The Interagency Fuels Treatment Decision Support System (IFT-DSS)

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Overview of Presentation

• Brief introduction and background
• What does IFT-DSS do for users?
• How is IFT-DSS related to other systems?
• The stakeholder operational environment
• The emerging vision for Fire Software Systems
Current Condition: Fuels Treatment Community

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

Governance & IT community missing

Users are isolated from each other

Developers are isolated from each other

Tools are isolated from each other

Scientists and data providers create tools
Current State of the Fuels Treatment Software

• Currently an assortment of data, software applications and systems

  ❖ Over 400 software tools of all types
  ❖ Not all are accessible to the community
  ❖ Most are problem-specific
  ❖ Some are comprehensive but only support specific data and use-cases
  ❖ It is difficult to “string” them together
  ❖ Not always supported
Survey of Fuels Treatment Specialists

- What does this mean for the user community?
  - Users use what they know
  - Use tools that are user-friendly, simple
  - May not know that other tools exist
  - Limited guidance on which to use
  - A lot of time is spent “stringing” tools together for specific purposes
  - A lot of time is spent acquiring and preparing data

IFT-DSS must facilitate the most difficult and time consuming tasks to ensure success
Current State of the Fuels Treatment Community

• What about the existing comprehensive systems that “string” models together?

ArcFuels, INFORMS, LANDFIRE-IFP, StarFire, OptFuels = **VERY USEFUL SCIENCE**

- Some are agency specific
- Some require “expert” knowledge
- Do not address all fuels treatment use cases

User groups are small
Do not facilitate collaboration with each other
Not SOA frameworks designed for expansion
User designed custom analyses not supported
Software Tools and Systems (STS) Study
Strategic Assessment - Phase I

Software Engineering Institute performed strategic analysis of problem space

Outcomes:
- Web-based SOA framework(s) needed
- BlueSky on right track
- Data not available to select “best” models
- Involve user, developer, governance, IT communities throughout
- Aligned with NWCG NWFEA
- Fuels planning focus for further exploration

February 2007
Initiation of Phase I of the STS Study

February 2008
Conclusion of Phase I of the STS Study
Interagency Fuels Treatment Decision Support System (IFT-DSS) Design - Phase II

Sonoma Technology, Inc.

Interagency fuels team

IFT-DSS Conceptual Design Document

Current Practices & Needs Assessment

Software Architecture Design

STS Study – Phase II

June 2008 Initiation of Phase II of the STS Study

March 2009 Conclusion of Phase II of the STS Study
IFT-DSS Proof of Concept Contract - Phase III

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- Phase III
- IFT-DSS v 0.1.0
- IFT-DSS v 0.2.0
- IFT-DSS v 0.3.0
- Savannah Fire Congress
- Refined IFT-DSS work flow scenarios
- GUI mock-ups
- Communications plan
- Forest Service: NWCG Managing Partner
- Systems of Systems Coordination Initiated
Phase IV: System Development
IFT-DSS v 0.4

- Focus on transitioning proof-of-concept architecture to full system architecture
- Expand prescribed burn functionality
  - Expanded FlamMap capability
  - Inclusion of FOFEM
  - FCCS surface fire behavior
  - Variable wind analysis
  - Burn plan documentation support
- User feedback from IFTDSS version 0.3
- Strategic planning (spatial) functionality from version 0.3
Phase IV: System Development
IFTDSS Version 1.0

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Prescribed burn plan work flow
- Integration of FCCS, Consume, and FEPS

Data acquisition and preparation work flow
- Acquire, view, and edit LANDFIRE data
- Integration of NIFFT tool functionality
- FCCS fuelbed editor
- Ability to overlay GIS layers (i.e., values at risk, etc.)
- FireFamily+

Strategic planning work flow
- Integration of FlamMap MTT (fire spread and direction)
- Simulate fire effects with FOFEM

Risk assessment work flow
- Ability to input values at risk functions
- Assessment of current conditions
Phase IV: System Development
IFTDSS Version 2.0

July 2011 – June 2012

Data acquisition and preparation work flow
- Acquire and edit treelist data; perform imputation; growth simulation (FVS)

Strategic planning work flow
- Integration of FARSITE

Spatially explicit fuels treatment assignment work flow
- Ability to identify project areas and treatment units
- Ability to assign treatments in space and time
- Ability to simulate treatment results

Fuels treatment effectiveness over time work flow
- Ability to choose vegetation types and establish treatment types
- Ability to input fuel moistures and other weather variables
- Ability to simulate results over time using FVS-FFE

Risk assessment work flow
- Ability to assign fuels treatments (simulation of vegetation needed)
- Ability to analyze the impact of treatments
- Ability to iterate treatment options until desired results are achieved
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Work Flow Scenarios

- 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 (http://frames.nbii.gov/ift-dss)
Analysis flow

1) Define project, vegetation, 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
Prepare data for

Identify/prioritize

Generate

FCCS

Fuels Treatment Planning Decision Support Process

Define project analysis

Define area of interest (AOI)

Retrieve vegetation, geophysical, & weather data

View/manipulate data as needed

Generate summary reports

Define project, vegetation data, landscape, and scale

Imputation analysis

Consider disturbance

Update tree list data (FFE-FVS)

Update vegetation data

Updated LANDFIRE data

Prepare data for input to fire behavior model

Generate summary reports

View/assess vegetation data

View/assess LANDFIRE data

Simulate & analyze fire behavior

View/assess output data

Simulate alternate weather scenario(s)

Meet geophysical, sociological, ecological target conditions?

YES

Analysis complete

generate final documentation

NO

Generate summary reports

Identify/prioritize treatment areas

Select treatments to apply

FFE-FVS

FCCS

Select treatment areas

Simulate post-treatment vegetation and fuels data

FFE-FVS

Manual adjustment

FCCS

Generate summary reports

Simulate vegetation, geophysical, and fuel conditions

= human mediated action
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Many Systems - Little Interaction

SOA Web-based

National
Regional
Sub-Regional
Project Level

Stand alone
Regional
Sub-Regional
Project Level

Fuels Systems

FPA
EMDS/HFPAS

IFT-DSS

IFP-LANDFIRE
StarFire
INFORMS
ARCFUELS
OptFuels
SFRAS

Reporting Systems

iRWin
NFPORS
Others

Non-Fuels Systems

FPA
WFDSS
BLUESKY

Base Models & Data

FlamMap
FOFEM
CONSUME
FVS/FFE
NEXUS
FMA+
FireFamily+

LANDFIRE
WIMS
FFI/FIREMON
FSVeg
FAMWEB

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Success requires stakeholder cooperation

- Fire and Fuel Operations Managers (Users)
- Governance through Agency Senior Management including NWCG (Leaders)
- Interagency Fuel Treatment Decision Support System Coordination Team (Coordinators)
- Scientist Developers (Service Providers)
- Information Technology and Software Managers (Enablers)
- Database Stewards (Service Providers)
Every stakeholder group must have rewards, IFT-DSS can:

- **Advantages for Fire & Fuel Operations Managers**
  - Universal access and version control through the Internet
  - Easy access to the necessary available data
  - Choice of software tools from a common interface
  - Easy setups for the most common analyses
  - Custom solutions for advanced users for unique situations
  - A single Graphical User Interface to master

- **Advantages for Scientist Developers**
  - Provides developers with software-software communications standards
  - Allows developers to improve functionality behind the scenes
  - Provides developers instant access to a large user community
  - Reduces the cost of developing and fielding software tools
  - Useage reports automatically sent to developers periodically
Every stakeholder group must have rewards, IFT-DSS can:

- Advantages for the IT/Software Managers
  - Ensures that security requirements are met
  - Ensures that agency IT policy has been followed
  - Databases of record are actually used

- Advantages for the Governance Community (NWCG+)
  - Organizes all fuels management software services into a single SOA system making supervision manageable
  - Enables informed management decisions on funding, expansion of functions, and prioritization of effort
  - Enhances ability to provide guidance on process and quality control
  - Increases agency operating capabilities by focusing scarce resources on high priority functions
A communications strategy is crucial to building a good stakeholder community

A - Awareness
U - Understanding
T - Trial Use
A - Adoption

- Innovators: 13
- Early Adopters: 44
- Early Majority: 100
- Late Majority: 800
Test User Group (1 of 2)

Demographics

- Multi-agency representation
- Geographic representation

IFT-DSS Test User Group Population
Test User Group (2 of 2)

*Anchorage contains 1 user from both US Fish and Wildlife & US National Park Service

- 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 Enterprises
- Confederated Salish and Kootenai Tribes
- North Carolina Department of Natural Resources
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Vision for the Fuels Treatment Community

IFT-DSS Framework Architecture:

Single interface, multiple tools, data transformations, web-based

New tools are coded as IFT-DSS services & linked with wrapped tools

Legacy tools are “wrapped” with a standard interface

Scientists and data providers create tools
Vision for the Fire and Fuels Community

Linked integrated framework architectures, e.g., IFT-DSS, BlueSky, WFDSS

System-to-system interoperability standards

Library of common services
Help us develop IFT-DSS

• Review the documentation published by the IFT-DSS project on the web:
  – http://frames.nbii.gov/ift-dss

• Contact: Mike Rauscher
  – Email: mrauscher@bellsouth.net