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.

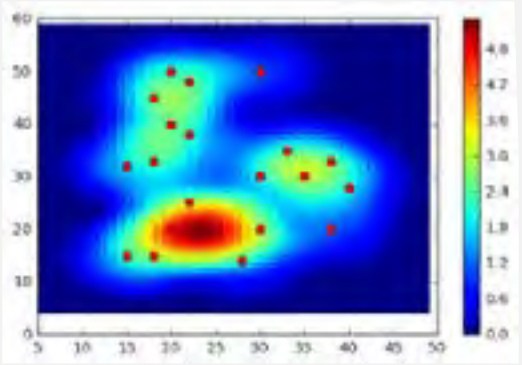
Common Types of Data Visualization

- 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





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 andconference 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.

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.

DATA LITERACY/FLUENCY

What is data literacy/fluency and how is it related to Data Knowledge & Analysis?

Data literacy/fluency is the ability to understand, analyze and draw insights from data and communicate about it clearly. Technicians use data to solve problems and improve operations. In troubleshooting a piece of equipment, for example, a technician gathers and analyzes data to diagnose the problem, and based on that data, identifies and applies a solution, and then uses data to verify the problem has been resolved.

Vocabulary

- **Data management** – the practice of collecting, keeping, and using data securely, efficiently, and cost-effectively
- **Spreadsheet** – a tool which stores data in a grid of rows and columns
- **Data backup and recovery** – the process of backing up data in the case of loss and setting up systems that allow data to be recovered due to data loss
- **Statistics** – mathematics used to predict outcomes by examining numerical data relationships
- **Analytical tools** – tools, such as Excel, R, and SAS, that enhance and automate data analysis
- **Data modeling** – the process for creating diagrams to represent data stored in a database
- **Data visualization** – software that represents information in the form of a chart, diagram, or picture

How will technicians use data literacy/fluency?

Many towns or cities are served by municipal water treatment companies and have Water and Wastewater Treatment Technicians on staff who use data to ensure drinking water is safe and clean. Trinh is a Water Treatment Technician at her town's municipal water and wastewater treatment facility. One of her responsibilities is testing water samples for acid and pH levels, bacteria, and a variety of contaminants. Trinh uses equipment such as a Dual Input Analyzer, Nitrate Analyzer and Free Chlorine Sensor to collect the data she needs. Trinh is part of her organization's Consumer Confidence Report team that prepares an annual report to distribute to the public as required by the Environmental Protection Agency (EPA). Trinh gathers the required data and explains it to the communications team who then writes the report to distribute to all their water customers.





DATA LITERACY/FLUENCY

What Is Data Literacy/Fluency?

Data literacy/fluency is the ability to understand, analyze and draw insights from data and communicate about it clearly. It is becoming increasingly more important as data becomes the new currency for business. Data literacy/fluency means being able to:

- **Read data**: understanding what data is and the aspects of the world it represents
- **Work with data**: including creating, acquiring, cleaning, and managing it
- **Analyze data**: filtering, sorting, aggregating, comparing, and performing other analytic operations on it
- **Persuade with data**: using data to support a larger narrative that is intended to communicate some message or story to a certain audience. (source)

Data Literacy/Fluency Competencies

- Locating and acquiring data relevant to a particular problem
- Organizing data in tables and spreadsheets
- Applying basic mathematics to clean up raw data
- Creating visualizations to communicate results

Cross-disciplinary Skills

- Using basic statistics
- Selecting and utilizing appropriate analytics tools
- Using data visualization software
- Communicating complex information

Bioinformatics Scenario

Ray is a Bioinformatics Technician at a cancer research center. He maintains the laboratory's electronic records and provides preliminary data analysis to assist the research scientists with their investigations of potential treatments. This week his center was asked to contribute data to a study on promising new research. Ray needs to determine which data is relevant to the research, extract it from the database, use sophisticated software to analyze it and then visualize it to present to his supervisor. Ray looks forward to reading the study once it comes out so he can see firsthand how his cancer research center's contributions are impacting the search for a cure.

Agriculture Scenario

Ann is a Food Science Technician who works for a large citrus grower. As part of her responsibilities, Ann collects and tests soil and water samples. While performing this function was essential, it was time consuming and only yielded basic data about the soil and trees. Ann recently assisted her company with adopting soil sensors. These are devices that are inserted in the ground at various locations in the grove where they provide highly specific data, such as moisture levels, fertilizer effectiveness, and plant reaction to variable conditions, including temperature and light. The sensor measurements deliver real-time data to a computer station Ann has set up in her office. She is then able to provide this data quickly to the grove manager, allowing the company to act when a field condition, such as low water levels, produces a stress reaction, can be mitigated.

DATA LITERACY/FLUENCY

Activity

This activity is designed to help students think about how data is used to solve problems and make decisions. Students will consider the way climate data influences the work of two industries: agriculture and energy and utilities.

Warm-Up

Review the definition of data literacy/fluency. Ask students:

- How is data collected and used in your career field?
- What STEM technician careers use data about the climate as part of their everyday work?
- What type of data do they need?
- How do they use this data?

Activity Steps

1. Go to https://www.climate.gov/maps-data/climate-data-primer.
2. Read the overview "Why does climate data manner?"
3. Go to the National Center for Environmental Information, https://www.ncei.noaa.gov/about/our-impact, and select either Agriculture or Energy and Utilities. Read the document and be prepared to share with the class what you learned about climate data and the impact of climate on that industry.
4. Share in small groups or with the class what you learned.
5. If there's time, explore the case studies within Value of Data and Tools and Resources sections at the bottom of Our Impact.

Tools Available

- How to Use Google Sheets (video)
- Videos and handouts for Excel Data Analysis Basics taught by Mike Girvin at Highline College
- Data Literacy for All (free eLearning program)

Read More

- What is Data Literacy?
- Data Literacy Project
- Developing a Data-Literate Workforce

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DATA LITERACY/FLUENCY

Skills Needed for a High-Paying Career

- Locating and acquiring data relevant to a particular problem
- Organizing data in tables and spreadsheets
- Applying basic mathematics to clean up raw data
- Creating visualizations to communicate results

Education

Your local community college provides the advanced technology classes you will need. Data literacy and fluency skills are most often taught within Data Analytics or Data Science programs offering associate degrees and one-year certificates. You'll also find applicable skills in technical specializations, such as cybersecurity, biomedical, energy, and environmental 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

Data, once a tightly held commodity that was costly and difficult to share, is now often very low cost or free. The generation of large amounts of data (Big Data) has increased substantially. This means a future where:

- Data is available autonomously using the Internet of Things (IoT)
- Artificial intelligence, machine and deep learning can predict future outcomes
- Sensors on objects send real-time data feeds

Learn More

- What are Data and Data Literacy? (video)
- Data Literacy for All (free eLearning program)
- The Language of Data (free course)

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SPREADSHEETS

What are spreadsheets and how are they related to Data Knowledge & Analysis?

A spreadsheet is a file created using software such as Microsoft Excel to capture, display, and manipulate data arranged in rows and columns. Technicians collect data as part of their normal daily workflow to install and configure systems, diagnose problems, and perform maintenance. Spreadsheets are a convenient and simple tool with which to store this data. Once the data is stored, the technician can use spreadsheet features to analyze data, including summaries, trends, and patterns. Spreadsheets can also be used to create data visualizations.

Vocabulary

- **CSV** – the file extension indicating that data will be displayed separated by commas and line breaks; compatible with all spreadsheets
- **Data visualization** – represents information in the form of a chart, diagram, or infographic so that data can be quickly and easily understood
- **Export** – to copy or move data from one program or computer to be saved or imported into another program; exporting can be used to back up and save important data or to move data between versions of a file
- **Pivot table –** a Excel tool used to reorganize and summarize data from specific rows and columns of data, making it easier to spot trends and patterns
- **TSV** – the file extension indicating data will be displayed separated by tabs; used when data is stored in tables
- **XLS or XLSX** – the file extension that indicates a spreadsheet can be opened in Microsoft Excel

How will technicians use spreadsheets?

Shanice is a Solar Technician on a solar farm. Recently her company installed sensors on each panel. The sensors collect data including voltage, current, temperature and the amount of sunlight reaching the panel. When there was a problem with the system in the past, Shanice would need to walk through the solar farm and examine each panel to determine which panels were malfunctioning. Now the sensors on the panels transmit readings to a database available on a computer at her workstation. When there is a system problem, Shanice logs into the database, exports the data to a CSV file, or a comma separated file, clicks on “Save As,” and selects the “xlsx file” option where it’s converted to an Excel spreadsheet. She then can review data that is displayed in with rows and columns (or use the program to create data visualizations) where she can easily spot the specific panel that is the source of the issue. Shanice can go directly to that panel and service it.





SPREADSHEETS

Skills Needed for a High-Paying Career

- Creating spreadsheets
- Manipulating data cells using copy/cut/paste
- Analyzing data
- Organizing and formatting related data
- Sorting data
- Creating charts
- Importing data from an external source

Education

Your local community college provides the advanced technology classes you will need. STEM technicians often use spreadsheet programs that are unique to their field. Spreadsheet skills are most often taught within Information Technology, Computer Science, Data Science, Data Analytics, or Business programs offering associate degrees and one-year certificates. You'll also find applicable skills in technical specializations, such as agriculture, cybersecurity, biomedical, energy, engineering, and environmental 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

In the future, spreadsheets will be able to:

- Work seamlessly with Big Data
- Analyze and correct unreliable and missing data
- Join external datasets together
- Provide analysis tools which utilize machine learning

Learn More

- What is a Spreadsheet?
- Microsoft Excel Video Training
- Google Sheets Tutorial
- Creating Pivot Tables in Excel

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SPREADSHEETS

What are spreadsheets?

A spreadsheet program stores data in a grid of rows and columns and a file in the program may contain multiple worksheets used for organization, analysis, and storage of data in tabular form. Data may consist of numbers, formulas, or text. Spreadsheets have features that enable users to store, analyze, model and visualize data. Common spreadsheets include Microsoft Excel and Google Sheets.

Spreadsheet Competencies

- Creating spreadsheets
- Performing basic functions, including sums and averages
- Manipulating data cells
- Analyzing data
- Organizing and formatting related data
- Sorting data
- Creating charts
- Importing data from an external source

Cross-disciplinary Skills

- Applying computational thinking
- Using basic statistics
- Utilizing analytics tools, such as Excel
- Managing data
- Demonstrating data literacy
- Creating data visualizations
- Communicating the implications of the data

Advanced Manufacturing Scenario

Mohammed is a Manufacturing Technician for a plastics manufacturing company where he works with an injection molding machine. Mohammed uses an HMI, a touch screen with that allows him to control the machine and track various functions, such as the temperature of the molds and the operation of the hoses. Since maintaining machinery is part of his responsibilities, Mohammed needs to periodically collect data that provides insight into the machine's functioning over time to determine when to do preventive maintenance. When Mohammed's company installed the HMI for his machine, they were able to set up a reporting feature where he can download the data directly into an Excel format. He views the data in rows and columns by date and function and uses that information to determine whether maintenance will be needed to ensure his machine is functioning properly.

Engineering Technologies Scenario

Lisa is a Materials Technician in a plasma lab where they are studying how to the shrink the size of chips used in electronics. She is responsible for setting up test fixtures, conducting materials and component tests, and collecting data. Lisa needs to share data on her materials testing with her supervisor weekly. She finds charts the most effective way to visually summarize the data. To accomplish this, she tracks and stores data daily exported to an Excel spreadsheet. On Fridays, Lisa creates charts by highlighting the data she wants to share, clicking on "Insert-Recommended Chart" and then selecting Bar or Pie charts. She then emails them to her supervisor or prints them out before discussing the week's testing results.

SPREADSHEETS

Activity

This activity is designed to give students hands-on experience with creating a simple spreadsheet that a technician might use in real life. It can be done in pairs in a classroom or by individual students via distance learning.

Warm-Up

Remind students that technicians collect data as part of their daily workflow to record, organize, and store data. Technicians then can use spreadsheet statistical tools and application features, such as Excel's Power Query or pivot tables (not introduced in this activity), to analyze, combine, and refine the data. Ask students:

- Who has created and/or used Excel spreadsheets?
- What did you use the spreadsheets for?

Activity Steps

1. Have students get into pairs. Each pair needs at least one computer with Excel. If they do not have Excel loaded, students can sign up for a free account at https://www.microsoft.com/en-us/microsoft-365/free-office-online-for-the-web.
2. Pairs are going to watch the video Calculating Wind Power in Excel and create the same spreadsheet as demonstrated in the video. They can stop the video or go back, as needed, so they are able replicate all the steps.
3. The pairs will need to have some basic cells ready in the spreadsheet as shown in the video.
   a. Click on "new spreadsheet."
   b. Type "Wind Velocity (meters and seconds)" in the first cell.
   c. In column A, type the numbers 1-11 in each cell going downwards.
   d. In column B, type "Wind Power (watts/meter^2)."
4. The pairs follow the steps in the video to add the data.
5. Ask students what they learned from the activity about how spreadsheets function.

Tools Available

- Excel is a common spreadsheet program. Users with a school email can set up a free account.
- Google Sheets offers similar tools and is free to those who have a Google log-in.
- On an iPad, Numbers is the free spreadsheet app.

Read More

- Twelve Best Spreadsheets to Try
- Is the Age of the Spreadsheet Over?

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Preparing Technicians for the FUTURE OF WORK

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ABOUT THE PROJECT

Preparing Technicians for the Future of Work, funded by the National Science Foundation Advanced Technological Education program, recognizes that technicians need an expanded skill set to remain competitive. The project's Framework for a Cross-Disciplinary STEM Core outlines recommendations for incorporating knowledge and skills in Advanced Digital Literacy, Data Knowledge and Analysis, and Business Knowledge and Processes. Learn more about implementing the Framework at preparingtechnicians.org.

ANALYTICS TOOLS

What are analytics tools and how are they related to Data Knowledge and Analysis?

The practice of analytics uses insights gained from data analysis to identify and anticipate trends and outcomes for making smarter, data-driven business decisions. Analytics software tools are available to make this more efficient by reducing manual computational tasks for gathering and analyzing the data.

Vocabulary

- **Business analytics (BA)** – focuses on predictive and prescriptive analysis of data
- **Business intelligence (BI)** – focuses on descriptive and diagnostic analytics
- **Descriptive analytics** – uses data to understand what has happened in the past
- **Diagnostic analytics** – uses data to understand what is happening now
- **Predictive analytics** – uses data to predict what could happen in the future
- **Prescriptive analytics** – uses data to support recommendations for actions that should be taken to improve future outcomes

How will technicians use analytics tools?

Lisa is a building technician for a commercial property management company in a fast-growing metropolitan area with many new office buildings. These new buildings typically are installing what is called a DDC or direct digital control systems. A DDC controls one or more building systems, including HVAC (heating, ventilation, and air conditioning), fire alarms, and security systems using sensors that transmit data to a remote computer workstation with specialized software where a technician can monitor the system. Lisa recently needed to troubleshoot an HVAC problem when one of the tenants complained it was chilly in their office in the morning. Lisa used data from the DDC to determine the temperature on their floor over the past several weeks. The data showed the HVAC system was adjusting to 65 degrees at 6:00 pm and was re-adjusting to 72 degrees at 8:00 am. Lisa also examined security data from the DDC and noticed that three employees had begun arriving earlier to work than in the past, at 7:30 am rather than 8:30 am when the rest of the employees arrived. This meant the temperature in the office was seven degrees cooler than the 72 degrees for which it was set for during the company's office hours of 8:30-5:00. Lisa shared this insight with the office manager. The office manager stated they recently hired three new employees to work an earlier shift. Lisa adjusted the DDC from her workstation to go back to 72 degrees at 7:00 am to ensure the office was more comfortable for all the employees. In this case, Lisa used a combination of descriptive and diagnostic analytics to solve the problem.





ANALYTICS TOOLS

Skills Needed for a High-Paying Career

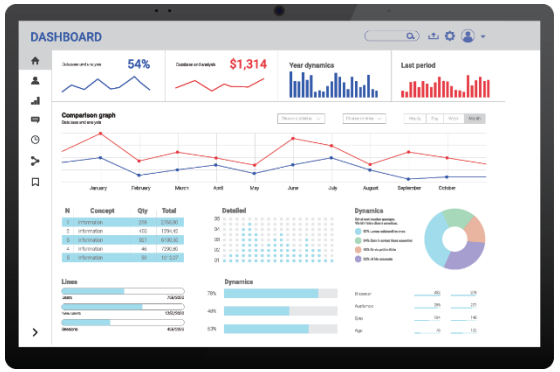
- Comparing and selecting appropriate analytics tools
- Writing basic R and Python scripts to import and summarize data
- Interpreting statistics
- Using tools like Excel, PowerBI, or Tableau to import and analyze data
- Creating data visualizations, reports, and dashboards
- Translating data analytics into actionable business recommendations

Education

Your local community college provides the advanced technology classes you will need. The number of associate degree programs in Data Analytics is growing but the required skills are often taught within Data Science or Computer Information Science programs. Many colleges offer short courses as well. You'll find applicable skills in technical specializations, such as cybersecurity, biotech, advanced manufacturing, and energy 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 analytics tools will include:



- A focus on data quality management
- An increase in predictive and prescriptive analytics capabilities
- Hyperconnected tools sharing data more widely via the Internet of Things (IoT) and cloud technology
- Increased automation of analytical processes
- Artificial intelligence (AI) equipped tools

Learn More

- What is Business Analytics? Using Data to Predict Business Outcomes
- What is Manufacturing Analytics?

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ANALYTICS TOOLS

What are analytics tools?

Analytics software takes "big data" and uses Artificial Intelligence (AI), statistical and quantitative analysis, explanatory and predictive models, and fact-based management to drive decisions and actions.

Analytics Competencies

- Comparing and selecting appropriate analytics tools
- Writing Basic R and Python scripts to import and summarize data
- Using tools like Excel, PowerBI, or Tableau to import and analyze data
- Creating data visualizations, reports, and dashboards
- Translating data processed using analytics tools into actionable business recommendations

Cross-disciplinary Skills

- Basic programming
- Using spreadsheets
- Interpreting statistics
- Selecting and using analytics tools
- Communicating effectively with internal and external stakeholders

Agriculture Scenario

Dan is a Fisheries Technician on a salmon farm. He was researching ways the farm could economize feeding their fish and found a company that had advanced aquatic technologies that can collect and analyze feeding behavior data using sensors, underwater cameras, and data analytics software. His supervisor agreed that having those tools could provide them with greater insight into the feeding patterns, resulting in raising healthier fish, saving money, and increasing the farm's efficiency. Dan worked closely with the aquaculture technologies company to set up the system to evaluate feeding behavior of the fish based on water temperature and dissolved oxygen, to find out when the fish were reaching satiation, and to determine the quantity of pellets left uneaten and falling to the bottom of the pens. The analytics software saved all the data and uploaded it to a secure private cloud. Dan was able to obtain descriptive and diagnostic analytics data and provide information to the company to help them optimize their fish feeding strategies.

Information Technology Scenario

Cameron is a Network Technician for a locally owned group of five automotive repair shops that specialize in hybrid vehicles. They have a client/server network configuration enabling all the shops to share a common customer database, maintenance records, accounting system, and office software package. Over the past two weeks, the server went down several times and Cameron needed to get to the bottom of what was causing the outages and take action to resolve the problem. Cameron used network monitoring agents and software to gather and analyze network data. Agents are small pieces of equipment located at each shop that monitor the network at that location. Monitoring software takes that information, runs metrics, and reports issues, with details about what the issue is and what caused it. Cameron was able to determine that the outages stemmed from bandwidth overload at one of the shops where they were receiving a large number of repair records transferred electronically from another shop. While both shops completed their end of the file transfer process, Cameron didn't expect the issue to continue but he communicated to the shop managers that they should consider using the cloud in the future as the business continues to grow.

ANALYTICS TOOLS

Activity

This activity is designed to help students use analytics tools by exploring an open-source Tableau dashboard from a manufacturing company. Begin by reviewing the terminology from the student card. Next, the students will get into small groups and explore the Tableau dashboard. Then they will work in groups to explore the descriptive and diagnostic analytics of production stops using data from the dashboard.

Warm-Up

Review the vocabulary and concepts provided on the student card. Ask students to share any stories they have from school, work, or home where analytics tools were used, though they may not have necessarily called it by its formal name.

Activity Steps

1. Ask the student to think about how the four types of analytics can be used to make decisions regarding pieces of equipment, such as timing of repairs or if a machine needs to be replaced.
2. Have students go to this public Tableau workspace on Manufacturing Analytics where they will find an open source data analytics dashboard from a manufacturing facility. This dashboard provided data visualization regarding times the machines are not working.
3. Break students into small groups to explore the interactive dashboard together.
4. Next, in their groups, have them identify:
   - Descriptive analytics – What has happened?
   - Diagnostic analytics – Why is it happening?
5. Then, have the groups work together to hypothesize:
   - Predictive analytics – What could happen?
   - Prescriptive analytics – What should happen?
6. Each group presents their findings to the class.

Tools Available

- Excel, Power BI, and Tableau are common tools used for analytics.
- Basic Python and R are open-source programming languages for analytics. Python Vs. R: What's the Difference?
- A variety of proprietary tools are available in the market.
  Top 10 Business Analytics Tools Used by Companies Today

Read More

- Business Analytics: What It Is and Why It's Important

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