



PROJECT MANAGEMENT
CENTER FOR EXCELLENCE

A.J. CLARK SCHOOL OF ENGINEERING
Civil & Environmental Engineering Department



ACCREDITED PROGRAM

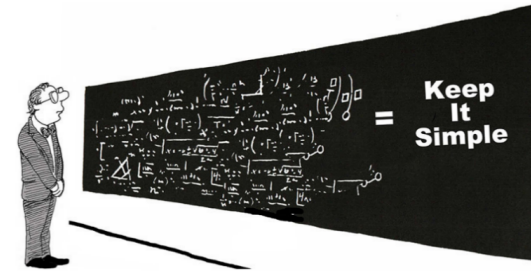
HOW TO GET MORE FROM YOUR PERFORMANCE DATA WITH MICROSOFT'S POWER BI

Susan Hostetter and John White
2019 Project Management Symposium

The views expressed in this paper are those of the authors and do not necessarily represent those of the U.S. Census Bureau.



Let's Talk Data



TaskName	TaskID	TaskStartDate	TaskFinishDate	TaskActualCost	TaskActualDuration	TaskActualSubCost	TaskActualStartDate	TaskActualFinishDate
Weighting Plan Delivered to ADOF	507740DE-5C2F-468E-859A-0CFE58457538	6/14/2018 8:00:00 AM	6/14/2018 5:00:00 PM	0	0	NULL	NULL	NULL
NTPS 17-18 Weekly Teacher Sampling - TLF	77855947-8668-4657-43F8-0D5C576A75C5	6/14/2018 8:00:00 AM	6/14/2018 5:00:00 PM	0	0	NULL	NULL	NULL
Incorporate Comments Draft 2	KC831128-40C8-46F6-4A15-10640468F0D6	6/14/2018 8:00:00 AM	6/14/2018 5:00:00 PM	0	0	NULL	NULL	NULL
Route for 25500 Signature	14448FFC-87F0-4A27-9F38-1046D4685640	6/14/2018 8:00:00 AM	6/14/2018 5:00:00 PM	0	0	NULL	NULL	NULL
Write 8	138360D4-148C-4365-6715-0F4C24481024	6/14/2018 8:00:00 AM	6/14/2018 5:00:00 PM	0	0	NULL	NULL	NULL
PRIVATE SCHOOLS - School CHAD	7523287F-1331-4488-820F-07046A997168	6/14/2018 8:00:00 AM	6/14/2018 5:00:00 PM	0	0	NULL	NULL	NULL
PRODUCTION 6 of 5: Teacher CHAD and Weighting - PRIVATE	A767832F-8377-420E-93D5-102D79F2D287	6/14/2018 8:00:00 AM	6/14/2018 5:00:00 PM	0	0	NULL	NULL	NULL
Back and Forth and Discussion of Scope Changes	E587E4ED-16D0-491A-839C-10E2782C2392	6/14/2018 8:00:00 AM	6/14/2018 5:00:00 PM	0	0	NULL	NULL	NULL
NCSF Review 2	7056E795-E59F-44F1-804F-11588F4D6448	6/14/2018 8:00:00 AM	6/14/2018 5:00:00 PM	0	0	NULL	NULL	NULL
PUBLIC PRINCIPALS - NTPS 17-18 - Receive Preliminary ISB File from ADOF	45162348-E295-4F48-887A-118879F9C23F	6/14/2018 8:00:00 AM	6/14/2018 5:00:00 PM	0	0	NULL	NULL	NULL
ISB File 11 New ADOF Email Instructions	458612C5-135C-4C28-802D-11887588F028	6/14/2018 8:00:00 AM	6/14/2018 5:00:00 PM	0	0	NULL	NULL	NULL
School Unit Bias Analysis (Base and Final Weighted Files, Tables)	1374466F-4C49-4922-9311-1218134C3804	6/14/2018 8:00:00 AM	6/14/2018 5:00:00 PM	0	0	NULL	NULL	NULL
PRIVATE PRINCIPALS - NTPS 17-18 - Receive Final ISB File from ADOF	78347755-0DE6-4325-9344-122F4FC0D038	6/14/2018 8:00:00 AM	6/14/2018 5:00:00 PM	0	0	NULL	NULL	NULL
Finalize School Weighting Specifications after CHAD is Incorporated	A5127101-4174-4738-8845-125308957C37	6/14/2018 8:00:00 AM	6/14/2018 5:00:00 PM	0	0	NULL	NULL	NULL
NTPS 17-18 Data Collection Planning	1E448809F137-462F-4428-122C3772A20C	6/14/2018 8:00:00 AM	6/14/2018 5:00:00 PM	0	0	NULL	NULL	NULL
City Teacher Unit NSBA (Base and Final Weighted Files, Tables)	14588F4E-430E-4493-841D-129F87080066	6/14/2018 8:00:00 AM	6/14/2018 5:00:00 PM	0	0	NULL	NULL	NULL
NTPS 17-18 Bias Analysis Sections of the "Response Rates" (charts)	D557019-8P94-47FD-AS95-118807548725	6/14/2018 8:00:00 AM	6/14/2018 5:00:00 PM	0	0	NULL	NULL	NULL
Receive Unit Response Rates from ADOF for Principals	2F449911-7254-4825-8329-13413845448E	6/14/2018 8:00:00 AM	6/14/2018 5:00:00 PM	0	0	NULL	NULL	NULL
PLANS 18 of 2: NTPS 17-18 School, Principal and Teacher weighting	848435C7-7318-4718-1109-14448589F426	6/14/2018 8:00:00 AM	6/14/2018 5:00:00 PM	0	0	NULL	NULL	NULL
NTPS 17-18 Both Response Bias Analysis Plan	C7883C61-6811-4815-9C86-152841739123	6/14/2018 8:00:00 AM	6/14/2018 5:00:00 PM	0	0	NULL	NULL	NULL
Write 12	190C4418-7348-41EC-9028-158445C979C4	6/14/2018 8:00:00 AM	6/14/2018 5:00:00 PM	0	0	NULL	NULL	NULL
Teacher Item Bias Analysis - PRIVATE	A132B0E7-7F6C-455D-8818-16167C2D21C7	6/14/2018 8:00:00 AM	6/14/2018 5:00:00 PM	0	0	NULL	NULL	NULL
DSMO Internal Review and Comment Draft 1	0766828-2D2C-109C-9F5C-16A102082898	6/14/2018 8:00:00 AM	6/14/2018 5:00:00 PM	0	0	NULL	NULL	NULL
Incorporate Comments Draft 1	05121026-3108-4338-109F-18C762921449	6/14/2018 8:00:00 AM	6/14/2018 5:00:00 PM	0	0	NULL	NULL	NULL
PUBLIC PRINCIPALS - Principal Weighting - CAN START AFTER CHAD	F85C24D2-2524-4A05-84C2-17C404842F5F	6/14/2018 8:00:00 AM	6/14/2018 5:00:00 PM	0	0	NULL	NULL	NULL
DSMO Internal Review and Comment Draft 1	10440088-4F44-4480-8267-17CDB58A5A5E	6/14/2018 8:00:00 AM	6/14/2018 5:00:00 PM	0	0	NULL	NULL	NULL
NTPS 17-18 Teacher Weighting Specifications Complete	12C86A4F-3889-4075-888E-183470212D94	6/14/2018 8:00:00 AM	6/14/2018 5:00:00 PM	0	0	NULL	NULL	NULL
NTPS 17-18 Programming Status and Principal Weighting and ISB	10032676-244C-4F2A-8059-185886858406	6/14/2018 8:00:00 AM	6/14/2018 5:00:00 PM	0	0	NULL	NULL	NULL
Write 13	9F16835A-77D6-4485-8433-1958A45A6265	6/14/2018 8:00:00 AM	6/14/2018 5:00:00 PM	0	0	NULL	NULL	NULL
Teacher Weighting Specs Draft 2	A0E71E8-403F-4F45-4775-189020E2610C	6/14/2018 8:00:00 AM	6/14/2018 5:00:00 PM	0	0	NULL	NULL	NULL



Microsoft Power BI

What is Microsoft Power BI?

- Power BI is a Microsoft business analytics application and service that combines tools from Excel and Access into an easy to use format.
- It provides interactive charts and graphs, called visualizations, with self-service business intelligence features.
- It allows users to create reports and dashboards by themselves without any advanced database knowledge or dependence on IT staff.

What are the Benefits of Microsoft Power BI?

- Makes your data stand out - your data becomes more life-like and gets noticed!
- Helps your stakeholders understand complicated problems with clear and easy visuals
- Visualizations show the big picture. Dashboards make it possible to see relationships and aspects of your data that you missed before.
- Quickly creates visually appealing drag-and-drop graphs and charts that give meaning to your data – without having any advanced data knowledge
- Brings your charts and graphs into the modern age by creating crisp and clean data visualizations

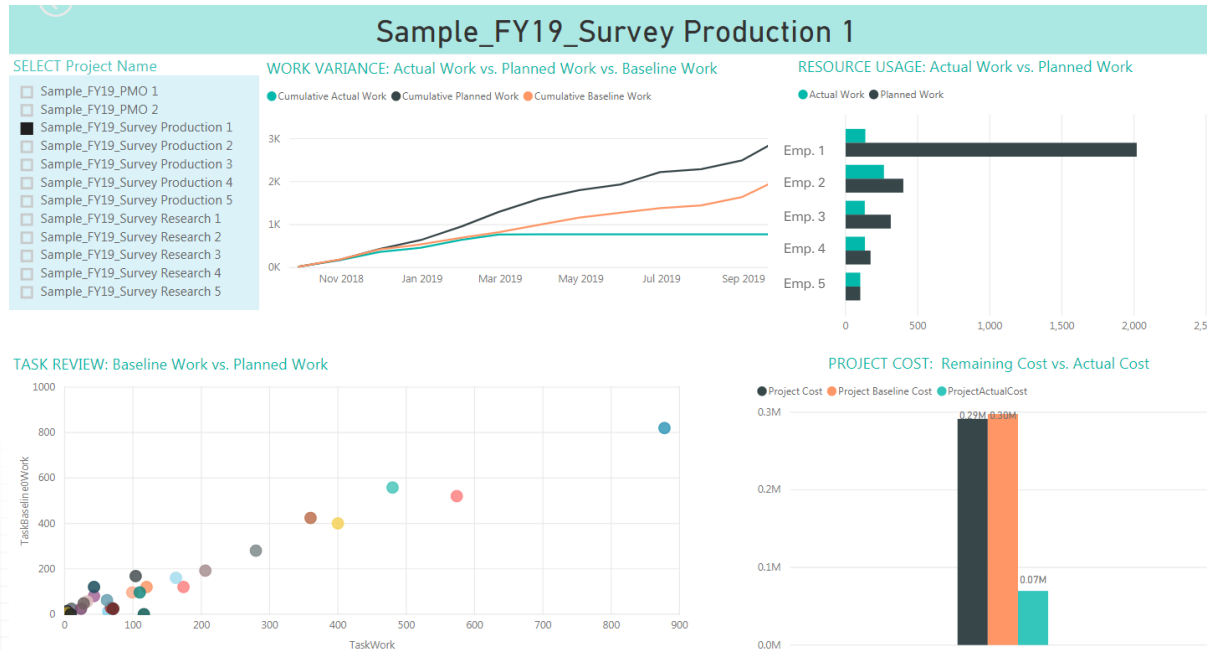
Where can I get Power BI?

Power BI Desktop is free and you can download it here:
<https://powerbi.microsoft.com>





Live Demonstration





Questions

Who has the first question?





Contact Information

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Back Up Slides

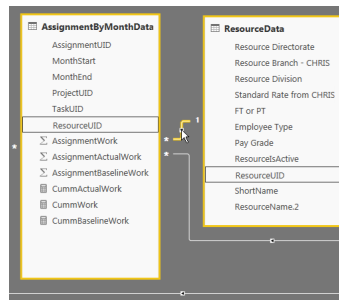
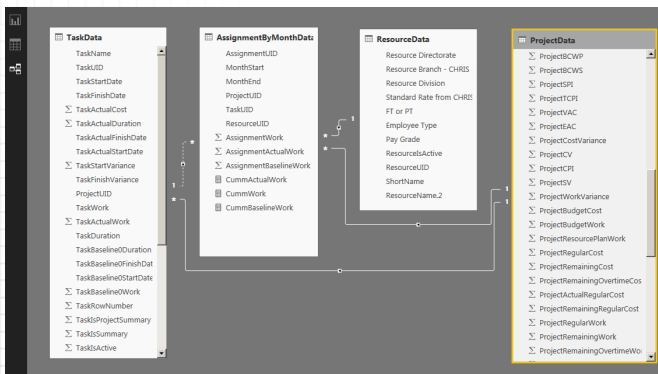




Data and Relationship Managers

TaskName	TaskID	TaskEstimate	TaskEstimateDate	TaskActualCost	TaskActualDuration	TaskActualEstimate	TaskActualStart	TaskActualFinish
Weighting Plan Deliver to ADOF	5019A00E-5C1F-458E-859A-0C7E5A191026	6/14/2018 8:00:00 AM	6/14/2018 8:00:00 PM	0	0	NULL	0	NULL
NTPS 19-20 Weekly Teacher Sampling - TLF	F78554F7-8883-4957-AP8E-0D5C267A6F62	6/14/2018 8:00:00 AM	6/14/2018 5:00:00 PM	0	0	NULL	0	NULL
Incorporation Comments Draft 2	8C831018-A8C7-4899-AD19-026A4D-849D02	6/14/2018 8:00:00 AM	6/14/2018 5:00:00 PM	0	0	NULL	0	NULL
Review for 50503 Signature	544680C5-0705-4421-9028-02A040A50000	6/14/2018 8:00:00 AM	6/14/2018 5:00:00 PM	0	0	NULL	0	NULL
Week 8	1583900A-148C-4365-8713-0F4C24481026	6/14/2018 8:00:00 AM	6/14/2018 5:00:00 PM	0	0	NULL	0	NULL
PRIVATE SCHOOLS - School CHAD	F3C528F1-43E7-4488-8D9F-0F0A0A9FF748	6/14/2018 8:00:00 AM	6/14/2018 5:00:00 PM	0	0	NULL	0	NULL
PRODUCTION 6 of 6: Teacher CHAD and Weighting - PRIVATE	A70F838F-877F-4D0C-9555-1022770D7203	6/14/2018 8:00:00 AM	6/14/2018 5:00:00 PM	0	0	NULL	0	NULL
Back and Forth and Discussion of Scope Changes	1587846D-5D20-4916-820E-10E2070E0200	6/14/2018 8:00:00 AM	6/14/2018 5:00:00 PM	0	0	NULL	0	NULL
NES Review 2	7036E795-539F-44F1-804F-11588F49204E	6/14/2018 8:00:00 AM	6/14/2018 5:00:00 PM	0	0	NULL	0	NULL
PUBLIC PRINCIPALS - NTPS 17-18 - Review Preliminary ISB File for ISB	45180248-E0F5-4F48-88FA-11688F89FC8F	6/14/2018 8:00:00 AM	6/14/2018 5:00:00 PM	0	0	NULL	0	NULL
ISB Week 11 Per ADOF Email Instruction	4588512C-125C-4C28-8C2D-118FF88F882C	6/14/2018 8:00:00 AM	6/14/2018 5:00:00 PM	0	0	NULL	0	NULL
School Unit Bias Analysis (Base and Final Weighted (Final, Tables))	1214680D-4C28-48D2-9210-121812420864	6/14/2018 8:00:00 AM	6/14/2018 5:00:00 PM	0	0	NULL	0	NULL
PRIVATE PRINCIPALS NTPS 17-18 - Review Final ISB File from ADO	78341910-8E28-4125-9348-1221467C0008	6/14/2018 8:00:00 AM	6/14/2018 5:00:00 PM	0	0	NULL	0	NULL
Finalize School Weighting Specification after CHAD is Incorporated	45311321-617A-4F08-8843-125208807637	6/14/2018 8:00:00 AM	6/14/2018 5:00:00 PM	0	0	NULL	0	NULL
NTPS 17-18 Data Collection Planning	EE4A808D-4757-4627-0A18-12CA3772403C	6/14/2018 8:00:00 AM	6/14/2018 5:00:00 PM	0	0	NULL	0	NULL
City Teacher Unit NBAs (Base and Final Weighted (Final, Tables))	240846C-030C-4459-8410-1219F8708054	6/14/2018 8:00:00 AM	6/14/2018 5:00:00 PM	0	0	NULL	0	NULL
NTPS 17-18 Bias Analysis Section of the "Response Basis" Sheet	05701010-9FA-4762-43F9-118507507C72	6/14/2018 8:00:00 AM	6/14/2018 5:00:00 PM	0	0	NULL	0	NULL
Review Unit Response Basis from ADOF for Principals	3F4A9111-2554-4825-9529-13413884D485	6/14/2018 8:00:00 AM	6/14/2018 5:00:00 PM	0	0	NULL	0	NULL
PLAN 1 of 2: NTPS 17-18 School, Principal and Teacher Weighting	864835C7-2383-4738-9128-14443A8F8A26	6/14/2018 8:00:00 AM	6/14/2018 5:00:00 PM	0	0	NULL	0	NULL
NTPS 17-18 Non-Response Bias Analysis Plan	C7F883CD-88F1-4981-9086-1326A7299218	6/14/2018 8:00:00 AM	6/14/2018 5:00:00 PM	0	0	NULL	0	NULL
Week 21	28C2483D-7340-4E12-9029-15944D379764	6/14/2018 8:00:00 AM	6/14/2018 5:00:00 PM	0	0	NULL	0	NULL
Teacher Item Bias Analysis - PRIVATE	A32816F1-F16C-455D-8828-18181C32001C	6/14/2018 8:00:00 AM	6/14/2018 5:00:00 PM	0	0	NULL	0	NULL
ODAD Internal Review and Comment Draft 1	07868823-2DC1-469C-950C-56A103089398	6/14/2018 8:00:00 AM	6/14/2018 5:00:00 PM	0	0	NULL	0	NULL
Incorporation Comments Draft 1	053107A0-3308-4308-839F-58C78C319449	6/14/2018 8:00:00 AM	6/14/2018 5:00:00 PM	0	0	NULL	0	NULL
PUBLIC PRINCIPALS - Principal Weighting - CAN START AFTER SCHOOL	4922A210-325A-4A28-8462-17C2408A0999	6/14/2018 8:00:00 AM	6/14/2018 5:00:00 PM	0	0	NULL	0	NULL
ODAD Internal Review and Comment Draft 1	8C480208-4F44-4460-828E-127C203A4A8D	6/14/2018 8:00:00 AM	6/14/2018 5:00:00 PM	0	0	NULL	0	NULL
NTPS 17-18 Teacher Weighting Instructions Complete	3C2864F2-3888-4078-8881-183A702120F4	6/14/2018 8:00:00 AM	6/14/2018 5:00:00 PM	0	0	NULL	0	NULL
NTPS 17-18 Programming School and Principal Weighting and VET	18030E70-244C-4F19-8089-188380E0A06A	6/14/2018 8:00:00 AM	6/14/2018 5:00:00 PM	0	0	NULL	0	NULL
Week 33	8F18657A-7704-4480-4433-3988A8A54623	6/14/2018 8:00:00 AM	6/14/2018 5:00:00 PM	0	0	NULL	0	NULL
Teacher Weighting Spec Draft 2	A6E77E3A-0399-4F45-4173-39C02002020C	6/14/2018 8:00:00 AM	6/14/2018 5:00:00 PM	0	0	NULL	0	NULL

Managing data in Power BI is very similar to Excel. The data is displayed in spreadsheets and you have all of the formatting tools from Excel available to you. It is in the data manager where you can add in variables for your dashboard visualizations, change a data type, or correct typos and other problems with your data. You also can access data queries and advanced editors here.



Power BI has a relationship manager similar to what you would find in Access. The relationship manager shows the fields within each table and then shows the data relationship linkages between the data sets. These linkages between the data sets are important as they allow you to combine data from different tables into one visualization. Each linkage will have a one to many relationship and the lines and highlighted fields show which items are linked between the tables.



Data Visualizations in Power BI

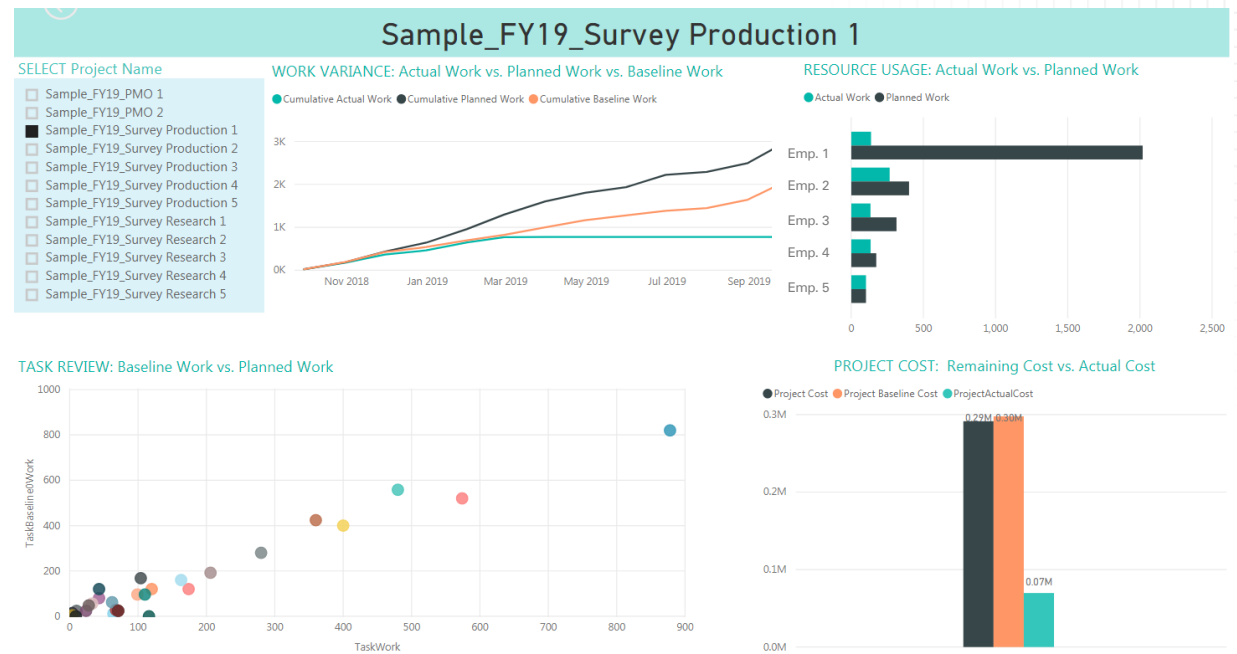


In the report section of Power BI you are given a blank sheet and access to many visualization options. We will show you how we created the dashboard shown here and provide details on how to use the Power BI controls to add data fields and format the charts.

We will cover how to create a slicer, a card, a clustered column chart, a clustered bar chart, a line chart and a scatter chart.

Power BI offers many other "out-of-the box" visualizations such as:

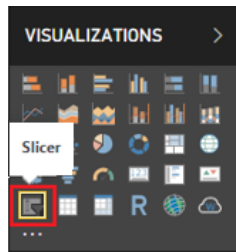
- Charts – Waterfall, Pie, and Donut
- Maps – Filled, Tree, and ArcGIS
- Funnel
- Gauge
- KPI
- Word Cloud



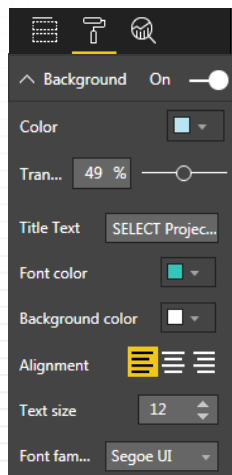
Dashboard with the visualizations we will be discussing.



Data Slicer



Select the Slicer icon from the Visualizations

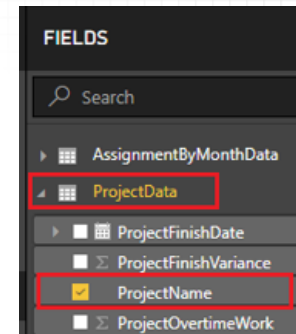
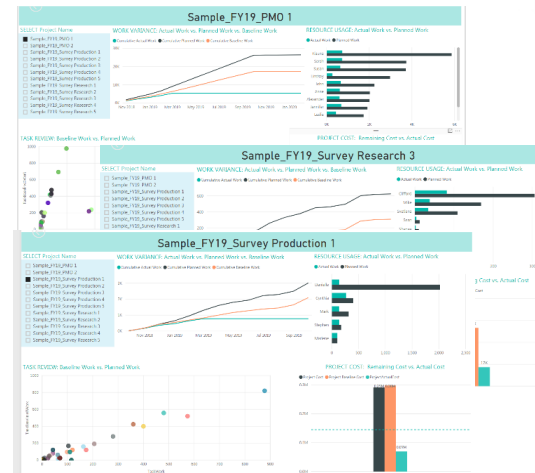


Use the Format section to set the background color and the title text, font, size and color

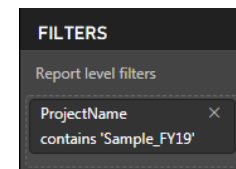
SELECT Project Name

- Sample_FY19_PMO 1
- Sample_FY19_PMO 2
- Sample_FY19_Survey Production 1
- Sample_FY19_Survey Production 2
- Sample_FY19_Survey Production 3
- Sample_FY19_Survey Production 4
- Sample_FY19_Survey Production 5
- Sample_FY19_Survey Research 1
- Sample_FY19_Survey Research 2
- Sample_FY19_Survey Research 3
- Sample_FY19_Survey Research 4
- Sample_FY19_Survey Research 5

A Data Slicer is the best thing since sliced bread. This feature will save a lot of time by allowing you to build measures once and then use them for multiple projects/data sets. Above we show 3 of the 12 dashboards that the slicer created. Each card and chart on the dashboard reflects the data specific to the item (project schedules in this case) that is used in the slicer.



Use the Fields section to populate the item to drive the slicer. Here we used the Project Name field from the ProjectData table.

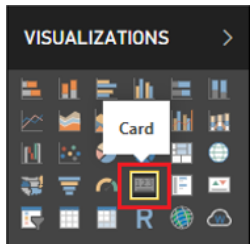


Use the Filters to limit the data that is in the slicer. This is a useful feature when you are using a large data set.

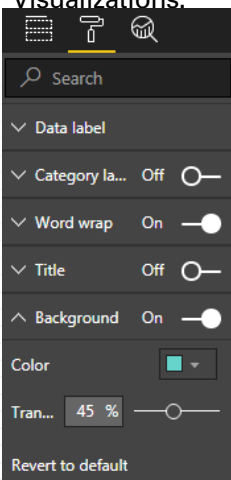


Data Card

Sample_FY19_Survey Production 1



Select the Card icon from the Visualizations.

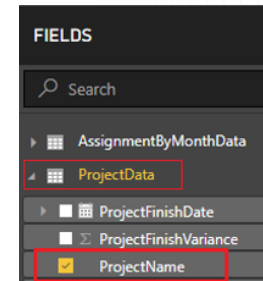


Use the Format section to set the background color and to turn off labels and titles that may distract from the card content.

The card is useful for displaying or highlighting important information. We used the card as a title bar for the dashboard and were able to use the project name already included in our data. Shown below are examples from another dashboard project. The bottom example used data already included in the data set and the top example needed it's data built into an excel file and then added to PowerBI.

The Consumer Expenditure Surveys (CES) are monthly ongoing computer-assisted personal interviewing (CAPI) surveys sponsored by the Bureau of Labor Statistics. Together, the CE surveys provide a current and continuous series of data on consumer expenditures and other related characteristics used to revise the Consumer Price Index (CPI) and in expenditure studies and policy analyses.

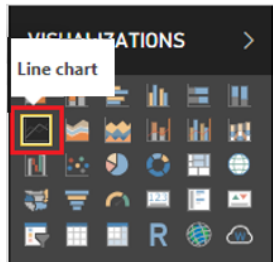
Will look into adjusting operating plan to better reflect monthly projections. Also there was some unplanned work in November.



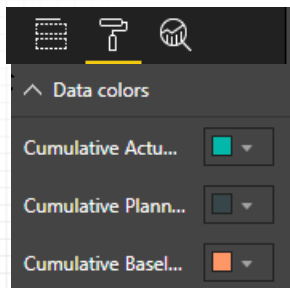
Use the Fields section to select the data to showcase.



Work Variance Line Chart

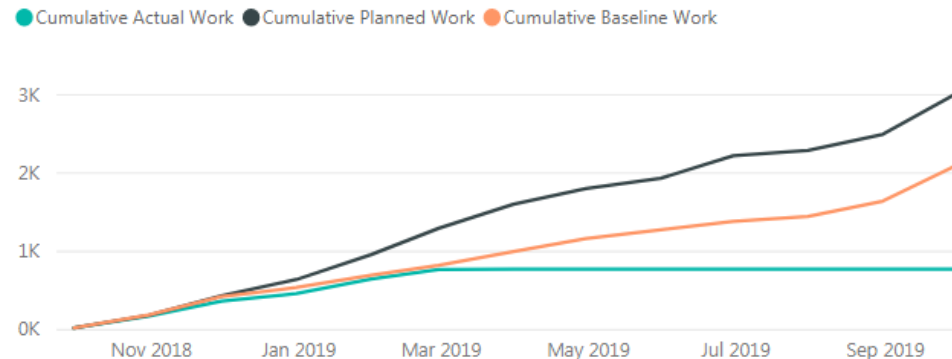


Select the Line chart icon from the Visualizations.

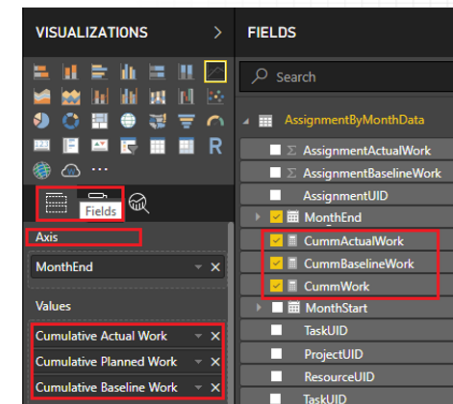


Use the Format section to set the line colors.

WORK VARIANCE: Actual Work vs. Planned Work vs. Baseline Work



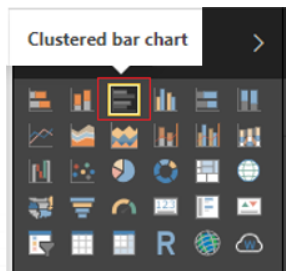
A line chart works well for showing the variance from baseline to plan and plan to actual. Looking at this chart you can see quickly that the planned work changed from the baseline in December and the actual work is following closely to the revised plan. Note: Actual work values are only updated through March 2019.



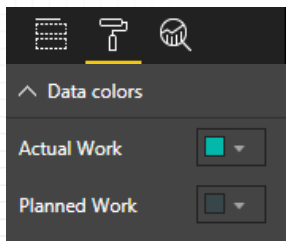
Use the Fields section to set the axis value and select the data values for the lines.



Resource Usage Clustered Bar Chart

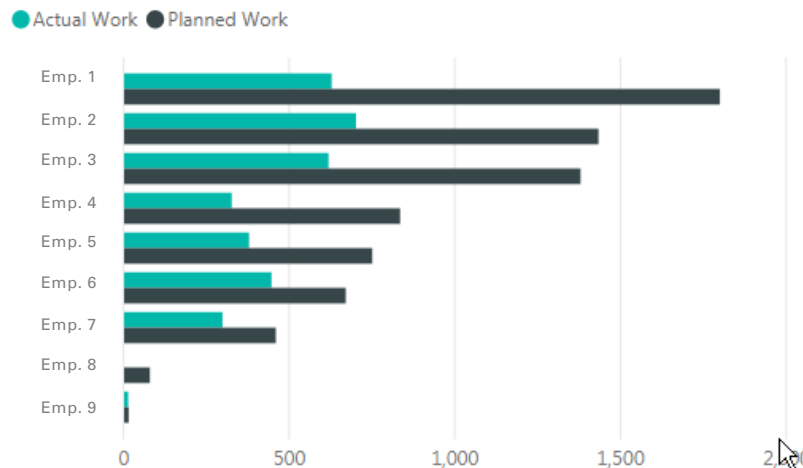


Select the Clustered bar chart icon from the Visualizations.

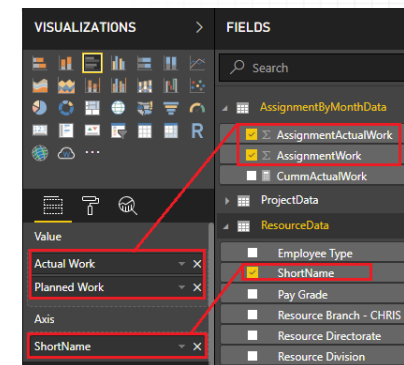


Use the Format section to set the bar colors.

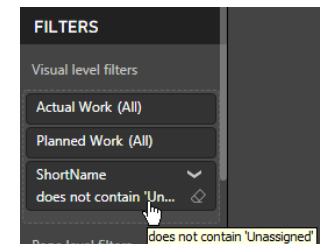
RESOURCE USAGE: Actual Work vs. Planned Work



A clustered bar chart works well when you want to have data sets broken out into multiple categories. Here we show planned to actual work assignments broken out by assigned project resources.



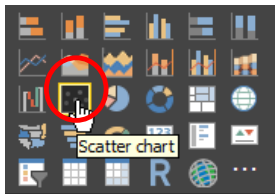
Use the Fields section to populate the values with actual and planned work. Add an Axis field to break the value data out into categories.



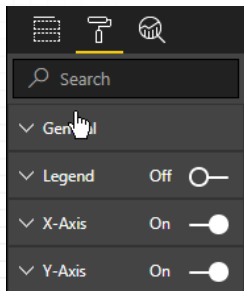
Use the Filter section to restrict values in your chart. Here we use it to eliminate the "unassigned" values from the chart.



Task Review Scatter Chart

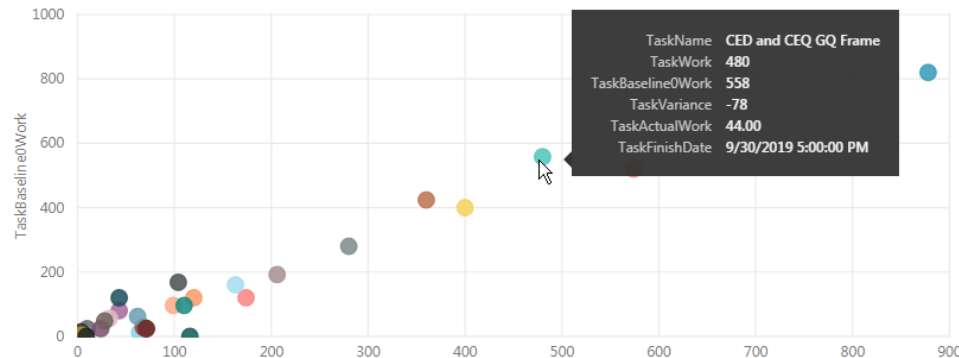


Select the Scatter chart icon from the Visualizations

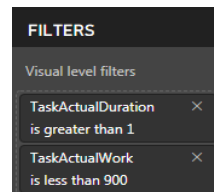


Use the Format section to turn off the legend since there are too many items to display.

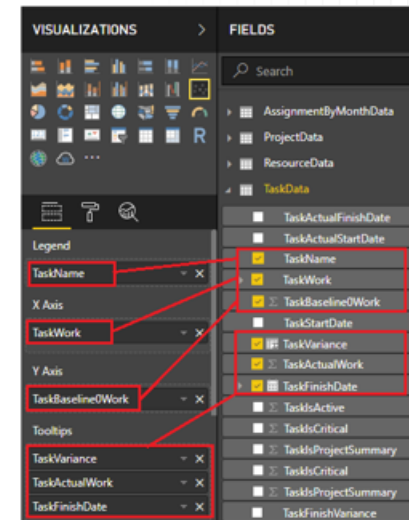
TASK REVIEW: Baseline Work vs. Planned Work



A scatter chart is an interesting way to show variance for many data points. Here we use it to show the baseline to planned variance for work tasks. A large variance will be drawn to the left or right of the central line. Tasks with large values will be positioned at the top right corner of the plot.



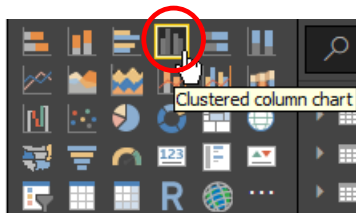
Use the Filters to take out data points with zeros and large items. (In this case we eliminated incomplete items and summary lines from the schedule.)



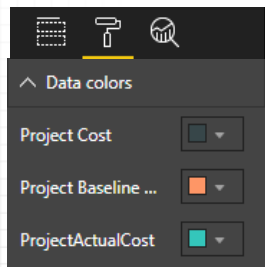
Use the Fields section to select the legend and x and y axis data values. Adding Task Name to the legend makes the dots different colors. Use the tooltips function to add more information about your schedule task in the popup box.



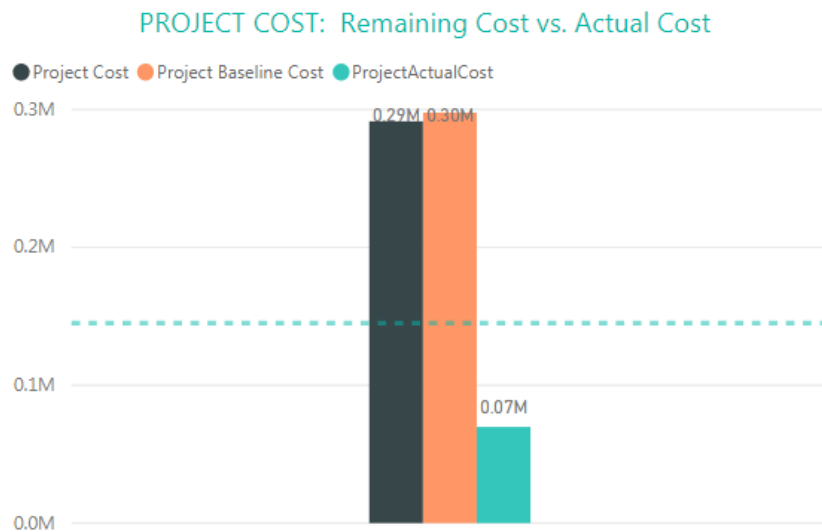
Project Cost Clustered Column Chart



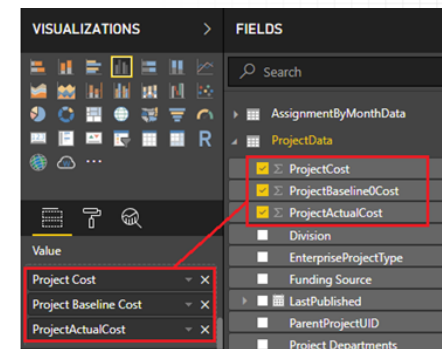
Select the Clustered column chart icon from the Visualizations.



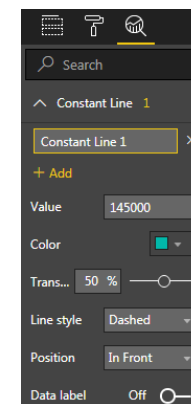
Use the Format section to set the column colors.



A clustered column chart is one way to show summary data for baseline, planned and actual costs for your project. Note: The actual work column reflects actual costs through March 2019 and the planned and baseline costs are for the whole year. The fiscal year begins in October so costs through March represent half the year. We added a trend line to show the half year value for baseline costs. The constant line in analytics works for this specific chart but will be inaccurate for other projects when you use a slicer.



Use the Fields section to select the data values.



Use the analytics section to set a trend line. Here we set the value to equal the half year value of the baseline costs to represent the passage of half of the fiscal year.