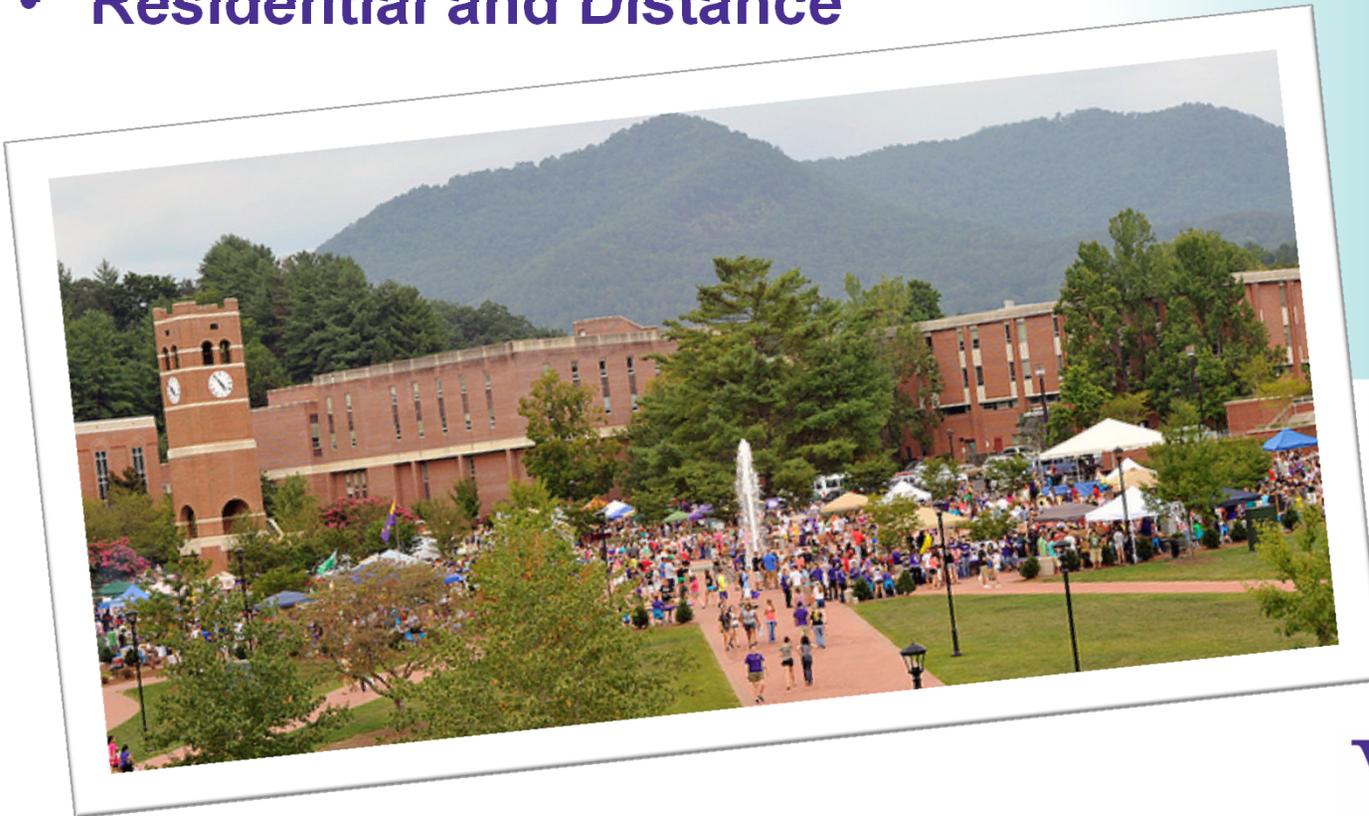# Report Automation Using Excel

Alison Joseph, David Onder, and Billy Hutchings

NCAIR Summer Drive-in 2013

- **9608 students**
- **Master's Comprehensive**
- **Mountain location**
- **Residential and Distance**

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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

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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

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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

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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**

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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

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Process tab

- **All the work happens here**

- **"No" data or layout should be on this tab**

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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")

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Important Concepts

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

Fix column as column A → A1 ← Fix row as row 1

- **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

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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"

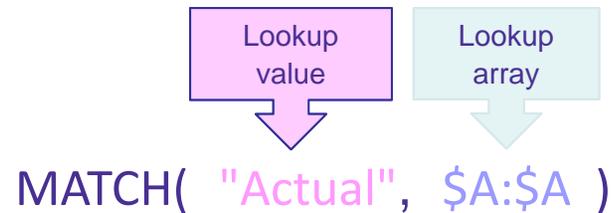COUNTIFS(Factbook_Data[Gender], $A4, Factbook_Data[Race], B$3)
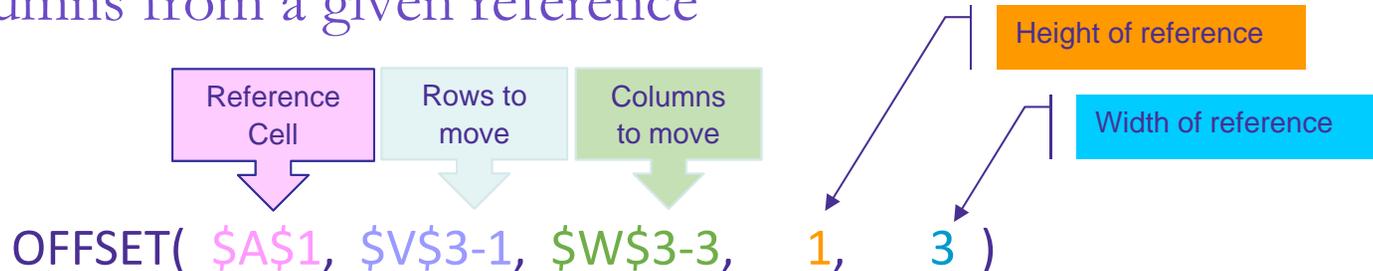
Complete Hands-on Exercise 2

MATCH and OFFSET

MATCH

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

Lookup value | Lookup array

Specified order defaults to finding the largest value less than or equal to Lookup Value

MATCH("Actual", $A:$A)

OFFSET

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

Reference Cell | Rows to move | Columns to move

Height of reference

Width of reference

OFFSET(A1, V3-1, W3-3, 1, 3)

Complete Hands-on Exercise 3

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VLOOKUP

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"

Lookup value	Table or range	Return column index number

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

Complete Hands-on Exercise 4

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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

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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)**

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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

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Exercise – IF, INDEX/MATCH

- **Make sure program code = Prog1 on report sheet**

Complete Hands-on Exercise 6

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"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

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Exercise – "MEDIANIF"

- **Make sure program code = Prog1 on report sheet**

Complete Hands-on Exercise 7

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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.perceptualedge.com/)**
  - Show Me the Numbers, 2004
  - Information Dashboard Design, 2006
  - Now you see it, 2009

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