AMICUS: National Fire Behaviour Knowledge Base

Bringing together the best information for best decision

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ECOSYSTEM SCIENCES/DIGITAL PRODUCTIVITY AND SERVICES FLAGSHIP

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Amicus: *(an independent adviser)*
National Fire Behaviour Knowledge Base (NFBKB)

Outline

- National Fire Behaviour Knowledge Base
  - Relevance
  - Science
- Software architecture
- Benefits and applications
- Future development

**Amicus- Fire behaviour DSS**

- **NOT** another bushfire simulator
- Will **NOT** replace PHEONIX RapidFire- but will be **COMPLIMENTARY**
Relevance

**National Fire Behaviour Knowledge Base (NFBKB)**

- Significant increase in frequency of severe disastrous bushfire causing unprecedented land lasting socio-economic and ecological impacts

- Current fire behaviour tools for prediction fail to incorporate the latest knowledge in fire science

- Limiting forecast quality and impairing critical decision making regarding community protection and safe and effective fire-fighting.
Relevance

National Fire Behaviour Knowledge Base (NFBKB)
Evolution of decision making tools (1960’s+)

Australia vs. United States

1960’s
- Slide rules and tables

1970’s
- Slide rules and tables

1980’s
- CSIRO Fire Calculator
- Farsite
- GSPro
- FireFamily+

1990’s
- CSIRO Fire Calculator
- Farsite
- GSPro
- FireFamily+

2000+
- PHOENIX Rapid Fire
- Server / Internet
- Behave+
- Farsite
- GSPro
- FireFamily+

Australia

US

CSIRO – AMICUS: National Fire Behaviour Prediction System
## Fire behaviour models and applications

### Models
- Fire spread sustainability
- Rate of fire spread
- Onset of crowning
- Fire intensity
- Flame height
- Scorch height
- Residence time
- Burnout time
- Spotting
- Fuel consumption
- Smoke production

### Applications
- Fuel management
- Prescribed burn planning
- Interface hazard rating
- Pre-suppression planning
- Initial attach dispatching
- Firefighter safety
- Fire behaviour forecasting
- Bushfire suppression planning
- Large scale fire projections

CSIRO – AMICUS: National Fire Behaviour Prediction System
NFBKB

Sub-systems and applications

Systems

Fuel Hazard Assessment System

Fire Danger Index System

Bushfire Behaviour Pred. System

Bushfire Forecasting System

Applications

Prescribed burn planning;
Fuel management;
Interface hazard rating;

Presuppression planning;
Public awareness;
Policy and legislation;

- Develop Prescribed fire prescriptions;
- Conduct prescribed fires;
- Suppression difficulty;
- Initial attack bushfire behaviour assessment;
- Firefighter safety;
- Training;

- Short and medium range fire behaviour forecasts
- Large scale fire projections
- Landscape level fuel management;
Amicus - phase I  Fire behaviour calculations
Software development

- Amicus- NFBKB will be built using Workspace workflow environment (CSIRO Computational Informatics - Computational Modelling)
- Workspace workflow input and output operations

Example of workspace operation that calculates fire danger rating for grasslands.
**Amicus - phase I Fire behaviour calculations**

Software development

- Workspace users may construct, modify and execute workflows using an intuitive graphical editor which inspects any input and output on workflow by using custom build widgets.

A workflow that plots temperatures against fire danger indices using newly developed fire model operations.
Amicus: Phase I  Fire behaviour calculations
Beta GUI layout
Amicus: Phase II NFBKB

Concept Overview

Vegetation description
Fire history maps

Bushfire fuel classifications

Weather/behaviour data

Model comparison

Photo/Video/PDF documentation

Fire behaviour details
Amicus- phase II NFBKB
Understanding natural variability in fire spread

Source Cheney et al (1998); IJWF
Amicus- *phase II NFBKB*

Fire behaviour prediction data assimilation

Ref: Cruz & Alexander (2013); EM&S
Amicus- phase II NFBKB
Fire behaviour prediction- ensemble methods

Input distribution

Output distribution
Vegetation description
Fire history maps

Fuel type matching

Ground truthing

Photo/Video Documentation

Fuel Models

Input fuel parameters:
• Fire behaviour
• Fire danger
• Prescribed burn planning
• Fuel hazard assessment
• Fire effects
• etc

Fuel attributes:
• Fuel hazard rating
• Load
• Height
• Curing
• Particle size
• etc
Amicus- NFBKB
Application and benefits

• Operational tool for different platforms- PC, Tablets, Smartphone, Web base including the latest fire science

• NFKB will be a powerful tool for fire behaviour analysis and prediction for FBAN(Fire Behaviour Analysts), fire managers, etc

• Centralised repository of national fire behaviour data

• NFBKB will have the capacity to include photographs, videos, documents of pre-during and post-burn operation development DSS on prescribed burning

• Will integrate the Australian Bushfire Fuel Classification which will improve our overall understanding and prediction of fires
Amicus- Beta release

CSIRO SYMPOSIUM
Fire Behaviour
The State of the Science for Practitioners

When: 14-16 October 2013
Where: CSIRO Discovery Centre, Canberra, ACT

To register your attendance at the symposium please go to:
http://tinyurl.com/CSIRO-Bushfire-Registration

IN PARTNERSHIP WITH THE BUSHFIRE CRC, ACT PARKS AND CONSERVATION, ACT RURAL FIRE SERVICE AND NSW RURAL FIRE SERVICE.
Thank you

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