Report Automation Using Excel

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NCAIR Summer Drive-in 2013
• 9608 students
• Master’s Comprehensive
• Mountain location
• Residential and Distance
Why automate?

- **Efficiency**
  - Time

- **Mitigates problems related to staff turn-over**

- **Consistency**
  - Data (same queries/criteria)
  - Format/design/branding

- **Timeliness**
  - Reports are ready as soon as data is available
What to automate?

• **Same report generated throughout the year(s)**
  – Fact Book
  – Census reports
  – Admissions reports
  – Facilities utilization
  – Class-level profiles
  – Grade distribution

• **Same report generated at the same time for several different groups**
  – Program/Dept. profiles
  – Main campus v. other teaching sites/distance
  – Legislative reports
What can be included?

- Data tables
- Graphs
- Complex graphics (e.g., maps with enrollment)
- Cover pages
- Branding/logos
Getting started

• **Start with an end product in mind**
  – Real data or mock-up

• **Determine data source**
  – Use of combined data files
Excel structure

• Data tab
  – All data

• Process tab
  – All formulas and data manipulation

• Report tab
  – This is the final report
  – No formulas – only cell references

• Why do this
  – Consistent/organized
  – Allow multiple people to work on the same document
  – Compartmentalize different parts
Data tab

- **Where does data come from**
  - Access
  - SQL Server
  - ODBC Connection
  - Analysis Services
  - XML
  - Text files
Data - Access

• **We use Access**

• **Benefits**
  – We already have our data there
  – Cheap/most people already have
  – User friendly (Point & click)
  – Approachable for entry-level staffers
  – Transition to SQL Server is practically seamless

• **Drawbacks**
  – Slow
  – Limited functionality
  – Sometimes multiple steps needed
How do you connect the data?

• Build query in Access the returns the data elements that we need
• Go to Data tab in Excel
• Click “Connections” then “Add…” or “From Access”
• Browse out to your Access file, and link
• Point it to your table or query
Demo

• **Brainstorm data elements**
  – Race, Load, Gender for Undergraduate and Graduate levels

• **View Access Database** *(together)*
  – Open database, see table structure and available queries

• **Hands-on Exercise 1** *(together)*
  – Connect to Access Database
  – Convert to table
Process tab

- All the work happens here

- “No” data or layout should be on this tab
Report tab

• Make it look great – this is your finished product

• No formulas, only cell references & graphs
Important Formulas

• All formulas
  – Frequently used:
    • COUNTIFS
    • SUMIFS
    • AVERAGEIFS
    • MAX(year)
    • IF
  – More complex
    • VLOOKUP
    • INDEX, MATCH, and OFFSET
    • SUMPRODUCT (not covering today)
    • Array formulas (“MEDIANIFS”)
Important Concepts

• **Anchors**
  – Fix the Row or Column elements in a cell reference
  – Can be used separately or together or not at all

• **Named Ranges**
  – Refer to a specific cell or range of cells by name
  – Fixed vs. Dynamic Named Ranges

• **Structured References**
  – Used to reference specific elements of a Table
More Important Concepts

• Picture Tool
  – Used to show a portion of a sheet at another location in the workbook

• Master Crosswalks
Structured References and COUNTIFS

COUNTIFS

“Counts the number of cells specified by a given set of conditions or criteria”

\[ \text{COUNTIFS( Factbook\_Data[Gender], } $A4, \text{ Factbook\_Data[Race], B3 )} \]

Complete Hands-on Exercise 2
MATCH and OFFSET

MATCH

“Returns the relative position of an item in an array that matches a specified value in a specified order”

OFFSET

“Returns a reference to a range that is a given number of rows and columns from a given reference”

Complete Hands-on Exercise 3
VLOOKUP

“Looks for a value in the leftmost column of a table, and then returns a value in the same row from a column you specify. By default, the table must be sorted in ascending order”

VLOOKUP( $A3, Data[#All], COLUMN(B2) )

Complete Hands-on Exercise 4
Getting more complicated

• Program/Department Profiles
  – Support for Program Prioritization process
  – Several sets of data, process, & report tabs
  – Results from process sheets all combined into large report
  – Once formulas are written, report can be generated automatically for each program
Looking at the pieces

• **Report**
• **Programs**
  – Master Crosswalk that links Program Code to other critical pieces of data. Everything is driven by program code and associated elements. Easy to change dept./college, etc.

1. **Retention – Process (2), Data**
2. **Enrollment and Degree – Process, Data (2)**
3. **Instructional Costs – Process, Data (2)**
4. **Gen v All FTE – Process, Data (3)**
5. **SCH – Process, Data**
6. **Course by Faculty Type – Process, Data (2)**
Approach

• **Mock-up report, get appropriate feedback**

• **For each metric:**
  – With report in mind, select data elements needed
  – Bring data into data tab (static if one-time, joined if annual)
  – Develop process sheet by dropping in final table look/feel
  – Write formulas in each cell to get correct results
    • include appropriate anchors
    • think about error checking
  – Drag/copy formulas out to complete the table
  – Using picture tool, take snapshot, and drop onto main report
Exercise - SUMIFS

- Make sure program code = Prog1 on report sheet

Complete Hands-on Exercise 5
Exercise – IF, INDEX/MATCH

- Make sure program code = Prog1 on report sheet

Complete Hands-on Exercise 6
“MEDIANIFS” – Intro to Array Formulas

• Array formulas
  – Use Excel to create your own formulas when none exist for a particular task

• We needed MEDIANIFS, turned to the web to find documentation about building these formulas
  – Benefits – Powerful
  – Drawbacks – Complicated and hard for others to view and understand your formulas

• Other Common Examples:
  – SUMIF excluding highest and lowest values in a series
  – AVERAGEIF exclude zeros from calculation
Exercise – “MEDIANIF”

• Make sure program code = Prog1 on report sheet

Complete Hands-on Exercise 7
Getting more complicated - VBA

• **Program/Department Profiles**
  – Report can be generated for each program

  – Use a macro to:
    • Cycle through
    • Print off PDFs
    • Name them well
    • Put them into a well-structured series of folders

• **Demo**
Resources

• Purna Duggirala (http://chandoo.org/wp/) – Excel help

• Jon Peltier (http://peltiertech.com) – Excel templates

• Daniel Ferry (http://www.excelhero.com/)

• Edward Tufte (http://www.edwardtufte.com/)
  – The Visual Display of Quantitative Information, 2001

• Stephen Few (http://www.perceptualledge.com/)
  – Show Me the Numbers, 2004
  – Information Dashboard Design, 2006
  – Now you see it, 2009
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