Business School
UNIVERSITY OF COLORADO DENVER

Information Systems Program

Business Intelligence Concepts, Tools, and Applications

Week 3: Data Visualization and Dashboard Design

Lesson 1: Data Visualization

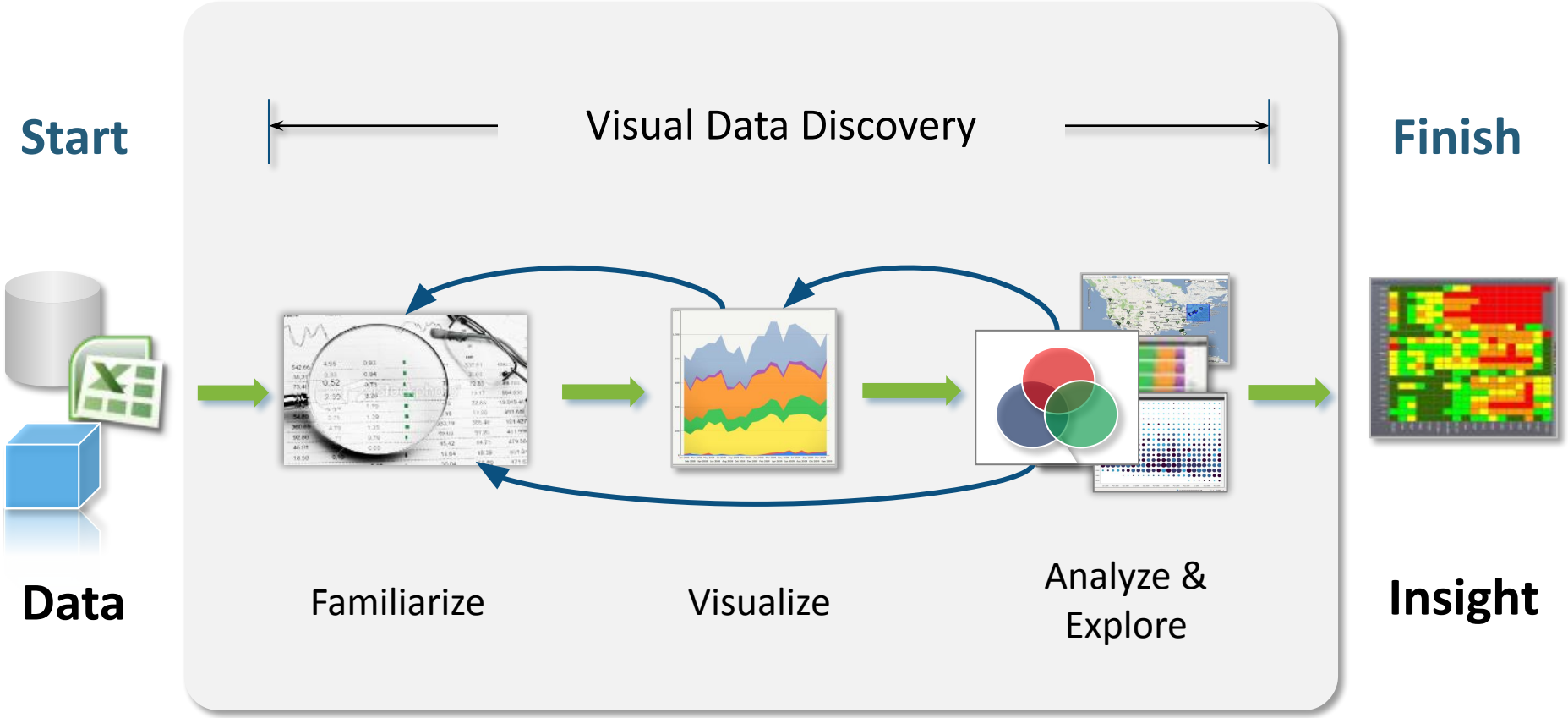
Data Visualizations

- Learning Objectives
  - Define data visualization.
  - Identify different types of data that can be visually represented.
  - List types of basic and composite charts and compare and determine which is most effective to display data associated with unique case studies

Data Visualization

- Companies and individuals increasingly rely on data to make good decisions.
  - Because data is so voluminous, there is a need for visual tools that help people understand it.
- Data or information visualization
  - is the use of visual representations to explore, make sense of, and communicate data.
- What is portrayed in data visualizations
  - is the information (aggregations, summarizations, and contextualization) and not the data.

Visual Data Discovery Empowers Business People to Conduct Analysis without IT Help



Types of Data

Nominal Attributes
Data that be counted, but not ordered or aggregated.

Examples:
•Products – Books, Movies, Music
•Gender – Male, Female
•State – Virginia, Nevada, California

Metrics
Quantitative data that can be counted, ordered, and aggregated.

Examples:
•Revenue, Cost, Profit
•Number of Customers
•Temperature
•Time

Ordinal Attributes
Data that can be counted and ordered, but not aggregated.

Examples:
•Date – 1/1/2014, 1/2/2014…
•Grades – A, B, C…
•Ranks – Like, Neutral, Dislike

Ordinal Attributes and Metrics
Some data can be used as either attributes or metrics. Their classification is dependent on usage.

Examples:
•Age
•Scores

Adopted From Best Practices in Data Visualization, by Vihao Pham 2014

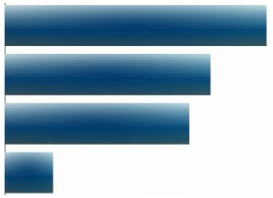
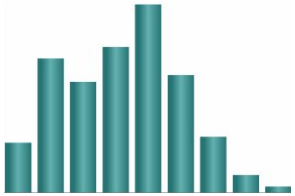
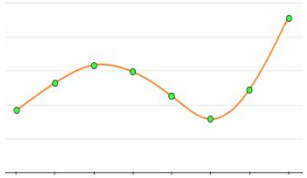
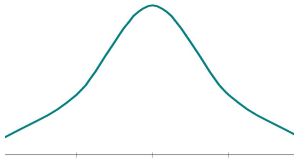
There Are Five Categories of Data Comparison

1	**COMPONENT (CONTRIBUTION)**	**Percentage of a total**	• Share • Percentage of total • Accounted for X percent • Size
2	**ITEM**	**Ranking of items**	• Rank • Larger than / Smaller than • More / Less • Equal / Same
3	**TIME SERIES**	**Changes over time**	• Change / Grow • Rise / Decline • Increase / Decrease • Fluctuate
4	**FREQUENCY DISTRIBUTION**	**Items within ranges**	• Concentration • X-to-Y range • Frequency • Distribution
5	**CORRELATION**	**Relationships between variables**	• Related to • Increases / Decreases with • Changes / Varies with • Does not increase with

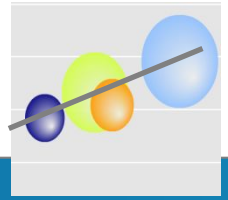
Source: Adapted from Gene Zelazny (2001). *Say It With Charts*

This Chart-Comparison Matrix Identifies the Best Chart Type to Maximize Data Comprehension

Comparison Type

Basic Chart Form	COMPONENT	ITEM	TIME SERIES	FREQUENCY	CORRELATION
PIE					
BAR					
COLUMN					
LINE					
DOT					

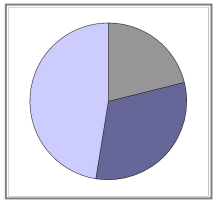
Adopted from Zelazny, G. Saying It With Charts: The executive's Guide to Visual Communication McGraw Hill Professional, March 15, 2001

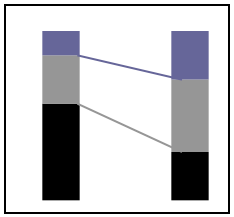


Source: Adapted from Gene Zelazny (2001). *Say It With Charts*

In Most Cases, One of Five Basic Chart Types Provides the Most Effective Data Presentation

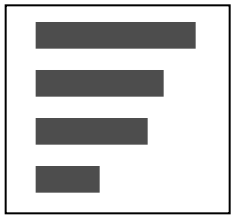
Pie Chart

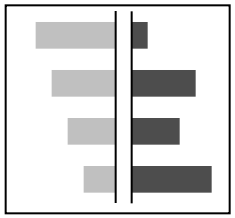




5% Recommended usage frequency

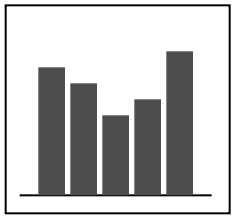
Bar Chart

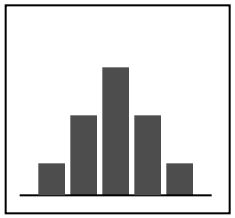




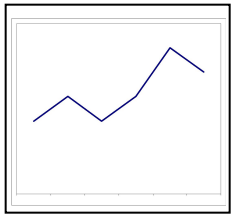
25% Recommended usage frequency

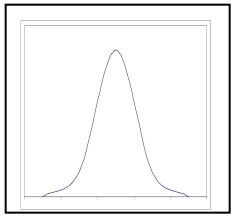
Column Chart





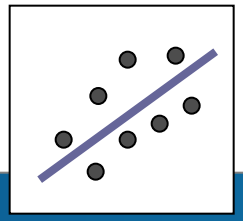
Line Chart

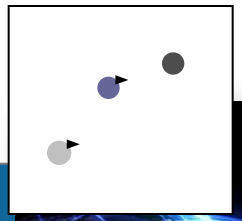




50% Recommended usage frequency (combined)

Dot Chart



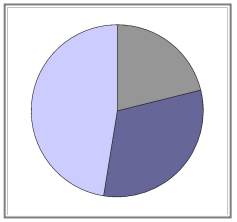


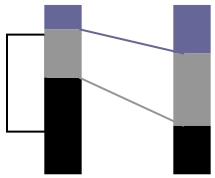
10% Recommended usage frequency

Source: Adapted from Gene Zelazny (2001). *Say It With Charts*

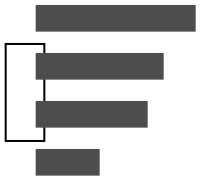
Composite Charts Convey More Business Dimensions and Metrics into a Single Display

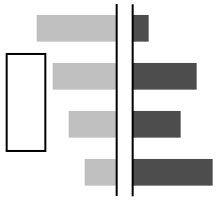
Pie Chart



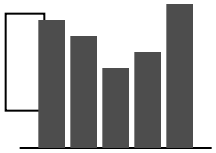


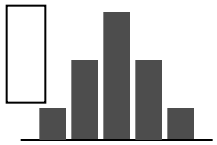
Bar Chart



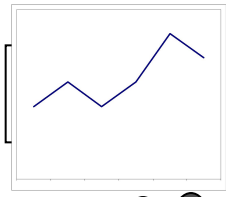


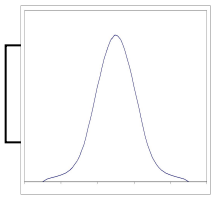
Column Chart



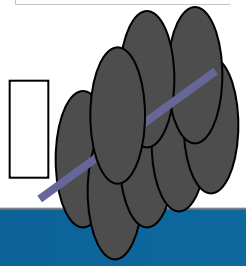


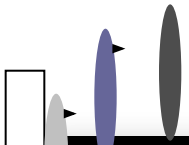
Line Chart



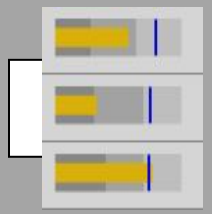


Dot Chart





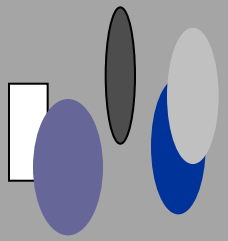
Heat Map



Bullet Graph

Micro Chart

Graph Matrix



Bubble Chart

Source: Adapted from Gene Zelazny (2001). *Say It With Charts*