

# Beyond Data-Driven Pages: .NET-Based Map Series Development

David A. Howes

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# Acknowledgements

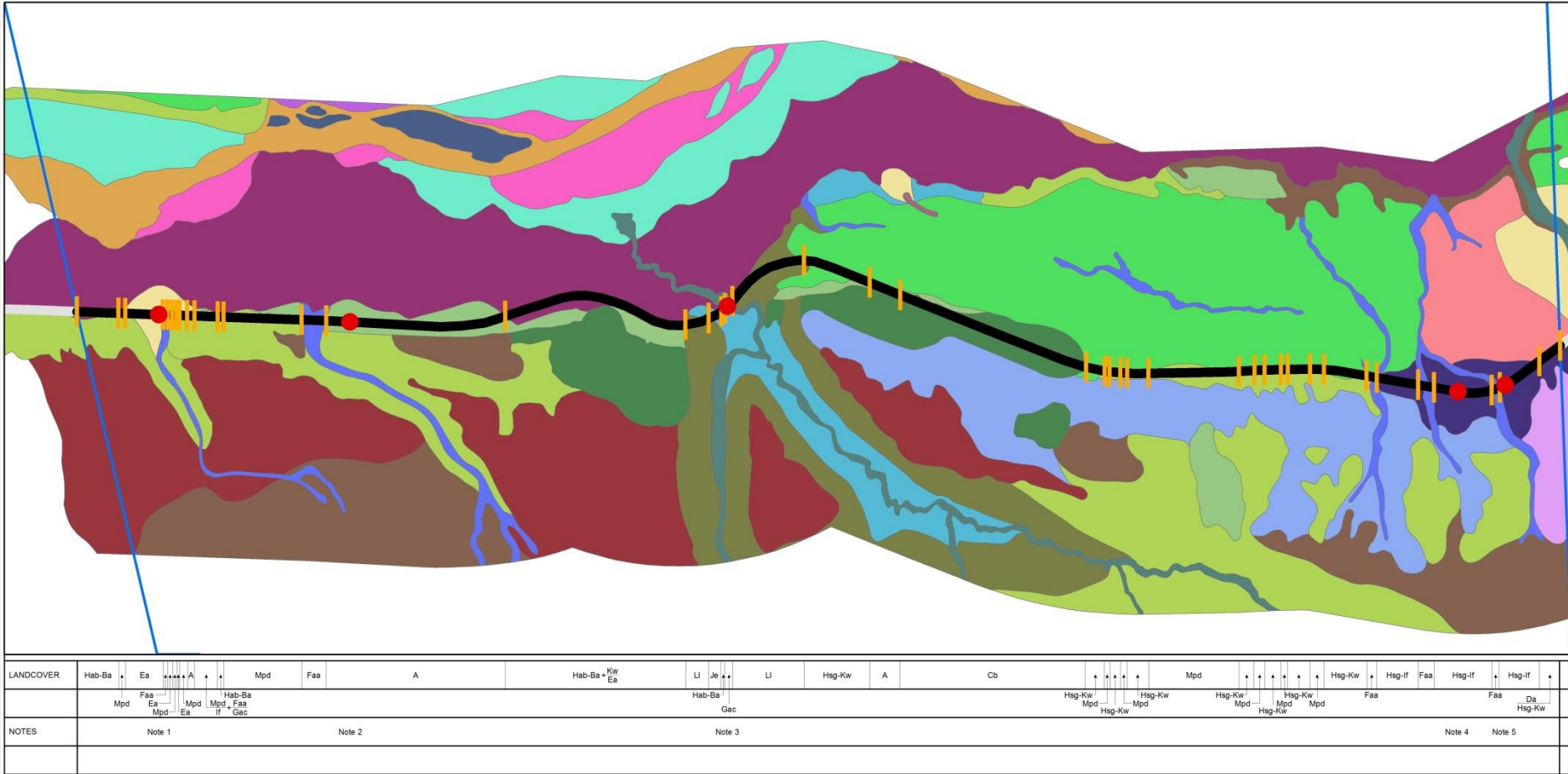


Many thanks to Luke Boggess, Charlie Riddle & Pete Hardcastle at R&M Consultants, Inc., Anchorage, Alaska, for their business and for permission to present the tool described in the presentation, which is used in their projects

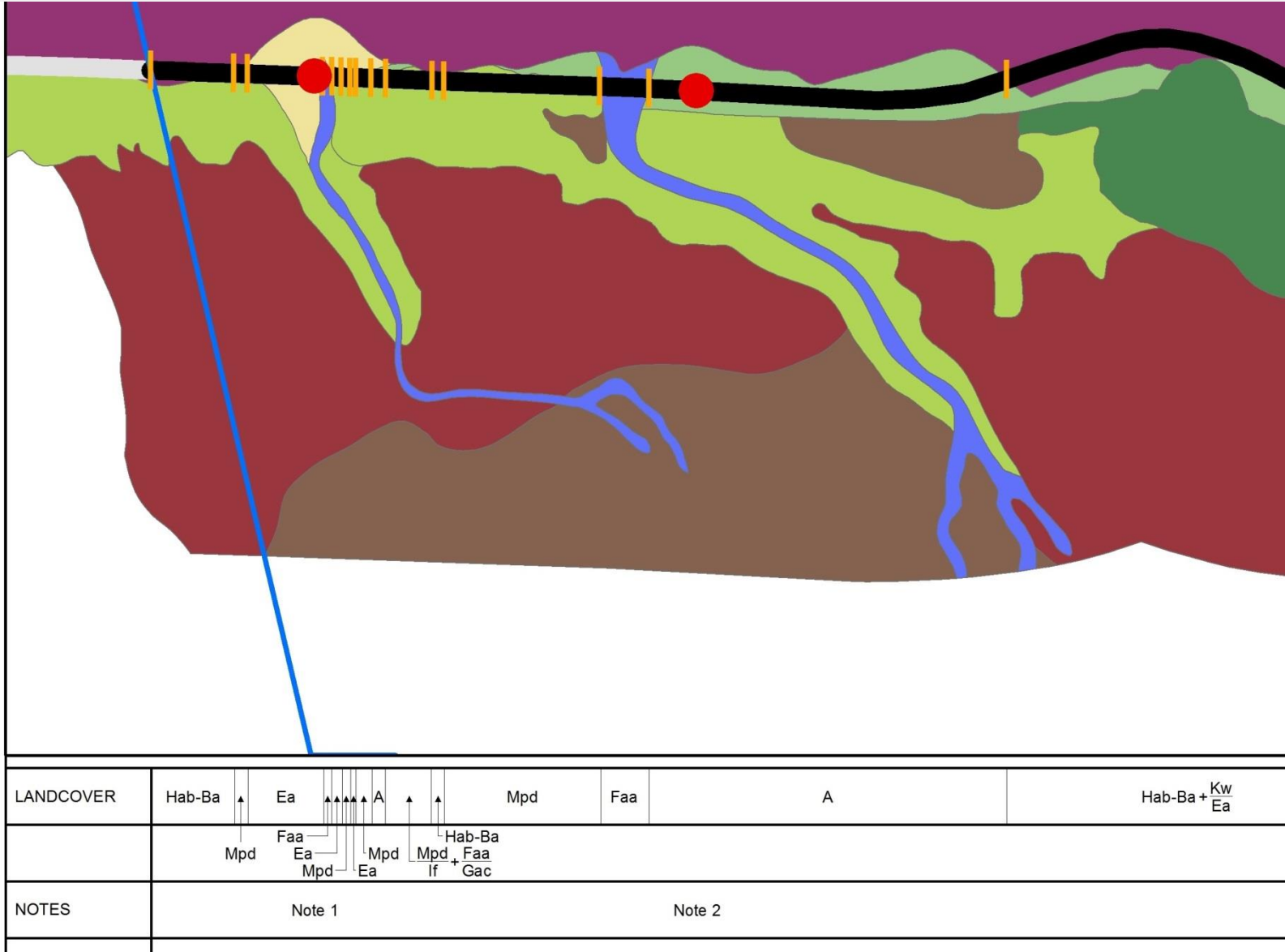
LANDCOVER	Hab-Ba	Ea	A	Mpd	Faa	A	Hab-Ba Kw Ea	Li	Je	Li	Hsg-Kw	A	Cb	Hsg-Kw	Mpd	Hsg-Kw	Hsg-Kw	Hsg-Kw	Faa	Hsg-If	Hsg-If	Hsg-If		
	Mpd	Faa	Mpd	Hab-Ba			Hab-Ba							Hsg-Kw	Mpd	Hsg-Kw	Hsg-Kw	Hsg-Kw	Faa	Hsg-If	Faa	Hsg-If		
NOTES	Note 1				Note 2				Note 3								Note 4				Note 5			

TITLE		DATE		AUTHOR		PAGE	
San Joaquin Hills		04/04/02		J. L. ...		022	

# Data Band Creation



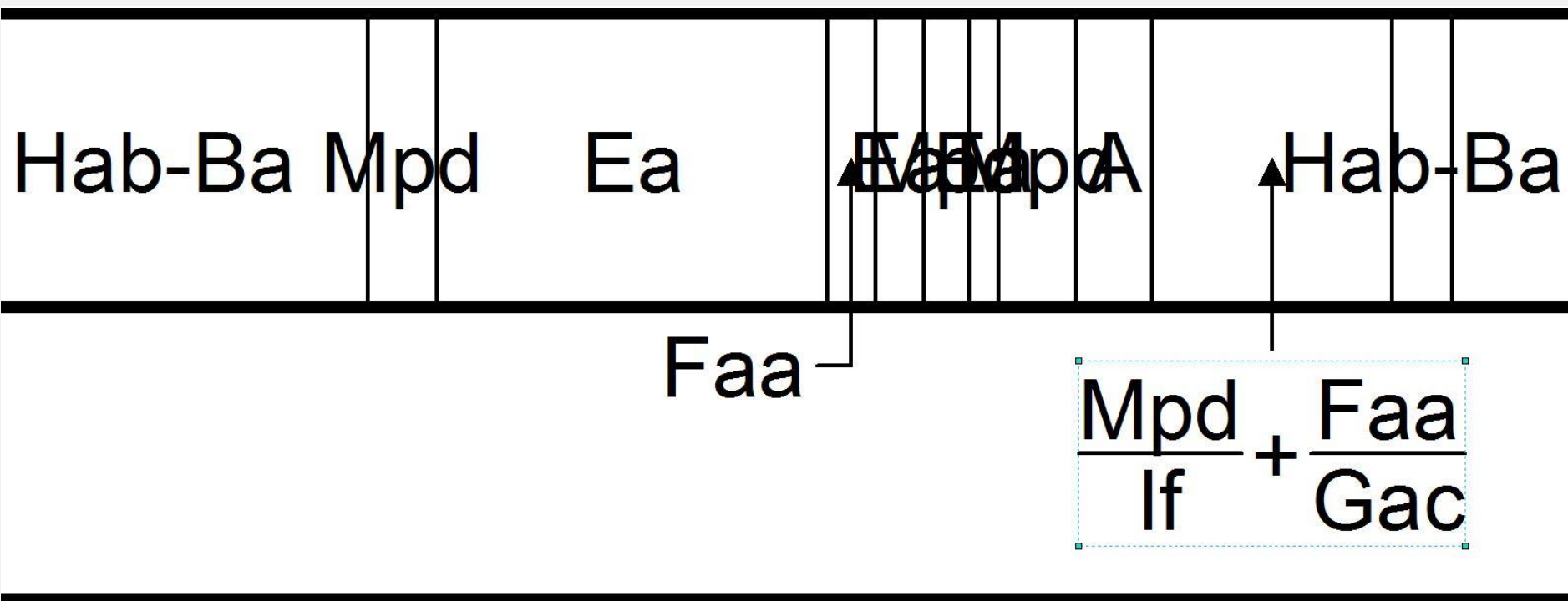
# Data Band Creation



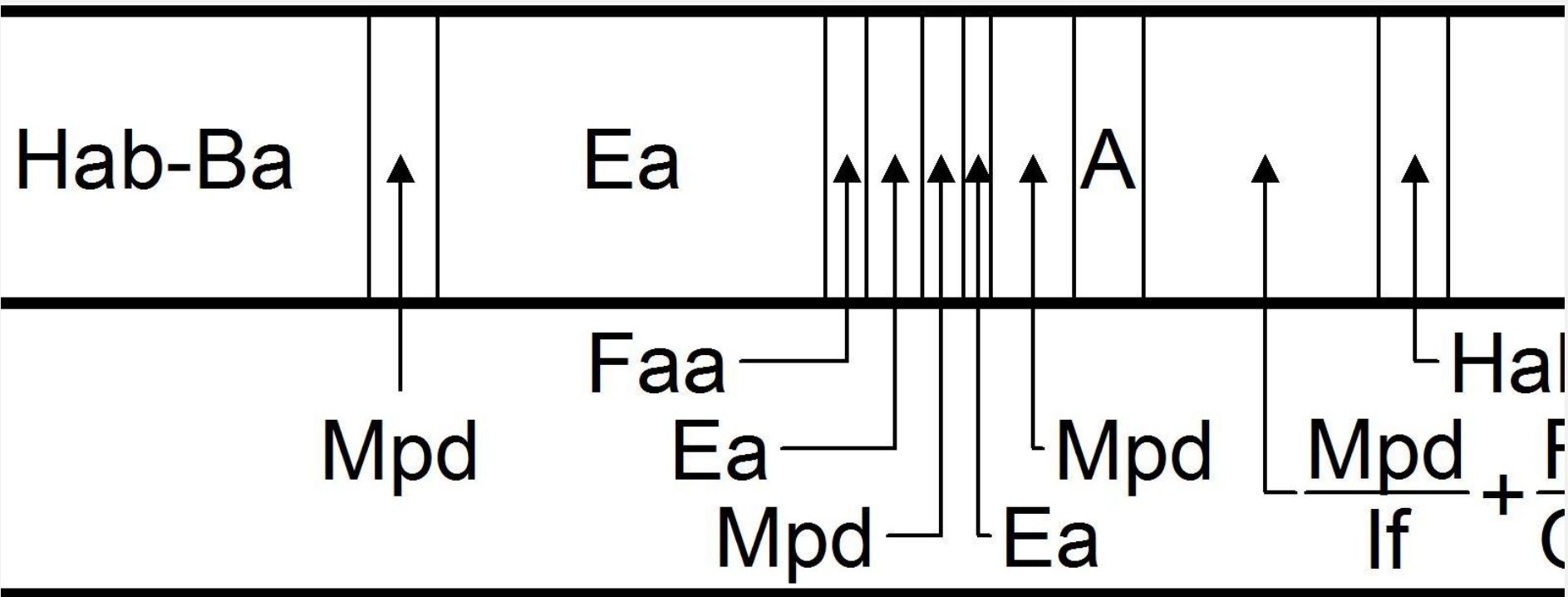
## Line Data Band: Initial Build

Hab-Ba	Mpd	Ea	Faa	Faa	Faa	Faa	Mpd	Faa	Faa	Ba
							If	Gac		

# Line Data Band: Partially Adjusted



# Line Data Band: Adjusted





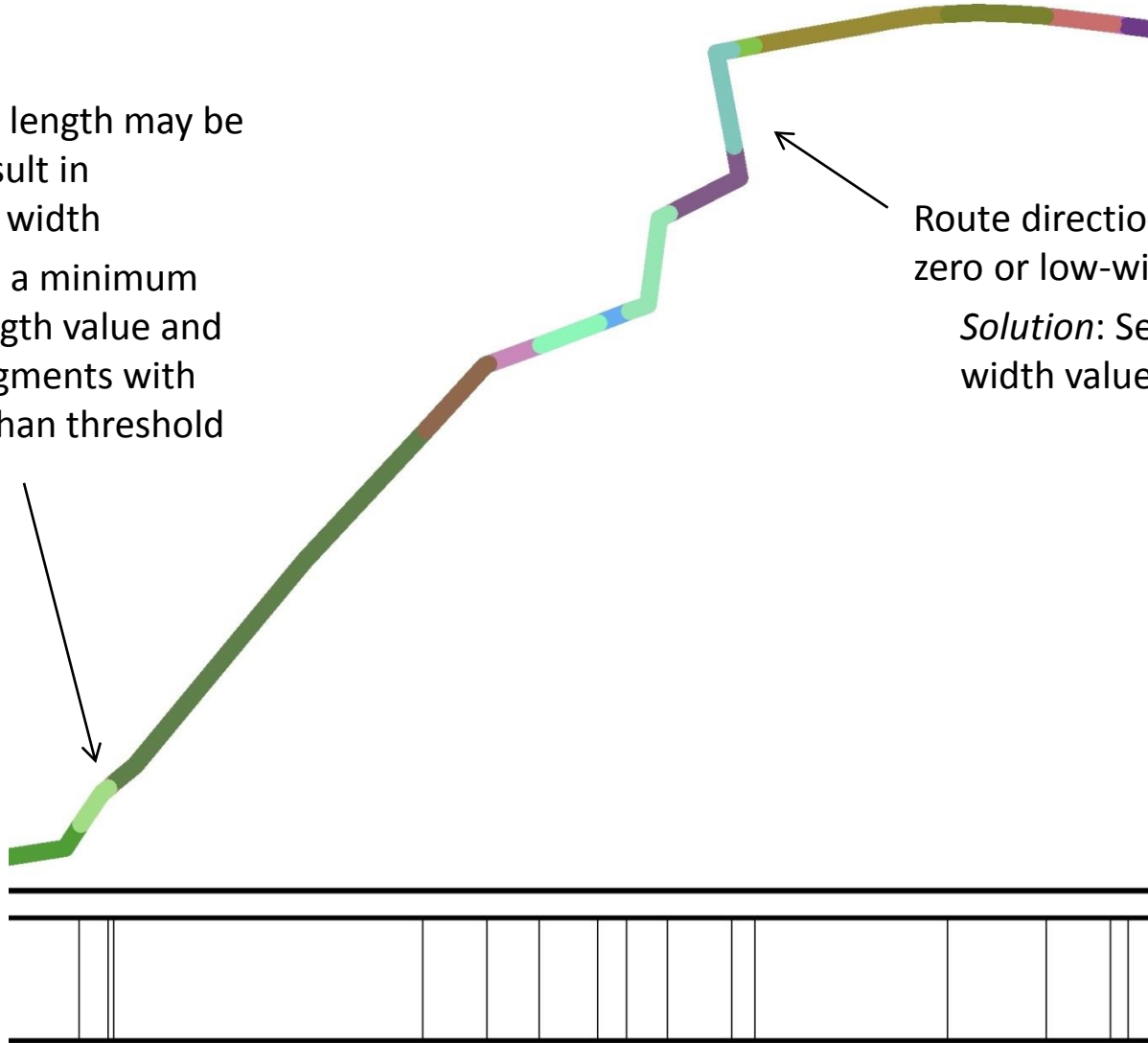
# Line Data Band: Narrow Data Band

Route segment length may be too small to result in reasonable bar width

*Solution:* set a minimum segment length value and skip over segments with length less than threshold value

Route direction may result in zero or low-width bars

*Solution:* Set a minimum bar width value



# Project Requirements

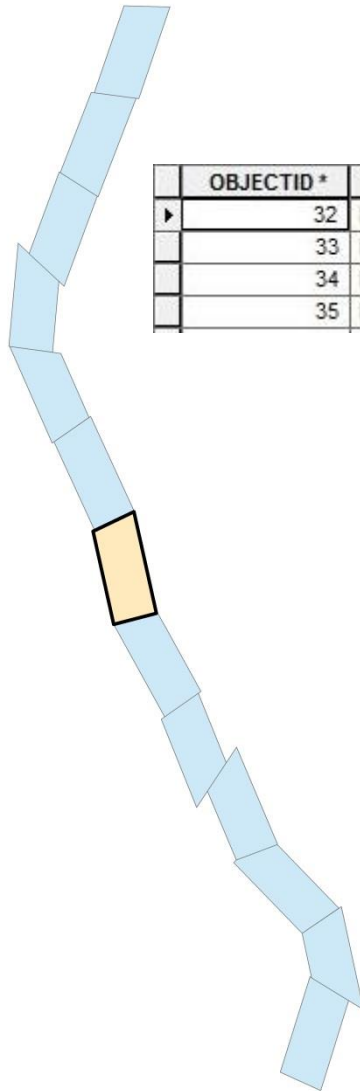
## **Mapping requirement:**

- Generate a series of maps for the full length of a route
- For each map
  - Build the required data bands
  - Adjust the label positions
  - Save the map configuration (analogous to having multiple layouts)
- Export the series of maps

## **Development requirement:**

Create tools to simplify and speed up the mapping process

# Data-Driven Pages



	OBJECTID *	Shape *	PageNumber	GroupId	SeqId	Angle	Scale	PageLabel
▶	32	Polygon	27	1	27	107.22	24000	027
	33	Polygon	26	1	26	77.84	24000	026
	34	Polygon	25	1	25	45.97	24000	025
	35	Polygon	24	1	24	67.16	24000	024

Set Up Data Driven Pages

Definition Extent

**What are data driven pages?**  
An index layer is used to produce multiple output pages using a single layout. Each page shows the data at a different extent. The extents are defined by the features in the index layer.

☒ Enable Data Driven Pages

Index Layer

Data Frame:  
Layers

Layer:  
index\_polygon

Name Field:  
SeqId

Sort Field:  
SeqId

☒ Sort Ascending

Optional Fields

Rotation:  
Angle

Spatial Reference:  
none

Page Number:  
none

Starting Page Number:  
1

OK Cancel

Map Series Development Tools

**Setup**

Setup file path: C:\Temp\Map Series Dev Inputs.txt

Setup values:

Map document - C:\Temp\Demo\Demo.mxd  
 Map data file geodatabase - C:\Temp\Demo\Demo.gdb  
 Index layer - index\_polygon  
 Index layer group ID - 1  
 Land cover route layer - landcover\_alignment

**Element Definition**

Map:   ☒ Update index only Current index: 21

Databand type: Land Cover ☐ Apply to all

Adjust label position:  Selected element name: <None selected>

Relative position: ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ X adjustment factor: 1.00

Y adjustment factor: 1.00

Custom map center:

Element definition:   Dynamic text:

**Map Export**

Start Index:   End index:    Output type: PDF Resolution: 300

☐ Overwrite existing file ☒ Load data bands?

**Messages**

# Providing User Functionality: .NET (C#) Add-In

- Add-ins provide a means of extending ArcGIS functionality
- Available as a development option beginning with ArcGIS 10.0
- Small .esriaddin file is easily distributed and installed
- Can be built using .NET (C# & VB.NET), Java or Python

# User Functionality: Setup

**Setup**

Setup file path: C:\Temp\Map Series Dev Inputs.txt Select

Setup values:

Map document - C:\Temp\Demo\Demo.mxd  
Map data file geodatabase - C:\Temp\Demo\Demo.gdb  
Index layer - index\_polygon  
Index layer group ID - 1  
Land cover route layer - landcover\_alignment

Update

- Store input parameters in as simple a format as possible
- XML works, but key/value pairs are even simpler
- Only add setup controls (for choosing layers, specifying parameter values etc.) when ready, to save time and expense

# User Functionality: Element Definition

Move between maps

Resume where you left off

**Element Definition**

Map:   ☒ Update index only Current index: 21

Databand type: Land Cover

Adjust label position:  Selected element name: <None selected>

Relative position: ☐ ☐ ☐ ☐ ☒ ☐ ☐ X adjustment factor: 1.00

Y adjustment factor: 1.00

Custom map center:

Element definition:   Dynamic text:

Build, load, delete data bands

Adjust label positions

Save definitions to table

Update dynamic text

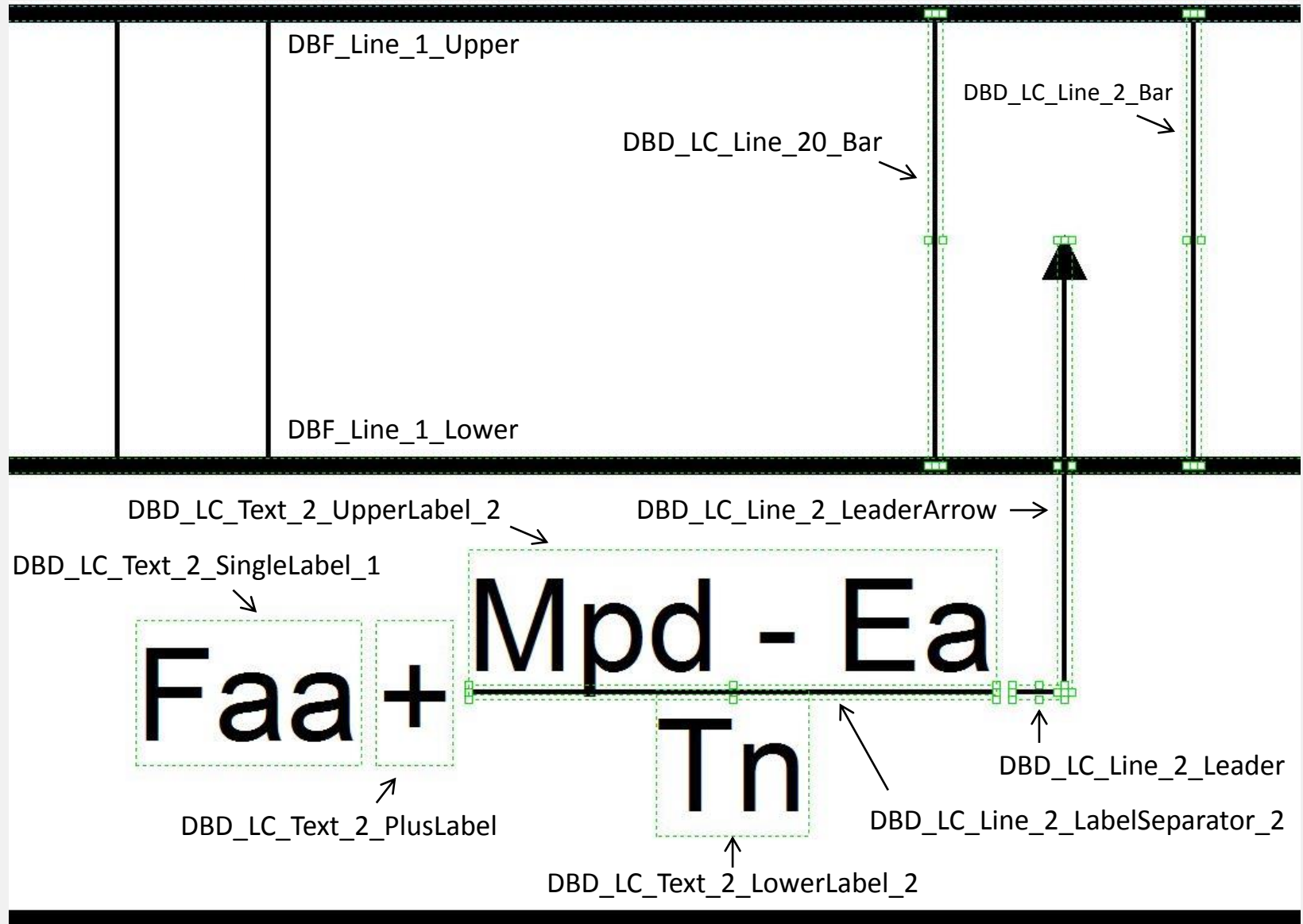
Custom functions for controlling map centering

Columns added to index layer

If non-zero coordinates present, they're used to center the map

CenterX	CenterY
0	0
1611492.083826	2814554.756334
0	0
0	0

# Element Name as Storage Unit



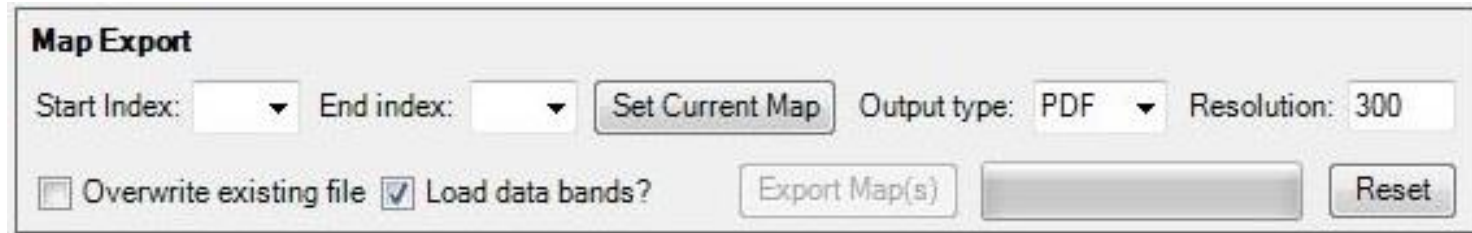


# Element Definition Storage

OBJECTID *	MapDocumentPath	IndexGroupID	IndexSeqID	ElementType	ElementName	PropertyName	PropertyValue	CreationDate
21313	C:\Temp\Demo\Demo.mxd	1	21	Text	DBD_LC_Text_2_LowerLabel_2	Text	Tn	5/2/2013 10:09:34 PM
21314	C:\Temp\Demo\Demo.mxd	1	21	Text	DBD_LC_Text_2_LowerLabel_2	ColorRGB	33554432	5/2/2013 10:09:34 PM
21315	C:\Temp\Demo\Demo.mxd	1	21	Text	DBD_LC_Text_2_LowerLabel_2	Size	6	5/2/2013 10:09:34 PM
21316	C:\Temp\Demo\Demo.mxd	1	21	Text	DBD_LC_Text_2_LowerLabel_2	PtX	14.9635999999991	5/2/2013 10:09:34 PM
21317	C:\Temp\Demo\Demo.mxd	1	21	Text	DBD_LC_Text_2_LowerLabel_2	PtY	3.5581000000002	5/2/2013 10:09:34 PM
21318	C:\Temp\Demo\Demo.mxd	1	21	Text	DBD_LC_Text_2_LowerLabel_2	HorizontalAlignment	esriTHACenter	5/2/2013 10:09:34 PM
21319	C:\Temp\Demo\Demo.mxd	1	21	Text	DBD_LC_Text_2_LowerLabel_2	VerticalAlignment	esriTVACenter	5/2/2013 10:09:34 PM
21320	C:\Temp\Demo\Demo.mxd	1	21	Text	DBD_LC_Text_2_LowerLabel_2	AnchorPoint	esriTopMidPoint	5/2/2013 10:09:34 PM
21321	C:\Temp\Demo\Demo.mxd	1	21	Line	DBD_LC_Line_2_LabelSeparator_2	ColorRGB	33554432	5/2/2013 10:09:34 PM
21322	C:\Temp\Demo\Demo.mxd	1	21	Line	DBD_LC_Line_2_LabelSeparator_2	Width	0.25	5/2/2013 10:09:34 PM
21323	C:\Temp\Demo\Demo.mxd	1	21	Line	DBD_LC_Line_2_LabelSeparator_2	FromPtX	14.7945999999993	5/2/2013 10:09:34 PM
21324	C:\Temp\Demo\Demo.mxd	1	21	Line	DBD_LC_Line_2_LabelSeparator_2	FromPtY	3.60310000000027	5/2/2013 10:09:34 PM
21325	C:\Temp\Demo\Demo.mxd	1	21	Line	DBD_LC_Line_2_LabelSeparator_2	ToPtX	15.1327000000001	5/2/2013 10:09:34 PM
21326	C:\Temp\Demo\Demo.mxd	1	21	Line	DBD_LC_Line_2_LabelSeparator_2	ToPtY	3.60310000000027	5/2/2013 10:09:34 PM
21327	C:\Temp\Demo\Demo.mxd	1	21	Line	DBD_LC_Line_2_LabelSeparator_2	AnchorPoint	esriCenterPoint	5/2/2013 10:09:34 PM
21328	C:\Temp\Demo\Demo.mxd	1	21	Text	DBD_LC_Text_2_UpperLabel_2	Text	Mpd - Ea	5/2/2013 10:09:34 PM
21329	C:\Temp\Demo\Demo.mxd	1	21	Text	DBD_LC_Text_2_UpperLabel_2	ColorRGB	33554432	5/2/2013 10:09:34 PM
21330	C:\Temp\Demo\Demo.mxd	1	21	Text	DBD_LC_Text_2_UpperLabel_2	Size	6	5/2/2013 10:09:34 PM
21331	C:\Temp\Demo\Demo.mxd	1	21	Text	DBD_LC_Text_2_UpperLabel_2	PtX	14.9635999999991	5/2/2013 10:09:34 PM
21332	C:\Temp\Demo\Demo.mxd	1	21	Text	DBD_LC_Text_2_UpperLabel_2	PtY	3.64810000000034	5/2/2013 10:09:34 PM
21333	C:\Temp\Demo\Demo.mxd	1	21	Text	DBD_LC_Text_2_UpperLabel_2	HorizontalAlignment	esriTHACenter	5/2/2013 10:09:34 PM
21334	C:\Temp\Demo\Demo.mxd	1	21	Text	DBD_LC_Text_2_UpperLabel_2	VerticalAlignment	esriTVACenter	5/2/2013 10:09:34 PM
21335	C:\Temp\Demo\Demo.mxd	1	21	Text	DBD_LC_Text_2_UpperLabel_2	AnchorPoint	esriBottomMidPoint	5/2/2013 10:09:34 PM
21336	C:\Temp\Demo\Demo.mxd	1	21	Text	DBD_LC_Text_2_SingleLabel_1	Text	Faa	5/2/2013 10:09:34 PM
21337	C:\Temp\Demo\Demo.mxd	1	21	Text	DBD_LC_Text_2_SingleLabel_1	ColorRGB	33554432	5/2/2013 10:09:34 PM
21338	C:\Temp\Demo\Demo.mxd	1	21	Text	DBD_LC_Text_2_SingleLabel_1	Size	6	5/2/2013 10:09:34 PM
21339	C:\Temp\Demo\Demo.mxd	1	21	Text	DBD_LC_Text_2_SingleLabel_1	PtX	14.6540999999997	5/2/2013 10:09:34 PM
21340	C:\Temp\Demo\Demo.mxd	1	21	Text	DBD_LC_Text_2_SingleLabel_1	PtY	3.60310000000027	5/2/2013 10:09:34 PM
21341	C:\Temp\Demo\Demo.mxd	1	21	Text	DBD_LC_Text_2_SingleLabel_1	HorizontalAlignment	esriTHACenter	5/2/2013 10:09:34 PM
21342	C:\Temp\Demo\Demo.mxd	1	21	Text	DBD_LC_Text_2_SingleLabel_1	VerticalAlignment	esriTVACenter	5/2/2013 10:09:34 PM
21343	C:\Temp\Demo\Demo.mxd	1	21	Text	DBD_LC_Text_2_SingleLabel_1	AnchorPoint	esriCenterPoint	5/2/2013 10:09:34 PM
21344	C:\Temp\Demo\Demo.mxd	1	21	Text	DBD_LC_Text_2_PlusLabel	Text	+	5/2/2013 10:09:34 PM



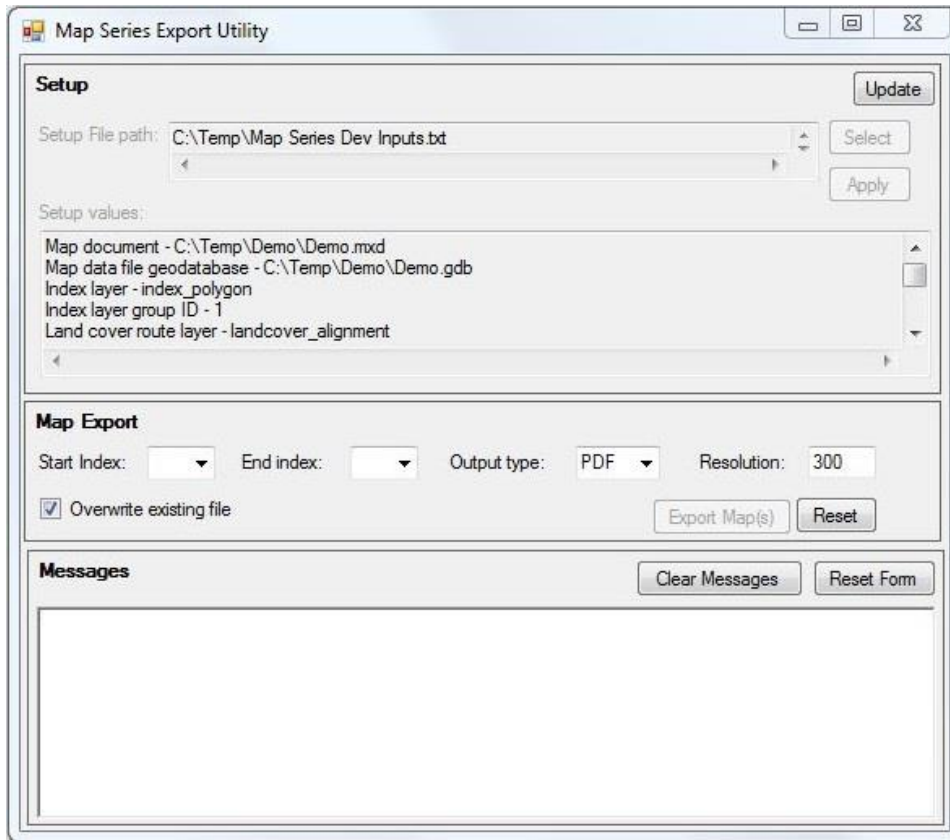
# User Functionality: Map Export



**Map Export**

Start Index:  End index:   Output type: PDF Resolution: 300

☐ Overwrite existing file ☒ Load data bands?



**Map Series Export Utility**

**Setup**

Setup File path: C:\Temp\Map Series Dev Inputs.txt

Setup values:

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Map data file geodatabase - C:\Temp\Demo\Demo.gdb  
Index layer - index\_polygon  
Index layer group ID - 1  
Land cover route layer - landcover\_alignment

**Map Export**

Start Index:  End index:  Output type: PDF Resolution: 300

☒ Overwrite existing file

**Messages**

Map export from within ArcMap:  
2 minutes per map

Standalone exporter using most of the  
same code as the add-in:  
2 seconds per map

# User Functionality: Messages



- Messages may be of instructions or error messages
- Can easily be copied and pasted elsewhere
- History can be maintained and cleared

# Development Considerations

- General
  - Try to keep processes as simple as possible
  - Use exploratory data analysis to help determine the nature of the problem
- User
  - Be cognizant of the user
  - Reliability is key
  - Interface doesn't always have to look good, but must work properly

# Development Considerations

- Core Construction
  - Allow for continual expansion
  - Strike a balance between generalizing for wider use and getting something working
  - Allow for expansion as further needs arise
  - Create re-usable code (e.g., standalone export program, uses much of the code from the add-in)
  - Code neatly and comment well
- Refactoring
  - Once you figure out how the process works, you can soon go back and refine it
  - Even though the client may not demand it, you're the one who has to support it
  - It's always in your interests to generate high quality products that are simple to maintain

# Administrative Considerations

- Estimates
  - Time and cost estimates can be difficult as complexity begins to grow
  - Split tasks into clearly defined and manageable pieces
- Scope

Be as clear as possible about what will and will not be done
- Cost

It's in everyone's interests to make sure the costs are clearly understood
- Return on investment

Tool development lends itself to quantification in terms of time and cost, which can help justify a project
- Honesty

Above all else, be honest and open with yourself and your client

# Conclusions

- Compared to traditional alternatives, streamlined approaches such as that described here can often pay for themselves many times over
- Developing customized procedures yourself or with assistance from someone else can allow you to reap tremendous returns on what can be a sizeable investment in a product such as ArcGIS for Desktop
- Despite the current heavy emphasis on cloud functionality, the benefits of desktop functionality will remain strong for many years to come