Decision Support Tools Matrix

Status Update

Briefing to FRTR

December 9, 2004

USEPA OSRTI

DST Matrix - Background

- In June 2004, Carlos Pachon briefed FRTR on plans for development of DST Matrix
- EPA compiled a list of DSTs based on information from its laboratories and regions, as well as from other federal agencies including DOE and DoD
- Many of the DSTs relate to implementation of the Triad approach (e.g., SADA, FIELDS, VSP)
- EPA also developed a set of criteria to use in evaluating these DSTs

DST Matrix - Background

- Based on funding and scheduling, the DST matrix development team determined that we could effectively review 20 DSTs.
- There were many more than 20 tools available for review. Therefore, we developed the following criteria to control the number of tools that we reviewed.

Baseline Criteria for DST Selection

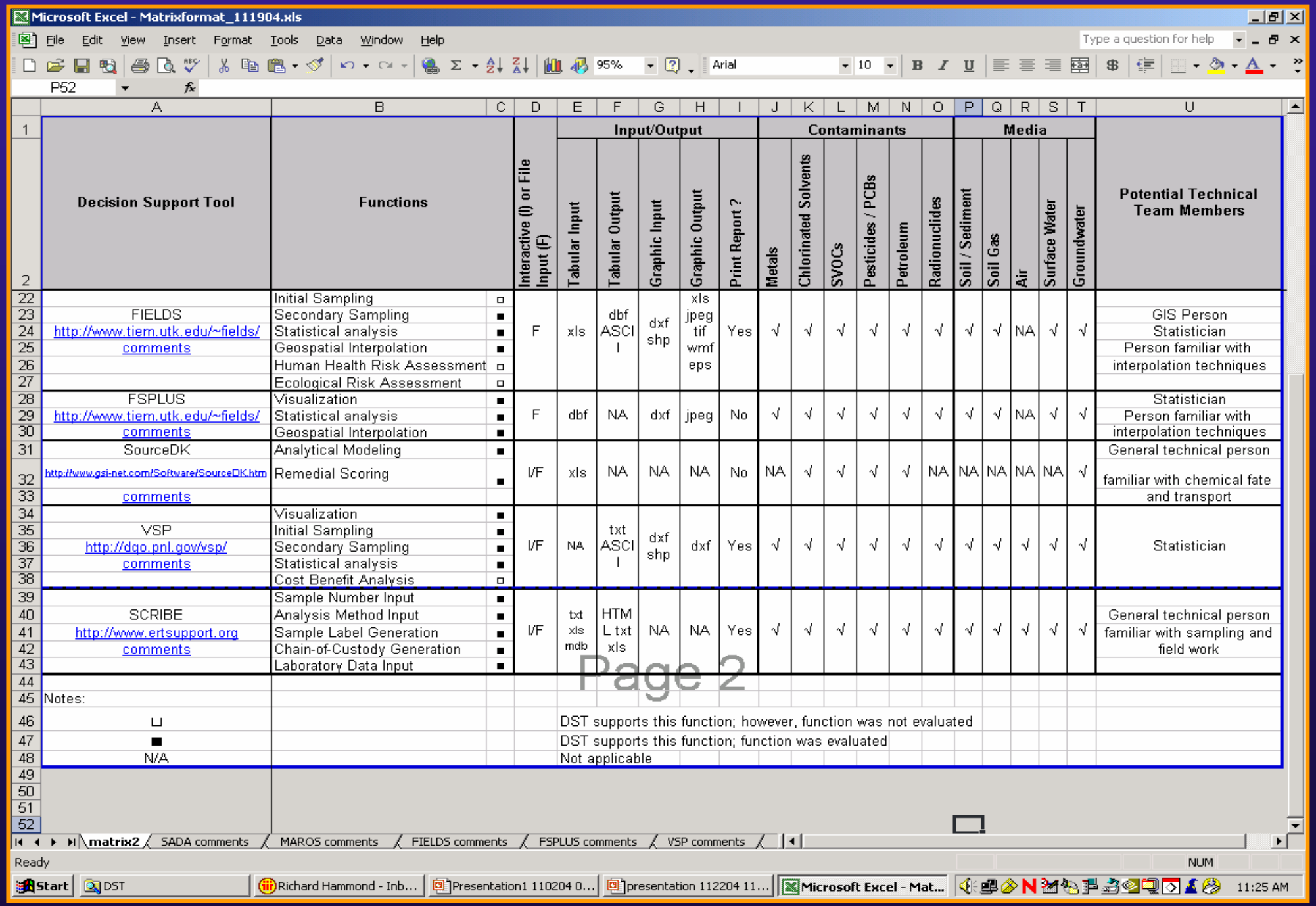
1. The end user was defined as a technically proficient field person such as an EPA OSC – able to use a computer but not a computer modeling expert.
2. The tool had to be a Decision Support tool. The default output should be predictive (decision support) from input.
3. The tool must be freely available to the public.

Baseline Criteria for DST Selection

The team also recognized the need to stay away from comparative evaluation between tools. We sought ways to review each tool independently.

During the development of the reviewed list, we sought peer review from a variety of sources including individuals from internal EPA sources as well as the Dept. of Energy, the Air Force, and several knowledgeable individuals from private consulting companies.

Decision Support Tool Matrix



Microsoft Excel - Matrixformat_111904.xls

Decision Support Tool	Functions		Interactive (I) or File Input (F)	Input/Output: Tabular Input	Input/Output: Tabular Output	Input/Output: Graphic Input	Input/Output: Graphic Output	Input/Output: Print Report ?	Contaminants: Metals	Contaminants: Chlorinated Solvents	Contaminants: SVOCs	Contaminants: Pesticides / PCBs	Contaminants: Petroleum	Contaminants: Radionuclides	Media: Soil / Sediment	Media: Soil Gas	Media: Air	Media: Surface Water	Media: Groundwater	Potential Technical Team Members
	Initial Sampling	□																		
FIELDS	Secondary Sampling	■																		GIS Person
http://www.tiem.utk.edu/~fields/	Statistical analysis	■	F	xls	dbf ASCII	dxf shp	xls jpeg tif wmf eps	Yes	√	√	√	√	√	√	√	√	NA	√	√	Statistician
comments	Geospatial Interpolation	■																		Person familiar with interpolation techniques
	Human Health Risk Assessment	□																		
	Ecological Risk Assessment	□																		
FSPLUS	Visualization	■																		Statistician
http://www.tiem.utk.edu/~fields/	Statistical analysis	■	F	dbf	NA	dxf	jpeg	No	√	√	√	√	√	√	√	√	NA	√	√	Person familiar with interpolation techniques
comments	Geospatial Interpolation	■																		
SourceDK	Analytical Modeling	■																		General technical person
http://www.gsi-net.com/Software/SourceDK.htm	Remedial Scoring	■	I/F	xls	NA	NA	NA	No	NA	√	√	√	√	NA	NA	NA	NA	NA	√	familiar with chemical fate and transport
comments																				
	Visualization	■																		
VSP	Initial Sampling	■																		
http://dqo.pnl.gov/vsp/	Secondary Sampling	■	I/F	NA	txt ASCII	dxf shp	dxf	Yes	√	√	√	√	√	√	√	√	√	√	√	Statistician
comments	Statistical analysis	■																		
	Cost Benefit Analysis	□																		
	Sample Number Input	■																		
SCRIBE	Analysis Method Input	■																		General technical person
http://www.ertsupport.org	Sample Label Generation	■	I/F	txt xls mdb	HTML txt xls	NA	NA	Yes	√	√	√	√	√	√	√	√	√	√	√	familiar with sampling and field work
comments	Chain-of-Custody Generation	■																		
	Laboratory Data Input	■																		

Page 2

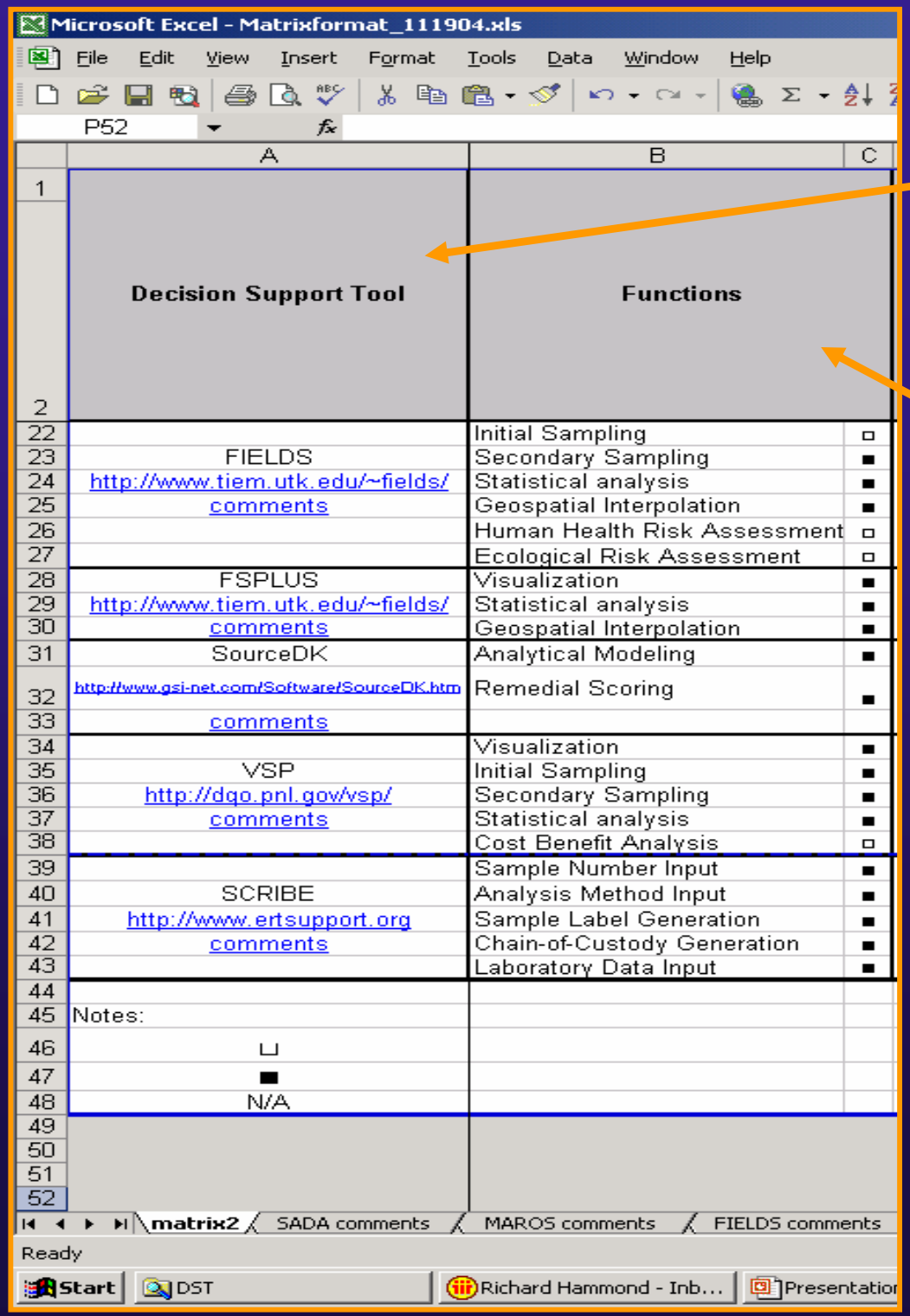
Notes:

⊔	DST supports this function; however, function was not evaluated
■	DST supports this function; function was evaluated
N/A	Not applicable

matrix2 | SADA comments | MAROS comments | FIELDS comments | FSPLUS comments | VSP comments

Ready

Start | DST | Richard Hammond - Inb... | Presentation1 110204 0... | presentation 112204 11... | Microsoft Excel - Mat... | 11:25 AM



Microsoft Excel - Matrixformat_111904.xls

File Edit View Insert Format Tools Data Window Help

P52

	A	B	C
1			
2	**Decision Support Tool**	**Functions**	
22		Initial Sampling	▫
23	FIELDS	Secondary Sampling	■
24	http://www.tiem.utk.edu/~fields/	Statistical analysis	■
25	comments	Geospatial Interpolation	■
26		Human Health Risk Assessment	▫
27		Ecological Risk Assessment	▫
28	FSPLUS	Visualization	■
29	http://www.tiem.utk.edu/~fields/	Statistical analysis	■
30	comments	Geospatial Interpolation	■
31	SourceDK	Analytical Modeling	■
32	http://www.gsi-net.com/Software/SourceDK.htm	Remedial Scoring	■
33	comments		
34		Visualization	■
35	VSP	Initial Sampling	■
36	http://dqo.pnl.gov/vsp/	Secondary Sampling	■
37	comments	Statistical analysis	■
38		Cost Benefit Analysis	▫
39		Sample Number Input	■
40	SCRIBE	Analysis Method Input	■
41	http://www.ertsupport.org	Sample Label Generation	■
42	comments	Chain-of-Custody Generation	■
43		Laboratory Data Input	■
44			
45	Notes:		
46	▫		
47	■		
48	N/A		
49			
50			
51			
52			

matrix2 SADA comments MAROS comments FIELDS comments

Ready

Start DST Richard Hammond - Inb... Presentation

Column 1 presents the tool name, a hyperlink to the tool homepage and comments from the test.

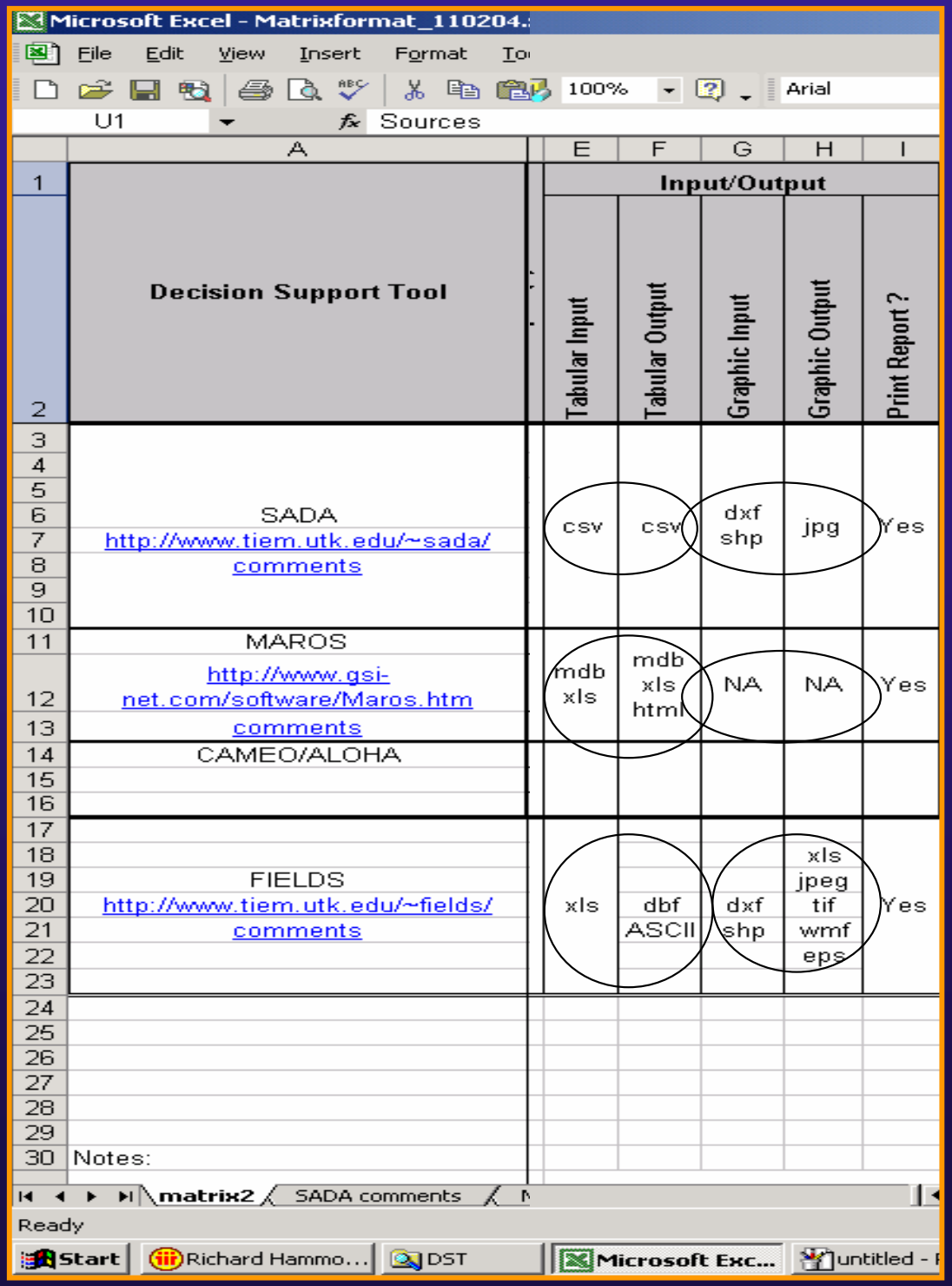
Column 2 presents a list of functions derived from the literature about the tool and/or the tool menus.

We selected several real datasets to apply to the tools, but used a limit of 12 LOE hours to evaluate the tools

Column 3 indicates how the tool receives input, through a file or interactively.

File only

File or user input



Microsoft Excel - Matrixformat_110204.

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U1 Sources

	A	E	F	G	H	I
1		Input/Output				
2	Decision Support Tool	Tabular Input	Tabular Output	Graphic Input	Graphic Output	Print Report ?
3						
4						
5						
6	SADA	csv	csv	dxf shp	jpg	Yes
7	http://www.tiem.utk.edu/~sada/					
8	comments					
9						
10						
11	MAROS					
12	http://www.gsi-net.com/software/Maros.htm	mdb xls	mdb xls html	NA	NA	Yes
13	comments					
14	CAMEO/ALOHA					
15						
16						
17						
18					xls	
19	FIELDS				jpeg	
20	http://www.tiem.utk.edu/~fields/	xls	dbf ASCII	dxf shp	tif	Yes
21	comments				wmf	
22					eps	
23						
24						
25						
26						
27						
28						
29						
30	Notes:					

matrix2 SADA comments

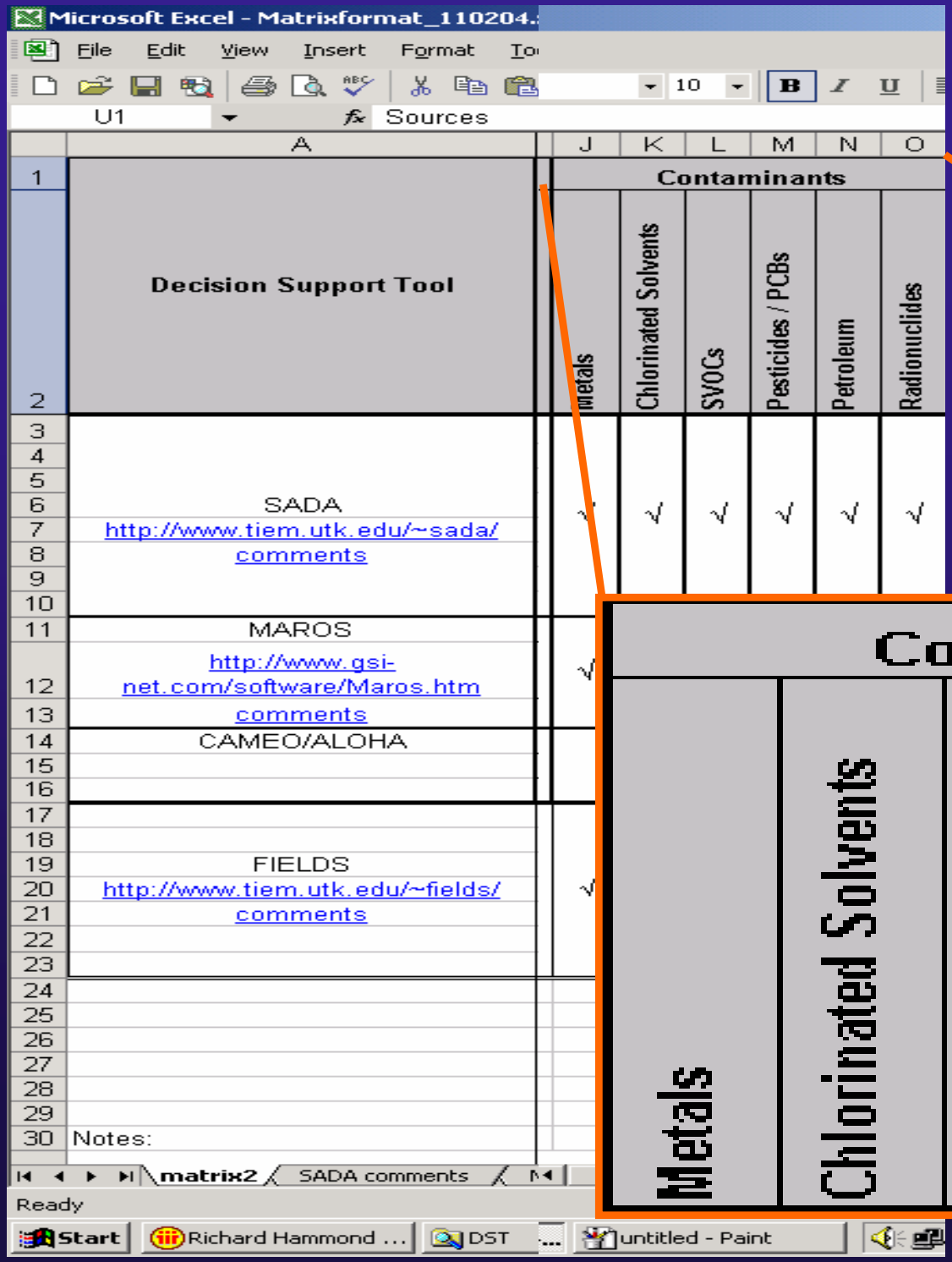
Ready

Start Richard Hammo... DST Microsoft Exc... untitled -

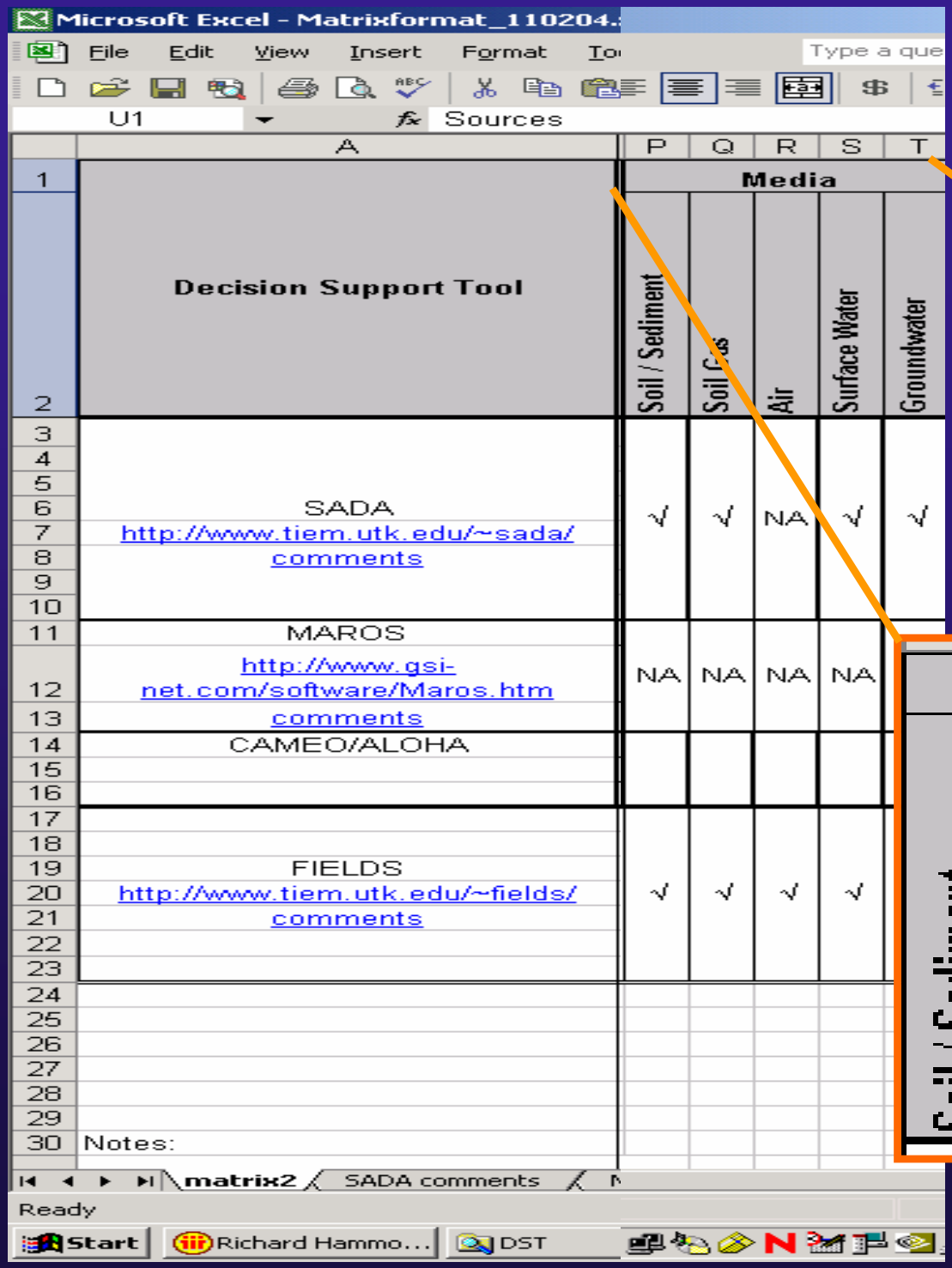
The Input/Output columns indicate the types of data and graphic input and output that can be accepted by the tool.

Common data input/output types include:
comma delimited files
Microsoft Access
Microsoft Excel

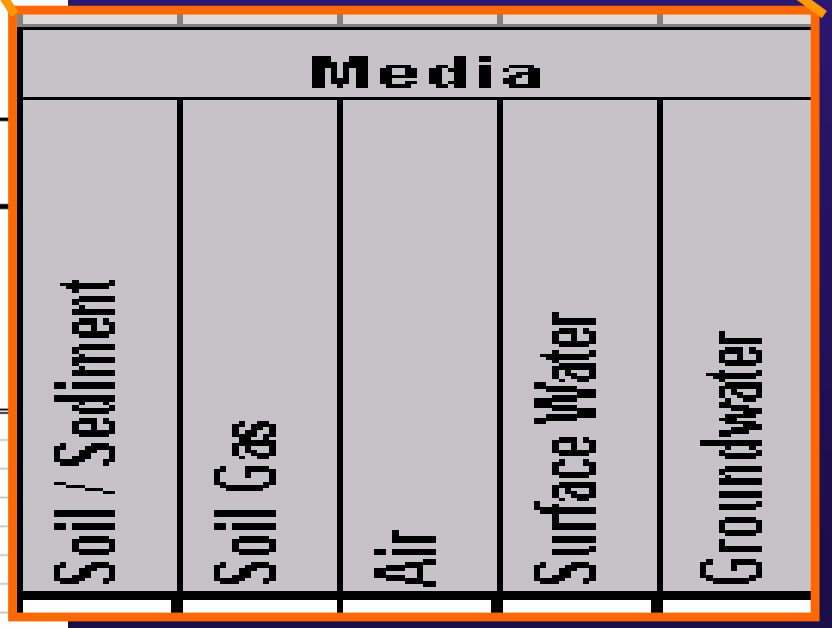
Common graphic input/output types include:
dxf
shapefiles
jpg

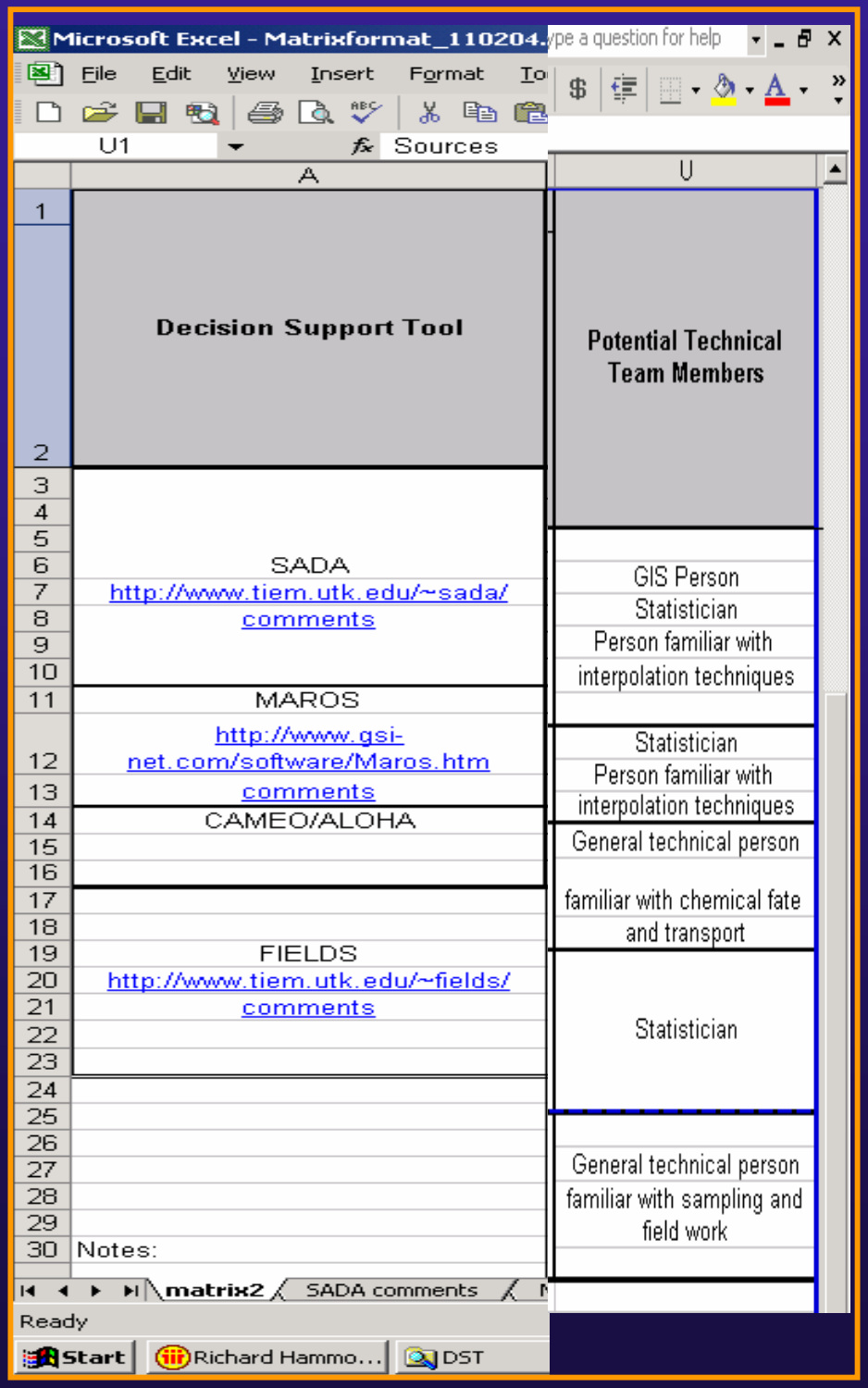


The Contaminants columns indicate the types of contaminants the tool was designed to accommodate.



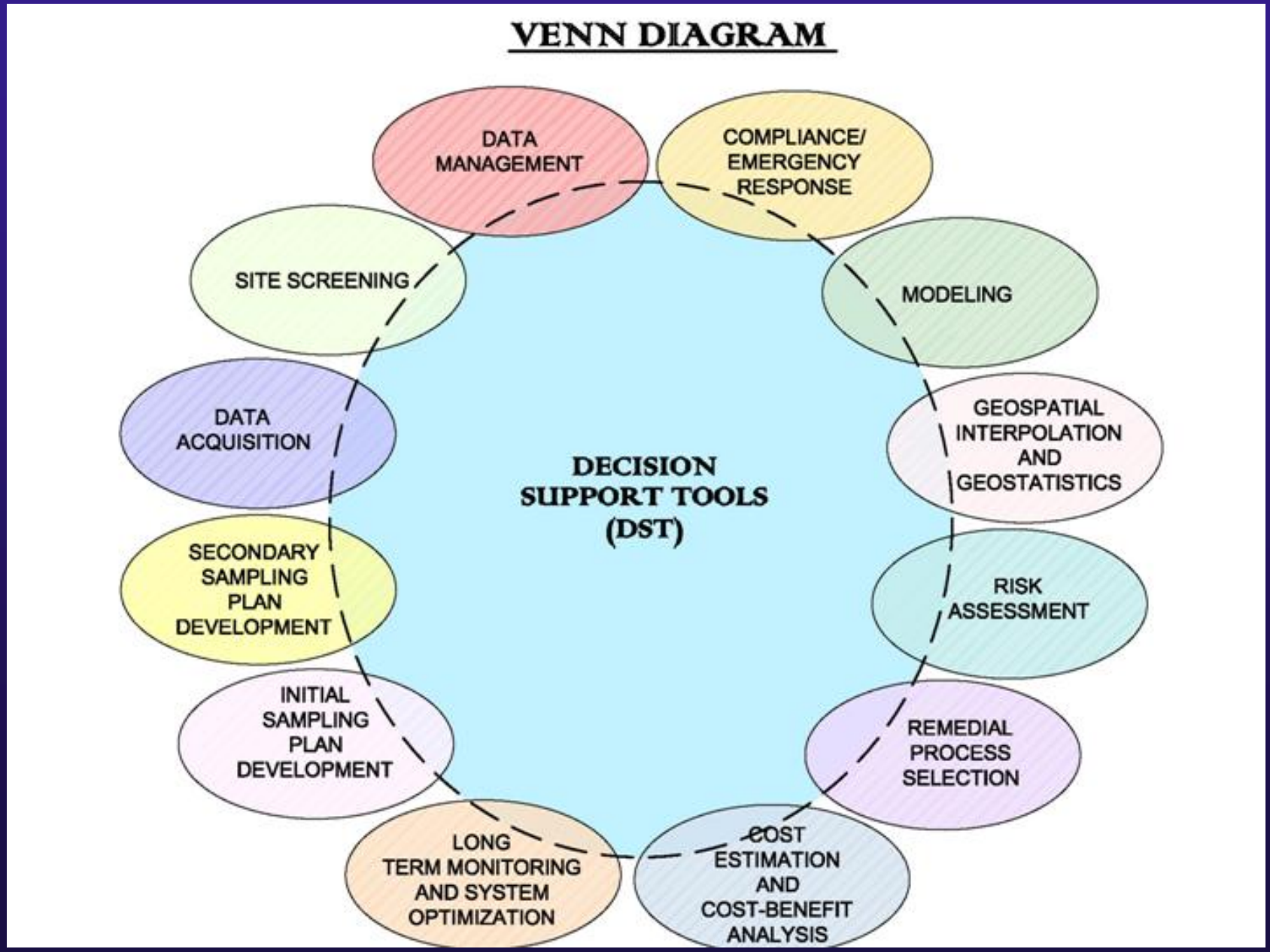
The Media columns indicate the types of media the tool was designed to accommodate.



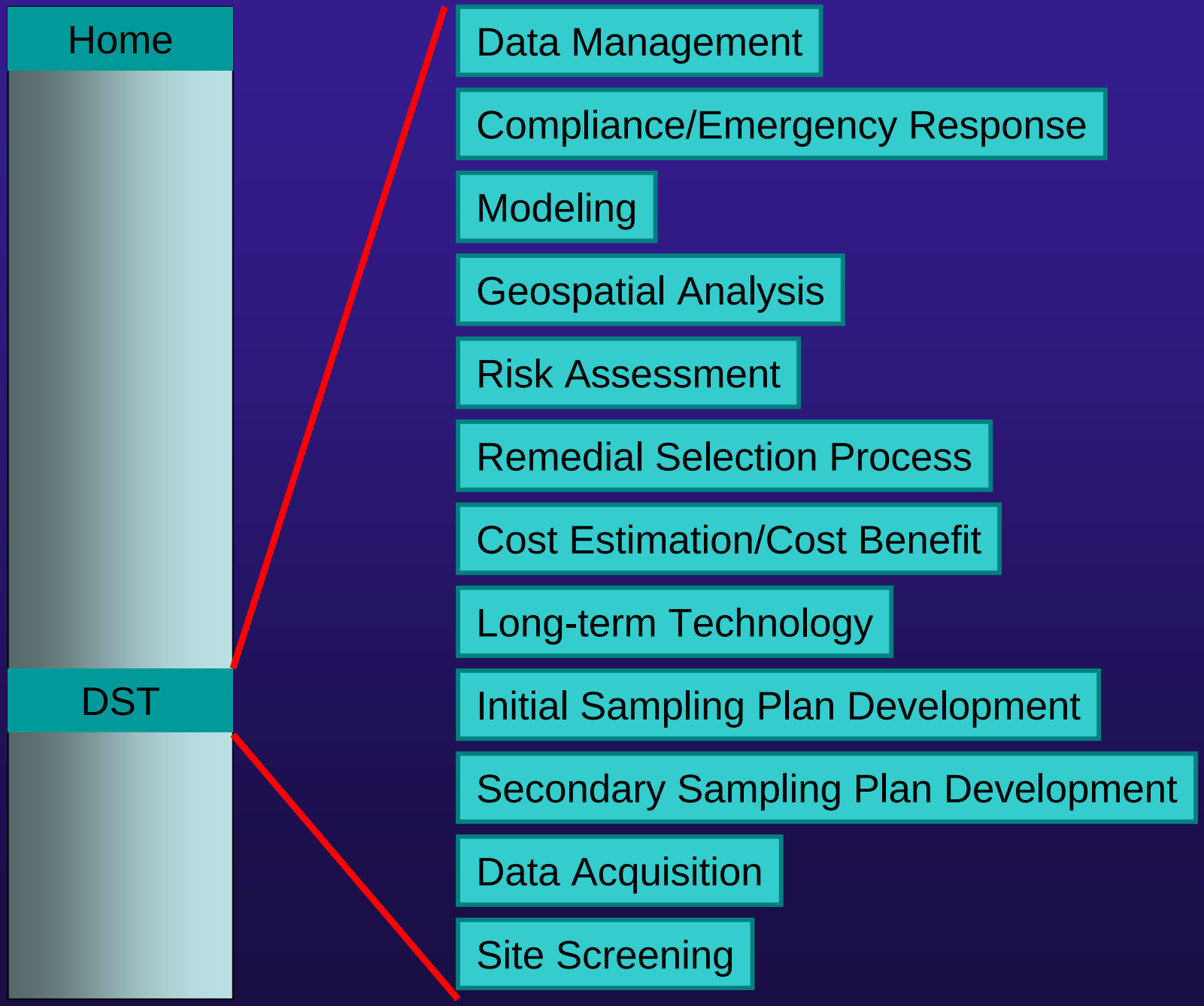


Potential Technical Team Members provides the project manager with an indication of expertise required to most effectively utilize the DST.

Home Page - Possible



Web Page Menu Bar



Web Page Sub-Menu

Initial Sample Plan Development | MATRIX

A decision support tool (DST) may be used to develop an initial sample plan when there is no pre-existing sample data at a site, or when the existing data is not of sufficient quality or quantity to be used in a meaningful way. Initial sample designs may be as simple as specifying a number of samples and having the tool place them randomly on a grid. (All three DSTs listed below can do this). They may also be fully integrated into the data quality objective (DQO) process and based on statistical considerations (VSP and SADA provide this capability).

FIELDS (www.epa.gov/region5fields/htm/software.htm)

SADA (www.tiem.utk.edu/~sada/)

VSP (dqo.pnl.gov/vsp/)

Takes you to either the full matrix…

…Or to the individual DSTs.

Technology >> FIELDS

Introduction >> The FIELDS Tools for ArcView (version 3.5) are a collection of ArcView-based extensions (modules) that include Sample Design (as well as a link to Visual Sample Plan [VSP]), Database Query, Geospatial Modeling and Analysis, and Human Health and Ecological Risk Assessment.

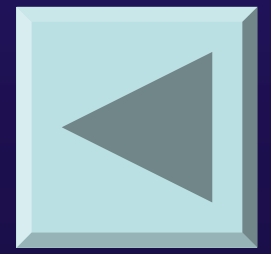
Functions:
- Visualization
- Initial Sampling
- Secondary Sampling
- Statistical Analysis
- Geospatial Interpolation
- Human Health Risk Assessment
- Ecological Risk Assessment

Input
- Tabular file: *.xls
- Graphical file: *.dxf, *.shp

Output:
- Tabular file: *.dbf
- Graphical file: *.dxf, *.shp, *.jpg, *.tif, *.gif,
- *.wmf, *.eps

Contaminants:
- Metals
- Chlorinated Solvents
- SVOCs
- Pesticides/PCBs
- Petroleum
- Radionuclides

Media:
- Soil/Sediment
- Soil Gas
- Surface Water
- Groundwater



Potential Technical Team Members:
- GIS Staff
- Statistician
- Person familiar with Interpolation Techniques

Technology >> SADA

Introduction >> Integrated modules for environmental characterization and decision-making, including visualization, geospatial analysis, statistical analysis, human health risk assessment, ecological risk assessment, cost/benefit analysis, sampling design, and decision analysis.

Functions:
- Visualization
- Initial Sampling
- Secondary Sampling
- Statistical Analysis
- Geospatial Interpolation
- Human Health Risk Assessment
- Ecological Risk Assessment
- Cost / Benefit Analysis

Input:
- Tabular file: *.csv
- Graphical file: *.dxf, *.shp

Output:
- Tabular file: *.csv
- Graphical file: *.jpg

Contaminants:
- Metals
- Chlorinated Solvents
- SVOCs
- Pesticides/PCBs
- Petroleum
- Radionuclides

Media:
- Soil/Sediment
- Soil Gas
- Surface Water
- Groundwater

Potential Technical Team Members:
- Risk Assessor
- Statistician
- Person familiar with Interpolation Techniques

Technology >> VSP

Introduction >> VSP provides statistical solutions to sampling design, mathematical and statistical algorithms, and a user-friendly visual interface, while answering two important questions in sample planning: How many samples are needed? Where should the samples be collected?

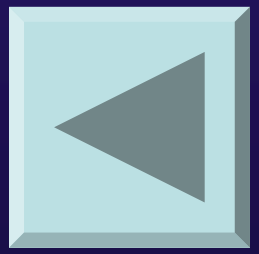
Functions:
- Visualization
- Initial Sampling
- Secondary Sampling
- Statistical Analysis
- Cost Benefit Analysis

Input:
- Interactive
- Graphical file: *.dxf, *.shp

Output:
- Text (ASCII) file: *.txt
- Graphical file: *.dxf

Contaminants:
- Metals
- Chlorinated Solvents
- SVOCs
- Pesticides/PCBs
- Petroleum
- Radionuclides

Media:
- Soil/Sediment
- Soil Gas
- Air
- Surface Water
- Groundwater



Potential Technical Team Members:
•Statistician

Matrix

Decision Support Tool	Functions		Interactive (I) or File Input (F)	Input/Output					Contaminants						Media					Potential Technical Team Members
				Tabular Input	Tabular Output	Graphic Input	Graphic Output	Print Report ?	Metals	Chlorinated Solvents	SVOCs	Pesticides / PCBs	Petroleum	Radionuclides	Soil / Sediment	Soil Gas	Air	Surface Water	Groundwater	
SADA http://www.tiem.utk.edu/~sada/ comments	Visualization	■	F	csv	csv	dxf shp	jpg	Yes	√	√	√	√	√	√	√	√	NA	√	√	
	Secondary Sampling	■																		
	Initial Sampling	□																		Risk Assessor
	Statistical Analysis	□																		Statistician
	Geospatial Interpolation	□																		Person familiar with interpolation techniques
	Human Health Risk Assessment	□																		
	Ecological Risk Assessment	□																		
	Cost / Benefit Analysis	□																		
FIELDS http://www.tiem.utk.edu/~fields/ comments	Visualization	■	F	csv dbf	dbf txt	dxf shp	xls jpg tif wmf eps	Yes	√	√	√	√	√	√	√	√	NA	√	√	
	Initial Sampling	□																		
	Secondary Sampling	■																		GIS Person
	Statistical Analysis	■																		Statistician
	Geospatial Interpolation	■																		Person familiar with interpolation techniques
	Human Health Risk Assessment	□																		
	Ecological Risk Assessment	□																		
VSP http://dqo.pnl.gov/vsp/ comments	Visualization	■	I/F	NA	txt	dxf shp	dxf	Yes	√	√	√	√	√	√	√	√	√	√	√	Statistician
	Initial Sampling	■																		
	Secondary Sampling	■																		
	Statistical Analysis	■																		
	Cost / Benefit Analysis	□																		

Notes:

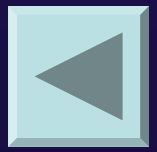
File input and output formats are represented in the matrix by their file extension. ASCII files, for example are indicated by the extension "txt"

Legend:

□ DST supports this function; however, this function was not evaluated

■ DST supports this function; this function was evaluated

N/A Not applicable



Potential Modifications to the Web Site

- The website will be constructed to facilitate updates featuring new tools that have become available.

- An “Interview” feature can be added that solicits site-specific information from the user and returns a subset of DSTs that may be applicable to the user’s site or project.

- A diagram can be added that depicts the various functions that DSTs perform. Clicking on a function (for instance, “Visualization”) returns an alphabetized list of DSTs that support this function.

Conclusions

1. There are many more DSTs available for review.
2. We would like to see the matrix become a living document, with regular updates.
3. We will also have several mini case studies to provide examples of how the DSTs are used.
4. We hope to bring the DST matrix online ASAP.

Contacts

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