FORFAIT – Forest Fire Risk and Hazard Assessment – A Holistic Approach

Abstract

FORFAIT is a Decision Support System (DSS) designed to assist planners, regulators and industry in optimising the management of forest fire risks, on a holistic, integrated and traceable basis. It provides a tool to aid in investigating measures that eliminate or mitigate harm to humans, the environment and business, using a cost benefit approach, where appropriate, and depending on local regulatory planning controls. FORFAIT combines generic and time varying site-specific information, state-of-the-art predictive models, and expert knowledge. Recognising that, in general, there are many different decisions that could be made in any given situation the system uses fuzzy logic to suggest the most appropriate course of action and a probabilistic framework to take account of uncertainty in the predictive model parameters.

The Decision Support framework places emphasis on effective communication, collaboration and negotiation between stakeholders and allows the problem of forest fires to be approached from an integrated, quantitative and holistic perspective.

The FORFAIT project is a collaborative effort under the CEC IST programme, involving organisations from six European companies. It brings together 11 partners with specialist skills in areas including:

- Risk Management and Assessment
- Logic Programming
- Earth Observation and Satellite Image Processing
- Fire Propagation Modelling
- Geographical Information Systems
- Forest Fire Expert Knowledge

FORFAIT has three modes of operation designed to answer different types of question relating to forest fires, such as:

- **Planning Mode**: used for resource allocation and deployment to mitigate risk, typically to give guidance on the risks from fires on a given site over a specified time period.
- **Teaching Mode**: used for interactive investigation of the behaviour of fires under site-specific conditions – typically concerned with how a given fire behaves and on what factors it depends.
- **Crisis Management Mode**: used to aid emergency planning from pre- to post-crisis remediation, typically used to guard against, and reduce the impact of fires.

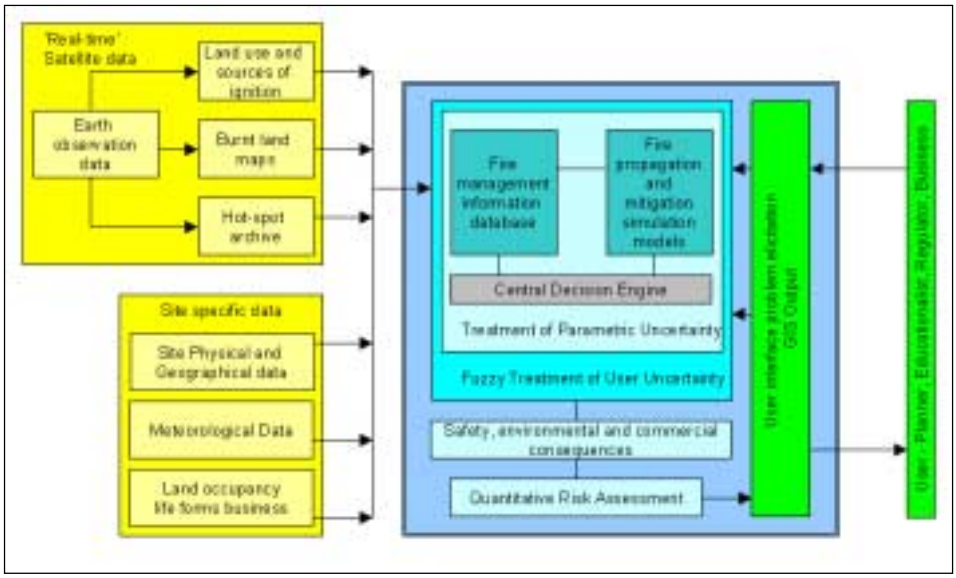

Figure 1 Schematic of the Key Elements of FORFAIT

The capability and flexibility of FORFAIT is currently being demonstrated by applying it to four pilot sites across Europe, namely:

- Comunità Montana di Elba e Capraia (CoMEC)
- Evia Island, Greece.
- Madrid Province, Spain
- Kampinos National Park, Poland

Each of these sites has an annual problem with forest fires, and are of particular interest because of the competing pressures resulting from the importance of allowing access (tourism) as against the associated increased incidence human induced fires.

An overview of the FORFAIT system will be given, illustrated with results obtained from the site trials and demonstrating the holistic perspective. The presentation will in particular emphasise the IT issues and lessons learnt during the development of this complex system. Examples of system output will be given to illustrate how the system may be used to support:

- long term risk-based planning information, taking account of uncertainty;
- practical advice and training;
- predictions and context sensitive advice on alternative actions under specific fire conditions. Using either fast time simulation or real time tracking of a forest fire event as it evolves.

The paper will further attempt to bring out the key issues arising from bringing together the latest multi-disciplinary techniques in a very practical system designed for use by fire fighters and a variety of other stakeholders.