NRCS
Natural Resources Conservation Service

NCSS
National Cooperative Soil Survey

Status of Digital Pen Technology

By:

Darrell Kautz

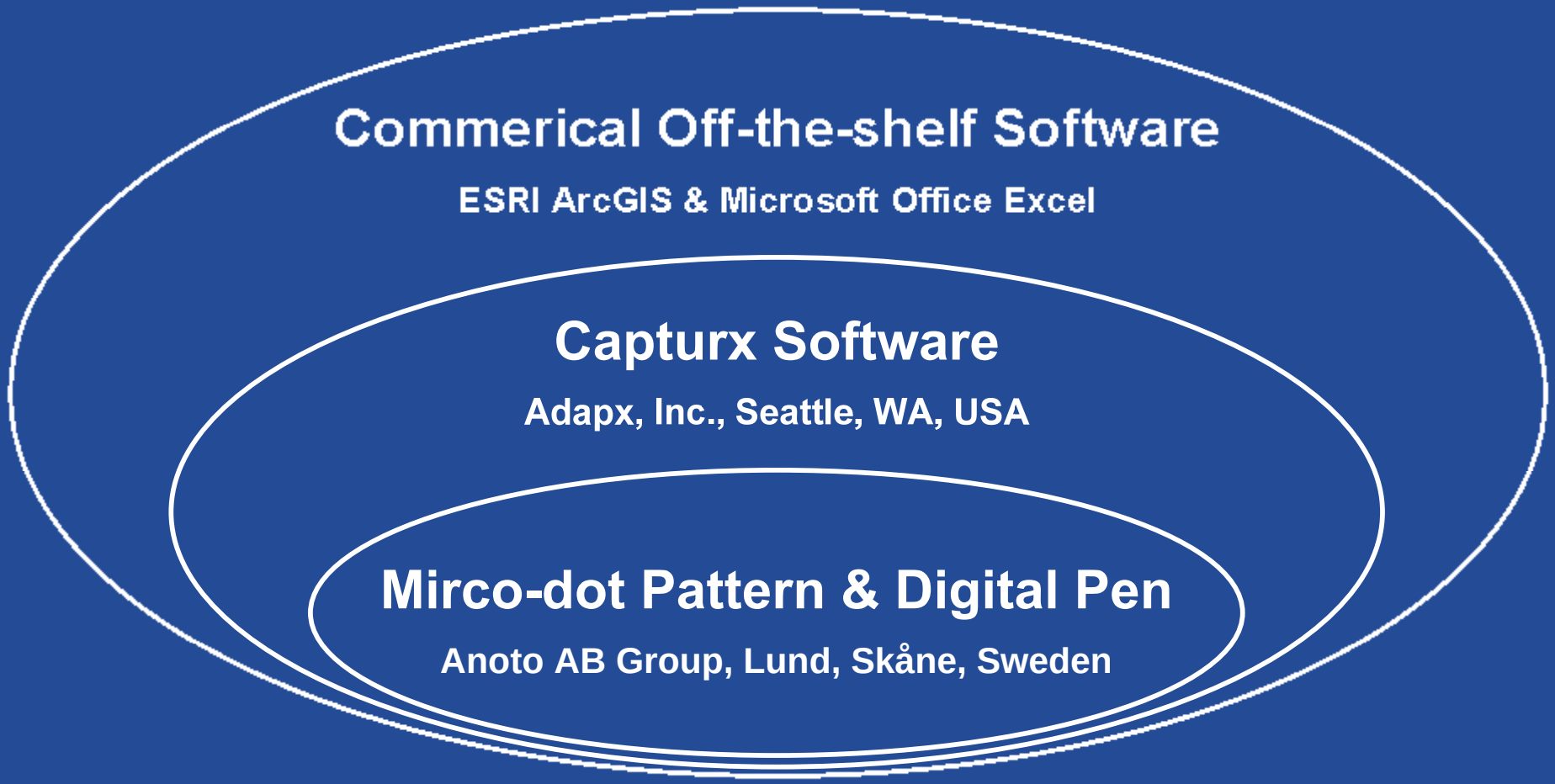
National Soil Survey Center, Geospatial Research Unit
USDA Natural Resources Conservation Service
Morgantown, WV

2011 NCSS National Conference, Asheville, NC
May 24, 2011

Digital Pen and Soil Survey

- Application: primarily, field data collection
  1. Collect information on paper maps and forms using pen
  2. Import data from pen into standard soil survey applications
- Benefit: create usable digital data directly from a paper map or form

Digital Pen Technology



Capturx for ArcGIS 1.2

- Extension to ESRI ArcGIS 9.3.1
  - Adds Capturx toolbar to ArcGIS

  - Version 1.1 for ArcGIS 9.2 also available
  - Version for ArcGIS 10 under development by Adapx

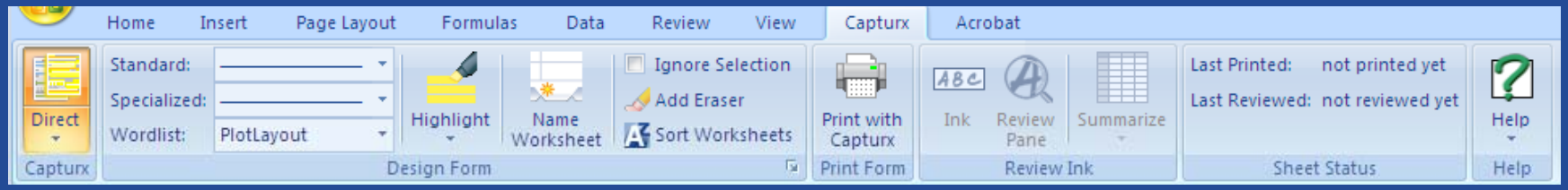
Capturx for ArcGIS 1.2

- Soil survey R&D
  - Develop and test workflow for soil survey
  - Developing User Guide and other job aids

"The ArcGIS stuff is pretty cool but what I really want is the forms capability!"

Capturx Forms for Excel 1.1

- Add-in to Microsoft Office Excel 2007
  - Adds Capturx toolbar to the Excel ribbon



  - Version 1.2 recently released by Adapx

Capturx Forms for Excel 1.1

- Soil survey R&D
  - “Proof-of-concept” using RaCA spreadsheet

Capturx Forms for Excel 1.1

- Proof-of-concept / RaCA spreadsheet
  - Understand Capturx Forms for Excel technology
    - Specialized formatting capabilities
    - Import and data validation processes
  - Support existing RaCA workflow
    - One spreadsheet per ‘plot’
    - Field data forms → data entry forms → database

CM07R37 Rapid Carbon Assessment Project -- Plot Master
(Digital Pen-enabled)

RaCA	2.14	Field form -- PRINT with Capturx Print Tool					Plot Master -- pg. 1
Collector(s)	AKM, JRT, MJL, MDJ					Date	5/18/2011
User site id	G1303F03	MO Office	1st Char	Soil Grp ID	Landuse	Plot #	1st Char: C | F
Plot layout	Chain	MO13	C	1303 7	F	3037	Landuse: C | F | P | W | X

LOCATION	RaCA site id	C1303F03	Offset azimuth	90°	Offset distance	500'

LATITUDE				LONGITUDE				
Degrees	Minutes	Seconds	Direction	Degrees	Minutes	Seconds	Direction	Datum
38	022	21.9	N	80	00	49.5	W	WGS84

EcoSite id					
EcoSite Name					
State id					
State name					
Phase id					
Phase name					
Land cover	Forest		Drained?	☐	
% bare soil	2	Distance to disturbance	25'	Disturbance type	SKID TRAIL
Plantation?	☐	Bedded?	☐	Stage	

Dominant species information				BAF	Nmbr In
Canopy position	Nat'l plant symbol	Local plant name	Order of Dominance	10	4
OVER		SUGAR MAPLE	1	First 4 'In' trees	
		BIRCH	2	DBH	Height
UNDER		STRIPE MAPLE	1		65'
					57
					45
					72

RaCA 2.14	Field form -- PRINT with Capturx Print Tool						Plot Master -- pg. 1
Collector(s)	AAKMIJRT, MJL, MD 5					Date	5/18/2011
User site id	C1307F37	MO Office	1st Char	Soil Grp ID	Landuse	Plot #	1st Char: C | F
Plot layout	TRI	MO13	C	1307	F	37	Landuse: C | F | P | W | X

LOCATION	RaCA site id	C1307F37	Offset azimuth	900	Offset distance	5000

LATITUDE				LONGITUDE				
Degrees	Minutes	Seconds	Direction	Degrees	Minutes	Seconds	Direction	Datum
38	22	219.00	N	80	0	49.50	W	WGS84

EcoSite id					
EcoSite Name					
State id					
State name					
Phase id					
Phase name					
Land cover	Forest		Drained?	☐	
% bare soil	2	Distance to disturbance	250	Disturbance type	St: i D Trail
Plantation?	☐	Bedded?	☐	Stage	

Dominant species information				BAF	Nmbr In
Canopy position	Nat'l plant symbol	Local plant name	Order of Dominance	10	4
Over		SUGAR MA PLF	1	First 4 'In' trees	
		BIRCH	2	DBH	Height
Under		STRIP E MAPLE	8		650
					57
					4115
					72

NRCS Natural Resources Conservation Service

NCSS National Cooperative Soil Survey

Home | Insert | Page Layout | Formulas | Data | Review | View | Capturx | Acrobat

Get External Data: From Access, From Web, From Text, From Other Sources, Existing Connections

Connections: Refresh All, Connections, Properties, Edit Links

Sort & Filter: Sort, Filter, Clear, Reapply, Advanced

Text to Columns, Remove Duplicates, Data Validation, Consolidate, What-If Analysis

Data Validation: Data Validation..., Circle Invalid Data, Clear Validation Circles

Outline: Group, Ungroup, Subtotal, Show Detail, Hide Detail

A1 | RaCA

RaCA	2.14	Field form -- PRINT with Capturx Print Tool					Plot Master -- pg. 1
Collector(s)	AAKMIJRT, MJL, MD 5					Date	5/18/2011
User site id	C1307F37	MO Office	1st Char	Soil Grp ID	Landuse	Plot #	1st Char: C | F
Plot layout	TRI	MO13	C	1307	F	37	Landuse: C | F | P | W | X

LOCATION	RaCA site id	C1307F37	Offset azimuth	900	Offset distance	5000

LATITUDE				LONGITUDE				
Degrees	Minutes	Seconds	Direction	Degrees	Minutes	Seconds	Direction	Datum
38	22	219.00	N	80	0	49.50	W	WGS84

EcoSite id					
EcoSite Name					
State id					
State name					
Phase id					
Phase name					
Land cover	Forest		Drained?	☐	
% bare soil	2	Distance to disturbance	250	Disturbance type	St: i D Trail
Plantation?	☐	Bedded?	☐	Stage	

Dominant species information

Canopy position	Nat'l plant symbol	Local plant name	Order of Dominance	BAF	Nmbr In
				10	4
Over		SUGAR MA PLF	1	First 4 'In' trees	
		BIRCH	2	DBH	Height
Under		STRIP E MAPLE	8		650
					57
					4115
					72

Codes -- enter terms in BOLD

Plot Master | Bulk Density | DB SSOL | Calc_Bulk_density | VNIR | Choice Lists | SoilGroups | Plot Master DE

Pane

Author:
Pen ID:
Date:

|< < > >|

Approve | Revert

Original:

Approve Remaining | Revert Remaining

NRCS Natural Resources Conservation Service

NCSS National Cooperative Soil Survey

Home | Insert | Page Layout | Formulas | Data | Review | View | Capturx | Acrobat

Direct (Capturx) | Standard: Text | Specialized: | Wordlist: | Highlight | Name Worksheet | Ignore Selection | Add Eraser | Sort Worksheets (Design Form) | Print with Capturx (Print Form) | Ink | Review Pane | Summarize (Review Ink) | Last Printed: 5/12/2011 10:34:11 AM | Last Reviewed: 5/23/2011 9:56:00 AM (Sheet Status) | Help

B3 | AAKMIJRT, MJL, MD 5

RaCA 2.14	Field form -- PRINT with Capturx Print Tool	Plot Master -- pg. 1

Collector(s)	AAKMIJRT, MJL, MD 5					Date	5/18/2011
User site id	C1307E37	MO Office	1st Char	Soil Grp ID	Landuse	Plot #	1st Char: C | F
Plot layout	TRI	MO13	C	1307	F	37	Landuse: C | F | P | W | X

LOCATION	RaCA site id	C1307F37	Offset azimuth	900	Offset distance	5000

LATITUDE				LONGITUDE				
Degrees	Minutes	Seconds	Direction	Degrees	Minutes	Seconds	Direction	Datum
38	22	219.00	N	80	0	49.50	W	WGS84

EcoSite id					
EcoSite Name					
State id					
State name					
Phase id					
Phase name					
Land cover	Forest		Drained?	☐	
% bare soil	2	Distance to disturbance	250	Disturbance type	St: i D Trail
Plantation?	☐	Bedded?	☐	Stage	

Dominant species information

Canopy position	Nat'l plant symbol	Local plant name	Order of Dominance	BAF 10	Nmbr In 4
Over		SUGAR MA PLF	1	First 4 'In' trees	
		BIRCH	2	DBH	Height
Under		STRIP E MAPLE	8		650
					57
					4115
					72

Codes -- enter terms in **BOLD**

Plot Master | Bulk Density | DB SSOL | Calc_Bulk_density | VNIR | Choice Lists | SoilGroups | Plot Master DE

Capturx Review Pane

Cell B3

Author: Test Pen 3 (AJX-AFF-9N4-MP)
Pen ID: AJX-AAF-9N4-MP
Date: 5/18/2011 11:14:36 AM

|< < > >| Approve Revert

Original: <Empty>

AKM, JRT, MJ

Cell value: AAKMIJRT, MJL, MD 5

Candidates: AAKMIJRT, MJL, MD 5

Approve Remaining | Revert Remaining

Challenges:
Pen, Data Collector, & OCR

Form

Height
65'
57
45

Scan

65'

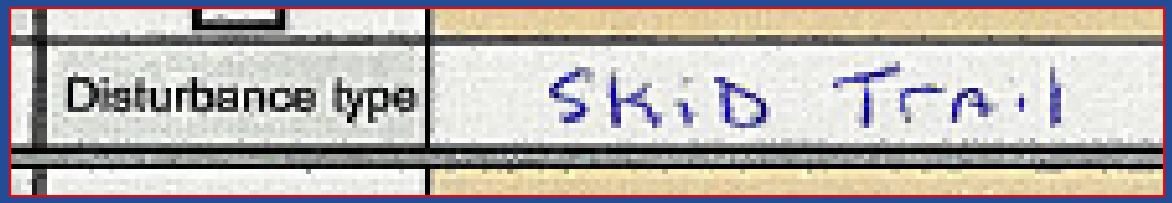
45

OCR

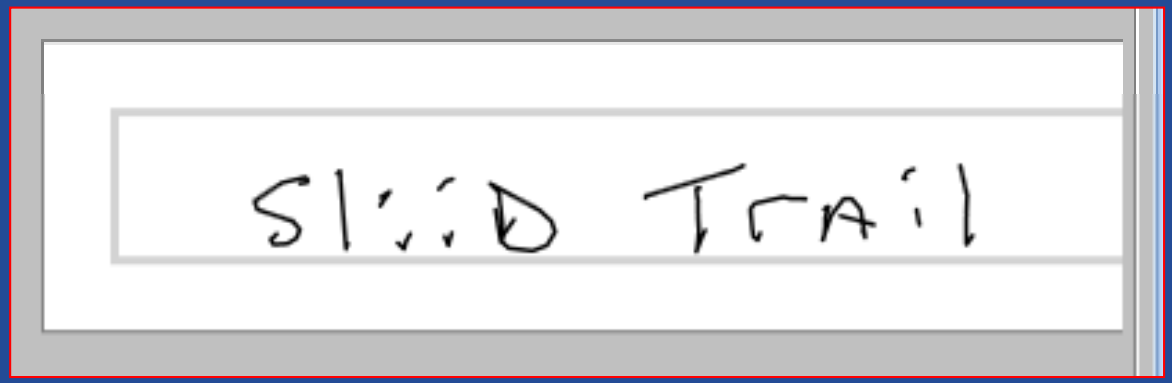
Height
650
57
4115

Challenges:
Pen, Data Collector, & OCR

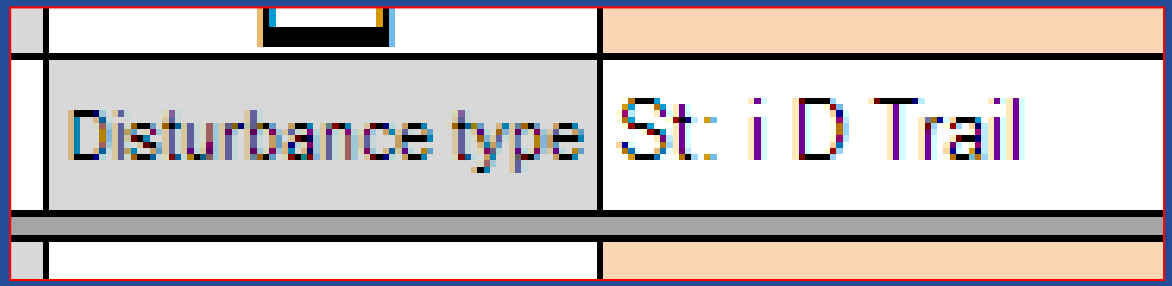
Form



Scan



OCR



Capturx Forms for Excel 1.1

- Soil survey R&D – next steps
  - Site + pedon description forms
    - Multi-part (page) form
    - Forms tailored for different regions of the country and soil characteristics
  - Ecological Site Inventory forms
    - Overstory / understory vegetation
    - Tree site index

Digital Pen and Soil Survey

- Easier to carry and use in the field than a tablet or laptop computer
  - Less vulnerable to damage in the field than a tablet computer
- Significantly less expensive than a tablet
  - Opportunity to replace tablets with less expensive, more powerful desktops

Digital Pen and Soil Survey

- Familiar, ‘low-tech’ data collection solution
  - Pen and paper
  - Don’t have to mess with a computer in the field
- Short-cut to usable, digital spatial and tabular data compared to manual digitizing and data entry

Digital Pen and Soil Survey

- Tabular data
  - Opportunity to focus on field data collection workflow and observations and not the data model
    - Data collection procedures and forms designed around logical groups and sequence of observations
    - Only field observations on forms
    - Background processing to decode and rearrange as necessary to upload to database

Questions, Comments