Interagency Fuels Treatment Decision Support System Phase III Accomplishments

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Presented to the Joint Fire Science Program Annual Meeting
Minneapolis, MN

May 25, 2010
IFT-DSS Phase III May 2009 – May 2010

- The Software Tools and Systems Study – John Cissel
- Phase III Accomplishments – Tami Funk
- IFT-DSS version 0.3.0 Demonstration – Tami Funk
- IFT-DSS Phase IV – Tami Funk/John Cissel
- The Emerging Vision for Fire Software Systems - Mike Rauscher
- The Human Framework around IFT-DSS – Mike Rauscher
- Questions and Discussion
Phase III Accomplishments - Overview

• IFT-DSS overall strategic objectives
• Phase III accomplishments
  – Summary of Phase III activities
  – Software development process
  – Test user group
  – Proof of concept objectives
  – Proof of concept demonstration
• Next steps – Phase IV
IFT-DSS Overall Strategic Objectives (1 of 2)

Make fuels treatment planning easier

• Allow users to acquire, create, and transform input data easily
• Provide data choices: treelist, LANDFIRE grids, user-supplied data
• Allow users to view and edit spatial and tabular data (inputs and outputs)
• Organize fuels treatment planning analysis steps and software tools
IFT-DSS Overall Strategic Objectives (2 of 2)

Make fuels treatment planning more scientifically robust

• Provide guidance regarding data and model choices based on the scale and type of analysis performed
• Allow users to publish and share analysis methods and algorithms
• Supply a mechanism to easily incorporate new models and tools as they are developed
• Provide quality control, documentation, and audit-trail information to meet regulatory reporting requirements
IFT-DSS Phase III Accomplishments

- Meetings in Seattle & Missoula
- Refined IFT-DSS work flow scenarios
- GUI mock-ups
- Development of communications strategy (Mike)
- Implementation of communication strategy (Mike)
- Forest Service: NWCG managing partner (John)
- WFDSS collaboration meetings, Boulder
- Savannah Fire Congress
- Systems of Systems meeting, Seattle (Mike)

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<tr>
<th>May</th>
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IFT-DSS v 0.1.0
IFT-DSS v 0.2.0
IFT-DSS v 0.3.0
Meetings in Seattle and Missoula

**Purpose:** Meetings with research model developers to discuss software development approach and gain support for collaboration

**Outcome:**

- Fire and Environmental Research Applications (FERA) team will modularize applications for integration in larger systems
- Missoula fire lab will develop and share code library of models/modules
- Reinhardt and Dickinson independently publish a paper confirming the IFT-DSS vision

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¹*First-Order Fire Effects Models for Land Management: Overview and Issues; Fire Ecology 6(1):2010*
Refined Work Flow Scenarios (1 of 2)

**Purpose:** Confirm and clarify the problem-solving needs of the fuels treatment planning community

Seven steps in the decision support process:

1) Define project, vegetation, landscape, and scale
2) Prepare and ensure quality of vegetation data
3) Simulate and analyze fire behavior
4) Analyze fire effects and/or fire risk
5) Design treatment strategies
6) Simulate treated vegetation as well as geophysical and fuel conditions
7) Simulate treatment effectiveness in reducing fire behavior and fire effects potentials
Refined Work Flow Scenarios (2 of 2)

**Outcome:** Seven work flow scenarios for implementation in IFT-DSS

Includes:

- Data acquisition and preparation
- **Strategic planning**
- Spatially explicit fuels treatment assignment
- Fuels treatment over time
- **Prescribed burn planning**
- Risk assessment
- User-defined (custom)

*Refined Work Flow Scenarios and Proposed Proof of Concept System Functionality for the IFT-DSS; Drury et al., 2009*
GUI Mock-ups and Software Design

**Purpose:** Share design ideas with the test user community and obtain feedback early

**Outcome:** Confirmation of design vision
WFDSS Collaboration Meetings

Purpose: Identify how IFT-DSS and WFDSS can collaborate and share software services

Outcome: Identified several initial collaboration areas

• Sharing “look and feel” elements of WFDSS (e.g., map symbology)
• Sharing GIS map layers
• Future sharing of IFT-DSS modules for WFDSS fuels analysis
• The WFDSS project team assigned Mitchell Burgard as the liaison between WFDSS and IFT-DSS
• Discussions regarding collaboration continue among the major systems (WFDSS, BlueSky, and IFT-DSS)
Fire Science Digest and Fire Ecology Congress, Savannah
Software Development Process (1 of 3)

Agile – rapid prototyping approach
Methodology for software development based on iterative development, where objectives and solutions evolve through collaboration among cross-functional teams

IFT-DSS v 0.1.0 (January 2009)
IFT-DSS v 0.2.0 (April 2010)
IFT-DSS v 0.3.0 (May 2010)
Software Development Process (2 of 3)

Goals:
- Software that people want to use
- Large user base = ongoing operations and maintenance support

Iterative design process
Software Development Process (3 of 3)

• Benefits
  – Engage user community early
  – Build user base in parallel with software development
  – Create software that people will want to use

• Critical elements
  – Active test user group
  – User feedback and response system
  – Strong team coordination
Test User Group (1 of 2)

Demographics

• Multi-agency representation
• Geographic representation
Test User Group (2 of 2)

- US Forest Service
- US Fish and Wildlife
- US National Park Service
- Bureau of Land Management
- Bureau of Indian Affairs
- BLM-Alaska Fire Service
- Douglas County
- Florida Division of Forestry
- Menominee Tribal Enterprizes
- Confederated Salish and Kootenai Tribes
- North Carolina Department of Natural Resources

*Anchorage contains 1 user from both US Fish and Wildlife & US National Park Service
Proof of Concept Objectives (1 of 2)

• Develop a framework to facilitate the fuels treatment decision support process
• Provide a user interface that is straightforward and easy to access
• Offer users software model choices within work flow scenarios
• Provide data choices
Proof of Concept Objectives (2 of 2)

• Support visualization and editing of spatial and tabular data
• Facilitate document preparation
• Support analytical collaboration
• Connect with other service-oriented systems
• Incorporate user feedback
IFT-DSS Proof of Concept Objectives

<table>
<thead>
<tr>
<th>Objective</th>
<th>IFT-DSS Version 0.1.0</th>
<th>IFT-DSS Version 0.2.0</th>
<th>IFT-DSS Version 0.3.0</th>
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</thead>
<tbody>
<tr>
<td>Develop a framework to facilitate the fuels treatment decision support process</td>
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<td>✓</td>
<td>✓</td>
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<tr>
<td>a) Prescribed burn planning</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>b) Strategic fuels treatment planning</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Provide an easily accessible and straightforward user interface</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Provide users with software model choices</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Provide users with input data choices</td>
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<td>✓</td>
</tr>
<tr>
<td>Support visualization of tabular and spatial data</td>
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<td>✓</td>
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<tr>
<td>Support for the preparation of documentation</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Support for collaboration among users</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Support the integration of existing and new models</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Support for connection and interoperability with other systems</td>
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<td>✓</td>
<td>✓</td>
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<tr>
<td>Incorporate user feedback during the development cycle</td>
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IFT-DSS Phase IV:
June 2010 – June 2012

• Continue community development effort
• Develop risk assessment work flow
• System implementation (2010-2011)
  – Refinement of work flow scenarios
  – Complete implementation of work flows:
    • Data acquisition and preparation
    • Strategic planning
    • Prescribed burn planning
    • Spatially explicit fuels treatment
    • Fuels treatment over time
• Transfer IFT-DSS v 1.0.0 to Forest Service
IFT-DSS Phase IV:
June 2010 – June 2012

• System administration training
• User training in coordination with Fuels Management Committee
• System implementation (2011-2012)
  – Risk assessment work flow
  – User-defined custom work flow
• Technology transfer
  – Transfer IFT-DSS v 2.0.0 to Forest Service (June 2012)
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• Questions and Discussion
The Evolution of the System of Systems Vision

- **Phase I (Apr 2007 – Mar 2008): Lessons from the SEI**
  - Web-based, Service Oriented Frameworks are possible & desirable
  - Stakeholder communities must be part of the solution from the start

- **Phase II (Apr 2008 – May 2009): Getting to know the problem**
  - Learning about web-based, SOA framework systems (WFDSS, Bluesky, etc)
  - Getting to know users and developers and their problems & needs

- **Phase III (Jun 2009 – May 2010): Clarifying the SoS Vision**
  - Writing & First Year Implementation of a Communications Plan (Tim Swedberg)
  - Discussions with WFDSS, Bluesky, FERA FFA, Missoula framework developers
  - Discussions with Brad Harwood, John Noneman, Paul Schlobohm
  - Presentations to the NWCG Directors & acceptance of vision (John Cissel)
  - First meeting of System of Systems Working Group, Seattle, WA Mar 2, 2010
  - Vision expounded in scientific journal article by Reinhardt and Dickinson

- **Phase IV (Jun 2010 – Sep 2012) Voluntary Implementation & POC**
Vision for the Fuels Treatment Community (1 of 5)

Fuels treatment planners have a need and they use what they know

Governance & IT Community Stakeholders Missing

Developers are isolated from each other

Users are isolated from each other

Tools are isolated from each other

Scientists and data providers create tools
Vision for the Fuels Treatment Community (3 of 5)

Scientists and data providers create tools

Standardized interfaces allow users to mix and match “string” tools to fit their need

New technologies allow existing tools to be wrapped (standard interfaces)
Scientists and data providers create tools

Standardized interfaces also allow inter-system communication

e.g., BlueSky

e.g., WFDSS
Vision for the Fuels Treatment Community

User communities

Integrated Systems
(IFT-DSS, BlueSky, WFDSS, FFA, IrWin, FamWeb, WIMS, etc)

Common Interface Standards
(allow for connections)

Capabilities
(algorithms, models, data)

Scientists and data providers create tools
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The Stakeholder Operational Environment

- Fire and Fuel Operations Managers (Users)
- Governance through Agency Senior Management including N W C G (Leaders)
- Interagency Fuel Treatment Decision Support System Coordination Team (Coordinators)
- Information Technologists and Software Managers (Enablers)
- Scientist Developers (Service Providers)
- Database Stewards (Service Providers)
The Diffusion of IFT-DSS Awareness & Use in a Stakeholder Community

Awareness
Understanding
Trial Use
Adoption
# Results of First Year Communications Efforts

<table>
<thead>
<tr>
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<th>Early Adopters</th>
<th>Early Majority</th>
<th>Late Majority</th>
<th>All Audiences</th>
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<tr>
<td>Users</td>
<td>T (50)</td>
<td>A (500)</td>
<td>app. 500</td>
<td>17,000</td>
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<td>Developers</td>
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A=awareness; U=understanding; T=Trial Use AD=adoption

Phase III Communications Efforts 2,500 people heard IFT-DSS Presentation