

USE OF OPERATIONS RESEARCH (OR) FOR DECISION SUPPORT IN BUSHFIRE MANAGEMENT

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1. OR and Bushfire Management

Bushfire managers operate in a decision environment that is characterised by:

- **Complexity;**
- **Uncertainty;**
- **Multiple Objectives** that may conflict; and
- **Hierarchical** interrelated decisions.

Operations Research (OR) can provide tools to assist bushfire managers to assess alternatives and make decisions in this challenging environment.

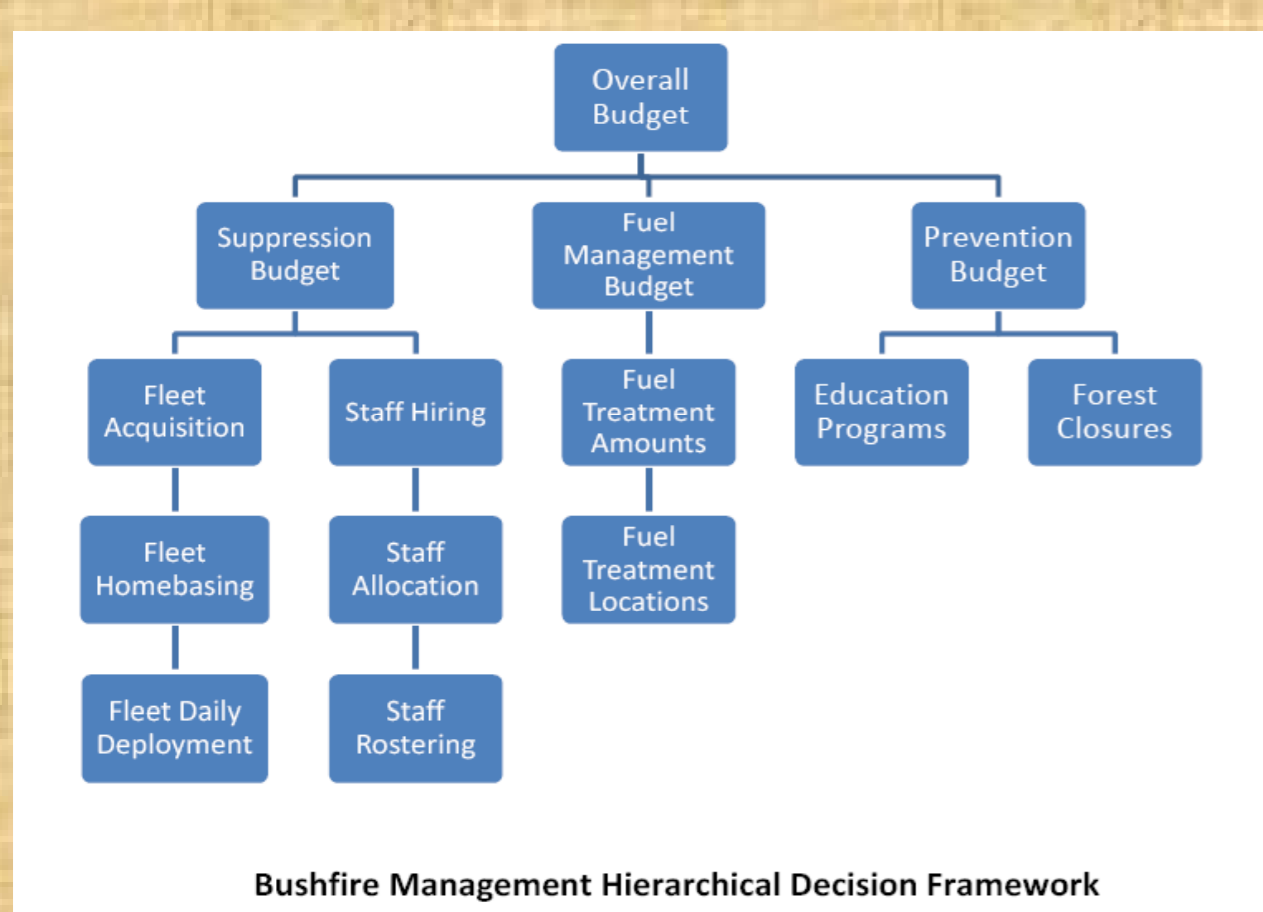
OR is the use of an analytical approach to aid decision making in complex real-world systems. OR employs a variety of techniques such as: mathematical modelling, optimisation, simulation, decision analysis and queuing theory.

OR is widely used in a number of industries including: transportation, logistics, telecommunications, manufacturing, mining, health care and forestry.

OR has been successfully used to aid wildfire management in North America. In contrast there is little evidence of OR usage in the Australian bushfire context.

Areas of bushfire management with potential to benefit from OR application, include:

- **Strategic planning** and budgeting
- **Purchasing** of fleet and equipment
- **Location** of facilities
- **Deployment** of resources
- **Fuel management**
- **Staffing** levels and rostering
- **Fire prevention** planning
- **Dispatch** of suppression resources
- **Information flow** management



2. Research Questions

The research will investigate:

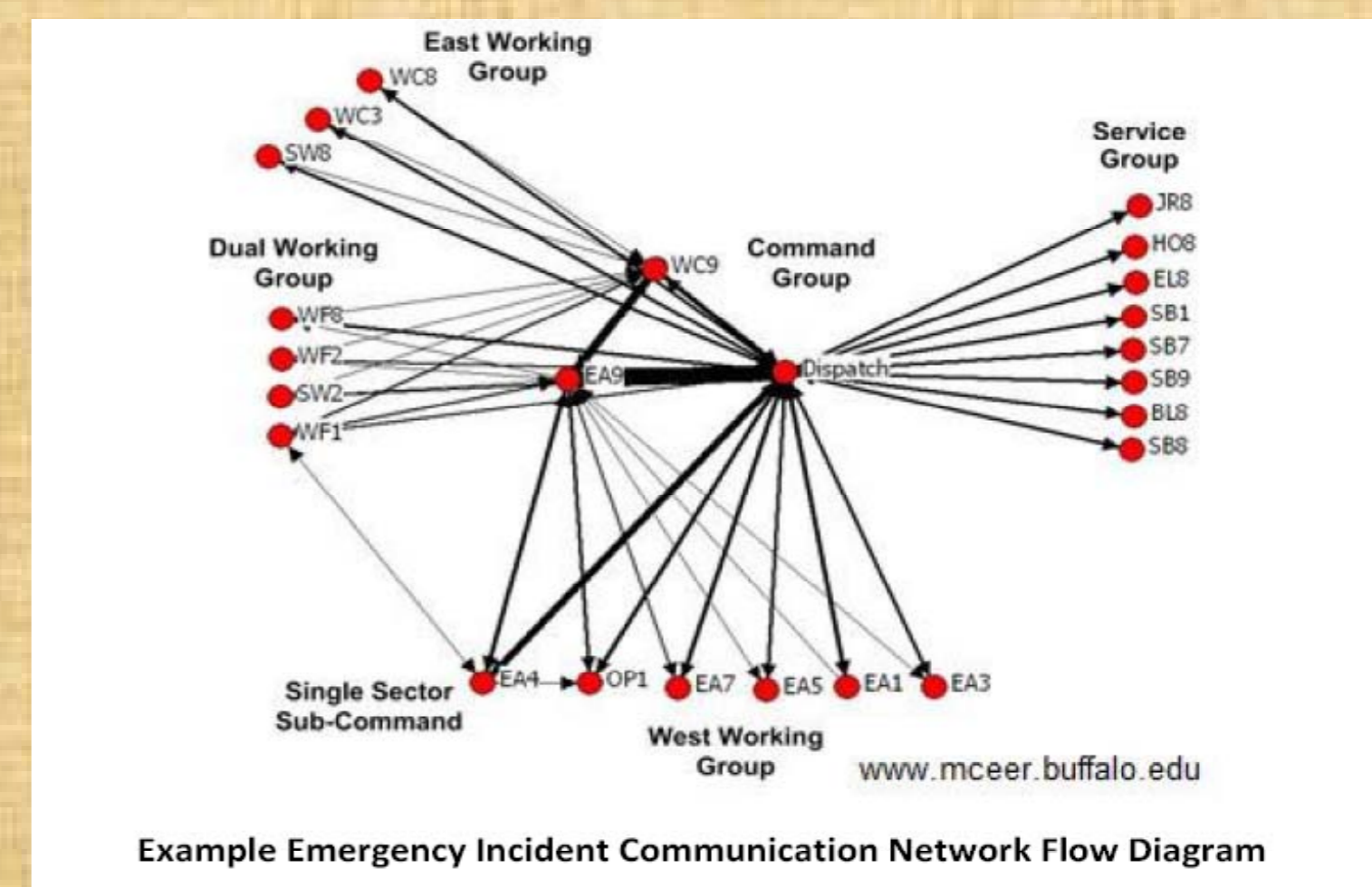
- What is the **current state of knowledge** in the use of OR for emergency and wildfire management;
- What are the **key decision-making challenges** facing bushfire managers that could potentially benefit from OR application;
- What is the **most pressing problem** faced by bushfire managers that OR can assist with;
- What **OR techniques** are available to tackle this problem; and
- How can these OR techniques be employed to develop problem-specific **decision support tools** to assist bushfire managers.



3. Research Methods

The proposed step-by-step research methodology is:

- **Literature review** of emergency and wildfire OR work;
- **Analyse** the strengths, weaknesses and limitations of the potential application of OR in the Australian bushfire context;
- Meet with **end users** to discuss needs;
- Meet with **international wildfire OR practitioners** to discuss their experiences;
- Work with end users to **identify** a specific **pressing problem** that OR can assist with;
- Undertake **preliminary modelling** to determine what OR techniques are applicable to the problem; and
- Work with end users on the problem identified to **develop** problem-specific OR **decision support tools**



4. Outcomes

The research will:

- Provide an understanding of the **current state of knowledge** in OR usage for emergency and wildfire management;
- Develop problem-specific OR **decision support tools** to assist bushfire managers in assessing alternatives and making complex decisions;
- Support **enhanced decision making** by bushfire managers in order to reduce the social, economic and environmental costs of bushfires; and
- Identify elements of bushfire management that could benefit from **future OR work**.



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