mission. Check rides are required for certification

**How important is reproducing the "real world" for your learning outcomes? i.e. will "generic" environments achieve the same result?**

We think that it is important to reproduce the real world as much as possible in the simulations, because it provides the trainees with the extra benefit of working in the actual environment that they will be required to in real life (navigation, values at risk, topography, turn around times, etc). We find that we can create much more realistic scenarios this way.

**Does the sim replicate terrain effect with wind, e.g. lee slope, turbulence, etc?**

No, it does not. We can alter the wind direction and speed in a simulation, and the rate for producing spot fires, but it currently does not recognize slope effect. We can somewhat reproduce this realistically in a simulation though, by increasing the fire behaviour on the upslope part of the fire.

**How much does the Lorby Wildfire Response Add-on cost?**

Approx. $25,000 (CAD) per year (2019/2020)

**How is this training certified, or approved, within the multi-agency framework you operate in? Who decides what is able to be logged?**

The provincial airtanker program supervisor and training group decide on candidates and certifications. Trainees are required to log all of their missons (simulated and real life), and each is signed off by their trainer. Minimum simulations, flight time with different types of airtankers, and fire time are required prior to certification.

**If you were going to the trouble to set up a simulation using up to 8 role players, I’m guessing you would plan to run a number of personnel through on the day. How many trainees is a realistic number, that could go through the sim in an 8 hr day?**

For air attack simulations, we typically will run 4 simulations a day (2 in the morning and 2 in the afternoon). Each simulation takes about 1 ½ hours to complete, plus some briefing/debriefing time. We will typically work with a group of 8, and rotate everyone through during a week.

**Are you able to add a 2nd air attack/air observer or both so you are able to assess tactical decisions in relation to command and control?**

Our current “main cockpit” has an observer station for the trainer/check rider. They can observe the CRM between the trainee and pilot, and listen to all conversations.

Yes, we currently have a second room that we use for an additional aircraft (separate from the main cockpit and other roleplayer stations). This allows us to train with an ignition specialist or HLCO or crew leader or second birddog team and pilot. In the future, as we upgrade our simulator, a second “main cockpit” will be developed for this purpose.

**Do the simulations allow communication role plays to ground crews?**

Yes - we set up "crew leader" role players to support the simulation. AAO communicates with simulated crew leaders on the ground

**Can the Lorby Wildfire Response cater for different models of vegetation concentration, atmospheric humidity, in addition to the wind speed and direction?**

SE: As it sits right now, the Lorby Wildfire Response does not have that refined ability to read the landscape or read the vegetation types of anything of that nature. The potential of adding those features into the future is a real thing but as it sits right now it does not. It does respond to the weather features that essentially are inherent in the prepared platform but doesn’t really necessarily see the scenery objects that are in prepared, as in vegetation type changes and things of that nature.

**How much would a system like this cost to setup? Any tips about getting government support for investment?**

NG: As it is a developmental project that we’ve undertaken the costs are interesting to describe. Originally we were in for about $120 to $150 000 (Canadian dollars) to purchase all the hardware and software and get the system set up. On top of that, $35 to $40 000 a year for software costs as an annual consumable. We’ve probably spent 2 or 3 times that if we looked at dedicated staff time and contractor support. We do have ‘techs and specs’ which we are willing to share with everybody about what our contractor has setup for a new system build which is in around the $120 00 mark to setup from scratch.

SE: It really is scalable in that the system we built for the cockpit, we went with a projector system and an outside the window screen system so that it has a 200 degree field of view on a cylindrical screen. There are options to go with an LCD flat panel display to create that outside the window visuals that you might be looking for. If you wanted to do it more cheaply then the flat panel display would be a way of saving some costs. The other thing that we’ve done is we did go with a full five role player setup which involves 5 different gaming computers and essentially 10 monitors and all the infrastructure that goes along with that. A less expensive system would potentially utilise less role player stations, but then potentially taking advantage of network capabilities if you had partner agencies or other people you could utilise to be the role players then maybe you don’t have to have the capital cost of all the computer stations, while utilizing your neighbours ability to have role players participate in your simulation. To duplicate what we have is in the order of about $120 to $140 000, but there are scaled in options that could potentially be a little less expensive.

**In terms of recommending that as an investment to our funding partners, you talked about some of the cost benefits. Is that how you sold it to them in that the cost benefits far outweighing the costs of setting it up?**

GB: Yes, that was a part of the big selling picture when we do a business case to get funding. Nicole and Scott did a lot of work towards obtaining federal funding. It certainly helped with the buy in when we can show how much money you could potentially save with this avenue. It becomes a bit of a no brainer when to train one Air Attack Officer is $75 000 and takes two years, and the whole system costs $120 000. It doesn’t take long before its value is shown.

NG: When you are looking at funding partners I wouldn’t put your blinders on. We were pleasantly surprised that we actually received a million dollars from our Federal Defence program because they have the mandate for public safety and security and we were able to draw parallels obviously between wildfire suppression and response and public safety.

**Is there any simulator of this type currently in operation in Australia?**

RA: There is some basic setups in Australia along the same lines but not quite as advanced. There is in fact a couple of mobile setups in trailers that can be taken out into the field. Obviously not as sophisticated but I think in some cases using the same underlying software. The state of NSW has also commissioned a system to be built which is quite similar to the approach of the Alberta system, and that is expected to be underway in the next couple of months. Our state of Queensland is also working on commissioning a system which is not dissimilar. The other thing to keep in mind is that there are a number of simulators around Australia that were probably designed primarily as pilot training simulators, but could be quite easily adapted to this sort of approach, retaining the pilot simulation and all the technical specs that go with that, but could quite easily be adapted to these sorts of activities. There is a lot of opportunity out there.

**Did our Canadian friends look at adapting simulators that were already in existence in the way that Richard just mentioned?**

GB: I guess we started this program. Shawn Lund from British Columbia had built a simulator in his garage, and at the very start of this project Scott and I went down to have a look at it and to see what its capabilities were and that basically started us down the road of where we’re at right now. Then some of the air tanker companies have some simulators that they use for their pilot training in Canada and we did have a look at some of those when we first started the project.

NG: Some of the federal funding we have is to look at compatibility with industry simulators and is there a way to network and report into the same virtual simulation environment. On our slide where we talked about challenges with compatibility between software that’s certainly where we are seeing some limitations to networking. Obviously when you are training pilots the level of simulator compliance with federal regulations is very different than training a person sitting beside a pilot.

**How many instructors and role players are required to conduct a simulation for a trainee?**

GB: It depends on how complex the simulation is, but typically we’ll use a group of about 8 personnel. That includes the trainee, the trainer, 4 to 5 role players. The role playing work is not just flying aircraft; we do role playing of ground crews on radios, of dispatchers, and fire centres and the Simulation Director. A typical advanced Air Attack Supervisor simulationx would involve around 8 people.

SE: It’s another one of those things that’s kind of scalable. There are critical role players that are required and that would essentially be your bird dog pilot and then maybe one or two other role players who play various roles on the radio that the Air Attack Officer would interact with. Depending on the complexity that you’re looking for, you have the ability to scale that up or down.

**Can you map the terrain database to real world areas or just generic terrain models?**

SE: The prepared software does come with some of the real-world terrain. The scenery package that comes along with the prepared system is reasonably generic and maybe not super helpful, but we’ve had some real success by using some add on scenery software like Orbx which is one which puts out a enhanced scenery package. It doesn’t quite hit photo realism but does enhance the immersive environment that people operate in. The software is geographically real, the places that you see are the real thing, and so it gets to the point where our trainees can navigate by map and by looking out the window of the simulation; and the land features they see are for real, but, the additional scenery packages really do enhance the realism because there are limitations to the fidelity that the prepared software offers.

GB: Lorby Wildfire Response has some scenery add-ons as part of the package so that you can add things like fire trucks and ground crews into a scenario at any time.

SE: Greg mentioned the high risk low frequency events. We can use some of those scenery effects to create fires in and around lets say towers and power lines and things of that nature, if we want to create a more complicated scenario to the simulated landscape.

**How long do the simulations generally last?**

NG: They generally last around an hour to an hour and a half for the more complicated ones.

GB: We try to do everything in real time as much as we can, especially enroute to the fire. The only time we might speed things up a little bit is coming back from the fire. We still want to make sure we do go over things like landing procedures, especially for a trainee, making sure the gear is down and all those standard operating procedures are covered. For longer despatches we have the ability to ‘warp’ ahead a little bit, usually on the way home.

**Does the fire growth in Lorby Fire Response include a random or stochastic element?**

SE: Not really. We use a real simplified fire growth model that has been overlaid into the prepared world. With that in mind, the stochastic element probably makes sense in computer land, but to us it sometimes looks like a series of pixels that weren’t on fire will all of a sudden be on fire. So sometimes it looks like it jumps ahead or moves in an unusual or random sort of feature or effect. For the most part it is safe to say that if it is random growth (stochastic growth) it’s probably more by accident.

GB: There is a feature in the Director Station where you can change some of the settings in terms of how the fire will affect the next pixel over (I guess they call it), so whether if you want a slow moving fire vs a fast moving fire. So that is a little bit built into it, and also if you do turn the wind up or change direction the fire will increase somewhat growth in that direction. As Scott mentioned, it is very rudimentary and not following any fire growth models.

**Can you see the suppression simulation being utilised for scenario planning for ground resources as well?**

SE: We haven’t really explored the opportunity to simulate ground firefighting on this platform. Our software developer from Lorby Wildfire Response seems to indicate that that would be a doable thing where we would be able to deploy say heavy equipment or fire crews and the suppression action that those resources employ would impact the fire spread and fire growth. We haven’t really explored that option yet, but then again, software developers will tell you that anything is doable for a price.