

MAKING CONNECTIONS, MAKING A DIFFERENCE

◦ **Making**
Connections 2024

◦ **The National Transit Workforce Conference**

◦ **November 11 – 13, 2024 • Baltimore, MD** ◦



MAKING CONNECTIONS, MAKING A DIFFERENCE



Making Connections 2024

The National Transit Workforce Conference

November 11 – 13, 2024 • Baltimore, MD



Transit Workforce Center – Mission

Operated by the **ITLC**, the **Transit Workforce Center (TWC)** is **FTA's** first ever national technical assistance center for transit workforce development.



mission

The **TRANSIT WORKFORCE CENTER** is the Federal Transit Administration's first ever national technical assistance center for transit workforce development. Its mission is to help urban, suburban, tribal, and rural public transportation entities throughout the U.S. recruit, hire, train, and retain a diverse workforce for now and into the future.



Safety Briefing

- Note your location: Hilton Baltimore Inner Harbor, Floor 1.
- Identify your nearest exits.
- Automated system will alert attendees if we need to evacuate the building.
 - Use stairs, not elevators. Anyone unable to use the stairs will be assisted by fire department at the stairwell.
 - Our assembly point is Northwest Warehouse, 333 West Camden Street, just behind the Sports Legend Museum and adjacent to the ballpark.
- In the event of medical emergency, call 911 from a cell phone (if no cell phone, use house phone). Security (443-683-8801) will also assist. Hotel has qualified staff to perform first aid and operate CPR.
- To report emergencies to the hotel, dial 65 on a house phone.



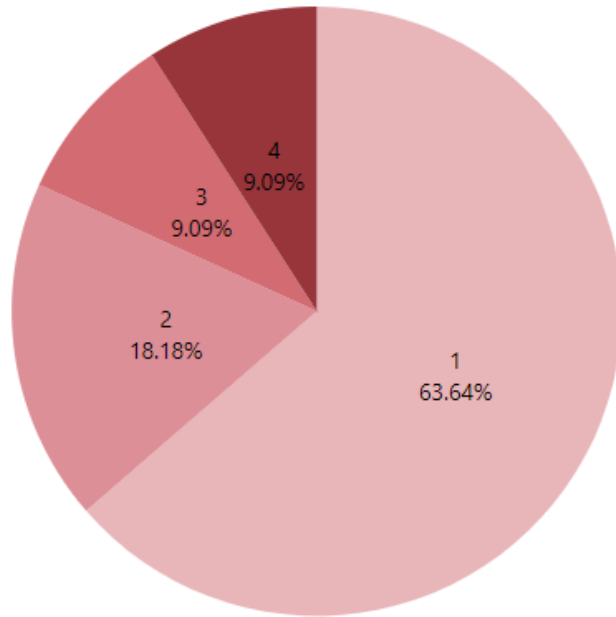
Elevating Your Workforce Data

The Power of Interactive Visualizations for
Analyzing

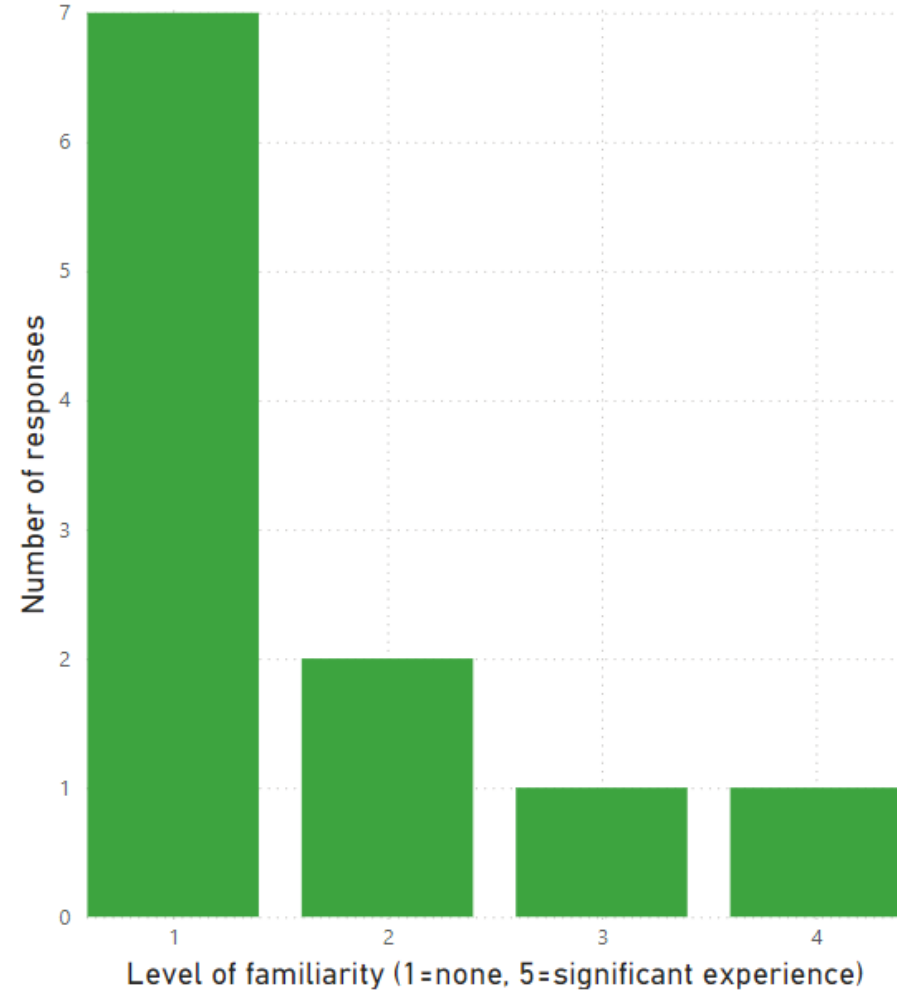


Introductions and Survey Responses

Microsoft Power BI



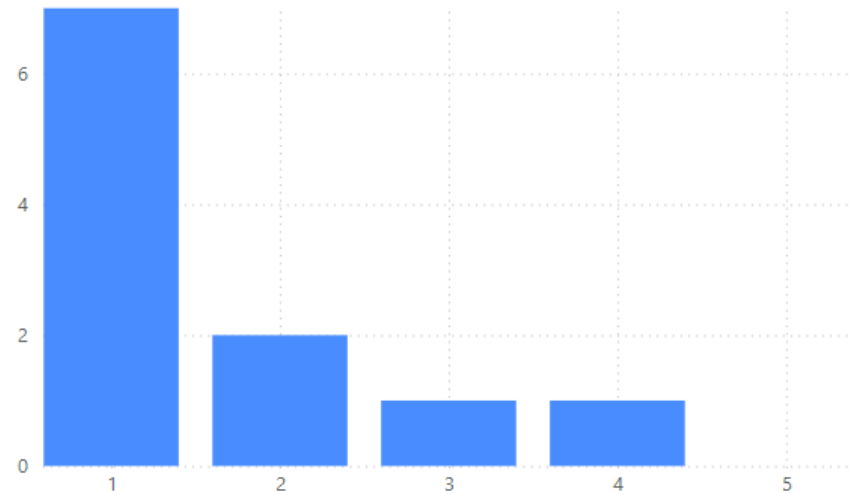
Microsoft Power BI



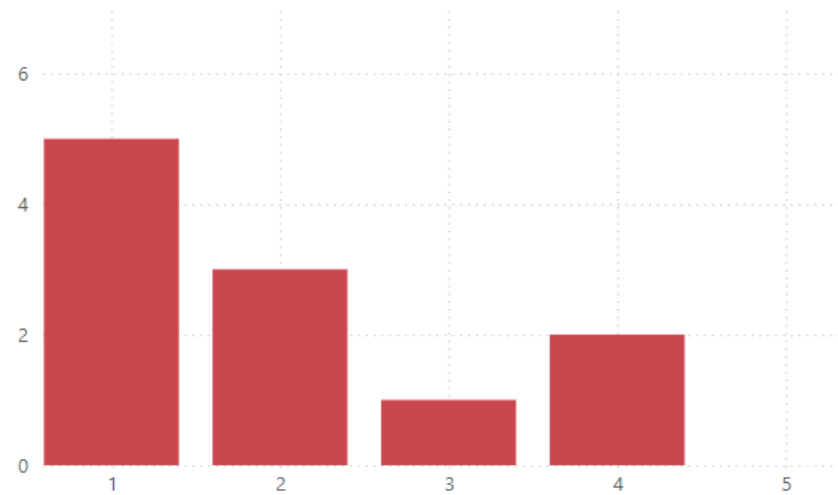


Introductions and Survey Responses

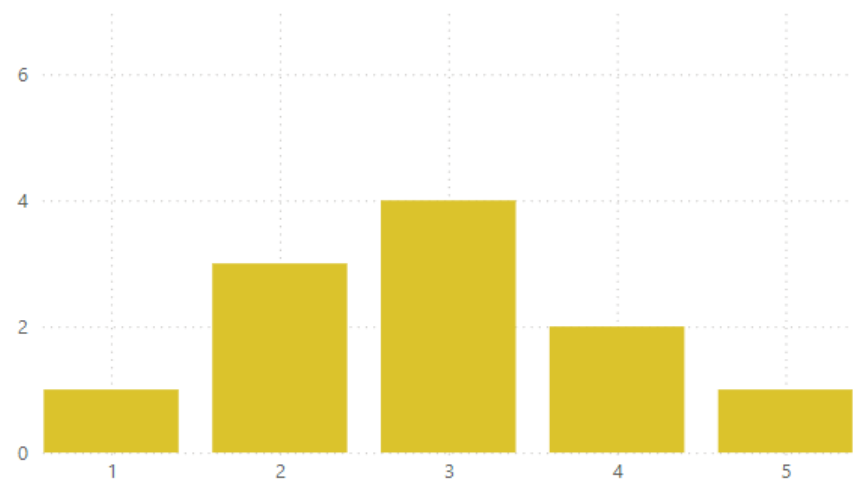
Familiarity with Microsoft Power BI



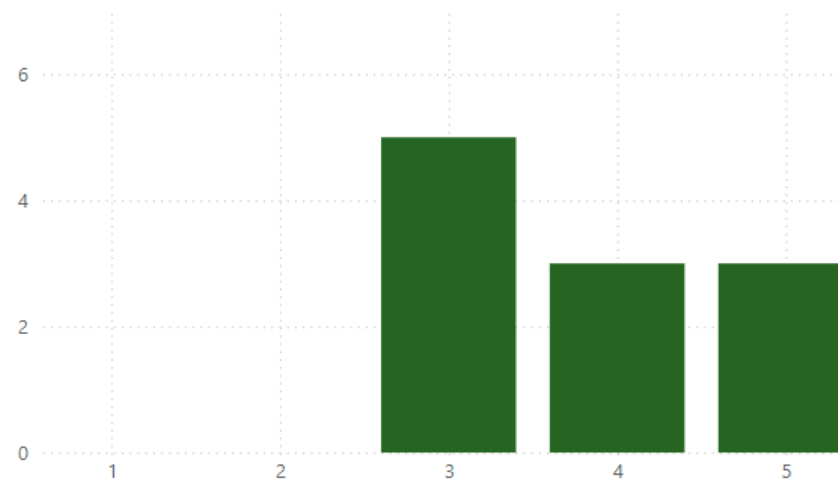
Familiarity with Other BI Tools



Familiarity with HR Data Systems



Familiarity with Excel



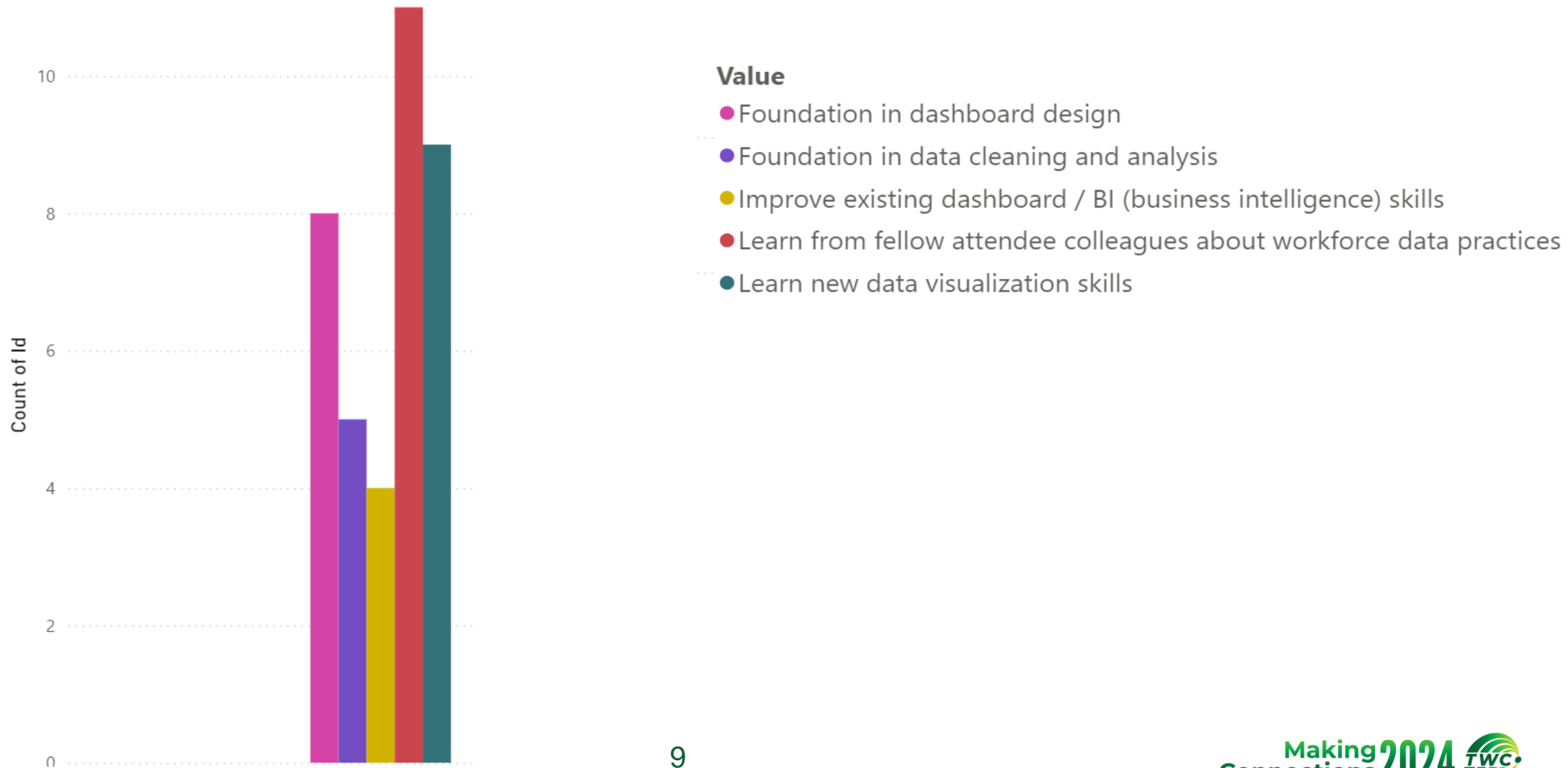


Introductions and Survey Responses



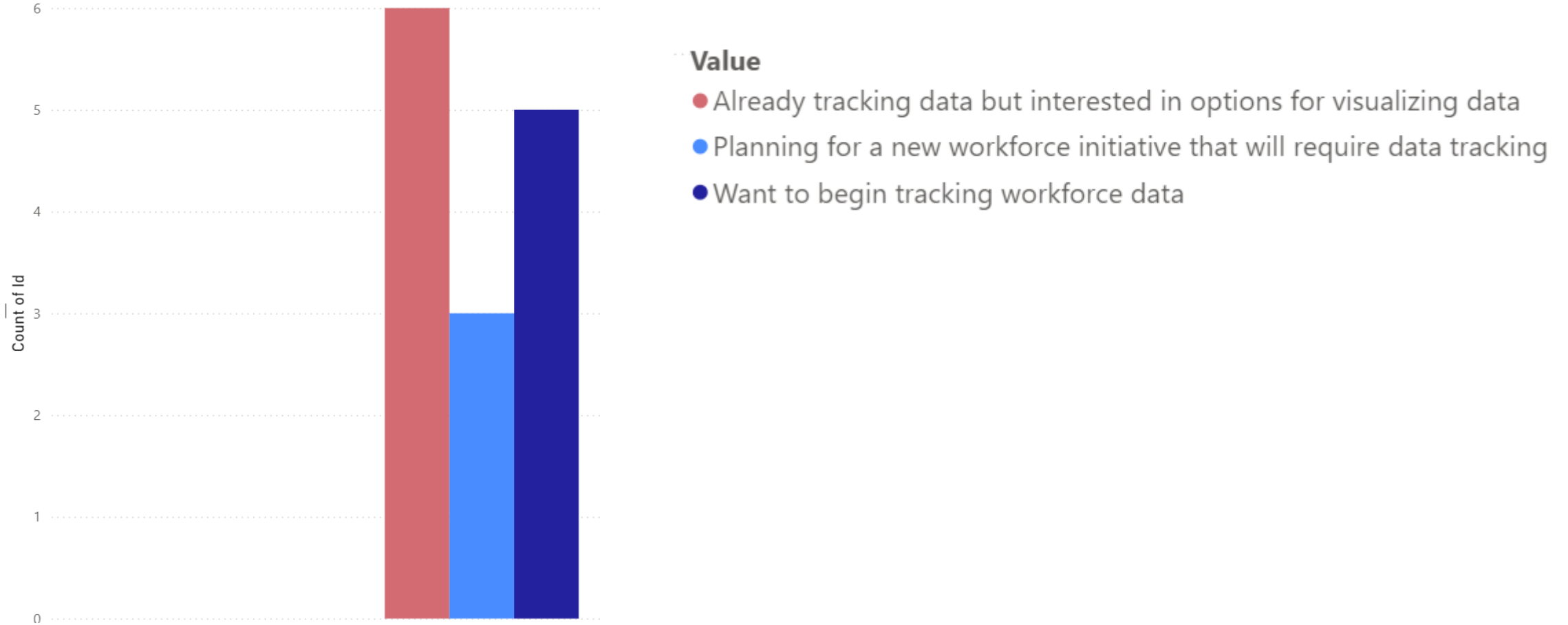


Introductions and Survey Responses





Why Did You Register for This Intensive?





Andrew Carpenter

Director, National Center for Applied
Transit Technology



The Importance of Data Dashboards

The National Center for Applied Transit Technology (N-CATT)

Making Connections '24 | November 11, 2024

The National Center for Applied Transit Technology

- Walking small transit agencies through the technology landscape
- Producing resources on adopting emerging technologies
 - Data literacy, scheduling/dispatching software strategies, fare payment technologies
 - Lessons learned, trends, strategies
- Providing in-depth technical assistance to adopting new tech
 - Technical Assistance Teams
 - State Technology Summits
 - Hands-On Workshops



STTATs

- One-on-one technical assistance with N-CATT staff and consultants.
- Support in identifying and making progress on technology goals.
 - Assess current processes and tech opportunities for improvement.
 - Develop roadmaps for achieving tech goals, alternatives assessments, tech specifications, procurement strategies.
 - Provide support for implementation plans and procurements.
- These have led to:
 - AV Feasibility Study
 - Microtransit Deployment Strategies
 - Alternatives analyses and technical specifications for upgrading fare payment systems.



The Data Literacy Initiative

Survey Data Literacy

- Identify critical areas of improvement
- Understand capacity to develop knowledge within small-urban, rural, and tribal agencies

Provide Training

- Develop training on collecting, managing, and making decisions from data
- Developed in concert with NTI, AASHTO, and other FTA-funded TA Centers

Provide Expert TA

- Help agencies deliver their desired results in improving mobility and transit

Create Resources

- Produce readily accessible online resources
- Emphasize benefits of emerging tech, investment/partnership opportunities, and legislative changes

Contextualize Dashboards

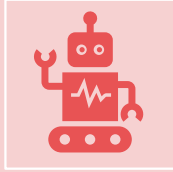
What is a data dashboard?

- A quick-reference, usually real-time, dynamic visualization of key performance indicators
- “summary of different but related data sets, presented in a way that makes [that] information easier to understand” – [Tableau](#)

Why are they important?

- Spot problems in their early stages to begin addressing them
- Quickly communicate important information
- Analyze trends to inform decisions

Why Data Dashboards?



Real-time information to manage day-to-day operations



High-level information to inform strategic insights, business performance, and long-term planning



In-depth analysis to uncover trends and patterns to inform decision-making



Purpose: Provide real-time insights into operational processes to manage day-to-day activities



Audience: Operational managers, Supervisors, Dispatchers, Passengers



Example Use Cases: On-time performance tracking, customer service response

Operations and Performance Management

Strategic and Business Intelligence



Purpose: Offer high-level strategic insights, overall business performance and long-term planning



Audience: Management, Boards, Funders



Example Use Cases: Assessing market trends and overall agency health



Purpose: Enable in-depth analysis to uncover trends and patterns for informed decision-making



Audience: Planners, Analysts



Example Use Cases: Identifying anomalies, future route planning

Analytical and Diagnostic

Considerations for Dashboards

Either time- or tech-intensive if you want regularly updated information

Doesn't displace more intense analyses for long-term planning

How to Create a Data Dashboard

1

Define your
audience and
goals

2

Choose your
data

3

Choose your
visualizations

The image features a white background with two large, solid red geometric shapes. On the left, a red triangle points towards the center. On the right, a red trapezoid is positioned, also pointing towards the center. The text 'What do you want to measure?' is centered between these two shapes.

What do you want to
measure?

What does a good dashboard look like?

M MetroPulse
Washington Metropolitan Area Transit Authority

- Service Status
- Rail
- Bus
- System Maps
- Rail
- System Map
- System Map Spanish
- Bus
- Performance Dashboard
- X (Formerly Twitter)
- Feedback

Menu Rail Bus

RD Destination **Glenmont** Destination **Shady Grove**

Average Time Between Trains
6 minutes 6 minutes

No MetroAlert

25 ACTIVE TRAINS

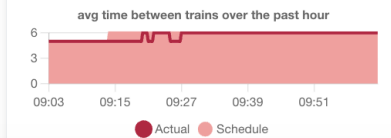
- 15 (8-car trains)
- 10 (6-car trains)
- 94% headway
- 2 service gaps
- 3 more than scheduled

Glenmont	Shady Grove
active: 12	active: 13
eight-car: 10	eight-car: 5
six-car: 2	six-car: 8
late: 2 of 12	late: 2 of 13
avg freq: 6 min	avg freq: 6 min
headway: 99%	headway: 89%

2 Noticeable Service Gaps:

9-minute gap towards Glenmont from Twinbrook to Medical Center, 3 minutes longer than expected

9-minute gap towards Shady Grove from Bethesda to North Bethesda, 3 minutes longer than expected



OR Destination **New Carrollton** Destination **Vienna**

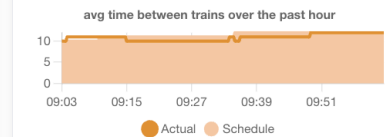
Average Time Between Trains
13 minutes 11 minutes

No MetroAlert

12 ACTIVE TRAINS

- 1 (8-car trains)
- 11 (6-car trains)
- 68% headway
- 0 service gaps
- 1 more than scheduled

New Carrollton	Vienna
active: 6	active: 6
eight-car: 0	eight-car: 1
six-car: 6	six-car: 5
late: 2 of 6	late: 1 of 6
avg freq: 13 min	avg freq: 11 min
headway: 58%	headway: 78%



S9

NORTH To Silver Spring | SOUTH To Franklin Square

12 minutes Actual time between buses | 12 minutes

12 minutes Scheduled time between buses | 9 minutes

- 6 Scheduled Buses
- 3 Active Buses
- 2 On Time
- 1 Early
- 0 Late

- 6 Scheduled Buses
- 4 Active Buses
- 3 On Time
- 1 Early
- 0 Late

NORTH TO SILVER SPRING

Average Time Between Buses
Avg. Time Between Buses Over the Past Hour

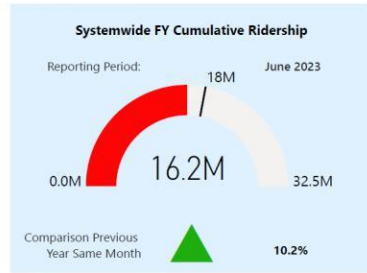
Today's Service Performance
On-Time Performance Since 4AM

Early On-Time Late

What does a good dashboard look like?

Executive Dashboard Home

Ridership



More Information Available:

Fixed-Route Monthly Ridership	Access Monthly Ridership
Rail Monthly Ridership	Pickup Monthly Ridership

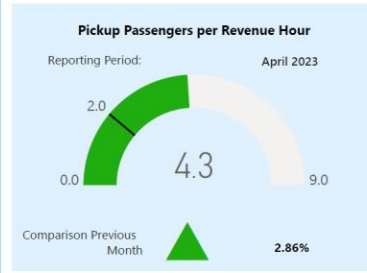
Reliability



More Information Available:

Fixed-Route OTP	Access OTP	Fixed-Route MDBF
Rail OTP	Pickup OTP	Demand Resp. MDBF
Missed Trips Access	Missed Trips Pickup	Scheduled Revenue Hours Lost

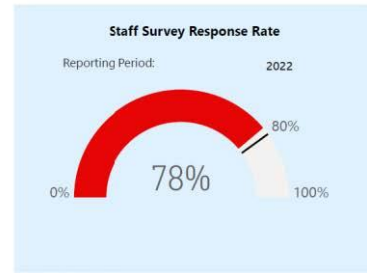
Productivity



More Information Available:

Fixed-Route Passengers per Revenue Hour	Rail Passenger per Revenue Hour
Pickup Passenger per Revenue Hour	

Workforce



More Information Available:

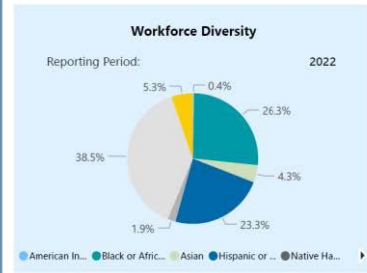
Staff Engagement & Satisfaction



More Information Available:

New Hires and Terminations

Diversity, Equity, and Inclusion



More Information Available:

DBE	SBE
-----	-----

Satisfaction



More Information Available:

Overall Rider Satisfaction by Year

Technology



More Information Available:

Incidents Made/Breached SLA

Sustainability





Newsletter



LinkedIn



STTATs

Questions?



Andrew Carpenter
Director
carpenter@ctaa.org



Abby Tremel
Senior Program Associate
tremel@ctaa.org



Jordan Howard
Senior Program Associate
howard@ctaa.org



Lauren Ellis
Program Associate
ellis@ctaa.org

N-CATT Staff

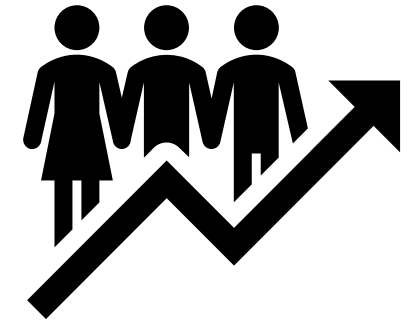
What Can Go in Your Dashboard?

Characteristics of your workforce

- Worker demographics
- Number / percent of employees by occupation
- Hours worked; full-time vs. part-time employees

Compensation and advancement

- Wages (averages / range; overall and by occupation)
- Promotions and career trajectories



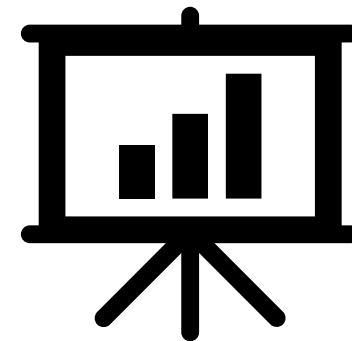
What Can Go in Your Dashboard?

Retention and turnover

- Number of vacancies (overall, over time, by occupation)
- Separations (retirements, quits, fires)
- Retention / turnover rate, espec. before and after implementation of a workforce development program

Mentorship / training effectiveness

- Absenteeism, attendance
- Grievances, complaints, compliments
- Accidents, moving violations



What Can Go in Your Dashboard?

Effectiveness of training / apprenticeship / other workforce programs & related cost savings

- Program entry v. completion metrics
- Pre- & post-test knowledge scores, exam pass rates
- Mean distance between failures
- Parts and labor costs
- Bus spare ratios
- Worker satisfaction scores (on programs or overall)





Discussion: example metrics

GLOBAL

Stakeholder buy-in

Time to implement

Cost to implement

Full return on investment

Sustainability

RECRUITMENT

Time to fill position

New-hire turnover within the first year

Offer-to-acceptance ratio

New-hire turnover during initial training

New-hire performance ratings

Recruiting cost ratio

RETENTION

Employee voluntary turnover rate

Cost to fill open positions

Diversity turnover

Employee engagement

Impact of turnover on employee knowledge

TRAINING AND DEVELOPMENT

Pre- and post-training knowledge/skill testing

Employee performance post-training

Percent of employees rating training as job-relevant

Impact of training on system operations, safety, and customer service

Percent of trainees satisfied with training

Recency of training materials

PROFESSIONAL CAPACITY BUILDING

Timeliness of task completion

Timeliness of scheduled activities

Percentage of employees who participate in employee development opportunities

Percentage of jobs filled internally

Percentage of operational supervisory positions filled by frontline personnel

Employee involvement in organization's decision making

Percentage of positions with an up-to-date job description

Which of these metrics do you think are most valuable?

Would it be feasible in your organization to combine these metrics into a report or dashboard?

Source:

TCRP Report 162: Building a Sustainable Workforce in the Public Transportation Industry — A Systems Approach (2013)



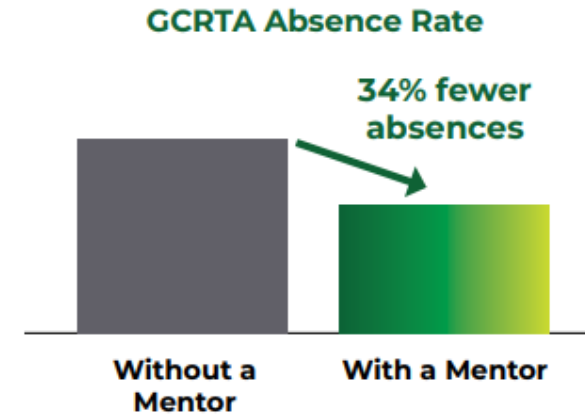
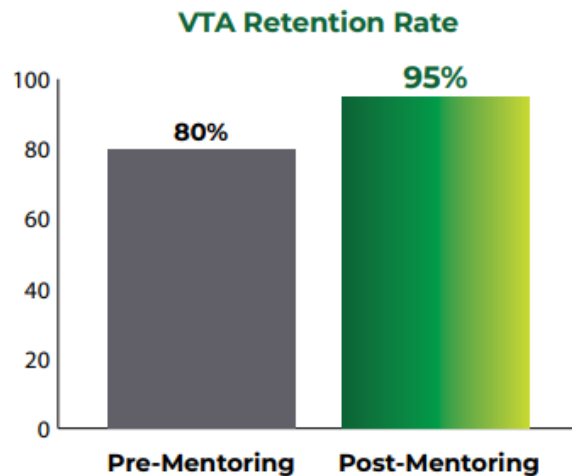
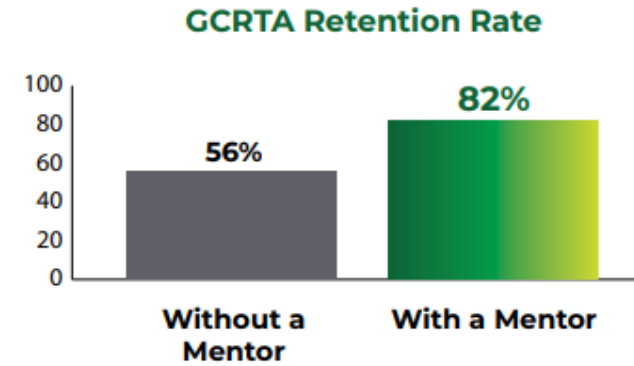
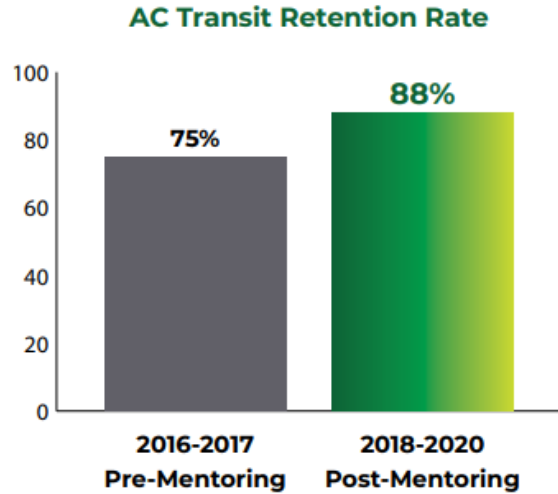
Discussion: example metrics

**How / where are
workforce data
stored?**

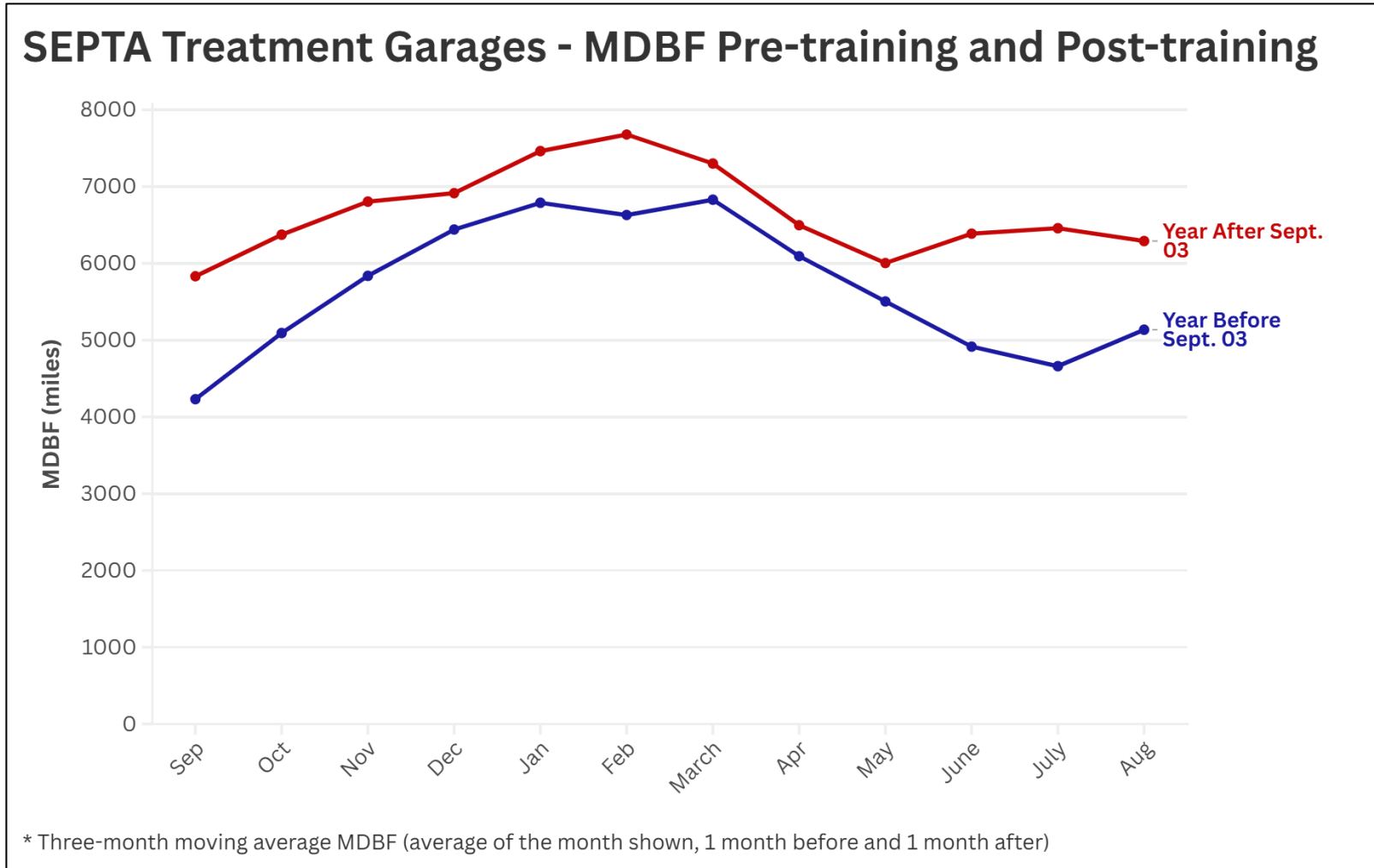
**What other data
systems does your
organization use?**

**Are these systems
connected?**

How Could You Visualize Trends?



How Could You Visualize Trends?



TWC Transit Workforce Data Dashboard



Data Visualization and Business Intelligence (BI) Platforms

Microsoft Excel

- Included in Microsoft Office
- Easy learning curve

Google Sheets

- Free
- Easy learning curve



Data Visualization and Business Intelligence (BI) Platforms

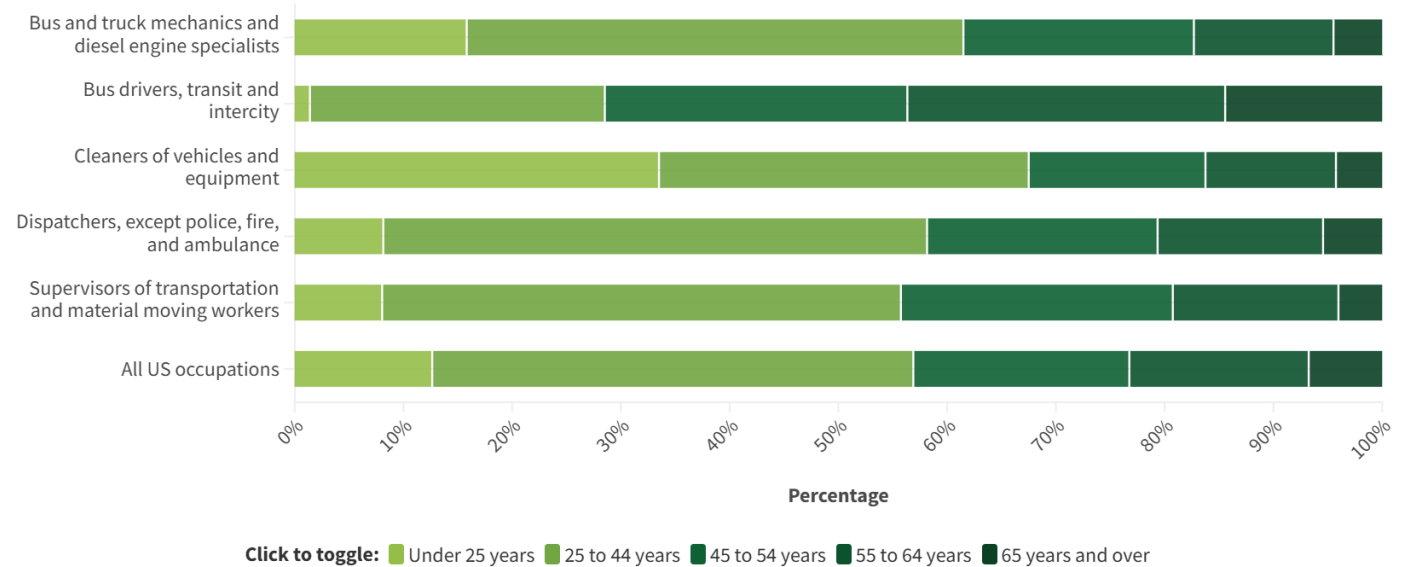
Flourish

- Free version available
- Easy learning curve
- User-friendly interface
- Wide variety of standard and unique chart options

Datawrapper

- Free version available

Employment by Age



* A Flourish chart

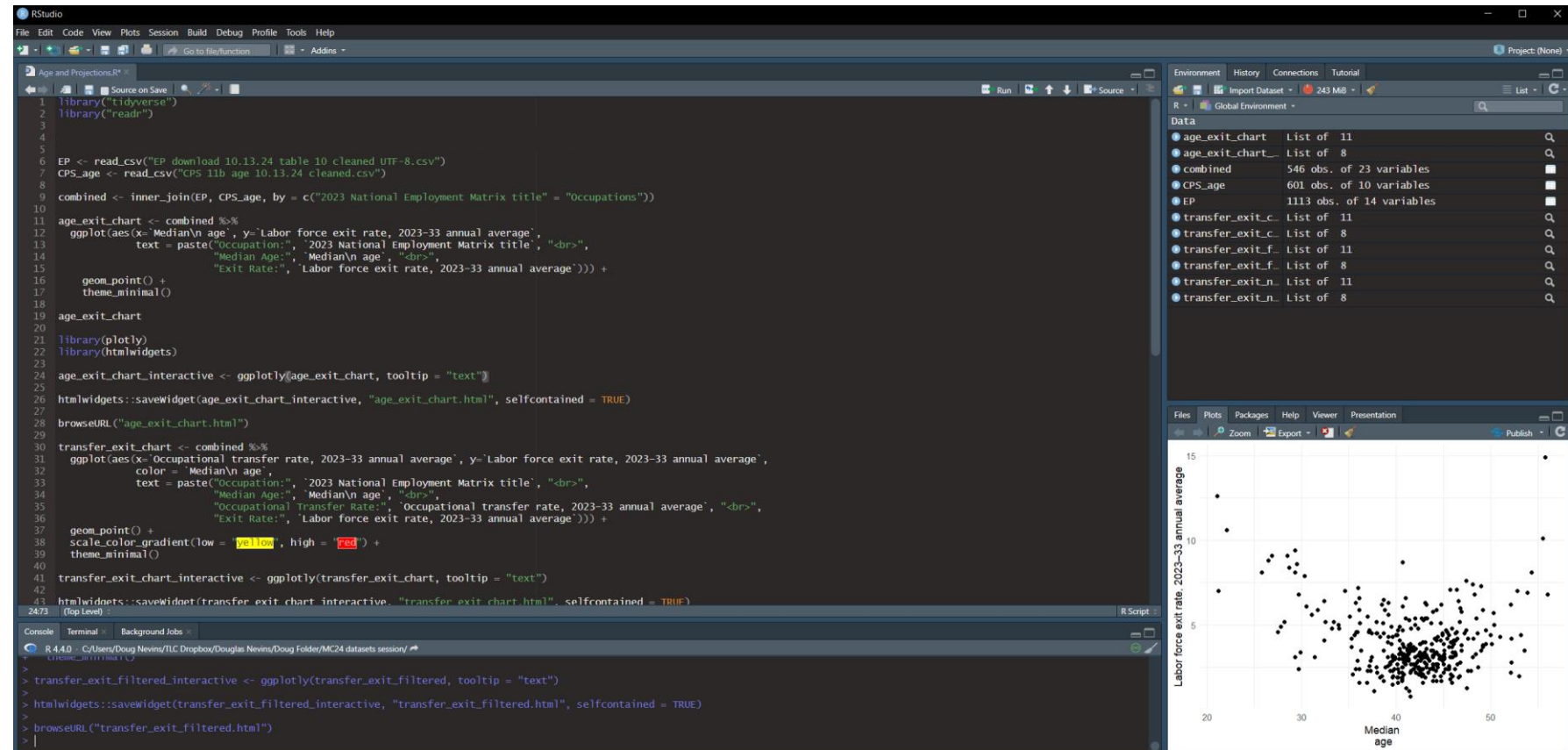
Source: TWC analysis of U.S. Bureau of Labor Statistics, 2023. Labor Force Statistics from the Current Population Survey. Employed persons by detailed occupation and age [Annual averages for 2023]. Retrieved from: <https://www.bls.gov/cps/cpsaat11b.htm>, February 20, 2024



Data Visualization and Business Intelligence (BI) Platforms

R or Python

- Free
- Coding required
- Can be used with other tools, like Plotly
- More powerful in terms of options and flexibility





Data Visualization and Business Intelligence (BI) Platforms

Tableau

- Paid

Power BI

- Free version included in Microsoft Office

Looker / Looker Studio

- Free version available

Quick 15-minute break



Discussion: workforce data in your organization

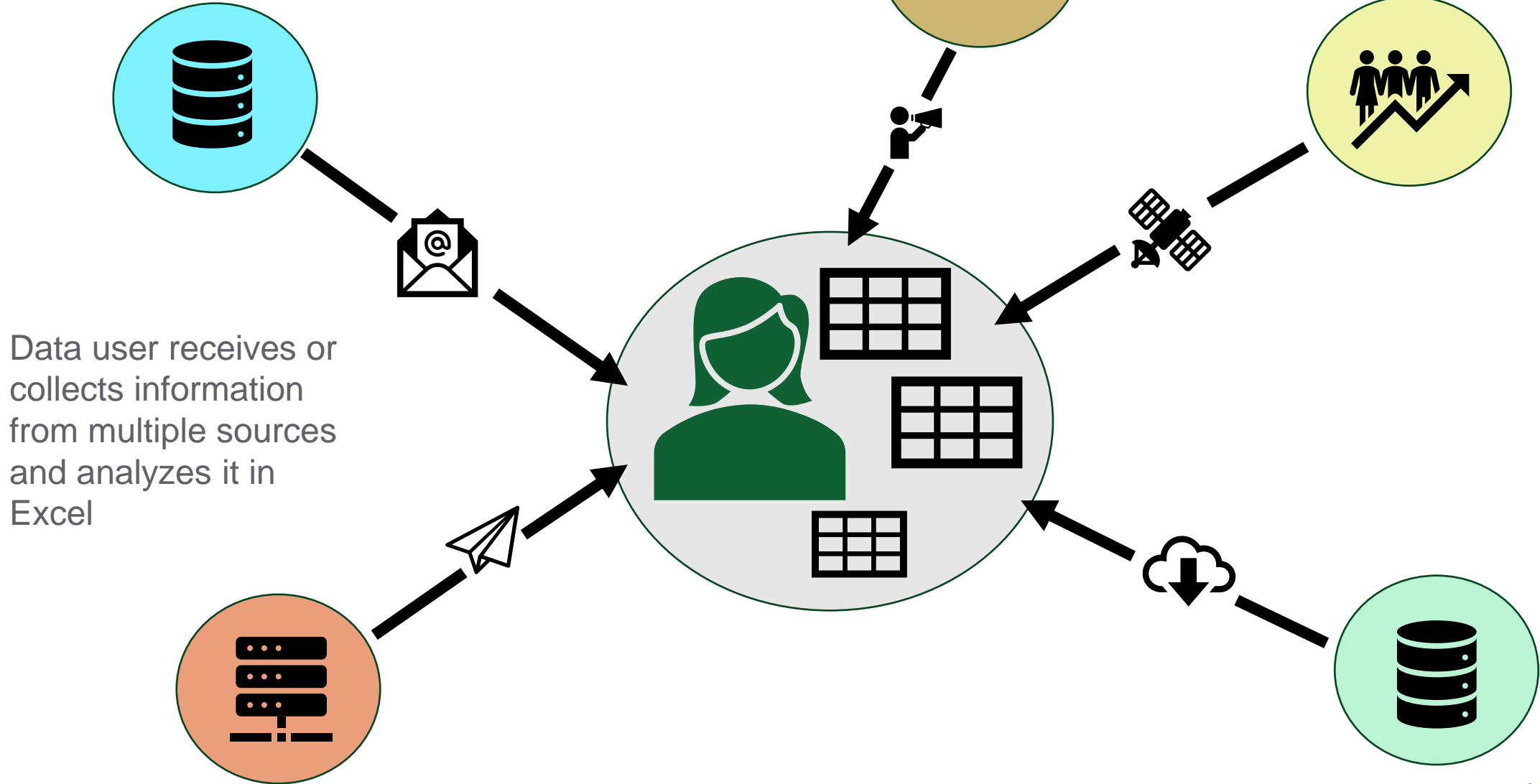
What workforce programs, if any, are you tracking and analyzing data for?

What types of visualizations, charts, or other summaries of data do you find most effective?

Least effective?

Any examples?

Data from many sources



Data from many sources



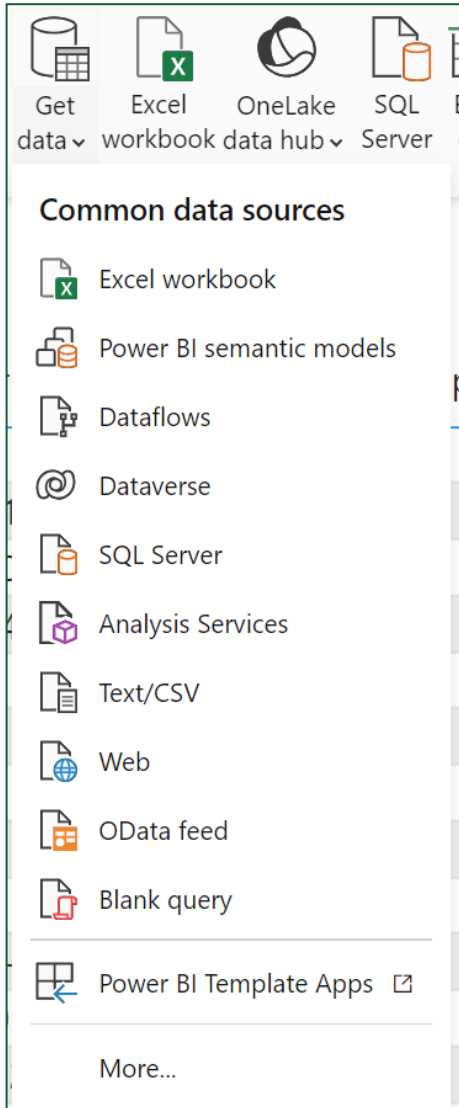


Accessing data sources in Power BI

The screenshot displays the Power BI desktop application interface. The top ribbon is visible, with the 'Insert' tab selected. Within the 'Insert' tab, the 'Get data' button is highlighted with a green circle. Below the ribbon, a central dialog box titled 'Add data to your report' is also highlighted with a green border. This dialog box contains the text 'Once loaded, your data will appear in the Data pane.' and four options: 'Import data from Excel', 'Import data from SQL Server', 'Paste data into a blank table', and 'Use sample data'. At the bottom of the dialog, there is a link 'Get data from another source →'. To the right of the main workspace, the 'Visualizations' and 'Data' panes are visible. The 'Visualizations' pane shows various chart and table icons, and the 'Data' pane shows a message: 'You haven't loaded any data yet. Get data'. The bottom status bar shows 'Page 1' and a zoom level of 73%.



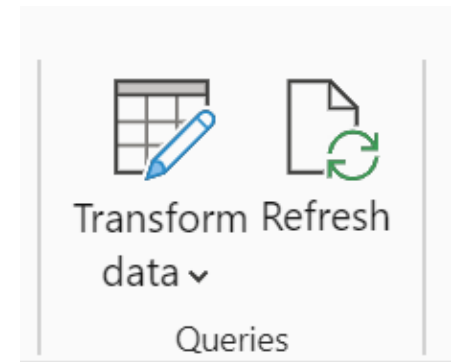
Accessing data sources in Power BI



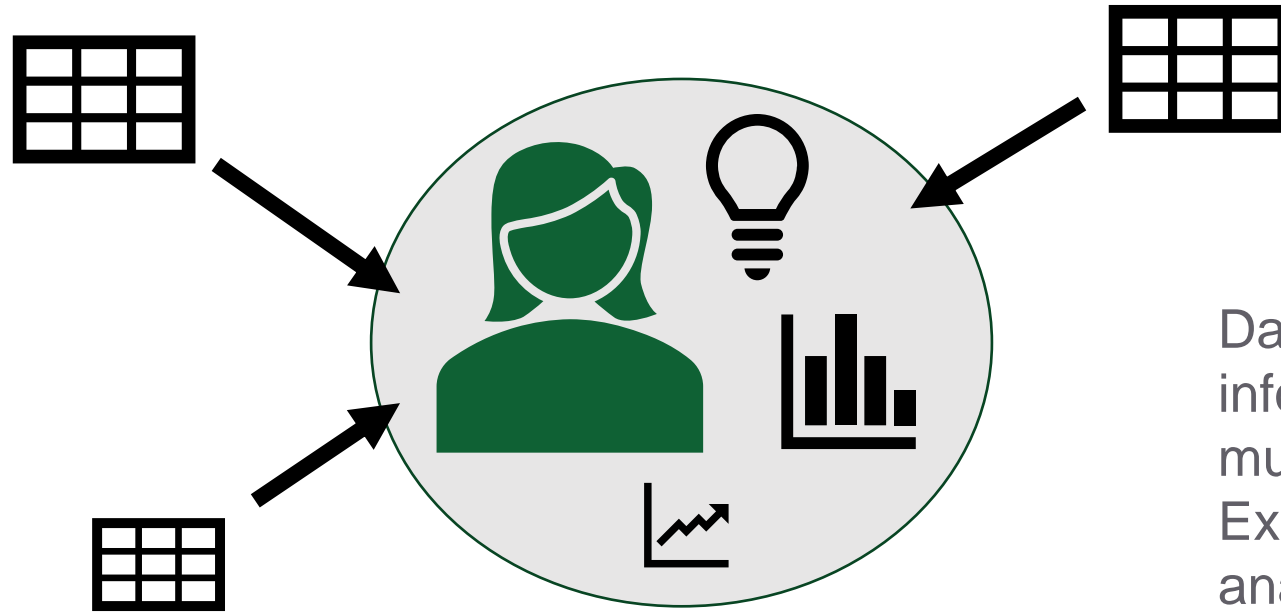
Power BI can pull data from many sources including data stored online (shared documents in the cloud, databases, websites)

Data stored online or in a file can be refreshed to reflect changes

And transformed to ensure a clean format for further analysis



Scenario for today



Data user receives information from multiple sources in Excel format and analyzes it in Power BI

Scenario for today

Our protagonist



- Managing a workforce initiative
- User of data collected by other stakeholders and stored in multiple systems
- Currently analyzes available data in Excel and cannot easily combine data from multiple sources



Sample Data

Employee info

First Name	Last Name	Employee ID	Role	Start Date	End Date	Birth date	Garage
firo	dimplefrost	7742	Bus operator	1/1/2014	5/12/2014	12/21/1975	Starlight Harbor
sagramor	farfoot	2884	Bus operator	1/1/2014		4/27/1965	Foggroove Post
coneth	hammerroar	4462	Bus operator	1/1/2014	10/24/2021	9/6/1978	Maplepoint Camp
itior	eagleshadow	9688	Bus operator	1/1/2014	4/3/2014	10/21/1985	Shadow Outpost
bear	silvermuddle	3488	Bus operator	1/1/2014		5/16/1983	Foggroove Post
wuzin	alpenswallow	4660	Bus operator	1/1/2014	11/30/2014	6/30/1969	Foggroove Post
bero	longfoot	9557	Bus operator	1/1/2014		1/16/1975	Foggroove Post
ofaris	shadevale	8071	Bus operator	1/1/2014	2/18/2015	8/17/1976	Maplepoint Camp
flix	blackfoam	2511	Bus operator	1/1/2014	9/3/2019	10/16/1987	Starlight Harbor
lul	hopesinger	4087	Bus operator	1/1/2014		5/10/1973	Foggroove Post
dhiwix	fusethorne	5975	Bus operator	1/1/2014	4/18/2014	1/6/1983	Maplepoint Camp

Incidents

Issue ID	Date	Time	Incident type	Employee ID	Bus ID	Injury	Hospital	Severity of collision (1-5)	Preventable
346669	3/19/2014	19:05	Near collision	9688		669 No	No		No
760082	4/25/2014	22:35	Passenger issue	4462		961 No	No		No
133152	5/15/2014	23:20	Near collision	7742		345 No	No		No
487915	6/10/2014	11:40	Passenger issue	3488		669 No	No		No
953907	7/7/2014	7:30	Passenger issue	4660		323 No	No		No
693413	8/4/2014	15:50	Collision	2884		664 No	No	1	No
167164	8/14/2014	11:40	Complaint	9557		961 No	No		No
452609	9/1/2014	19:40	Near collision	9746		294 No	No		No
664491	9/16/2014	20:10	Complaint	4462		961 No	No		No



Sample Data

Absences

Date	Employee ID
2/1/2014	7742
2/9/2014	9688
3/1/2014	4978
3/9/2014	8497
3/25/2014	5975
3/31/2014	8713
4/3/2014	8582
5/1/2014	2874
5/6/2014	7900
5/16/2014	5832
5/22/2014	1882
5/31/2014	5626

Assessments

Employee ID	Pre-test score (0-100)	Post-test score (0-100)	Pre-training self-assessment (0-10)	Post-training self-assessment (0-10)	Satisfaction score (0-10)
3638	59	77	6	7	6
2343	62	72	4	9	8
9253	35	63	1	4	5
2945	54	67	4	6	6
1733	63	78	4	7	8
9592	37	79	5	9	10
6070	52	57	6	6	3
9760	48	96	3	8	10
2768	52	80	5	7	7
7040	36	83	3	9	9
6350	42	69	4	6	6
4739	53	90	1	8	10
3805	37	91	6	10	10



Sample Data

Maintenance

Month Year	Miles traveled	Mechanical failures
Jan-14	2,243	8
Feb-14	2,200	9
Mar-14	2,129	13
Apr-14	2,174	14
May-14	2,044	8
Jun-14	2,155	13
Jul-14	2,118	12
Aug-14	2,155	13
Sep-14	2,264	10
Oct-14	2,024	13
Nov-14	2,231	6
Dec-14	2,000	14
Jan-15	2,267	12

Monthly Statistics

Month Year	New employees	Employees leaving	Employees at start of Month	Employees at end of Month
Jan-14	52		52	52
Feb-14			52	52
Mar-14			52	52
Apr-14	2	4	52	50
May-14	4	3	50	51
Jun-14	1		51	52
Jul-14	1	1	52	52
Aug-14		1	52	51
Sep-14	3	4	51	50
Oct-14	3	4	50	49
Nov-14	3	4	49	48
Dec-14	2	2	48	48
Jan-15	7		48	55

Data Cleaning Steps

- Remove missing data (but first figure out why it's missing)
- Remove duplicate rows
- Remove outliers (maybe!)
- Recode variables if needed
- Basic visualizations—does what you're seeing make sense?
- Tidy your data

Tidy Data

Data are tidy when:

- Each variable is a column; each column is a variable
- Each observation is a row; each row is an observation
- Each value is a cell; each cell is a single value

Messy

Country	1999	2000
Afghanistan	19987071	20595360
Brazil	172006362	174504898
China	1272915272	1280428583

Tidy

Country	Year	Population
Afghanistan	1999	19987071
Afghanistan	2000	20595360
Brazil	1999	172006362
Brazil	2000	174504898
China	1999	1272915272
China	2000	1280428583

Sources: [CRAN](#), [Stack Exchange](#)

Power BI Home Page

The screenshot displays the Power BI Home Page interface. At the top, the ribbon includes tabs for File, Home, Insert, Modeling, View, Optimize, and Help. The Home ribbon is active, showing various tool groups: Clipboard (Paste, Copy, Format painter), Data (Get data, Excel workbook, OneLake data hub, SQL Server, Enter data, Dataverse, Recent sources), Queries (Transform data, Refresh data), Insert (New visual, Text box, More visuals), Calculations (New visual calculation, New measure, Quick measure), Sensitivity, Share (Publish), and Copilot. A central area prompts the user to "Add data to your report" and states, "Once loaded, your data will appear in the Data pane." Below this, there are four options: "Import data from Excel", "Import data from SQL Server", "Paste data into a blank table", and "Use sample data". A link "Get data from another source" is also present. On the right side, there are three panes: "Filters" (with a search bar and sections for "Filters on this page" and "Filters on all pages"), "Visualizations" (with a "Build visual" section and a grid of visualization icons), and "Data" (with a search bar and a message "You haven't loaded any data yet. Get data"). At the bottom left, there is a navigation pane with icons for Reports, Datasets, Dashboards, and DAX, which is highlighted with a green box. The bottom status bar shows "Page 1 of 1", "Page 1", and a zoom level of "73%".

Different views



Report view

In the report view, you can develop and edit the visualizations, filters, buttons, etc. in your dashboard.



Table view

In the table view, you can view your datasets as tables and add columns based on the existing data.



Model view

In the model view, you can see relationships between your datasets and create/edit “connections” or linkages between columns (if the same variable appears in multiple datasets).



DAX query view

In DAX query view, you can use Power BI’s coding language to perform more complex calculations and data manipulations with your datasets.

Table View

First Name	Last Name	Employee ID	Role	Start Date	End Date	Sex	Race	Ethnicity	Birth date	Garage
sagramor	farfoot	2884	Bus operator	Wednesday, January 1, 2014		M	Asian	Not Hispanic	Tuesday, April 27, 1965	Foggrove Post
bear	silvermuddle	3488	Bus operator	Wednesday, January 1, 2014		F	Black	Not Hispanic	Monday, May 16, 1983	Foggrove Post
bero	longfoot	9557	Bus operator	Wednesday, January 1, 2014		F	Black	Not Hispanic	Thursday, January 16, 1975	Foggrove Post
lul	hopesinger	4087	Bus operator	Wednesday, January 1, 2014		M	Black	Hispanic	Thursday, May 10, 1973	Foggrove Post
qjinitor	fernsinger	3900	Bus operator	Wednesday, January 1, 2014		F	Asian	Not Hispanic	Wednesday, August 6, 1986	Shadow Outpost
ivasaar	grandarm	1432	Bus operator	Wednesday, January 1, 2014		M	Other	Hispanic	Thursday, November 2, 1989	Maplepoint Camp
pepper	hollybead	5700	Bus operator	Wednesday, January 1, 2014		M	White	Not Hispanic	Thursday, May 27, 1976	Foggrove Post
tulip	betterstream	5626	Bus operator	Wednesday, January 1, 2014		M	Asian	Not Hispanic	Tuesday, April 12, 1983	Maplepoint Camp
tangy	shadowsand	1792	Bus operator	Wednesday, January 1, 2014		M	Black	Not Hispanic	Friday, September 9, 1977	Starlight Harbor
frewin	vexx	1906	Bus operator	Wednesday, January 1, 2014		F	White	Hispanic	Monday, July 27, 1987	Maplepoint Camp
wynninn	fullreaver	9638	Bus operator	Wednesday, January 1, 2014		F	Black	Not Hispanic	Monday, February 9, 1976	Foggrove Post
thaqiohr	skullsnow	7799	Bus technician	Wednesday, January 1, 2014		F	White	Hispanic	Friday, October 2, 1964	Maplepoint Camp
cruxeor	irongrain	6684	Bus technician	Wednesday, January 1, 2014		F	Other	Hispanic	Wednesday, December 16, 1981	Shadow Outpost
odulf	bramblethorn	4241	Bus technician	Wednesday, January 1, 2014		M	White	Not Hispanic	Sunday, January 26, 1992	Starlight Harbor
ruvaen	shieldblaze	1488	Bus technician	Wednesday, January 1, 2014		F	Asian	Not Hispanic	Monday, March 25, 1974	Maplepoint Camp
tamnaeth	stilleye	6579	Bus technician	Wednesday, January 1, 2014		M	Other	Hispanic	Monday, May 2, 1988	Foggrove Post
arculf	hornwood	7854	Bus technician	Wednesday, January 1, 2014		M	Black	Not Hispanic	Tuesday, July 17, 1990	Maplepoint Camp
sprinkle	waterjacket	7061	Bus technician	Wednesday, January 1, 2014		M	White	Hispanic	Saturday, April 11, 1970	Starlight Harbor
foxglove	merrypearl	2192	Bus technician	Wednesday, January 1, 2014		F	White	Not Hispanic	Friday, January 18, 1980	Shadow Outpost
cirrus	honeybead	8151	Bus technician	Wednesday, January 1, 2014		F	Black	Hispanic	Tuesday, August 24, 1982	Shadow Outpost
cirro	mirthflaw	9100	Bus technician	Wednesday, January 1, 2014		F	Asian	Not Hispanic	Monday, July 7, 1986	Maplepoint Camp
florian	greentrap	9578	Bus technician	Wednesday, January 1, 2014		M	White	Not Hispanic	Thursday, January 27, 1966	Starlight Harbor
turnip	bittervale	3254	Bus technician	Wednesday, April 23, 2014		M	Asian	Not Hispanic	Monday, October 24, 1977	Foggrove Post
kaspar	shadowmead	7900	Bus operator	Tuesday, April 29, 2014		M	Black	Not Hispanic	Tuesday, November 8, 1977	Starlight Harbor
trevan	mildflame	5418	Bus operator	Monday, May 19, 2014		M	Black	Not Hispanic	Wednesday, July 9, 1986	Starlight Harbor
adam	fadington	3069	Bus technician	Tuesday, September 2, 2014		M	Black	Not Hispanic	Saturday, December 1, 1990	Starlight Harbor
rain	highstrike	5997	Bus operator	Friday, September 12, 2014		F	Other	Hispanic	Monday, April 17, 1978	Shadow Outpost
alric	discord	7121	Bus technician	Sunday, October 26, 2014		M	Black	Not Hispanic	Tuesday, September 10, 1980	Shadow Outpost

Data

Search

- Absences
- Assessments
- Calendar
 - Date
 - Month Year
 - Month Year Sort
- Employee info
- Incidents
- Maintenance
- Monthly Statistics

Table: Employee info (140 rows)

Model View

The screenshot displays a data model view with four tables: Absences, Assessments, Employee info, and Incidents. Relationships are indicated by lines connecting fields between tables, with cardinality notations (e.g., * to 1).

- Absences**: Date, Employee ID
- Assessments**: Employee ID, First Name, Last Name, Post-test score (0-100), Post-training self-assessment (0-100), Pre-test score (0-100), Pre-training self-assessment (0-10), Satisfaction score (0-10)
- Employee info**: Birth date, Employee ID, End Date, Ethnicity, First Name, Garage, Last Name, Race, Role
- Incidents**: Bus ID, Date, Employee ID, Hospital, Incident type, Injury, Issue Number, Preventable, Severity of collision (1-5)

Relationships shown:

- Absences (Employee ID) to Assessments (Employee ID): * to 1
- Assessments (Employee ID) to Employee info (Employee ID): * to 1
- Employee info (Employee ID) to Incidents (Employee ID): * to 1
- Incidents (Date) to Absences (Date): * to 1

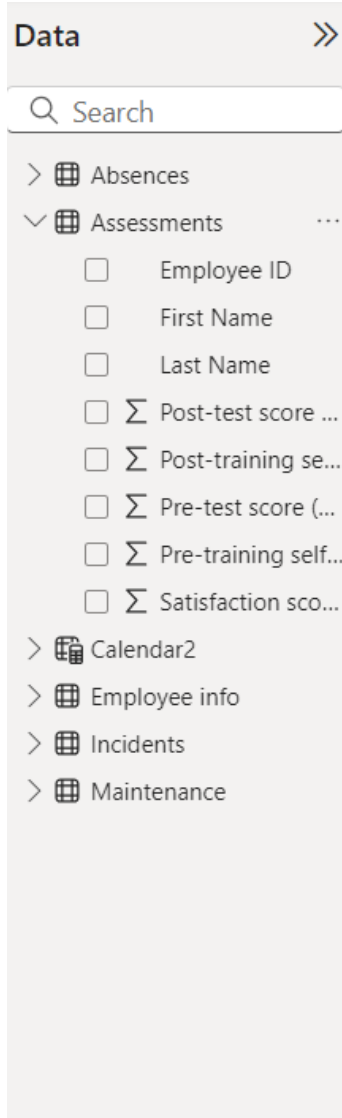
The Properties pane on the right shows the following structure:

- Tables
- Model
- Search
- Absences
- Assessments
- Calendar
 - Date
 - Month Year
 - Month Year Sort
- Employee info
- Incidents
 - Bus ID
 - Date
 - Employee ID
 - Hospital
 - Incident type
 - Injury
 - Issue Number
 - Preventable
 - Severity of collision (1-5)
 - Time
- Maintenance
- Monthly Statistics

Power BI Home Page

The screenshot shows the Power BI Home Page interface. The ribbon at the top includes tabs for File, Home, Insert, Modeling, View, Optimize, and Help. The Home tab is active, showing various icons for data sources (Excel, OneLake, SQL Server, Enter data, Dataverse, Recent sources), transformations (Transform data, Refresh data), and visualizations (New visual, Text box, More visuals). The main workspace area displays the message "Add data to your report" and "Once loaded, your data will appear in the Data pane." Below this, there are four buttons: "Import data from Excel", "Import data from SQL Server", "Paste data into a blank table", and "Use sample data". A link "Get data from another source" is also present. On the right side, the 'Data' pane is highlighted with a green border. It contains a search bar and the message "You haven't loaded any data yet. Get data". Other panes visible include 'Filters' and 'Visualizations'. The bottom status bar shows "Page 1 of 1" and a zoom level of 73%.

Data

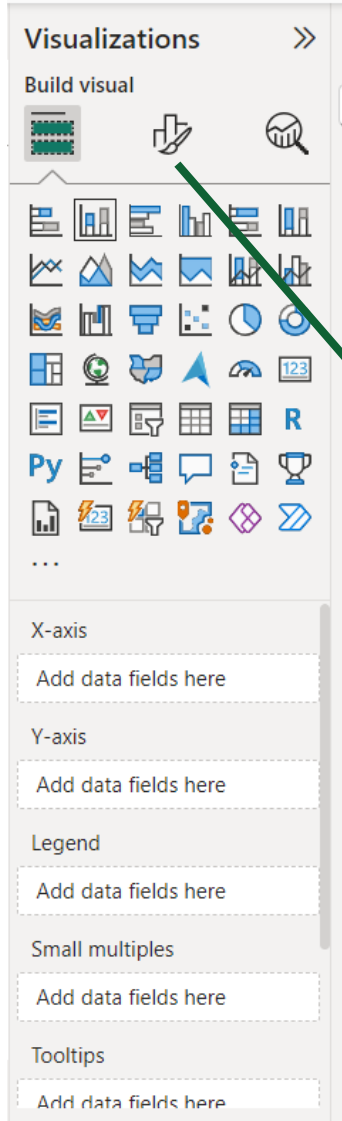


- The data sidebar shows all your datasets, which you can expand to view the variables/columns.
- You can select these column names when creating a visualization.

Power BI Home Page

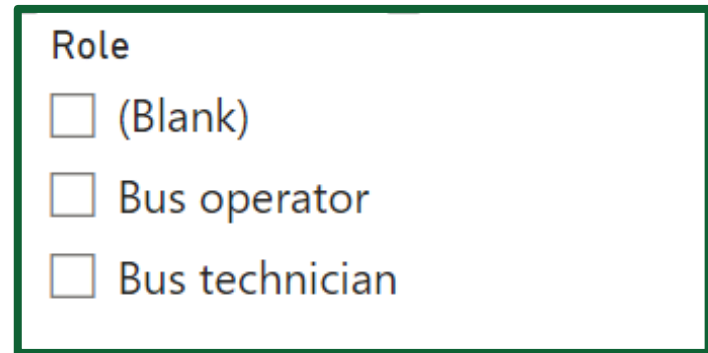
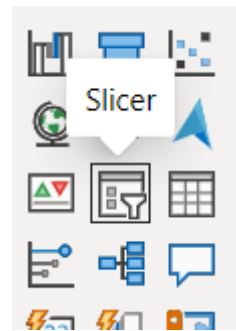
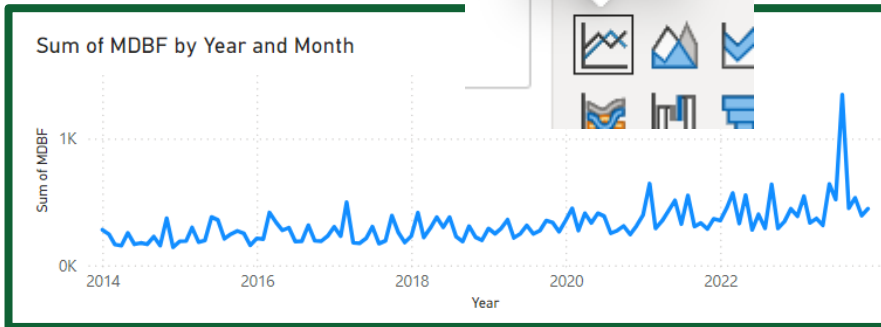
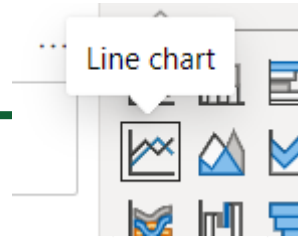
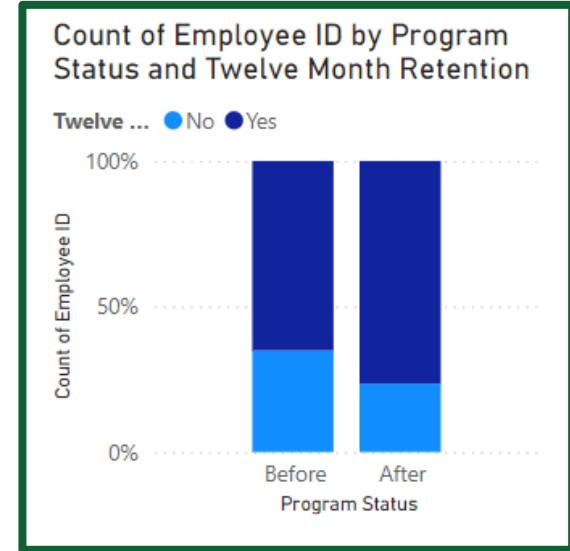
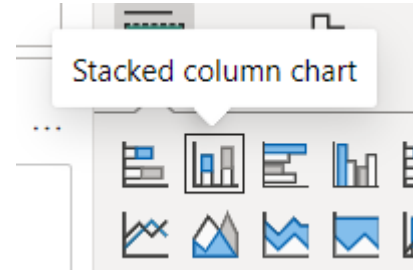
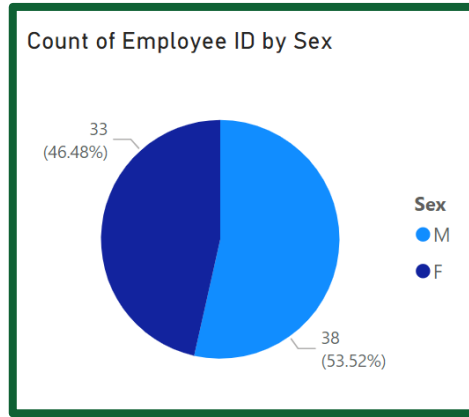
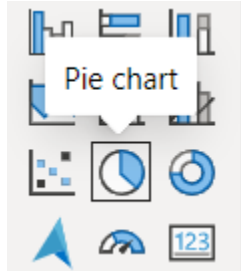
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Visualizations



- Use the visualization sidebar to create and edit your charts and slicers (filters).
- Drag the column names from the data sidebar to the fields in the visualization sidebar (i.e. X-axis, Y-axis, etc.).
- Edit visual components of the charts in this section of the sidebar.

Common Visualizations



Power BI Home Page

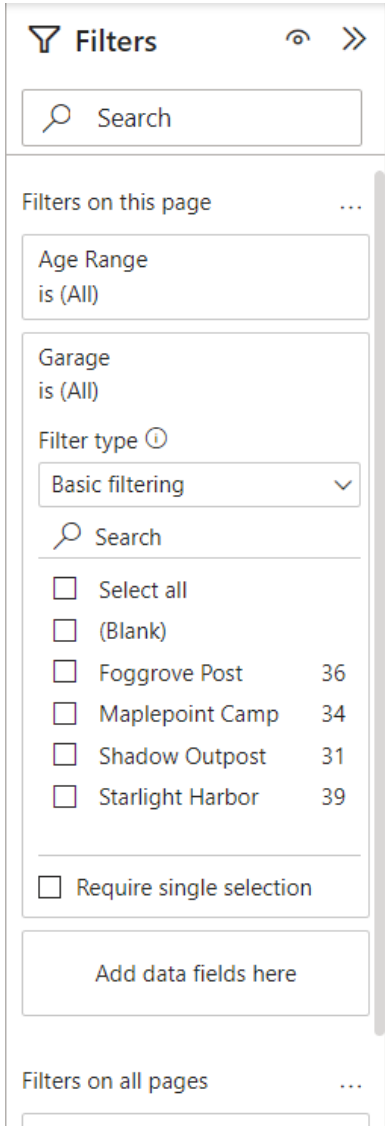
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The main workspace area contains the text "Add data to your report" and "Once loaded, your data will appear in the Data pane." Below this, there are four buttons: "Import data from Excel", "Import data from SQL Server", "Paste data into a blank table", and "Use sample data". A link "Get data from another source" is also present.

On the right side, there are three panes: Filters, Visualizations, and Data. The Filters pane is highlighted with a green border. It contains a search bar, sections for "Filters on this page" and "Filters on all pages" (both with "Add data fields here" buttons), and a "Values" section with "Add data fields here", "Drill through", "Cross-report" (set to Off), "Keep all filters" (set to On), and "Add drill-through fields here". The Visualizations pane shows a "Build visual" button and a grid of visualization icons. The Data pane shows a message: "You haven't loaded any data yet. Get data".

At the bottom, there is a navigation bar with "Page 1" and a "+" button, and a status bar showing "Page 1 of 1" and "73%" zoom.

Filters



The screenshot shows a sidebar titled "Filters" with a search bar and two sections: "Filters on this page" and "Filters on all pages". The "Filters on this page" section contains two filter cards. The first card is for "Age Range" with a value of "is (All)". The second card is for "Garage" with a value of "is (All)". Below the "Garage" card is a "Filter type" dropdown menu set to "Basic filtering". Underneath is another search bar and a list of checkboxes for selecting specific garages: "Select all", "(Blank)", "Foggrove Post" (36), "Maplepoint Camp" (34), "Shadow Outpost" (31), and "Starlight Harbor" (39). There is also a checkbox for "Require single selection" and a button labeled "Add data fields here".

- Add columns to this sidebar to use those variables as filters on the page or all pages.
 - For example, if your data comes from multiple garages, you can filter all of the visualizations on that page by garage to show data for one or several of them at a time.
- If you have a visualization selected, this sidebar shows filters for that visualization.
- Slicers are filters that appear on the page itself. If you want to embed your dashboard on a site publicly with filters for the user, you may want to add slicers.

DAX Expressions

- DAX expressions are like functions in Excel which allow you to manipulate data to populate new columns or create aggregated measures.

```
Program Status = IF('Employee info'[Start Date] < DATE(2019, 1, 1), "Before", "After")
```

```
Days Employed = DATEDIFF('Employee info'[Start Date], 'Employee info'[New End Date], DAY)
```

```
MDBF = [Miles traveled]/[Mechanical failures]
```

Data visualization design principles



Data visualization design principles

Color!

Data visualization design principles

Color.

- Minimize intense or distracting color combinations
- Choose one color per category and use consistently
- Utilize data visualization checklists and accessibility tools to check accessibility of visualizations for people with colorblindness
- Color should not be the only means of communicating information
- Consider directly labelling data
- Work with graphic designers and IT staff if available to integrate brand colors and fonts into data viz platforms

Lunch (12-1:30)



Hands-on with Power BI

Quick 15-minute break



Using and sharing your report or dashboard

Considerations for dashboard functionality and dissemination:

- Power BI Desktop vs. online
- Power BI free vs. pro and other versions
- Static report vs. interactive dashboard
- Internal vs. external audience



Using and sharing your report or dashboard

Options for using and sharing:



Individual use by data user / program manager / decisionmaker



Dissemination of static reports within an organization



Interactive dashboard available to internal users



Interactive dashboard available to external audience

Others?



Using and sharing your report or dashboard



Individual use by data user / program manager / decisionmaker

- Power BI Desktop free version is sufficient
 - Can still store or back up data sources and .pbix files securely
- Enables tracking of trends and KPIs for decision-making purposes

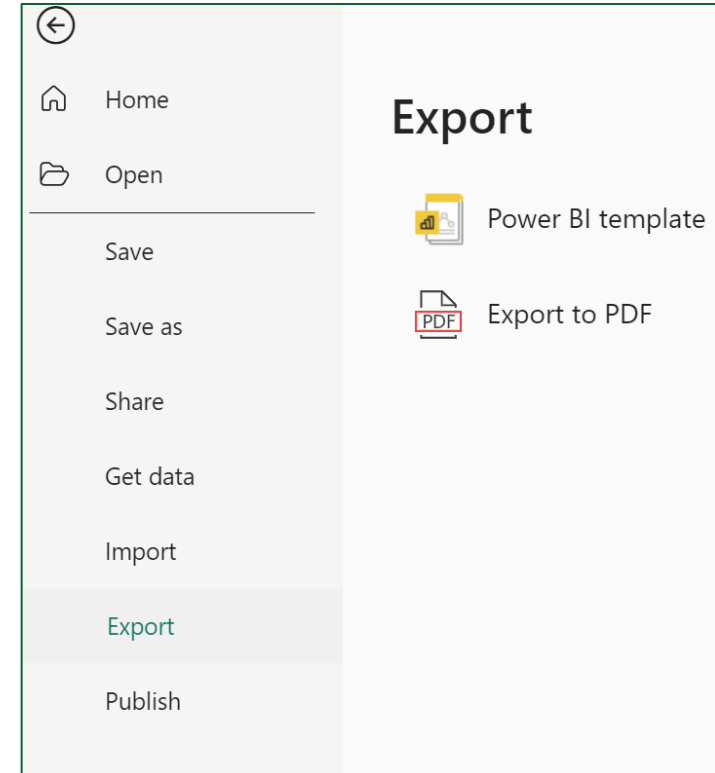


Using and sharing your report or dashboard



Dissemination of static reports within an organization

- Power BI Desktop free version is sufficient
- Go to File – Export – Export to PDF
- Considerations:
 - Dimensions of page
 - Simplicity and readability
 - Direct data labels on visuals



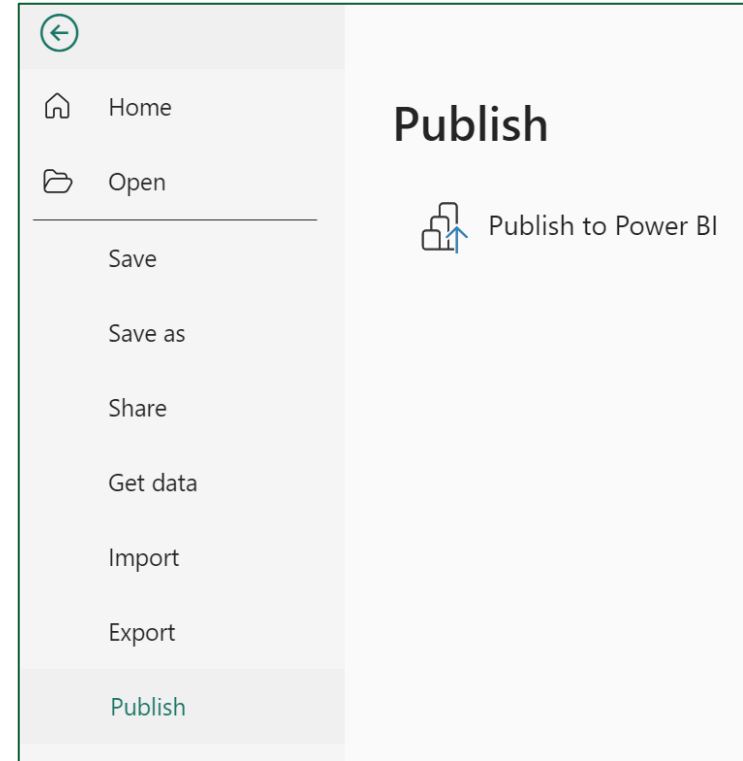


Using and sharing your report or dashboard



Interactive dashboard
available to internal users

- Power BI Pro version required
- Go to File – Publish – Publish to Power BI
- Can be accessed via Sharepoint page, MS Teams
- Considerations:
 - Access permissions – IT coordination
 - Visibility of filters and other components



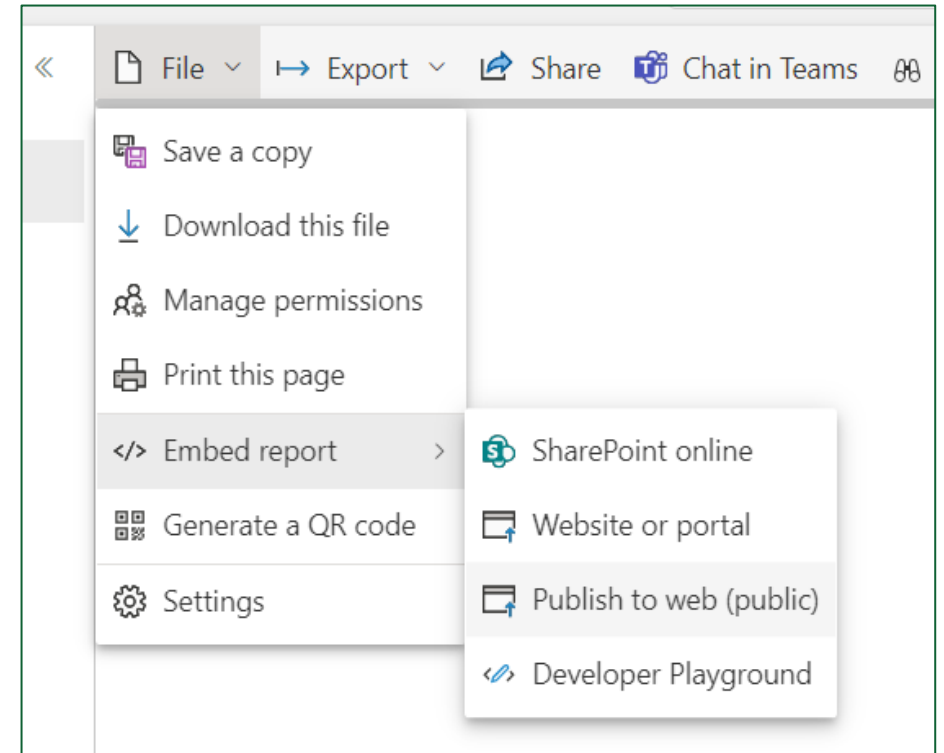


Using and sharing your report or dashboard



Interactive dashboard
available to external
audience

- Power BI Pro version required
- Generates embed link that can be added to public-facing website
- [An example embedded dashboard](#)
(Password: MC24)





Free hands-on time

Experiment with:

- Changing titles, labels, colors
- Changing the axis ranges (e.g., y-axis on absences chart)
- Adding alt text to charts
- Trying out other Power BI features