WEB SIMULATION TRAINING ENVIRONMENT FOR AIRCRAFT RESOURCE PLANNING IN WILDFIRE EVENTS

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ABSTRACT

This poster presents a simulation tool developed in cooperation with the Catalonia firefighting authority to provide a training environment for firefighter air operations commanders in wildfire events. In case of a wildfire event multiple aircrafts are deployed, including a commandment aircraft, by the main operation center. Aircrafts tasks, deployments and schedules can be assigned by both the commandment aircraft and the main operation center. This center is also in charge of controlling the different simultaneous wildfire aircrafts being able to re-assign, land or re-schedule aircrafts from one wildfire to another. An on-line multi-user environment has been developed to manage and optimize the aircraft operations. The aim of this environment is to increase operations security and to relief the operators from errors and repetitive tasks. On top of the optimization environment a multi-user web based simulation tool has been developed in order to provide a training framework for firefighters air controllers.

1 INTRODUCTION

The end user of the presented tool is the Catalonia firefighting authority. The tools provides a training tool for the aircraft management in wildfires. When a wildfire event happens several aircrafts are deployed to the wildfire to characterize it and perform a first attack to it. Pilots and crew are subject to special air regulations (Dirección General de Aviación Civil 2001) that restricts how the aircrafts can fly. For example, a helicopter pilot cannot be flying for more than two consecutive hours without having a rest time of one third of the flown time. The flying constraints depend on the type of the aircraft and affect how the air commanders can deploy and schedule the aircrafts, and also, how many aircraft have to be deployed.

During the wildfire campaign it is normal that a commander aircraft and a central coordination operator take decisions about the aircrafts and pilots. This decisions continuously change as the fire behavior evolve over time. To solve this problem an optimization tool has been developed (out of the scope of this poster). On top of the optimization tool a simulation environment has been developed to allow the air managers to learn (Kincaid et al. 2003, Jain et al. 2003) how to use the optimization tool. The simulation environment is multi-user web-based synchronized application and also can be used as a software quality assurance tool (Rus et al. 1999, Drapa et al. 2000) and a platform to propose and develop new functionality.

2 MODEL DEFINITION

The fire simulation data model proposed in (Nader et al. 2011, Figueras et al. 2013) has been extended to include the fire suppression entities, such as aircrafts, air crew and air operations planning including information about the aircraft type and regulation in force and the list of tasks a crew member has to perform, among others. Figure 1 shows a brief schema of the elements modelled, the most important is the air operation planning because it is the link between the simulator and the optimizer. All of the different elements are synchronized using a database and a RESTFull environment in order to keep all the users up

to date with the changes introduced by the air commanders. The simulator would be able to include a voice communication environment in the future..

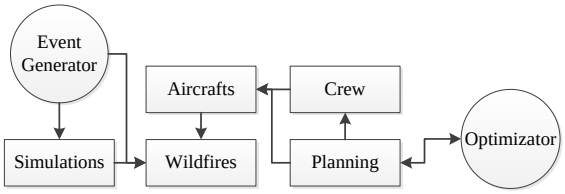

Figure 1: Data model schema

3 WEB SIMUALTION TOOL DEVELOPMENT

The tools used to develop the simulator have been chosen under the following constraints: the simulator is a single page web application; the different user must be synchronized; actual standards are used. With this restrictions and because the application is collaborative and reactive AngularJS has been the chosen framework to develop the client side (Kambona et al. 2013) and Django plus a PostGIS DBMS have been chosen to develop the RESTFull server side using GeoJSON as the communication standard between the clients and server.

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