

## Data Visualization

### What Is Data Visualization?

Data visualization represents information in the form of a chart, diagram, picture, or infographic so that the data can be quickly and easily understood. Technicians use data visualization software to create graphics that communicate complex and relational information to a variety of audiences.

### Vocabulary

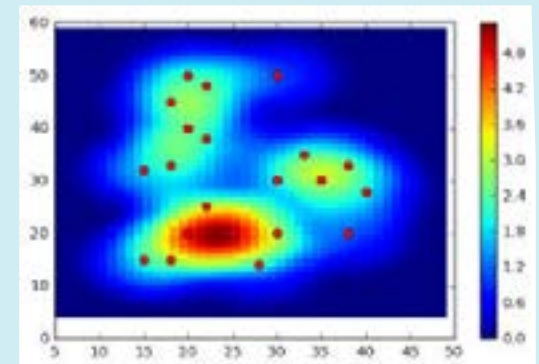
- Dataset – a collection of data, often organized in a spreadsheet or database
- Chart – a graphic representations of data; examples are charts, pie charts, histograms, line graphs for example
- Scale – marks on a visualization that indicate the range of data values presented. A scale on a graph reflects the magnitude of the data presented.

### Common Types of Data Visualization

- A pie chart uses “pie slices” to show relative sizes of data.
- A histogram uses bars of different heights to group data into range.
- A scatter plot uses points plotted on an XY axis to show the relationship between two sets of data.

### How will a technician use data visualization?

Evan Garcia is a technician for Green Mountain Power Company. He is responsible for tracking increased system outages over time across a metropolitan network, collects outage statistics, including system logs, environmental information, and helpdesk ticket details from network nodes and service centers in order to determine the cause. Evan stores the data in an Excel workbook, then imports data into SAS, Tableau, or MS Power BI visualization tools and creates a dashboard to present to management. The data dashboard provides an interactive geographical heat map showing outage details and other graphical representations of his data analysis of the event. The heat map allows management to make real-time decisions and troubleshoot problems.



*A **heat map** uses a warm-to-cool color spectrum to represent data values by color.*



## Data Visualization

### Skills Needed for a High-Pay Rewarding Career

- Describing the different ways to visualize data and data visualization tools.
- Cleaning and manipulating raw data and prepare the data for analysis.
- Analyzing various types of datasets.
- Analyzing real-world problems based on data visualization techniques and produce reports.
- Designing and developing data dashboards.

### Education

Your local community college provides the advanced technology classes you will need. Skills for analyzing and visualizing data are most often taught within Data Analytics programs offering associate degrees and one-year certificates. Data visualization skills are also important in other areas of technical fields such as agricultural, cybersecurity, biomedical, energy, environmental, and engineering technologies. Community college course schedules are designed to accommodate the needs of working students and often include online and hybrid delivery formats.

[Find your nearest community college here.](#)

### Future Trends

The Future of Data Visualization explains that as the amount of data grows, “people will have higher expectations for data availability, its accuracy, usefulness and how it’s visualized in future. The trend is clearly for new tools to provide more data to its users, not less.”

- Increased amount of available data
- Greater data accuracy
- Better data processing and visualization design tools
- Increased cloud connectivity for data storage and access
- Immersive, interactive data visualization
- Virtually assisted field service

### Learn More

- [What is Data Visualization?](#)
- [Fundamentals of Data Visualization](#)

For additional tools and information visit [preparing technicians.org](http://preparing technicians.org)



Preparing Technicians for the  
**FUTURE OF WORK**



## Data Visualization

### What is Data Visualization?

Data visualization is the graphical representation of information and data. By using visual elements like charts, graphs, and maps, data visualization tools provide an accessible way to see and understand trends, outliers, and patterns in data.

[Data Visualization Beginner's Guide](#)

### Data Visualization Technician Competencies

- Describe the different ways to visualize data
- Select appropriate data visualization tool
- Clean and manipulate raw data
- Analyze various types of datasets
- Analyze real-world problems based on data visualization techniques
- Design data dashboards

### Cross-disciplinary Skills

- Using basic statistics
- Collecting and representing data
- Creating reports
- Communicating complex information
- Collaborating with others
- Using essential office software

### IT Scenario

A large office building noticed that network performance varied dramatically for different users throughout the building. This led to complaints and less efficiency from employees. The onsite technician, Ben, has been troubleshooting router performance, as well as reaching out to the office's ISP to confirm delivery of the purchased network speeds. He has improved some individual devices' performance with basic PC cleanup, but has been unable to find a consistent solution. Ben decided to create a visualization of the LAN. Using Microsoft Excel, he creates a spreadsheet to store device information and performance data he has collected over the last several weeks. He creates several charts using this data, plotting response times against physical distance in one chart and against connection type in another. By using this method of visualization, he can clearly

spot patterns in the lower and higher-performing devices. Benjamin installs several wireless access points in areas of the office with a weaker connection and adds ethernet connections to many of the stationary devices in executive offices and conference rooms, such as desktop PCs and printers. The users find their internet speeds have improved the office now able to make full use of their internet service with fewer disruptions resulting in increased efficiency and productivity.



READ MORE ►

[The Future of Data Visualization, Towards Data Science](#)

[How Data Analytics and Visualization Drives Operational Efficiency, IndustryWeek](#)

[Manufacturing Dashboards: Why Visualizing Data Is Important for Manufacturers](#)

[Articles on how visualization is used, Towards Data Science](#)

[Using Big Data in Manufacturing to Drive Value in 2020 and Beyond, Informatica](#)

## Data Visualization

### Activity

This activity is designed to help students think about the data generated by equipment and processes in their field of study and how that data is interpreted and communicated. Depending on the level of your students, your options are to have students generate their own data; provide simple data in a spreadsheet; or select a more complex dataset from the sites listed below. Tableau, a common data visualization software, provides free access for students and instructors but you could use MS Office tools (e.g. Excel, Word) instead. Students will review a dataset, determine what the data trends mean, and create a graphic communicating the correct interpretation of the data.

### Free Public Datasets

- [Free public datasets for your science project](#)
- [Global open data at national, regional, and city levels: links to public databases](#)

### Tools for Data Visualization

- [Excel Easy](#)
- [Get started with Power BI Desktop](#)
- [Tableau instructional videos](#)
- Tableau Desktop is free for students and instructors at accredited academic institutions.

[Request a student license.](#)

[Request an instructor license.](#)



### Warm-up

Students need to be able to select the appropriate type of graphical representation to communicate data effectively to prevent misunderstanding. Begin by reviewing the concepts in [“Use and Misuse of Graphical Representations,”](#) with students.

**Then follow up with questions in the context of students’ field of study:**

- What equipment and processes are we operating that generates data?
- When we monitor data from our equipment and processes, what are we trying to discover?
- How would you visualize that data to communicate its meaning to someone unfamiliar with your field?

### Activity Steps

1. Acquire your dataset.
2. Organize and clean the data
3. Determine what data you need for the visualization.
4. Import your data into a visualization tool.
5. Identify any trends in the data, if any.
6. Create a visualization of the data.
7. Display and explain it to others.

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### ABOUT THE PROJECT

Preparing Technicians for the Future of Work, a project of the National Science Foundation Advanced Technological Education program, recognizes that technicians graduating today need an expanded skill set to remain competitive in the global economy. The project focuses on three skill areas: data knowledge and analysis, advanced digital literacy, and business knowledge and processes. Learn more at [preparingtechnicians.org](http://preparingtechnicians.org).