Surface Transportation Weather Decision Support Requirements (STWDSR)

Maintenance Decision Support System: Final FY 01 Project/Program Review

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Recap of Program Options
STWDSR/MDSS

• Surface Transportation Weather Decision Support Requirements (STWDSR)

  — User-based requirements for a general decision support system for winter road maintenance

• Maintenance Decision Support System (MDSS)

  — A user-validated realization of the STWDSR
FHWA Weather Team Formed from Rural ITS

First Road Weather Symposium (DOT/VAMS Stakeholders)

STWDSR Meetings 1 & 2 DOT/VAMS/Labs

MDSS Reviews 1 & 2 DOT/VAMS/Labs


MDSS NOI April 17, 01

Foretell™ Project launched

MDSS Project Launched

Surface Transportation Weather Decision Support Requirements (STWDSR) Project
Key Principles

• Decision support was identified gap since 1997

• Evolutionary development track:
  — requirements (one user group), prototype, test, deploy

• Stakeholder involvement

• Utilize National Labs talent to create open products
Key Decision Support Features

• Decision support *tailored* to decisions (needs = 53)
• Decision support *on top* of environmental threat, transportation and resource information
• Decision support functions *filter, fuse and present* information
• Requires an *open system*
• Statistical information key to *fusion* and *risk decision making*
• Collaboration and learning are potential features
Results to 6/22/01 (MDSS Rev2)

- A growing, collegial, stakeholder participation
  - 30 DOTs (56 individuals)
  - 66 VAMS, Canadian Met

- “Patient” with STWDSR, enthused by MDSS (2/21 MDSS review)

- NOI (April) promised Operational Test, re-planned at 6/22 review
The Re-Plan

• Responded to FHWA management concerns:
  — product risk/maturity
  — openness to all stakeholders

• Consensus on “Option B” for the MDSS demonstration phase
Demo Phase Plan (Option B)

- **Prototyping & Review**
  - Rev1 DOT
  - Rev2 DOT+VAMS
  - Rev3 DOT+VAMS
  - Rev4 All

- **System Development and Demonstration (Evaluation?)**
  - Rev5 All
  - Rev6 All
  - Rev7 All

- **Selected Demo Site(s)/Voluntary Partners**
- **Deployment**

- **Prototype (Release 0)**
- **Functional Prototype Release 1**
- **F.P. Release 2**

- **FY 00 Prototype Award**
  - Labs: $900,000
- **FY 01/02 (03?) Labs Funding**
- **Winter 02/03**
- **Winter 03/04**

- **Dates:**
  - 9/30/00 FY01
  - 9/30/01 FY02
  - 9/30/02 FY03
  - 9/30/03 FY04
Option B: Features

- **Product Risk**
  - Extended development: extra months to demo functional prototype 1 (FP1)
  - FP1 not an operational system
  - FP2 adds another year to mature product
  - Approx. 2 years to product ready for operational integration (adds 1 year over old FOT plan)

- **Openness**
  - No formal downselect of any vendor partner
  - Internet interface available at any site (but demo domain is site specific)
Option B: Costs

FOT Budget (Option A)

FY 01 $900K  
FY 02 $500K  
FY 03 $350K (depl. Advocacy)  

Total $1750K

Demo Estimates (Option B): Years are of expenditure

<table>
<thead>
<tr>
<th>Labs:</th>
<th>(1) Demo Site Award:</th>
<th>(4) Reviews, DOT travel:</th>
<th>Focus Group (CHI):</th>
<th>Total:</th>
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<tbody>
<tr>
<td>FY 02 $1500K</td>
<td>FY 02 $100K</td>
<td>FY 02 $60K</td>
<td>FY 02 $100K</td>
<td>FY 02 $1760K</td>
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<tr>
<td>FY 03 $500K</td>
<td>FY 03 $100K</td>
<td>FY 03 $60K</td>
<td>(may be in demo cost)</td>
<td>FY 03 $660</td>
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</table>

Total $2420*

*Multiple demo sites can raise cost
Summary of FY 02 SOW
Reflection on Option B

• Assumed product risk would be addressed by more time/money
  — neither extended by SOW, FP 2 not included

• Deferred integration: MDSS never intended as operational product

• Demo phase to avoid downselect: remains vague and needs to be planned

• Number of reviews important to "openness"
FY 02 SOW

• Continues Labs’ development from FY 01
• Contains one-year Functional Prototype (FP) development
  — End-to-end, live test domain, demonstration system
  — One demo domain: Downselect implications (vendor/DOT relationships)
• Budget
  — $900K for Labs (same as “Option A”)
  — $30K for one full stakeholder review
  — $10K to support DOT “GUI Group”
FY 02 SOW: Technical Content

• The “front end” (GUI) with rules-of-practice is essential to realize STWDSR
  — most variable across locations and individuals
  — necessary to demo, but may not be transferable
  — CRREL/NCAR with GUI Group advice

• Road Weather Forecast System (NCAR)
  — essential to the fusion function
  — embodies climatic adaptivity (learning)
  — benefits from ensemble input (FSL)
  — depends on observational inputs (scarce, radar not included, LL video sacrificed)
FY 02 SOW: Technical Content concl.

- Road condition algorithms (temperature and chemical concentration) (CRREL)
  - necessary for credible demo
  - most substitutable for vendor products
  - still important to create “open” development
- Precipitation-type algorithms (NSSL)
  - key environmental parameter for most road-weather uses
  - lack of radar again a deficiency
- ETL sensor technology: cut but vital to future infostructure planning
- Overall a tremendous bargain by leveraging Labs’ capabilities
# Technical Task Funding Allocation

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<thead>
<tr>
<th>Task</th>
<th>Lab</th>
<th>Cost $K</th>
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<tbody>
<tr>
<td>Road Wx Forecast System</td>
<td>NCAR</td>
<td>116.5</td>
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<tr>
<td>Display (GUI)</td>
<td>NCAR</td>
<td>50.</td>
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<tr>
<td>Rules of Practice</td>
<td>CRREL/LL</td>
<td>100.</td>
</tr>
<tr>
<td>Temp. and Chemical Algorithms</td>
<td>CRREL</td>
<td>152.3</td>
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<tr>
<td>Ensemble modeling</td>
<td>FSL</td>
<td>105.</td>
</tr>
<tr>
<td>Precip-Type Algorithm</td>
<td>NSSL</td>
<td>35.</td>
</tr>
<tr>
<td>Management, Integration etc.</td>
<td></td>
<td>342.3</td>
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</table>
Stakeholders and Reviews
FY 02 MDSS Reviews

- **FY 02 SOW Start**: Labs: $600,000
  - 9/30/01

- **Functional Prototype Release 1**: 9/20
- **Prototype (Release 0)**
- **Approve Balance**: $300,000
  - FY02

- **GUI Group Meetings ($10K DOTs)**
- **Public Participation?**
- **Public Rev 4**: 6/13 ($30K DOTs)
- **KDP “Proof” System**
- **KDP 1 Ca. Apr. 17**
- **RFI?**

- **Outreach: Project Plan, Website, 1/4ly Rpts.**

- **FHWA Rev 5**: 9/19
- **Functional Prototype Release 1**
- **Partnership Formation?**

- **Test?**
- **Winter 02/03**

**Note:** FHWA Rev 5 (9/19), Functional Prototype Release 1 (9/20), Partnership Formation?
Review Management

- Mitretek handles outreach and logistics
  - Will manage $40K in DOT travel funding
- Issue on review 5
  - SOW states it is “public”, but no DOT funding
- KDP 1: Public input?
  - Believe it essential to hear from stakeholders
  - Assume we will continue with RFI
  - Consider inviting GUI Group (need travel $)
- Concern about “ad hoc” input
  - Project has come a long way with stakeholder concurrence
  - If there is concern re VAMS, FHWA needs to articulate policy
Conclusion

- The stakeholder group is a valuable institution by itself:
  - FHWA to state contact
  - Exposure to Labs’ capabilities, new technology
  - Public-private meeting ground
  - an open exchange of information
- Continuity in and beyond MDSS must be considered.
- Consider a further evolutionary cycle.
Deployment Planning
By the end of FY 02 we will have spent 3 years and over $2 million on this project.

The end game—deployment—will determine whether it was worthwhile.
Concerns

• Our stakeholders make plans based on what we tell them to expect

• Any test requires resource planning by partners: We need to get into their >1 year budget cycle.

• We would like to leverage deployment demo funds etc.

• When we waffle, we look disorganized

• If FHWA mgt. sets constraints, they also have to know where we are
Status

• Stakeholders *think* we are operating to Option B.

• There are at least two anxious candidates to deploy (WA and ATWIS) and others who are ready.

• Under SOW, an **operational test** for winter 02/03 would be pressed and risky
  — FP not more mature, and no integration compared to original plan

• Under SOW, the **test domain** not integrated operationally, but is still a “downselect”.
Status, concluded

- Have stated openness to tech transfer and integration at any time
- Practically, Labs hard pressed to take on any parallel work
- Intend to have open, web demo in small domain in winter 02/03
  - domain choice critical re future deployment cost and time
  - prefer to work primarily through DOTs
- But need to show real integration and operational test some time to complete cycle
Factors

• Have $500K (FY 02) and $350K (FY 03) in budget.
• Funds probably marginal for one operational test
  — old problem of downselect and exclusion
  — labs need funding for integration and IOC work
  — small “incentive” fund to partners, may need substantial matching
• A piecemeal integration without FHWA participation could lose evaluation opportunity entirely
• Can we do a third-party evaluation even in demo phase? (JPO, university)
Options

1. Work out from demo into operational test
   — winter 03/04?
   — implies early downselect

2. Multiple demo sites into ops. tests
   — requires more demo phase and ops test phase funding
   — mitigates downselect

3. Old plan: Ops test in winter 02/03

4. Old Plan shifted: Ops test winter 03/04

5. Terminate with FP demo: No further FHWA funding

6. Terminate and “deploy incentive”
## Options:

<table>
<thead>
<tr>
<th>Option</th>
<th>Cost: 02 and 03</th>
<th>Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Demo → Test</td>
<td>$900K $850K +</td>
<td>End ~5/04</td>
</tr>
<tr>
<td>2. Demo+ → Test</td>
<td>$900K $850K++</td>
<td>End ~5/04</td>
</tr>
<tr>
<td>3. Old plan</td>
<td>$900K $850K</td>
<td>End ~5/03</td>
</tr>
<tr>
<td>4. Old Plan, 03/04</td>
<td>$900K $850K+</td>
<td>End ~5/04</td>
</tr>
<tr>
<td>5. Terminate (after winter demo)</td>
<td>$900K &lt;$500K</td>
<td>End ~3/03</td>
</tr>
<tr>
<td>6. Terminate and incentivize</td>
<td>$900K $850K</td>
<td>Open evaluation?</td>
</tr>
</tbody>
</table>