



# NIDays

**THE LabVIEW CONFERENCE**

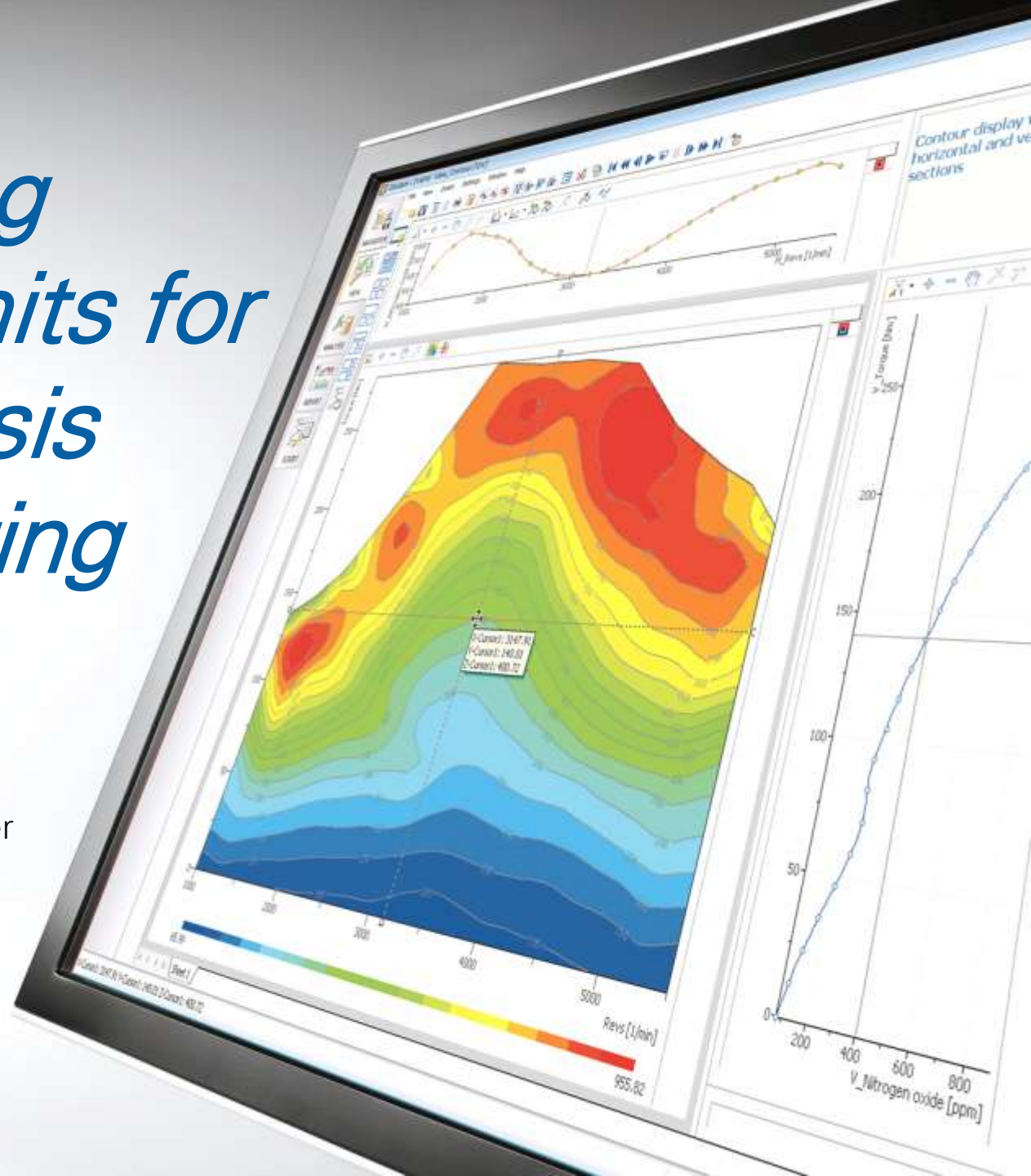
01/10/2013 | Netherlands

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<http://www.ni.com/nidays/>

# *Overcoming Excel's Limits for Data Analysis and Reporting*

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Platinum Applications Engineer  
NI Certified LabVIEW Developer  
NI Belgium



# Today's Agenda

- Importance of Data Today
- Shortcomings of Traditional Tools
- Use Fewer Resources to Get More from your Data
- Real-World Application Exercises
- Where to go next?



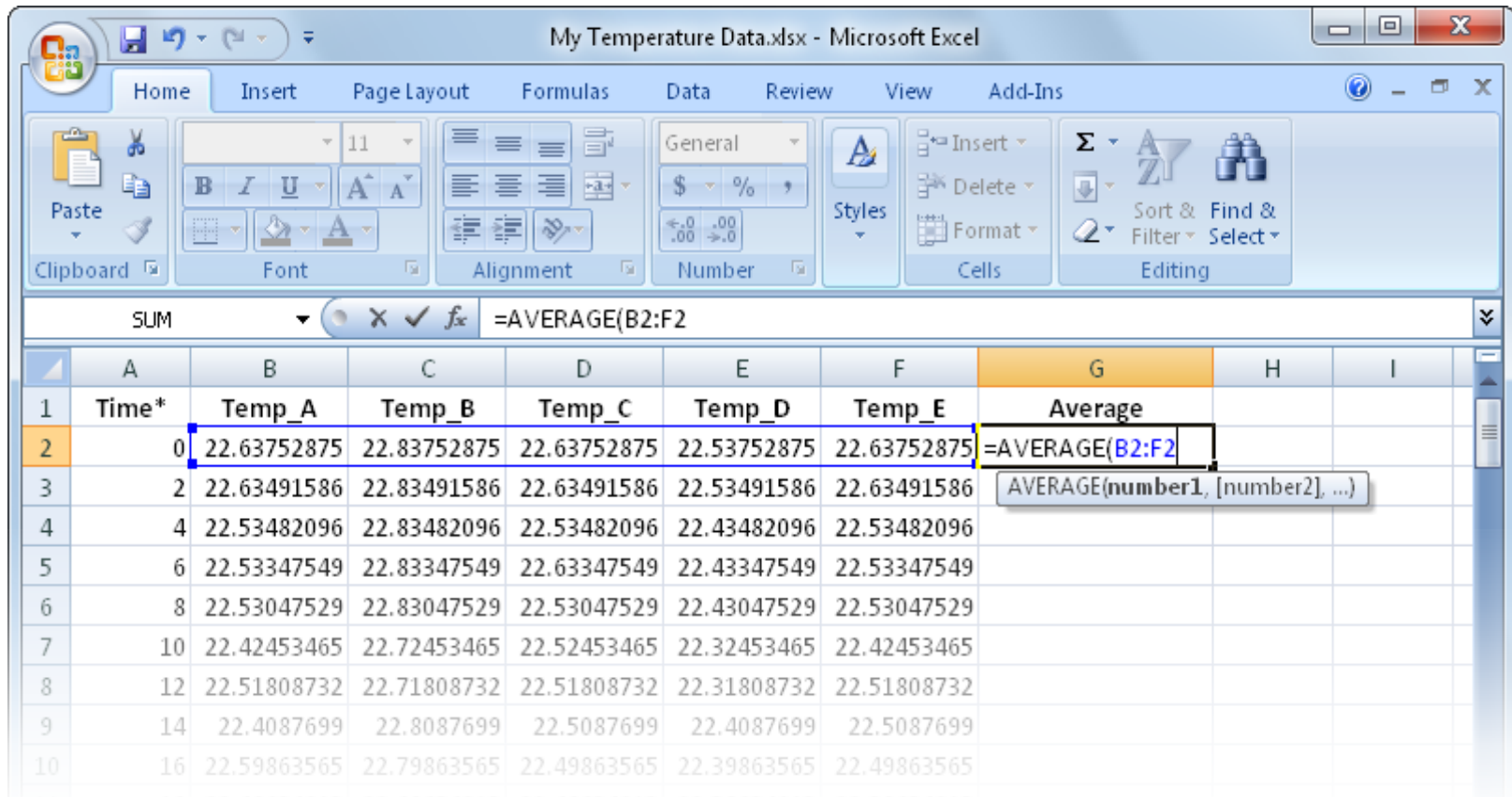
What is the most difficult aspect of working with your current software tools?



If data is so **valuable**...

...why use **financial** tools  
to extract engineering intelligence?

# Engineers work with channels...



My Temperature Data.xlsx - Microsoft Excel

Home Insert Page Layout Formulas Data Review View Add-Ins

Paste Font Alignment Number Styles Cells Editing

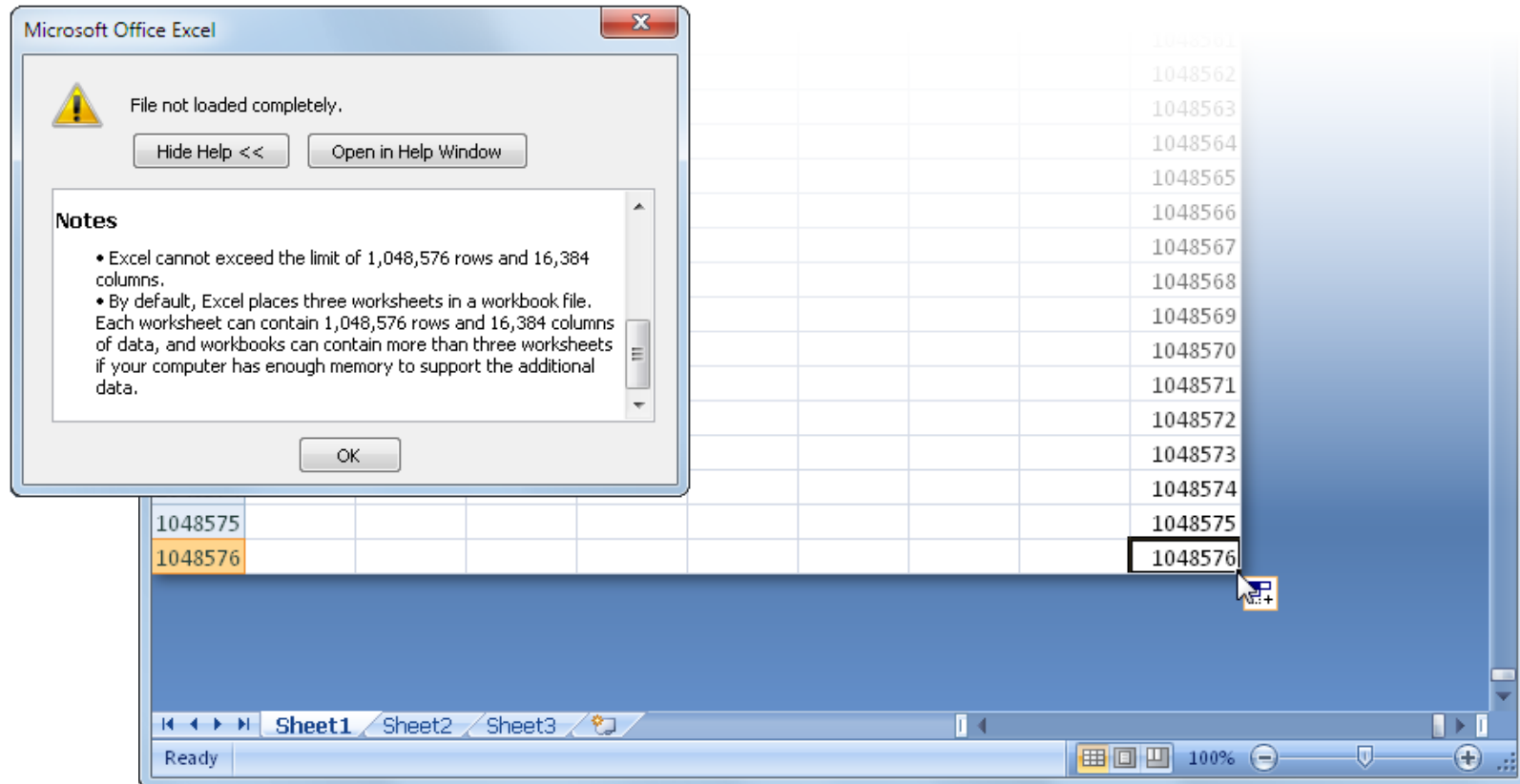
SUM X ✓ fx =AVERAGE(B2:F2

	A	B	C	D	E	F	G	H	I
1	Time*	Temp_A	Temp_B	Temp_C	Temp_D	Temp_E	Average		
2	0	22.63752875	22.83752875	22.63752875	22.53752875	22.63752875	=AVERAGE(B2:F2		
3	2	22.63491586	22.83491586	22.63491586	22.53491586	22.63491586			
4	4	22.53482096	22.83482096	22.53482096	22.43482096	22.53482096			
5	6	22.53347549	22.83347549	22.63347549	22.43347549	22.53347549			
6	8	22.53047529	22.83047529	22.53047529	22.43047529	22.53047529			
7	10	22.42453465	22.72453465	22.52453465	22.32453465	22.42453465			
8	12	22.51808732	22.71808732	22.51808732	22.31808732	22.51808732			
9	14	22.4087699	22.8087699	22.5087699	22.4087699	22.5087699			
10	16	22.59863565	22.79863565	22.49863565	22.39863565	22.49863565			

AVERAGE(number1, [number2], ...)

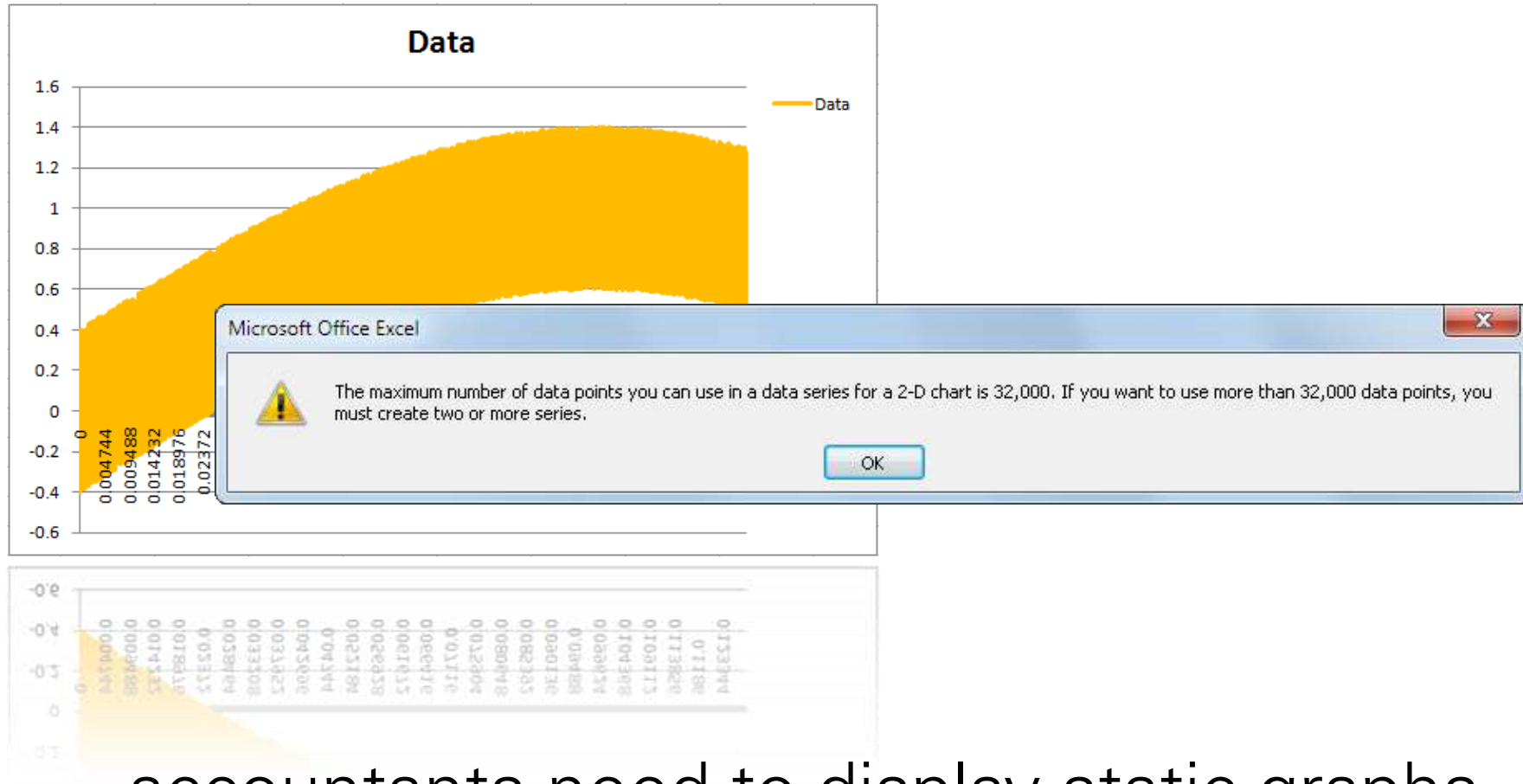
...accountants work with cells.

# Engineers process time-based data...



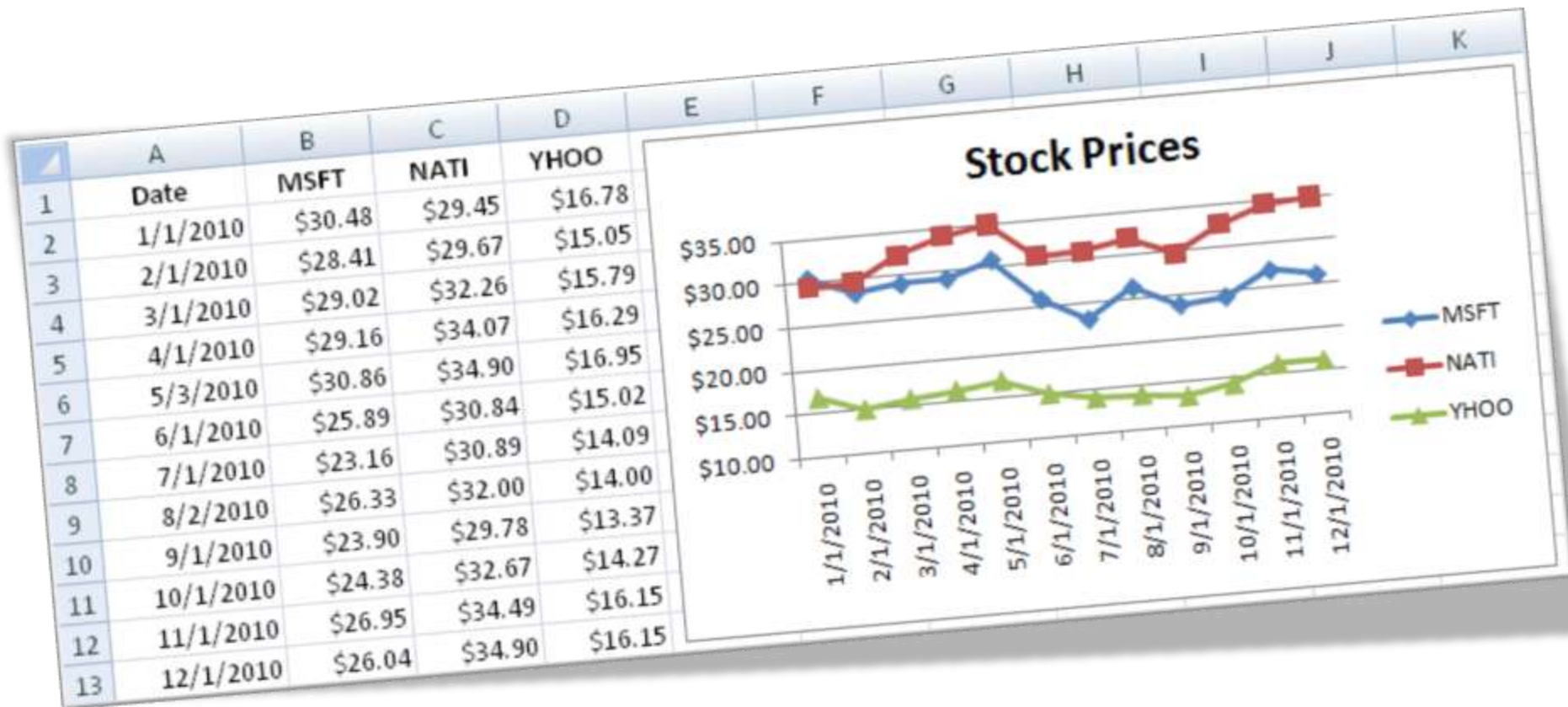
...accountants process balance sheets.

# Engineers need to interact with data...



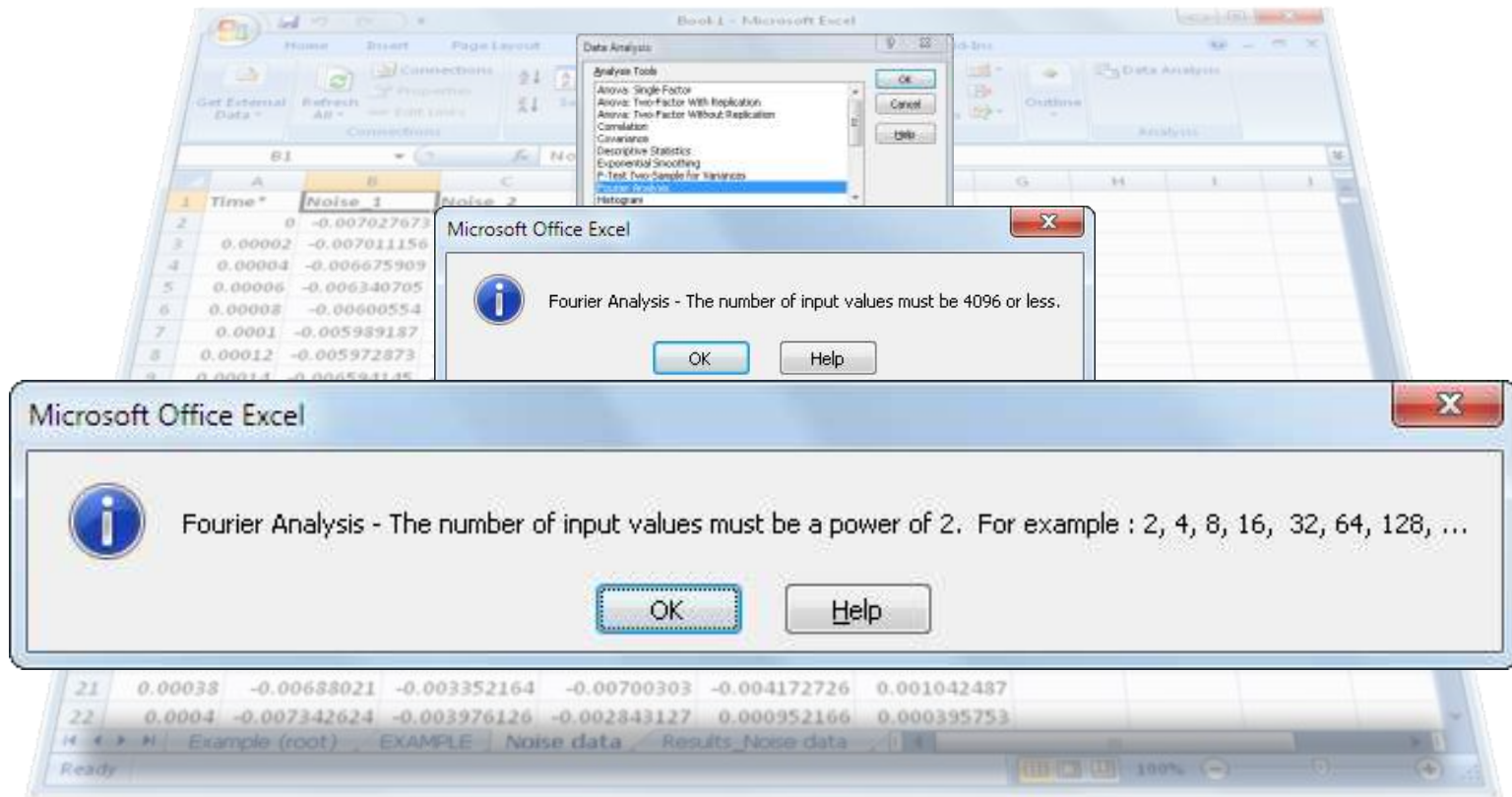


Engineers trend data from multiple files...



...accountants trend stock prices from multiple columns.

Engineers perform complex calculations...



...accountants perform basic math.

Engineers review complex reports...



...accountants review expense reports.



# What is NI DIAdem?



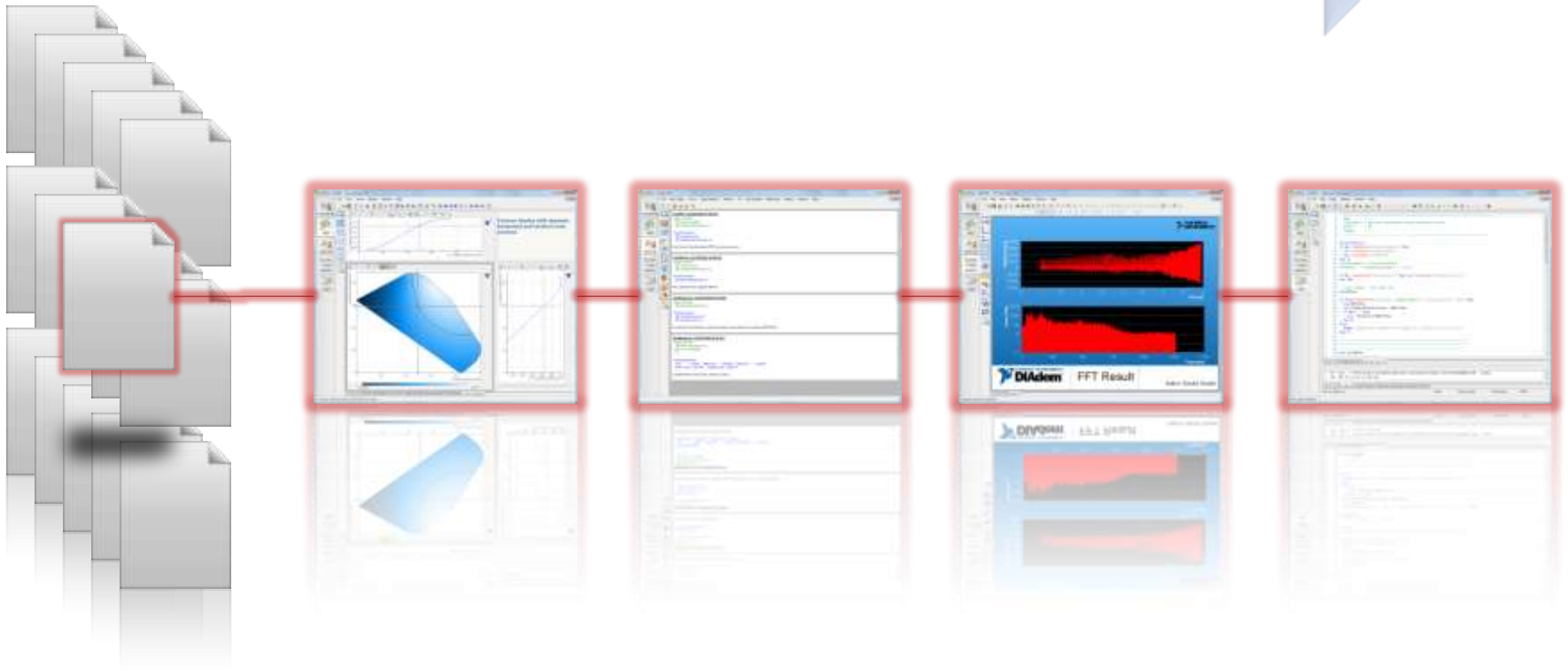
Ready to use data search and mining

Easy, flexible access to databases and files

Interactive analysis and report generation

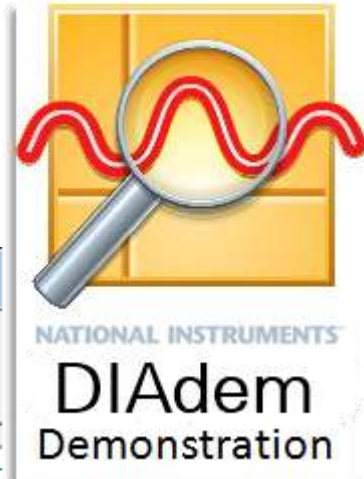
Automation through VBScript

# NI DIAdem uses Independent Components





# NI DIAdem Environment Layout



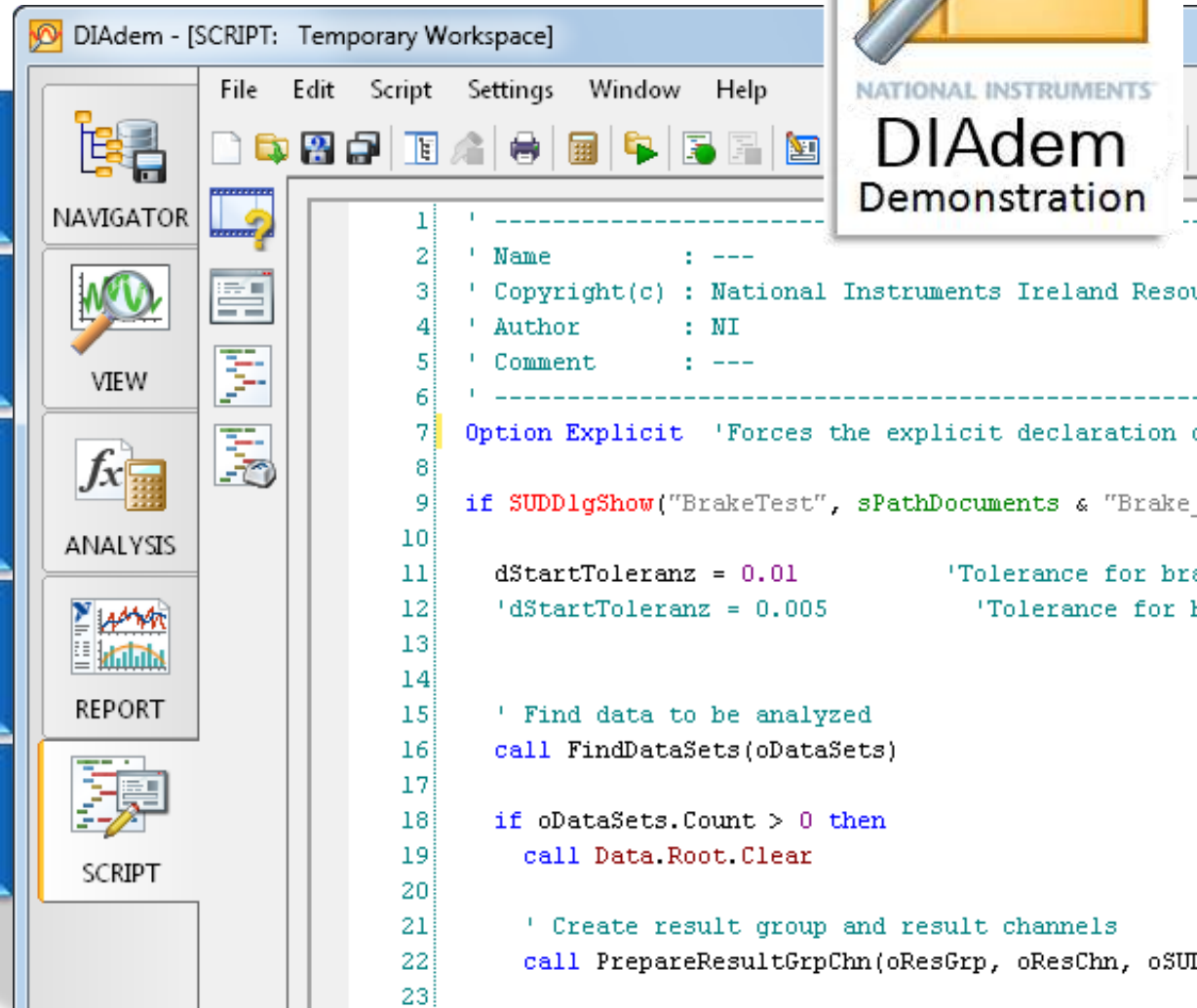
Find and Load Data

Inspect Data

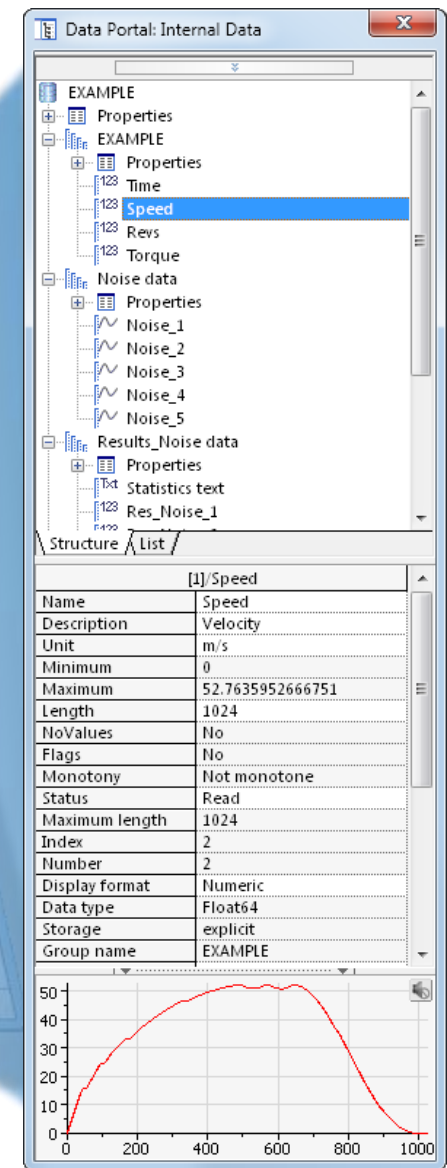
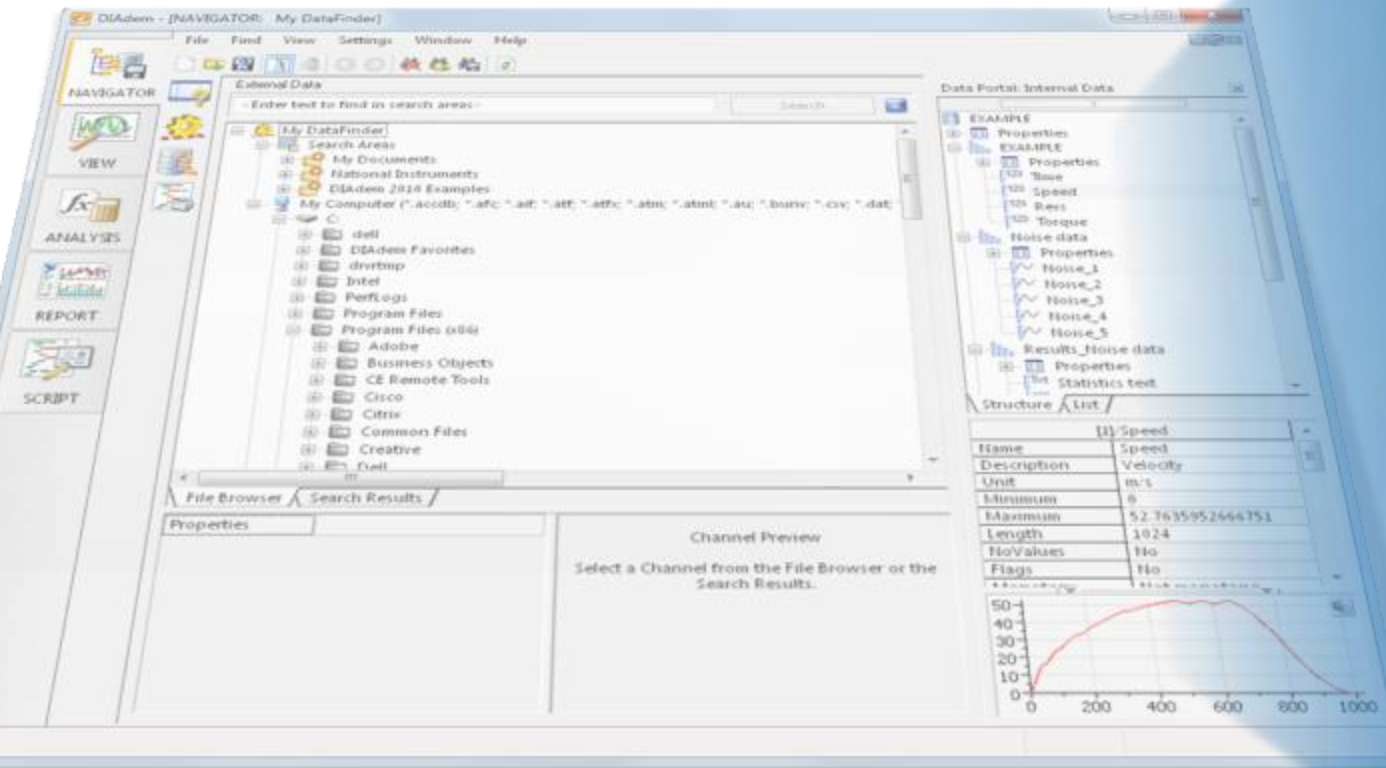
Analyze Data

Report Results

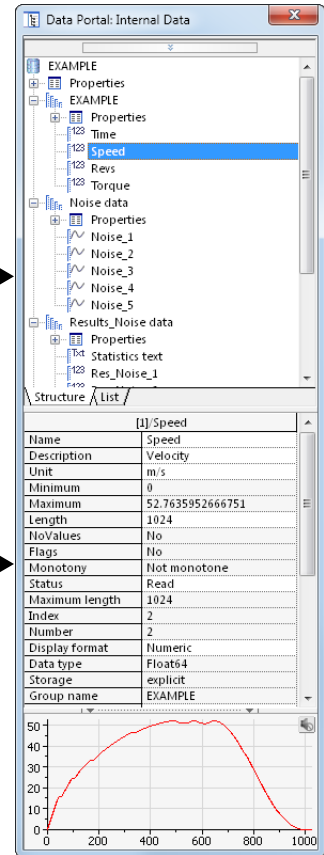
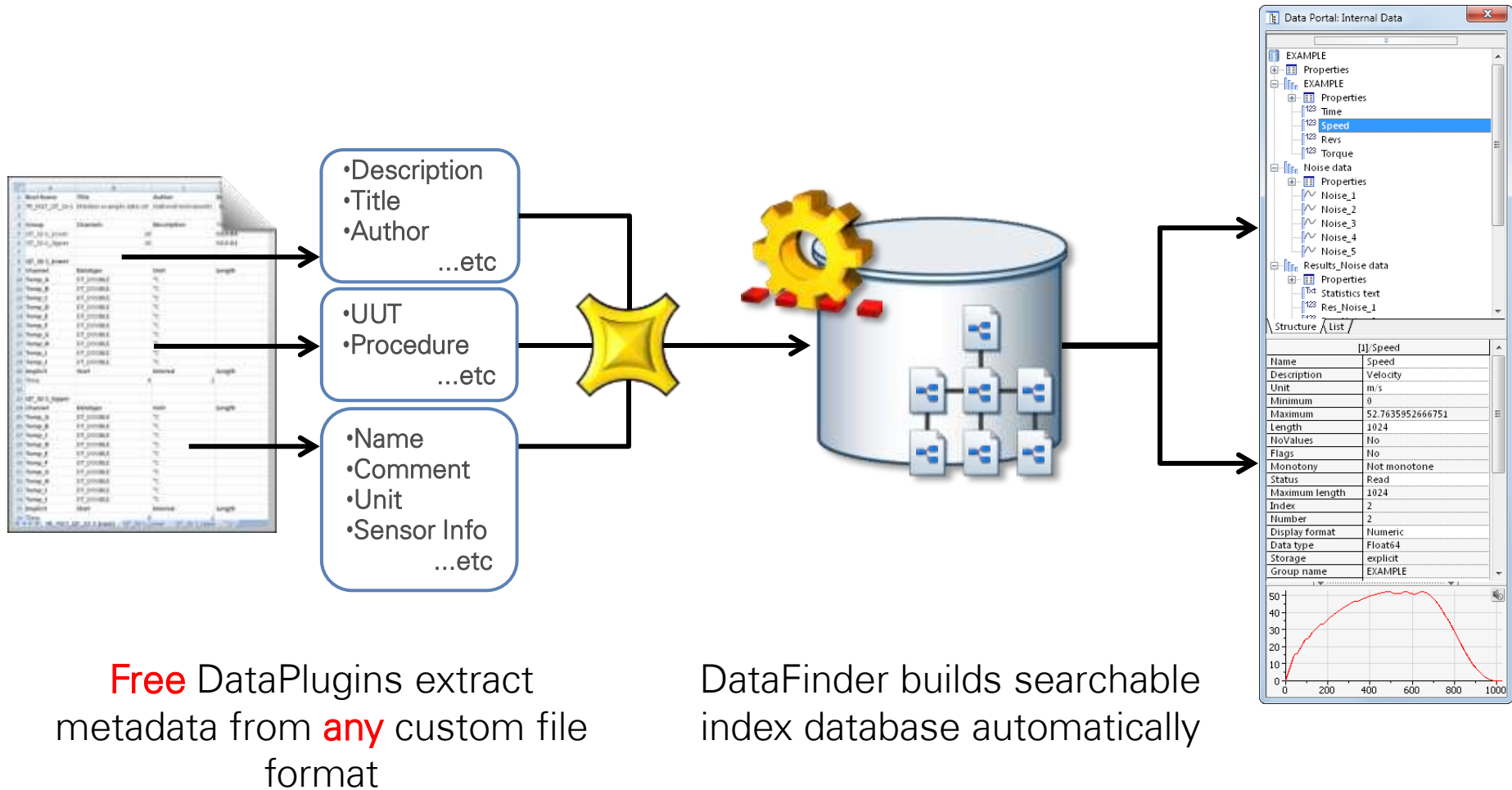
Automate



# What happens in the Data Portal...



# NI DataFinder and DataPlugin Technology



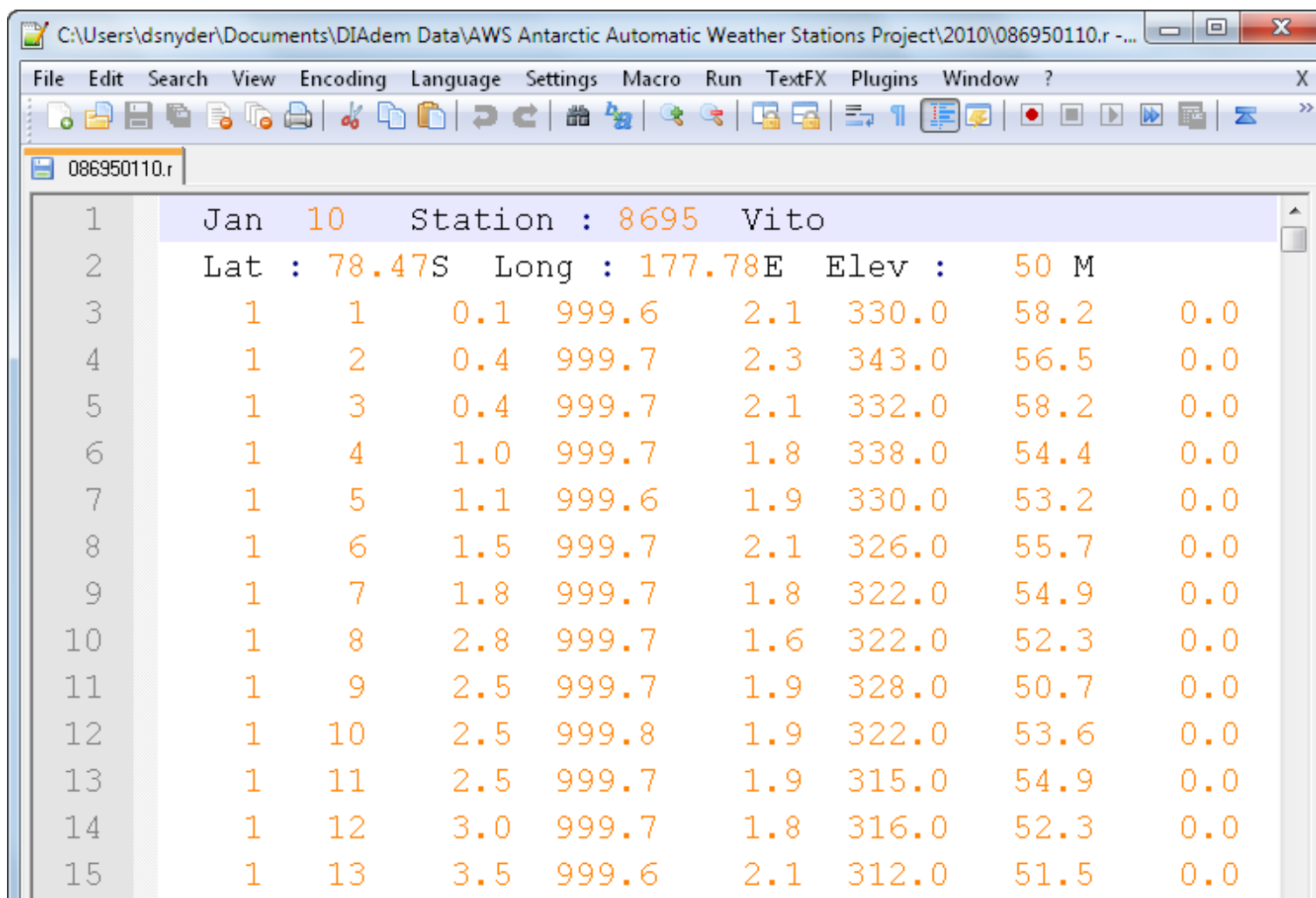
Automated Weather Station Data in \*.r Format

# REAL WORLD APPLICATION OF CONCEPTS





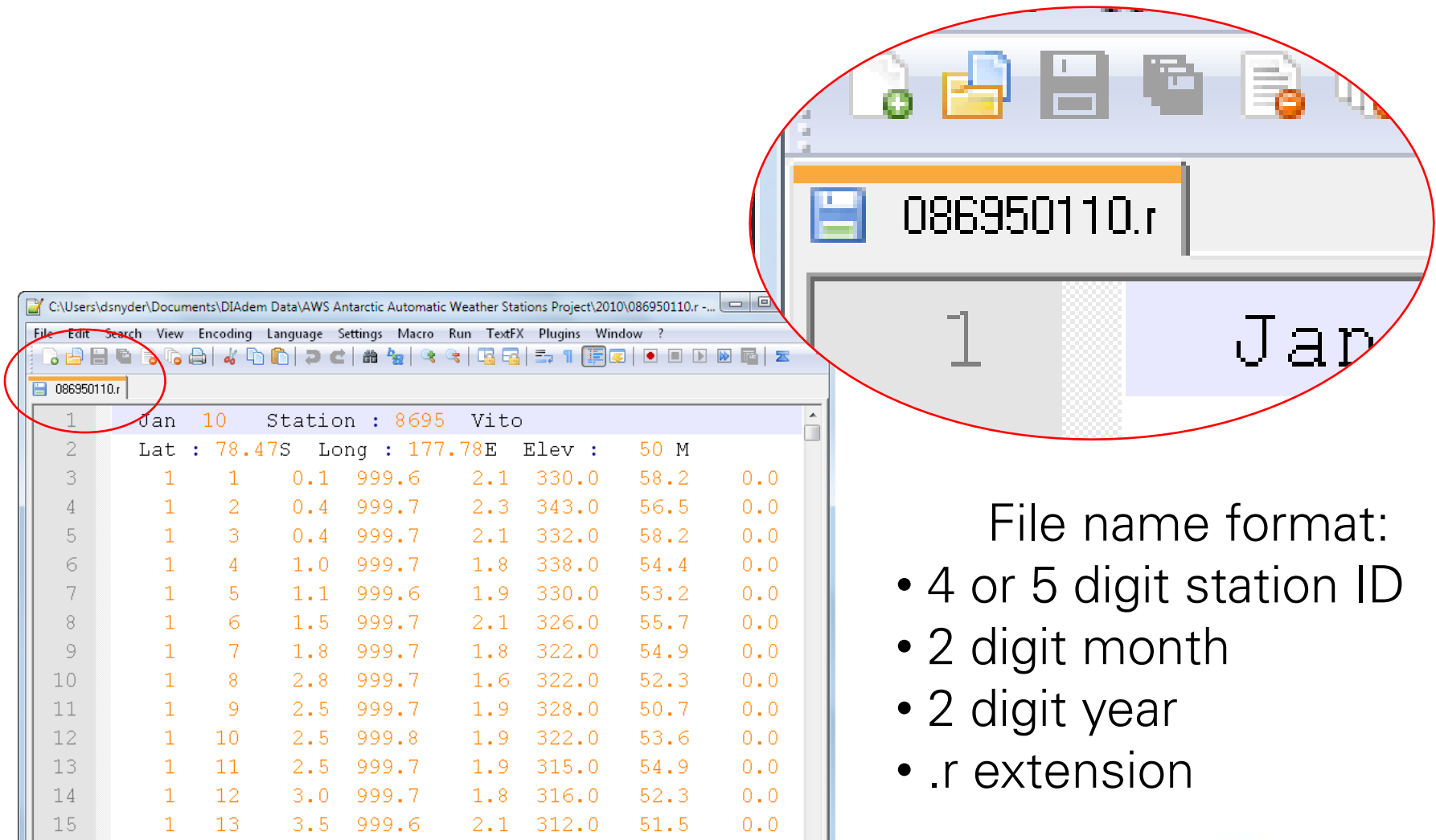
# File Format – Simple...Right?



The screenshot shows a LabVIEW project window titled "C:\Users\dsnyder\Documents\DIAdem Data\AWS Antarctic Automatic Weather Stations Project\2010\086950110.r ...". The window contains a text file named "086950110.r" with the following content:

Line	Text
1	Jan 10 Station : 8695 Vito
2	Lat : 78.47S Long : 177.78E Elev : 50 M
3	1 1 0.1 999.6 2.1 330.0 58.2 0.0
4	1 2 0.4 999.7 2.3 343.0 56.5 0.0
5	1 3 0.4 999.7 2.1 332.0 58.2 0.0
6	1 4 1.0 999.7 1.8 338.0 54.4 0.0
7	1 5 1.1 999.6 1.9 330.0 53.2 0.0
8	1 6 1.5 999.7 2.1 326.0 55.7 0.0
9	1 7 1.8 999.7 1.8 322.0 54.9 0.0
10	1 8 2.8 999.7 1.6 322.0 52.3 0.0
11	1 9 2.5 999.7 1.9 328.0 50.7 0.0
12	1 10 2.5 999.8 1.9 322.0 53.6 0.0
13	1 11 2.5 999.7 1.9 315.0 54.9 0.0
14	1 12 3.0 999.7 1.8 316.0 52.3 0.0
15	1 13 3.5 999.6 2.1 312.0 51.5 0.0

# File Format – Simple...Right?

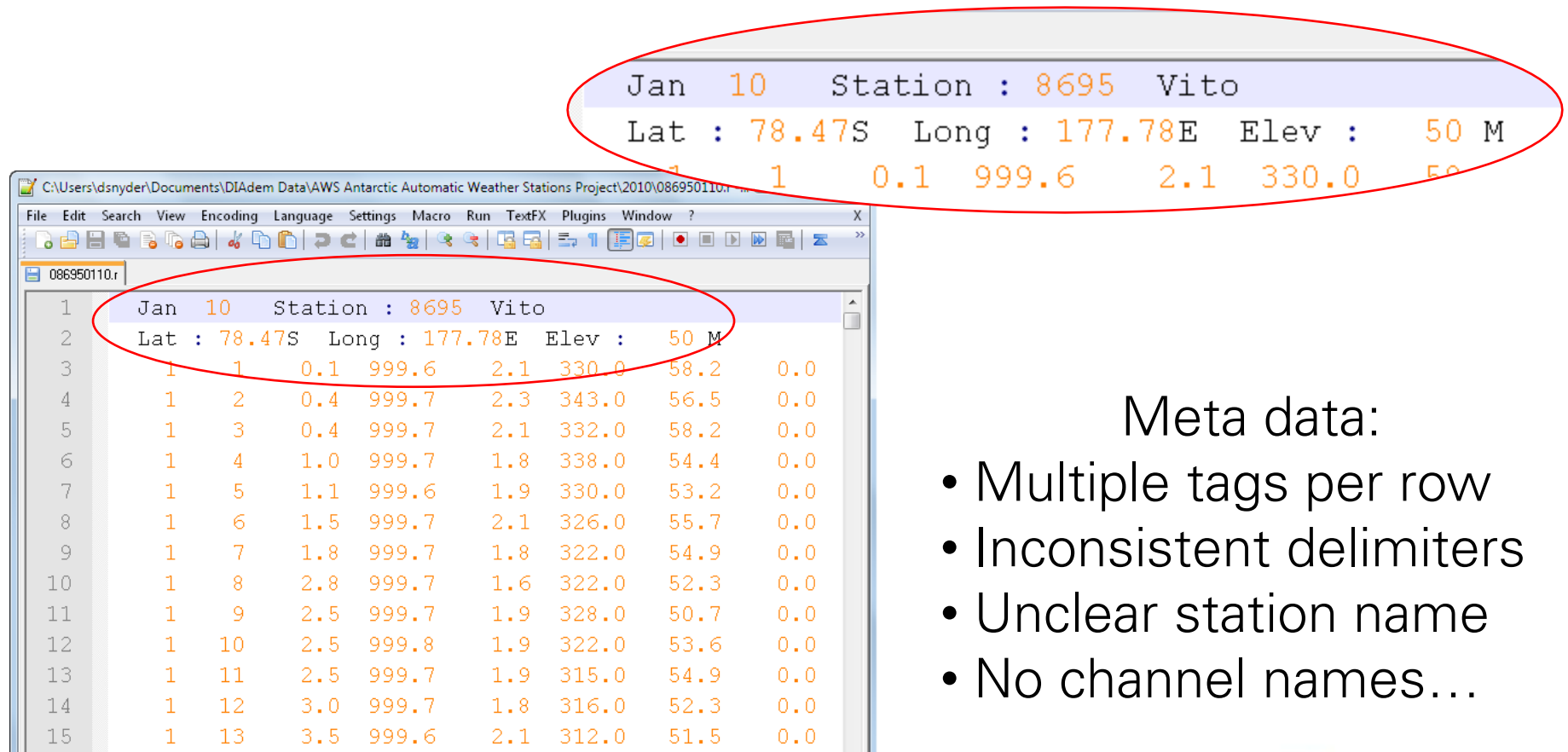


The image shows a screenshot of a National Instruments LabVIEW interface. The main window displays a table of data for a weather station. The table has columns for date, time, and various sensor readings. The first row of data is highlighted in blue. A red circle highlights the file name '086950110.r' in the top left corner of the interface. A red oval highlights a zoomed-in view of the file name format, showing the station ID '086950110.r' and the month 'Jan'.

File name format:

- 4 or 5 digit station ID
- 2 digit month
- 2 digit year
- .r extension

# File Format – Simple...Right?



The image shows a screenshot of a text editor window displaying a data file. The file contains two lines of meta-data at the top, which are circled in red. Below these are 15 rows of numerical data. The first row of data is also circled in red. The data is as follows:

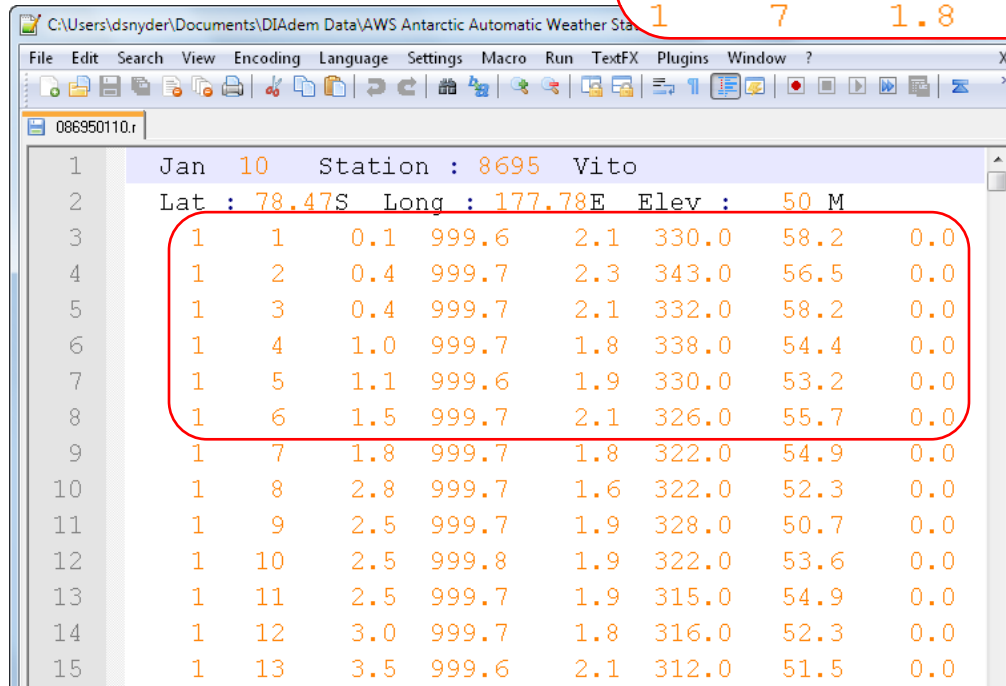
Meta data (circled in red)								
Jan 10 Station : 8695 Vito								
Lat : 78.47S Long : 177.78E Elev : 50 M								
Data (first row circled in red)								
1	1	0.1	999.6	2.1	330.0	58.2	0.0	
2	1	2	0.4	999.7	2.3	343.0	56.5	0.0
3	1	3	0.4	999.7	2.1	332.0	58.2	0.0
4	1	4	1.0	999.7	1.8	338.0	54.4	0.0
5	1	5	1.1	999.6	1.9	330.0	53.2	0.0
6	1	6	1.5	999.7	2.1	326.0	55.7	0.0
7	1	7	1.8	999.7	1.8	322.0	54.9	0.0
8	1	8	2.8	999.7	1.6	322.0	52.3	0.0
9	1	9	2.5	999.7	1.9	328.0	50.7	0.0
10	1	10	2.5	999.8	1.9	322.0	53.6	0.0
11	1	11	2.5	999.7	1.9	315.0	54.9	0.0
12	1	12	3.0	999.7	1.8	316.0	52.3	0.0
13	1	13	3.5	999.6	2.1	312.0	51.5	0.0

Meta data:

- Multiple tags per row
- Inconsistent delimiters
- Unclear station name
- No channel names...

# File Format – Simple...Right?

1	1	0.1	999.6	2.1	330.0	58.2	0.0
1	2	0.4	999.7	2.3	343.0	56.5	0.0
1	3	0.4	999.7	2.1	332.0	58.2	0.0
1	4	1.0	999.7	1.8	338.0	54.4	0.0
1	5	1.1	999.6	1.9	330.0	53.2	0.0
1	6	1.5	999.7	2.1	326.0	55.7	0.0
1	7	1.8	999.7	1.8	322.0	54.9	0.0



CAUsers\dsnyder\Documents\DIAdem Data\AWS Antarctic Automatic Weather Sta

File Edit Search View Encoding Language Settings Macro Run TextFX Plugins Window ?

086950110.r

1	Jan	10	Station :	8695	Vito		
2	Lat :	78.47S	Long :	177.78E	Elev :	50	M
3	1	1	0.1	999.6	2.1	330.0	58.2
4	1	2	0.4	999.7	2.3	343.0	56.5
5	1	3	0.4	999.7	2.1	332.0	58.2
6	1	4	1.0	999.7	1.8	338.0	54.4
7	1	5	1.1	999.6	1.9	330.0	53.2
8	1	6	1.5	999.7	2.1	326.0	55.7
9	1	7	1.8	999.7	1.8	322.0	54.9
10	1	8	2.8	999.7	1.6	322.0	52.3
11	1	9	2.5	999.7	1.9	328.0	50.7
12	1	10	2.5	999.8	1.9	322.0	53.6
13	1	11	2.5	999.7	1.9	315.0	54.9
14	1	12	3.0	999.7	1.8	316.0	52.3
15	1	13	3.5	999.6	2.1	312.0	51.5

Data:

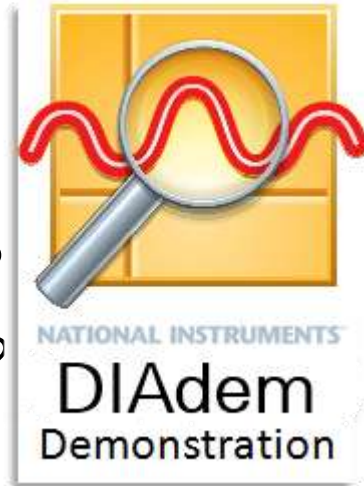
- Day of month
- Ten minute interval of day
- Temp, pressure, speed, angle
- Six *or eight* columns
- “Null” data values
- No obvious units
- Inconsistent delimiters

28 Years of Data  
13,000+ Files  
29 Folders  
2.13 GB of Data



## Hunting for some needles...

- What was the temperature profile in July 1984?
- Can I get insight into one station over one year?
- How does minimum temperature trend vs. time?
- What is the max wind speed...*ever*?
- What's the min pressure for a month by layout?
- How much does elevation affect temperature?



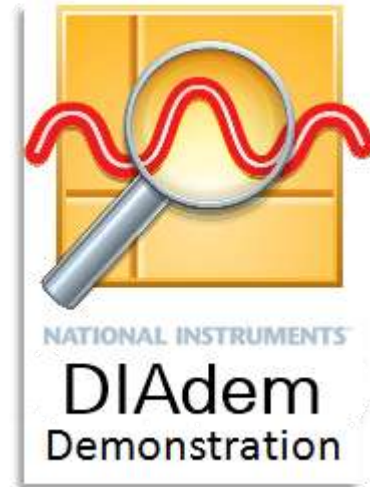
Audio Data Stored in \*.XLSX Format

# REAL WORLD APPLICATION OF CONCEPTS

# Let's Explore Some Data

Here are our simple challenges:

- Open 1 second of CD quality audio data (44.1 KHz)
- Search for information in our data sets
- Graph the entire microphone data set
- Zoom in on a region of interest



Could we accomplish these tasks (easily)  
using a normal spreadsheet?

# Where to go next?

Download Trial Version

Download Free DataPlugins

**Play** with NI DIAdem

Watch Tutorials and Demonstrations

Try Self-Paced Online Training (SPOT)

Get Support

@ <http://www.ni.com/diadem>

Contact Information:

[info.netherlands@ni.com](mailto:info.netherlands@ni.com)

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