

Using the Networked Fire Chief Wildfire Scenario Generator to Investigate Decision Making

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The Networked Fire Chief (NFC) wildfire simulator

NFC is a firefighting scenario generator. Participants control the spread of simulated fires by requesting the deployment of appliances to drop water or create control lines.

Two studies were conducted using **experienced wildfire instructors** as participants to (a) assess the realism of NFC and (b) determine its suitability for investigating decision-making error

Study 1: Assessing the realism of NFC generated scenarios

The NFC fire spread model was assessed for realism using (a) a simple landscape comprising flat terrain and homogenous fuel loads (see figure 1) and (b) a complex landscape comprising detailed contour information and heterogeneous fuel loads (see figure 2). To better reveal the fire spread model, constant wind conditions were used in both.

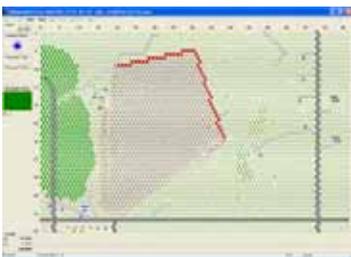


Figure 1. Fire spreading over a simple landscape



Figure 2. Fire spreading over a complex landscape

The participating wildfire instructors reported getting **caught up in controlling the fires** and reported the **fire spread as being realistic**.

Despite the basic fire shape containing some deviations from reality (due to the program's cellular automata structure), these were not severe enough to detract from the realism of their task. Furthermore these deviations were "smoothed" out when the fire spreads over complex terrain.

When asked how to further enhance scenario realism, participants suggested that we include wind changes and a more complex fire initiation pattern

Study 2: Investigating a potential decision error

During the past two fire seasons, 112 face to face interviews have been conducted with firefighters, ranging from Crew Leader to Incident Controller. One issue that emerged frequently was inflexibility in adapting plans.

In order to investigate this issue we modified the simple scenario used in Study 1 to include the suggestions made by participants, namely (a) changes in wind direction and strength and (b) a subsequent high priority fire outbreak requiring that consideration be given to the redistribution of resources (see Figure 3).

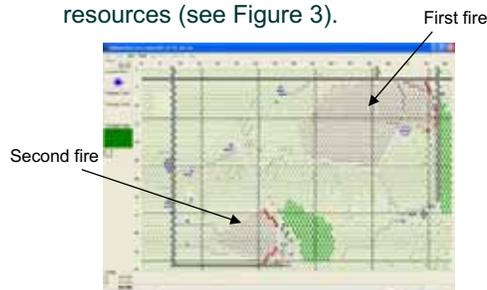


Figure 3. Experimental scenario with multiple fire outbreaks

We employed the NFC program's full on-screen replay facility to demonstrate participant's firefighting decisions. A panel of experts rated seven participants as requiring a significant redistribution of resources at the outbreak of the second fire. **Four out of these seven** participants were judged to be significantly slower to react to the new higher priority fire outbreak, revealing **planning inflexibility**.

These findings suggest that NFC is likely to be suitable for the investigation of a range of potential errors in decision making.



Figure 4. Example of an NFC experimental session in progress

Where to next ?

Systematically analyze interview data to highlight other problems that can be investigated using NFC

How fire agencies can help us

Particular assistance will be required for (a) ongoing feedback with respect to the development of realistic scenarios and (b) providing access to research participants of varying rank and experience