

GOT GRAPHS? AN ASSESSMENT OF DATA VISUALIZATION TOOLS

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Background

Graphs are powerful tools for simplifying complex data. They are useful for quickly assessing patterns and relationships among one or more variables from a dataset. As the amount of data increases, it becomes more difficult to visualize potential associations. Lifetime Surveillance of Astronaut Health (LSAH) was charged with assessing its current visualization tools along with others on the market to determine whether new tools would be useful for supporting NASA's occupational surveillance effort. It was concluded by members of LSAH that the current tools hindered their ability to provide quick results to researchers working with the department. Due to the high volume of data requests and the many iterations of visualizations requested by researchers, software with a better ability to replicate graphs and edit quickly could improve LSAH's efficiency and lead to faster research results.

Methods

Assessments on six data visualization products were conducted by an LSAH intern during the summer of 2014. Of these six products, three were already in use by the department: Microsoft Excel & Power Pivot, MATLAB, and SAS Enterprise Guide. After an online search, three more data visualization products determined to be the most commonly used and highly recommended were chosen to be included in the evaluation: Tableau, TIBCO Spotfire, and SAS Visual Analytics.

Product comparisons were made by the following five factors in order of importance (highest to lowest): range of capabilities, amount of time spent creating and editing graphs, ease of use, aesthetics, and customer service. Products not in use by LSAH were compared additionally by their respective individual and server license costs. A list of product capability requirements was assembled with inputs by many member of LSAH. This list included the software's ability to connect with databases that hold NASA's medical detail, export visualizations, create specific graphs, and many more various requirements. Time was an important factor due to LSAH's increasing number of data requests and the need to create and edit visualizations quickly in various meeting-type settings.

Results

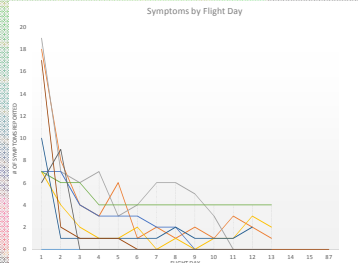
The evaluation was preformed using the three programs already utilized by LSAH and free demos of the market products provided by each of the respective company websites. Of the three market product demos, one did not allow the user to load his or her data and had to use data provided by the product's company for product testing. This meant that the same exact graphs could not be created among all six products for comparison. Various graphs were created by all programs using case-row formatted data (where every row of data represents one case) because that kind of data is the format most commonly used by LSAH.

Discussion

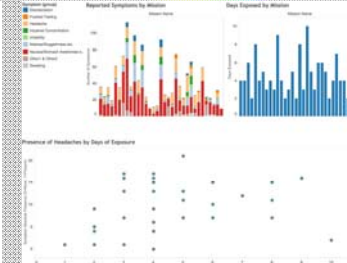
This effort determined that augmenting LSAH's existing tools will result in efficiencies and improvements in visual aesthetics in data analysis. Additional product research needs to be conducted to determine whether these products meet the IT system requirements of the Agency and whether LSAH would like to pursue individual licenses or a server license so a more accurate price comparison can be made. LSAH also needs to work with procurement to determine what products are already used within the Agency before proceeding with an official evaluation of new purchases.

Demos

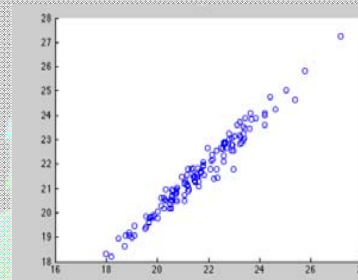
Excel Power Pivot



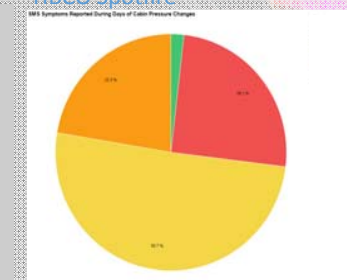
Tableau



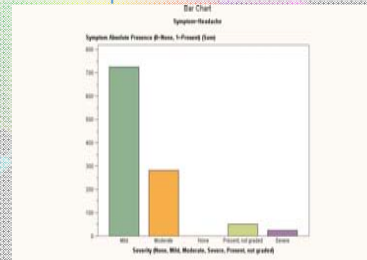
MATLAB



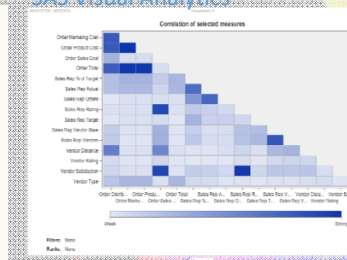
TIBCO Spotfire



SAS Enterprise Guide



SAS Visual Analytics



Comments

Any data represented are used for the sole purpose of demonstrating the capabilities of the tools and should not be interpreted as surveillance or research results. All pictures were made using the respective programs.

More information on any of these products can be found here:

<http://products.office.com/en-US/excel/>

<http://www.mathworks.com/products/matlab/>

http://www.sas.com/en_us/software/enterprise-guide.html

www.tableausoftware.com

www.spotfire.tibco.com

http://www.sas.com/en_us/software/business-intelligence/visual-analytics.html