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# Tell Your Story with Data

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# Introduction

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In today's data driven environment it is extremely difficult for people to present data in a way that make's it consumable and inspires people to take action. Every day people are inundated with a numbing amount of numbers which paralyzes their decisions and activities. Those presenters who can tell a story which focuses people's attention on the right data, the right outcomes, and the right emotions have a significant advantage.

Dan Pink, author of NY Times Best Seller: a Whole New Mind: Why Right Brainers Will Rule the Future, states that today's data focused environment has necessitated 2 skills: 1) Expert thinking, where new problems are solved for which routine solutions do not exist, and in 2) Complex Communication, where interpreting information, explaining, and influencing becomes essential to success. Storytelling is a vital skill that helps with both skills.

With a great story, you can get your point across, tap emotion, and drive action. Without one, you're left with people who might like your data, but won't do anything with it.

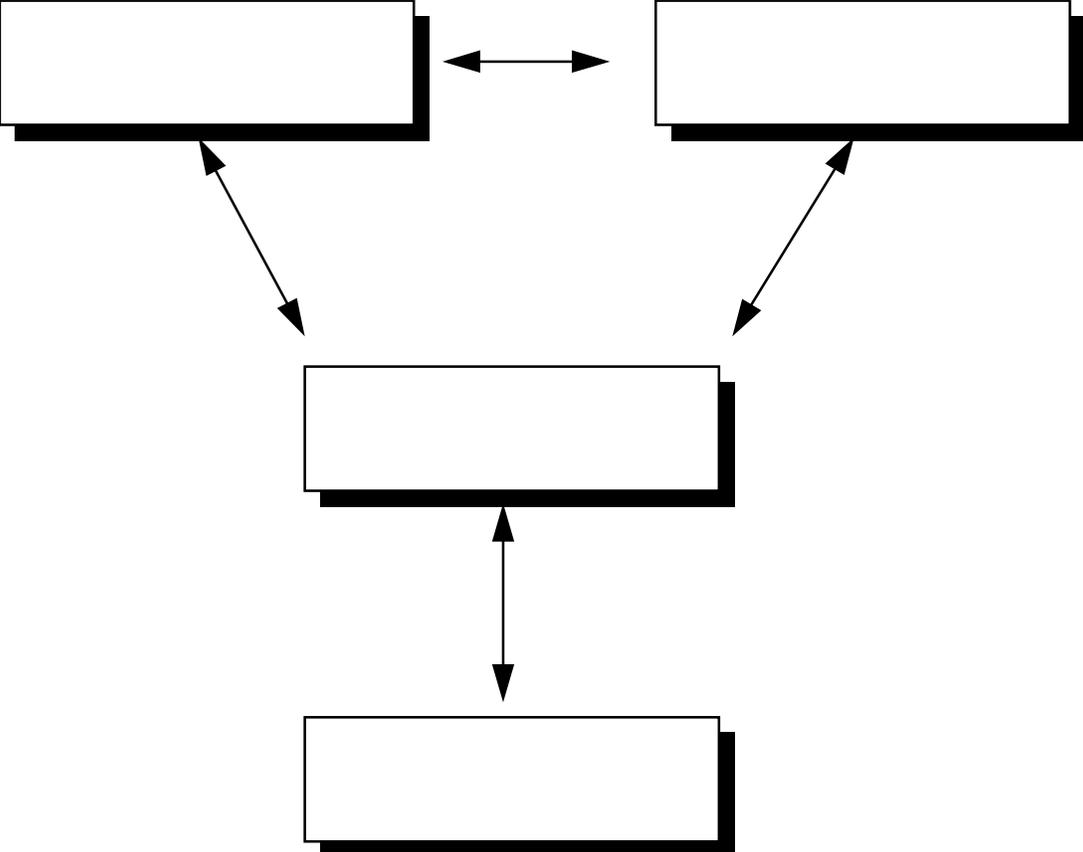
## **Course Objectives**

As a result of participating in this dynamic course, you will be able to:

- Effectively tell stories using data
- Structure a dynamic and persuasive data story
- Identify the best data and graphics to effectively communicate your story
- Present your story in a visual and dynamic way
- Tap emotion to enhance your data story's effectiveness

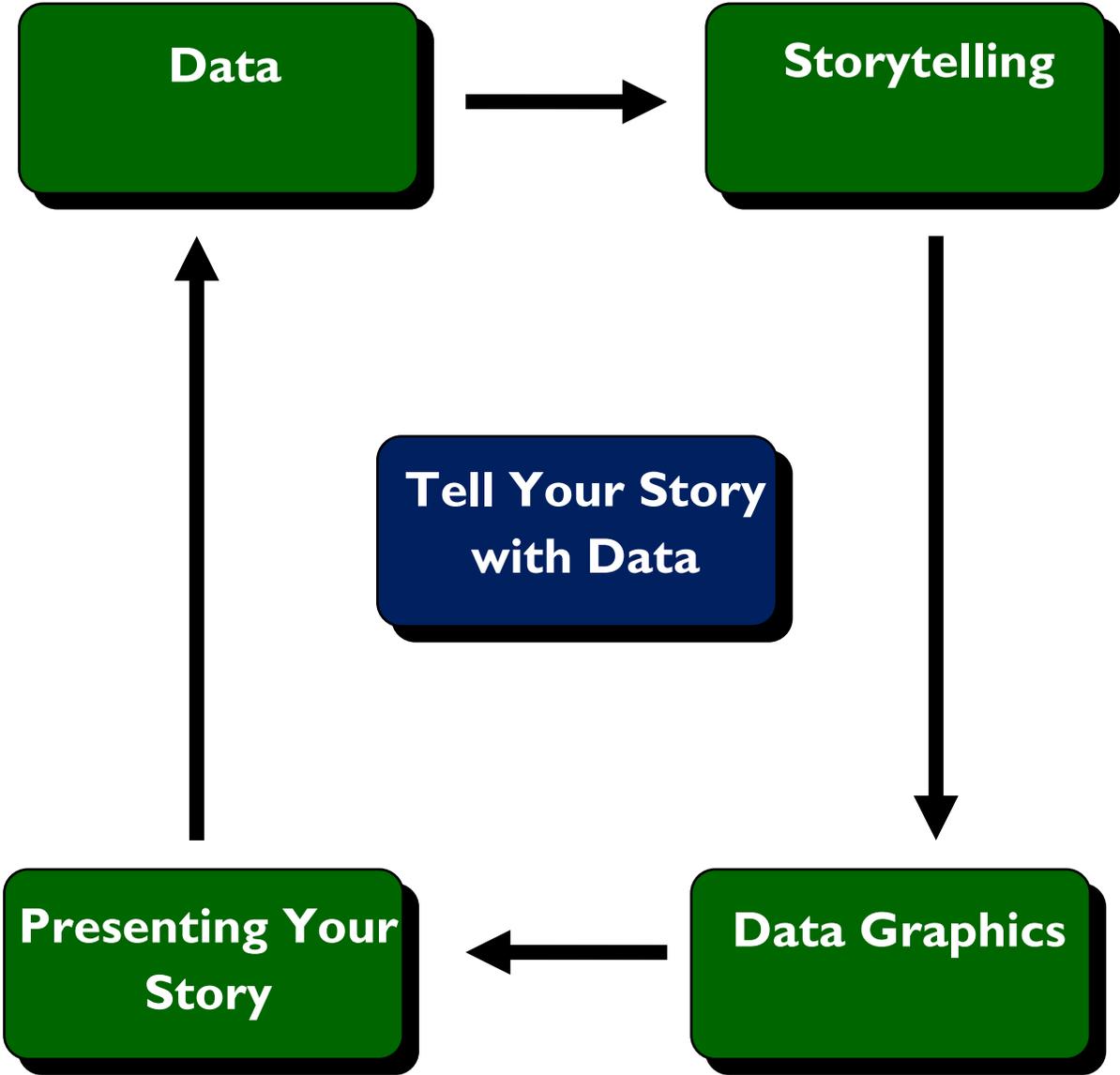
# Changing Attitudes

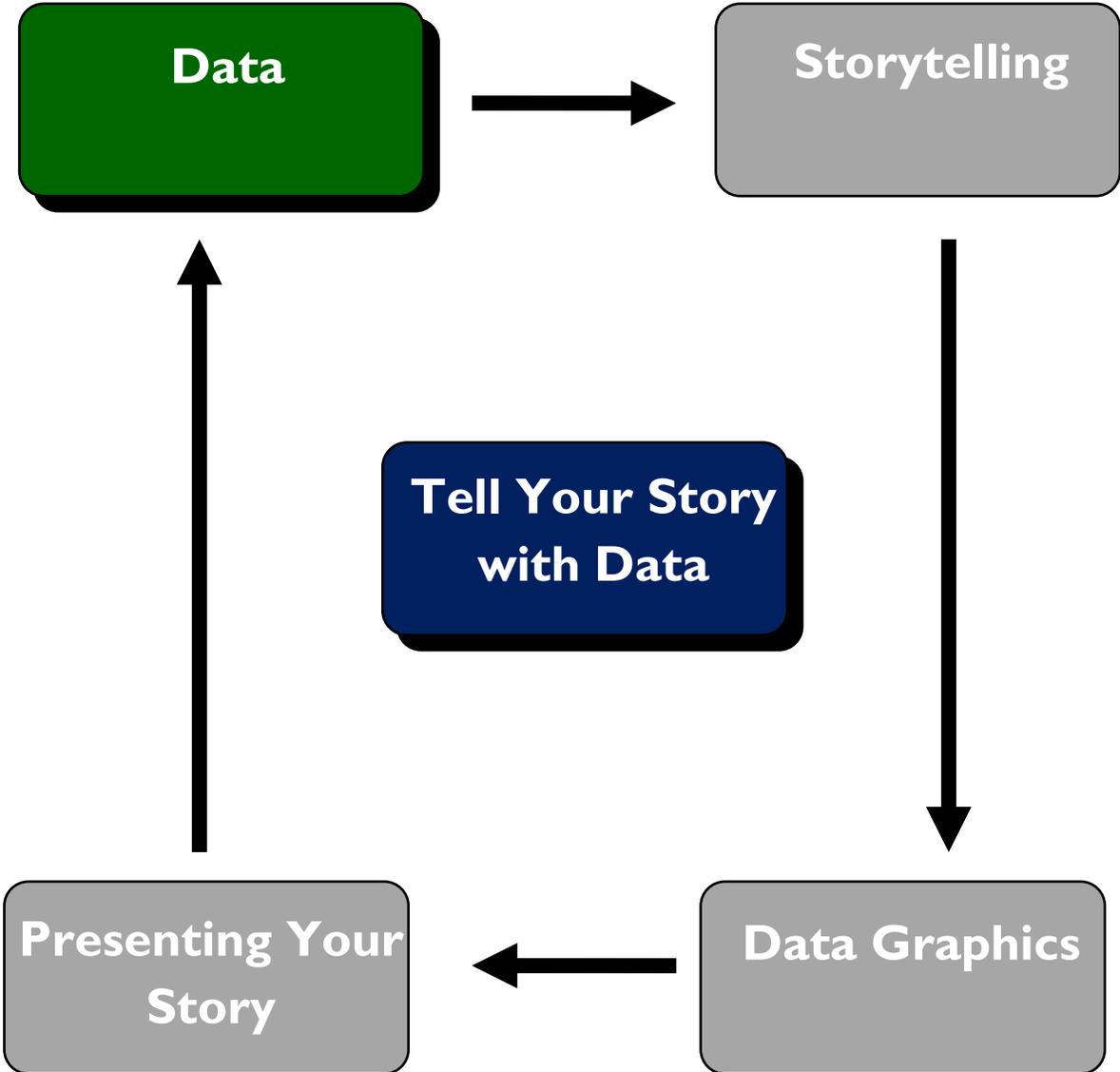
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# Tell Your Story with with Data

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# What is Data?

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Data has multiple meanings.

From a philosophical definition, it is related to things known or assumed as facts, making the basis of reasoning or calculation.

From a technology/computing approach, it discusses the quantities, characters or symbols on which operations are performed by a computer, being stored and transmitted in the form of electrical signals and recorded on magnetic, optical, or mechanical recording media.

When you search for a definition of data, most dictionary sources have a definition similar to the following:

**Data – Information in raw or unorganized form (such as alphabets, numbers, or symbols) that refer to, or represent, conditions, ideas, or objects.**

- <http://www.businessdictionary.com/definition/data.html>

As a set of values for qualitative or quantitative variables, data are seen as individual pieces of information. In computing, data is a structure that is represented as rows and columns that can be designed using graphs and charts.

Other terms that can define data would appear as 'information' or 'knowledge'. In any case data is needed to give use the ability to make decisions.

## Why use data?

According to Karen Dietz, PhD, there are a number of reasons why people use data in their presentations. Some of the reasons include:

- Raising awareness about research findings
- Seeking support and using data to add credibility
- Producing a new strategy and validating it with data
- Clarifying a controversial issue using data or research
- Providing data for policy or executive decision-making
- Redirecting program or project priorities using the latest research

# What is Data?

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**Data is a value assigned to a thing.**

Take for example the balls in the picture below.



What can we say about these? They are golf balls, right? What else?

The first data point we have is that they are used for golf. Golf is a category of sport, so this helps us to put the ball in a taxonomy (*a way to group things together*). But there is more to them. We have the color (“white”) and the condition (“used”). They all have a size, there is a certain number of them and they probably have some monetary value.

In this example – we can see there are two major types of data (Qualitative & Quantitative).

**Qualitative**

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**Quantitative**

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# Communicating Data

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When you create a graph, you step through a series of choices, including which type of graph you should use and several aspects of its appearance. Most people walk through these choices as if they were sleepwalking, with only a vague sense at best of what works, of why one choice is better than another. Without guiding principles rooted in a clear understanding of graph design, choices are arbitrary and the resulting communication fails in a way that can be costly to the business.

To communicate effectively using graphs, you must understand the nature of the data, graphing conventions and a bit about visual perception—not only what works and what doesn't.

Remember the golf ball examples? If we revisit, data when collected and structured suddenly becomes a lot more useful.

<b>Color</b>	White
<b>Category</b>	Sport – Golf
<b>Condition</b>	Used
<b>Diameter</b>	43mm
<b>Price (p/ ball)</b>	\$.08 (USD)

Now, keep in mind that each data value by itself is meaningless. To create information from this table, we need to **interpret the data** above.

Let's take the size: A diameter of 43mm does not say much by itself. It is only meaningful when we compare it to other things. In sports, there are often size regulations for equipment. The minimum size for a competition golf ball is 42.67mm. Good, we can use that golf ball in a competition. This is information - but not quite knowledge. Knowledge is only created when that same information is learned, applied and understood.

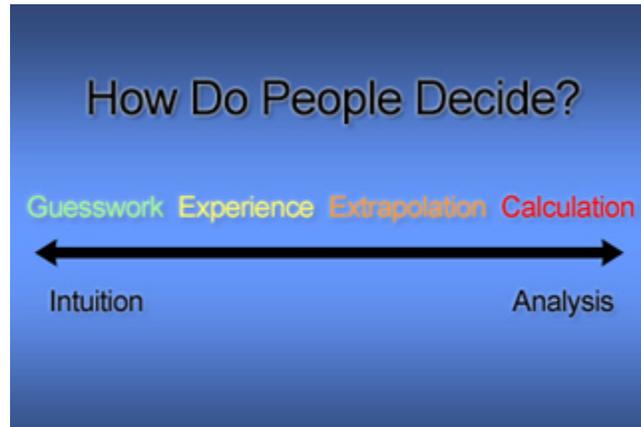
# Communicating Data

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Communicating or conveying basic information well is a skill that's learned by most. As we explore the concept of data, we are trained to understand it and its related terms and generally have no problems communicating this terminology amongst ourselves.

However, when it comes to explaining data and terms to other audiences, we may experience some difficulty. Understanding exactly what information is important for your audience and presenting it in a way that is meaningful can greatly affect the understanding of the intended message.

Traditionally, we see data presented in published articles, complex charts, and graphs. In this next section, we will discuss some of the common barriers encountered when communicating data to audiences, things to consider when identifying your audience, and goals for communicating data, as well as exploring ways in which to better communicate.



## Common Barriers to Communicating Data

- Misinterpretation of data
- Inability to deliver the intended message
- Lack of interest in the topic
- Assumption that “data speak for themselves”

Common issues with traditional messages, similar to those shown at the beginning of the presentation for communicating data, involve sending an unintended message because your audience interprets the data in a way that seems correct to them, or the message that you try to communicate is not received by your audience.

Some additional barriers are a lack of interest in the topic and that your audience tends to tune you out, or an assumption that data speaks for itself. So, now that we've talked about some common barriers, let's explore ways to improve how you communicate data related to your audience, goals, and methods to visually convey your message.

\*Simpson, Rachel (2011). CDC Coffee Break: Communicating about Data

# Levels of Measurements

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Not all data is created equally. I mentioned previously, some are quantitative and some are qualitative. Some are continuous and some are discrete.

Another way to separate data is to look at what is being measured.

To do this there are four levels of measurement:

- 1) Nominal
- 2) Ordinal
- 3) Interval
- 4) Ratio

Different levels of measurement call for different statistical techniques.

For example, it makes no sense whatsoever to find the mean, and median of a list of Social Security numbers.

In statistics and quantitative research methodology, various attempts have been made to classify variables (or types of data) and thereby develop a taxonomy of **levels of measurement** or **scales of measure**.

## Nominal Level

The nominal level of measurement is the lowest of the four ways to characterize data. Nominal means "in name only" and that should help to remember what this level is all about. Nominal data deals with names, categories, or labels.

Data at the nominal level is qualitative. Colors of eyes, yes or no responses to a survey, and favorite breakfast cereal all deal with the nominal level of measurement. Even some things with numbers associated with them, such as a number on the back of a football jersey, are nominal since it is used to "name" an individual player on the field.

Data at this level can't be ordered in a meaningful way, and it makes no sense to calculate things such as means and standard deviations.

The name 'Nominal' comes from the Latin *nomen*, meaning 'name' and nominal data are items which are differentiated by a simple naming system.

The only thing a nominal scale does is to say that items being measured have something in common, although this may not be described.

Nominal items may have numbers assigned to them. This may appear ordinal but is not -- these are used to simplify capture and referencing.

Nominal items are usually *categorical*, in that they belong to a definable category, such as 'employees'.

*Example*

- The number pinned on a sports person.
- A set of countries.



## **Ordinal Level**

The next level is called the ordinal level of measurement. Data at this level can be ordered, but no differences between the data can be taken that are meaningful.

Here you should think of things like a list of the top ten cities to live. The data, here ten cities, are ranked from one to ten, but differences between the cities don't make much sense. There's no way from looking at just the rankings to know how much better life is in city number 1 than city number 2.

Another example of this are letter grades. You can order things so that A is higher than a B, but without any other information, there is no way of knowing how much better an A is from a B.

As with the nominal level, data at the ordinal level should not be used in calculations.

Items on an ordinal scale are set into some kind of *order* by their position on the scale. This may indicate such as temporal position, superiority, etc.

The order of items is often defined by assigning numbers to them to show their relative position. Letters or other sequential symbols may also be used as appropriate.

Ordinal items are usually categorical, in that they belong to a definable category, such as '1956 marathon runners'.

You cannot do arithmetic with ordinal numbers -- they show sequence only.

### *Example*

- The first, third and fifth person in a race.
- Pay bands in an organization, as denoted by A, B, C and D.

## Interval Level

The interval level of measurement deals with data that can be ordered, and in which differences between the data does make sense. Data at this level does not have a starting point.

The Fahrenheit and Celsius scales of temperatures are both examples of data at the interval level of measurement. You can talk about 30 degrees being 60 degrees less than 90 degrees, so differences do make sense. However 0 degrees (in both scales) cold as it may be does not represent the total absence of temperature.

Data at the interval level can be used in calculations. However, data at this level does lack one type of comparison. Even though  $3 \times 30 = 90$ , it is not correct to say that 90 degrees Celsius is three times as hot as 30 degrees Celsius.

Interval data (also sometimes called *integer*) is measured along a scale in which each position is equidistant from one another. This allows for the distance between two pairs to be equivalent in some way.

This is often used in psychological experiments that measure attributes along an arbitrary scale between two extremes.

Interval data cannot be multiplied or divided.

### *Example*

- My level of happiness, rated from 1 to 10.
- Temperature, in degrees Fahrenheit.

## Ratio Level

The fourth and highest level of measurement is the ratio level. Data at the ratio level possess all of the features of the interval level, in addition to a zero value. Due to the presence of a zero, it now makes sense to compare the ratios of measurements. Phrases such as "four times" and "twice" are meaningful at the ratio level.

Distances, in any system of measurement give us data at the ratio level. A measurement such as 0 feet does make sense, as it represents no length. Furthermore 2 feet is twice as long as 1 foot. So ratios can be formed between the data.

At the ratio level of measurement, not only can sums and differences be calculated, but also ratios. One measurement can be divided by any nonzero measurement, and a meaningful number will result.

In a ratio scale, numbers can be compared as multiples of one another. Thus one person can be twice as tall as another person. Important also, the number zero has meaning.

Thus the difference between a person of 35 and a person 38 is the same as the difference between people who are 12 and 15. A person can also have an age of zero.

Ratio data can be multiplied and divided because not only is the difference between 1 and 2 the same as between 3 and 4, but also that 4 is twice as much as 2.

Interval and ratio data measure quantities and hence are *quantitative*. Because they can be measured on a scale, they are also called *scale data*.

### *Example*

- A person's weight
- The number of pizzas I can eat before fainting

Some additional terms to support the levels of measurement are as follows:

- MEAN
- MEDIAN
- MODE

# Exercise: Levels of Measurement

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1. Find the mean median, and mode for the data set:

5, 12, 7, 14, 8, 9, 5

2. A survey of 20 students was conducted to find out how many books they had read during the past four months. The results from those 20 students are shown below. Find the mean, median, and mode for this data.

3, 4, 6, 1, 2, 2, 5, 6, 1, 3, 4, 3, 5, 11, 12, 10, 2, 9, 6, 7

3. Movies R Us keeps a record of how many movies are rented on each day of the week.

Mon	Tues	Wed	Thurs	Fri	Sat	Sun
420	260	220	430	700	660	410

Find the mean, median, and mode for this data (rounded to the nearest whole number.)

# Data is Only Valuable When ...

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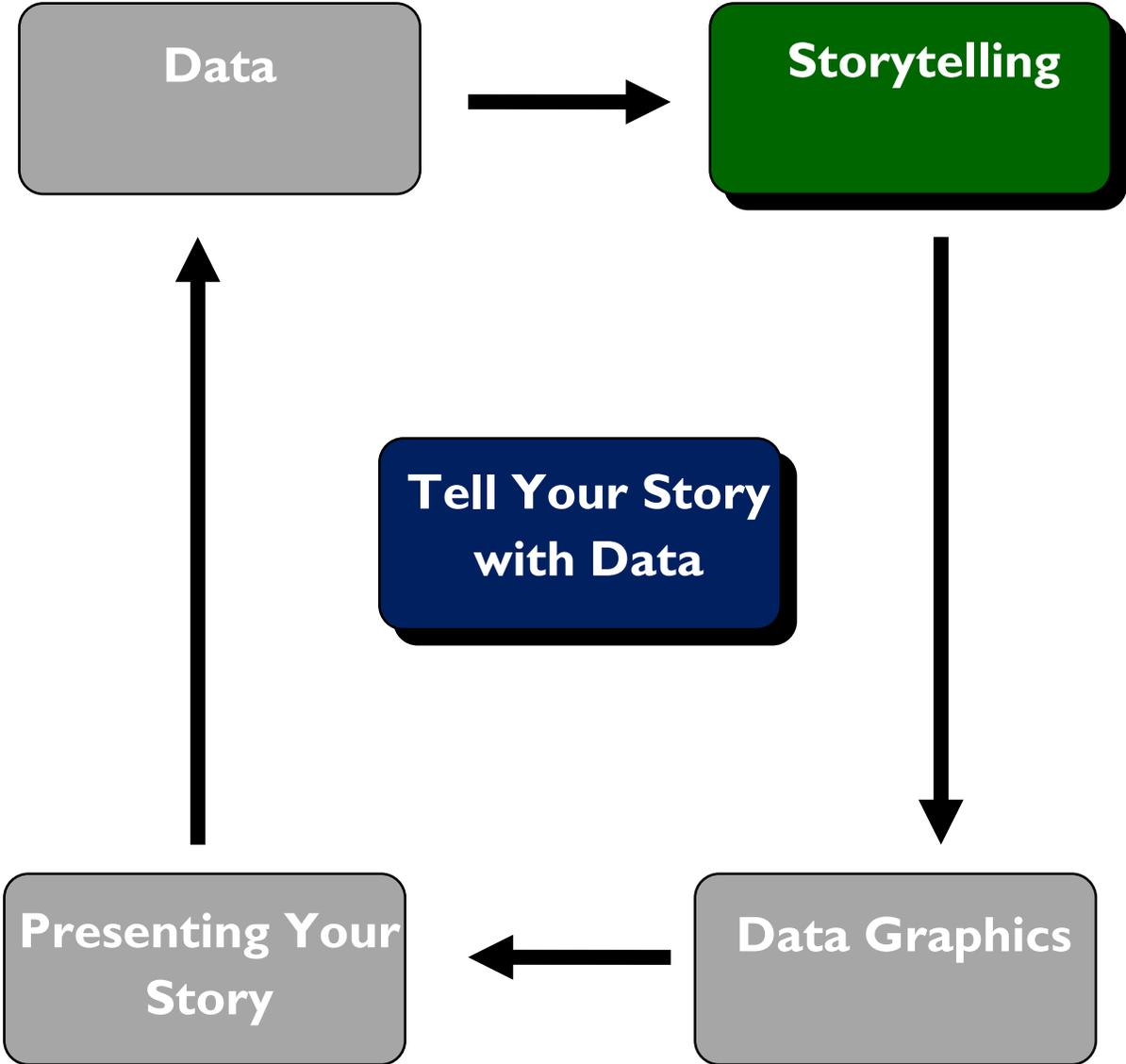
It has been said that “data” is the new oil. While the statement implies value, there really is no value unless people can derive something from it.

Data is only valuable when...

1. It is relevant to your audience
2. It meets the needs of your audience
3. It is easy to understand
4. It is presented at the right time
5. It is presented in the right way
6. It is useful (people can make better decisions)

# Storytelling

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# Storytelling

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Storytelling is skill that has been developed and used for thousands of years. It has been used to entertain, inform, communicate, simplify, persuade, and even tap emotion. Storytelling converts data from just numbers to valuable information where decisions can be made.

Karen Dietz and Laurie Silverman, Co Authors of Business Storytelling for Dummies, define a story as a tool that provides packets of sensory language presented in a particular way that allows the listener to quickly and easily internalize the material , comprehend it, and create meaning from it.

People don't move on logic alone. They need stories to connect to their emotions to get them moving forward. They need to connect to the why, what, and how on the human side

In this section, you will learn to build an effective story. You will learn:

- What makes a good story
- How to build story structure
- Models for different types of stories
- Storyboarding basics
- Tips for effective business storytelling

# What Makes a Good Story?

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According to the American Press Institute, there are a number of components that make up a good story.

1. Interesting to the audience
2. Adds value to the topic. People actually learn something.
3. Valid researched information. Information has been verified. Used reliable sources
4. Presented in an engaging way – How it is told is more important than the topic.
5. The story is complete

## Ingredients

What needs to be in a story? Noted Author and writing coach Author Aaron Shepard recommends the following ingredients.

**Theme.** A theme is something important the story tries to tell us—something that might help us in our own lives. Even a data presentation can have a theme. Many times what is learned through the process is the theme.

**Plot.** Plot is most often about a conflict, struggle, or challenge that the main character goes through. The conflict should get more and more tense or exciting. The tension should reach a high point or “climax” near the end of the story, then ease off. The basic steps of a plot are: conflict begins, things go right, things go WRONG, final victory (or defeat), and wrap-up.

**Story Structure.** Every story must have structure. The structure is the framework that holds the story together. Know at the beginning, you have to grab your audiences attention. At the end, you have to wind up the story and get to your point quickly.

**Characters.** Every story must have characters. Your audience must have someone to care about. In a data story, the characters might be the researchers. They might be the people that the data is generated on. They might be the people who the data is being generated for. Whoever the characters are, know them well.

**Setting.** Set your story in a place and time that will be interesting or familiar.

**Style and Tone.** Use language that feels right for your story and your audience. Keep terminology and concepts simple and understandable. Use actions and speech to let readers know what’s happening. *Show, don’t tell.*

# Story Structure

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Structuring your story correctly is vital. Story structure is the framework by which you build your story. Once you have the basic framework you can enhance your story. A good framework makes it easy for your audience to understand, follow, and consume. When a story is developed without a solid framework, your audience gets lost. You have to lead your audience down a path that's simple, easy to understand and consumable.

## Story Structure Elements

There are five elements in the building blocks of a story.

1. **Action.** What are your characters doing?
2. **Dialogue.** What are they saying?
3. **Description.** What are they seeing, hearing, touching, tasting, and smelling?
4. **Inner Monologue.** What are they thinking?
5. **Exposition / Narrative.** What other information does the narrator (IE you) want us to know?

# The Story Spine

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<b>The Story Spine</b>	<b>Structure</b>	<b>Function</b>
Once upon a time...	Beginning	The world of the story is introduced and the main character's routine is established
Every day...		
But, one day...	The Event	The main character breaks the routine
Because of that...	Middle	There are dire consequences for having broken the routine. It is unclear if the main character will come out alright in the end.
Because of that...		
Because of that...		
And, ever since then...	End	The main character succeeds or fails, and a new routine is established.

Adams, Kenn (5JUN13). Back to the Story Spine. Retrieved from <https://www.aerogrammestudio.com/>

# Typical Business Story Structures

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Name	Structure	Comments
“I’m Better Off”	Main character gets in trouble, then gets out of trouble, and ends up better off for the experience.	Story of struggle and redemption — of losing everything and gaining something better in return. A bankruptcy, being let go from a job, losing a home, or making major mistakes and recovering from them.
“Highlight Both Loss and Gain”	Main character falls in love with a business or opportunity or is doing work that fulfills their dreams — loses it when something puts those dreams on hold — and then regains it.	This is a very common business story. What makes it different than “I’m Better Off” is that there’s a dream that starts the story, which is followed by loss.
“The Cinderella Down-and-Out Story”	The main character is in a bad spot. A special helper provides gifts, but then the character loses their good standing. Eventually that good standing is restored, and the character gains incredible bliss.	The most popular story in Western civilization. In business, this could be a story of dissatisfying work and living in desperation. Then a mentor comes along and transforms the person’s life, but circumstances still hold the character back. These are eventually resolved which leads to the character’s dreams being realized.
SHARES	Start with a <i>setting</i> (“I was sitting at my desk . . .”), followed by the <i>hindrance</i> or obstacle that’s creating a problem. The <i>action</i> that was taken is given next, followed by the <i>result</i> . The teller then provides a statement <i>evaluating</i> the experience (“this made me think about . . .”), ending with <i>suggested actions</i> .	This is a very useful structure to use when time is limited. It’s particularly helpful during interviews. Or in e-mail newsletters and on blogs where space is short.

# Typical Business Story Structures

(pt. 2)

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Name	Structure	Comments
PARLAS	Start by presenting the <i>problem</i> . Then work your way through the <i>action</i> taken to solve the problem, what the <i>result</i> was, what was <i>learned</i> in the process (“what I learned from this was . . .”), how that learning <i>applies</i> to today, and ending with <i>suggested</i> actions for your audience.	This is a very useful structure to use when time is limited. It’s particularly helpful during interviews. Or in e-mail newsletters and on blogs where space is short.
CHARQES	Start with laying out the <i>context</i> — what was happening and why. Then the <i>challenge</i> is presented, what <i>action</i> was taken comes next, followed by the <i>result</i> in <i>quantifiable</i> numbers. After this, the teller gives an <i>evaluation</i> of the experience and finally provides <i>suggested</i> actions to take.	This is a very useful structure to use when time is limited. It’s particularly helpful during interviews. Or in e-mail newsletters and on blogs where space is short.
CCARLS	Start with the <i>context</i> of the issue (similar to CHARQES). Then the <i>challenge</i> is presented, the <i>action</i> that was taken is brought in, and the <i>result</i> is provided — along with the <i>lesson</i> . <i>Suggested</i> actions are given at the end.	This is a very useful structure to use when time is limited. It’s particularly helpful during interviews. Or in e-mail newsletters and on blogs where space is short.
“Open with an Opportunity”	Present a possibility — a dream, a promise — based on what’s known to be true today. Follow this with the obstacle that’s preventing this possibility from happening, how others have already helped to (partially) remove the obstacle (if indeed that’s the case), and the action steps your audience can take to overcome it.	This is a powerful structure for nonprofits and companies involved in social change.

# Typical Business Story Structures

(pt. 3)

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Name	Structure	Comments
<p>“Speak to the Why”</p>	<ol style="list-style-type: none"> <li>1. State a problem that the product or service addresses.</li> <li>2. The first “why” is: Why is that important? Because ...</li> <li>3. The second “why”: Why is that important? Because ...</li> <li>4. The third “why”: Why is that important? Because ...</li> <li>5. The fourth “why”: Why is that important? Because ...</li> <li>6. The fifth “why”: Why is that important? Because ...</li> <li>7. The ultimate “why” is: Because . . .</li> </ol>	<p>Use in marketing to get at a product or service story.</p> <p>Example:</p> <ol style="list-style-type: none"> <li>1. Our product makes stinky sneakers smell better.</li> <li>2. Because stinky sneakers turn people off.</li> <li>3. Because when they’re turned off to you, they won’t want to hang around you.</li> <li>4. Because if they don’t want to hang around you, you can’t get to know them.</li> <li>5. Because if you can’t get to know them, you can’t date them.</li> <li>6. Because if you can’t date them, you won’t get one to marry you.</li> <li>7. The ultimate “why”: If you have smelly sneakers, you’ll never find your mate (and never get married).</li> </ol>
<p>“Leverage the Underdog”</p>	<ol style="list-style-type: none"> <li>1. Describe the significant struggle that the person has experienced.</li> <li>2. Insert a hint of hope.</li> <li>3. Share the moment of deliverance from the struggle.</li> <li>4. Provide the key message.</li> <li>5. Reference back to the implied action steps or attitudes if this can be done appropriately.</li> <li>6. Show how your organization is celebrating the success.</li> </ol>	<p>People love underdogs. Think Superman, Spiderman, and other favorite heroes who experience deliverance. Hint: We’re all heroes who’ve experienced deliverance. And many of your customers are underdogs who have overcome and persevered. Hope is the ultimate message.</p>

# Typical Business Story Structures

(pt. 4)

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Name	Structure	Comments
“Present-Future”	<ol style="list-style-type: none"> <li>1. Start out by painting the picture of the current reality.</li> <li>2. Introduce the first turning point — the urgent call to do things differently.</li> <li>3. State what could be.</li> <li>4. Outline what is (based on another part of step 1).</li> <li>5. State another example of what could be.</li> <li>6. Outline what is (based on another part of step 1).</li> <li>7. State another example of what could be.</li> <li>8. Outline what is (based on another part of step 1).</li> <li>9. Introduce the second turning point — the call to action — and articulate the finish line and problem resolution. These are action steps that will resolve shortcomings in the current reality and bring about the future.</li> <li>10. End on a higher plane. Have proof of a happy ending to share so folks know their hard work, dedication, commitment, and perseverance will pay off. They’ll have a greater commitment to taking action knowing it won’t be easy, but worth it.</li> </ol>	<p>This structure is very useful when presenting a project that you want people to support or become a part of. And it’s a great structure to use when launching change.</p>

Dietz, K. & Silverman L. L. (2014). Business Storytelling for Dummies

# Storyboarding

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## What is Storyboarding?

According to Wikipedia Storyboarding is a visual technique to organize your story. By doing it visually first, you are able to take apart the components of the story. This allows you flexibility and clarity. Walt Disney Studio was the first to use storyboarding in the early 1930s, when animator Webb Smith drew scenes on separate sheets of paper and pinned them up on a bulletin board to tell a story in sequence.

A storyboard functions similarly to an outline of a story; it is a shorthand version of the final product that you can use to plan ahead. . It is your way of visualizing the final product before going through the motions of actual production.

## Benefits of Story Boarding

1. Helps in identifying the areas where more information and or analysis is needed.
2. Helps you maintain a view of the bigger picture
3. Easy to communicate the understanding to others
4. Helps in organizing the work.
5. Provides flexibility of concepts
6. Allows you to break the bigger picture of the project into chunks
7. Goes straight to the crux of the message
8. Can get everyone on board before spending countless hours refining
9. Gains clarity

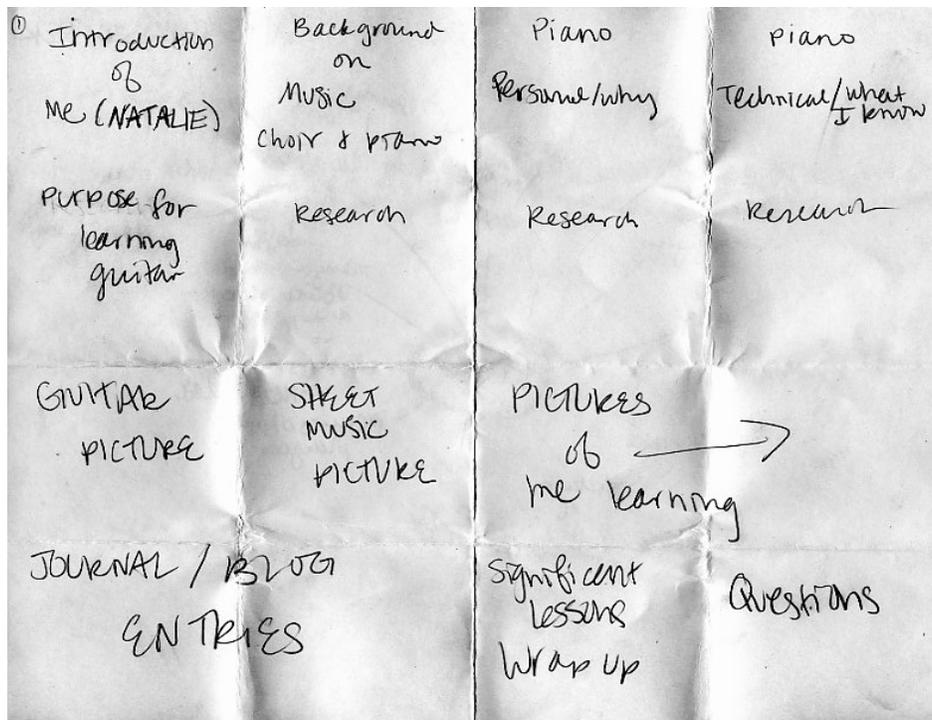
# Key Steps to Storyboarding

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- 1) **Get all of your story ideas onto paper.** Take a piece of paper, divide it into 4-8 sections. You can draw lines or fold it to create the sections. Make sure to make the sections large enough to see. Some people use sticky notes instead of dividing paper.
- 2) **Cut and shuffle ideas into storyboard panels.**
- 3) **Don't linger on the opening sequence.** As you work through different orders of your panels, you'll figure out the best opening sequence to grab your audience.
- 4) **Keep things flexible.** Sometimes we get stuck on certain order and we lose creativity. Open your mind to trying different ideas and orders.
- 5) **Embrace random ideas.** You never know what idea might resonate once you put it on paper.
- 6) **Explore different narratives**
- 7) **Make every frame count. Have enough detail in each frame. Ask yourself the following questions**
- 8) **Think beyond what's on the page.** What is your audience needing or wanting. What is missing?
- 9) **Embrace feedback.** Engage your peers in the process. Most innovation happens when others review and provide ideas. Keep your mind open to everything

# Storyboarding Tips

1. **Keep it simple.** Keep the story simple, do not make it complicated.
2. **Make it visual.**
3. **Break the story into scenes.** Breaking the story into scenes or sections will help you to organize the story better. It will also help you in identifying the shortcomings, if any, in the story. While making a Storyboard, do the Horizontal and Vertical analysis of storyboard, that will ensure completeness of the story.
4. **Make it collaborative:** The idea behind storyboarding is to make the complete picture clear. To make sure that you have covered every aspect of the story, involve your clients in the storyboarding session. Check the logic flow (“necessary and sufficient” arguments)
5. **Tell a good story:** In the end keep in mind to tell a good story.
6. **Make sure that your objectives are clear and concise.**
7. **Make sure that it is relevant to your audience meets the needs of your audience**



# Storyboard Worksheet


## Storyboard Worksheet


# Tips for Effective Storytelling

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Paul Smith, the author of: *Lead with a Story: A Guide to Crafting Business Narratives That Captivate, Convince, and Inspire*", recommends the following tips for effective business storytelling.

**Keep it real.** Use specific people and events and not vague generalizations or abstract ideas. Leave out the technical jargon and use numbers or facts that are relevant.

**Create a great beginning.** Good, effective stories lead off with a surprise, a mystery or a challenge. Don't apologize before you even begin telling a story.

**Keep it simple.** Use short sentences and small words with an active voice. Most stories should be about 250 to 750 words long, or two to four minutes when told orally. Use real names and characters.

**Generate the right emotion.** Make sure your tale is relevant to your audience and eliciting the right emotion for the right reason. Show them what's in it for them, such as helping advance their careers or making a difference in the world.

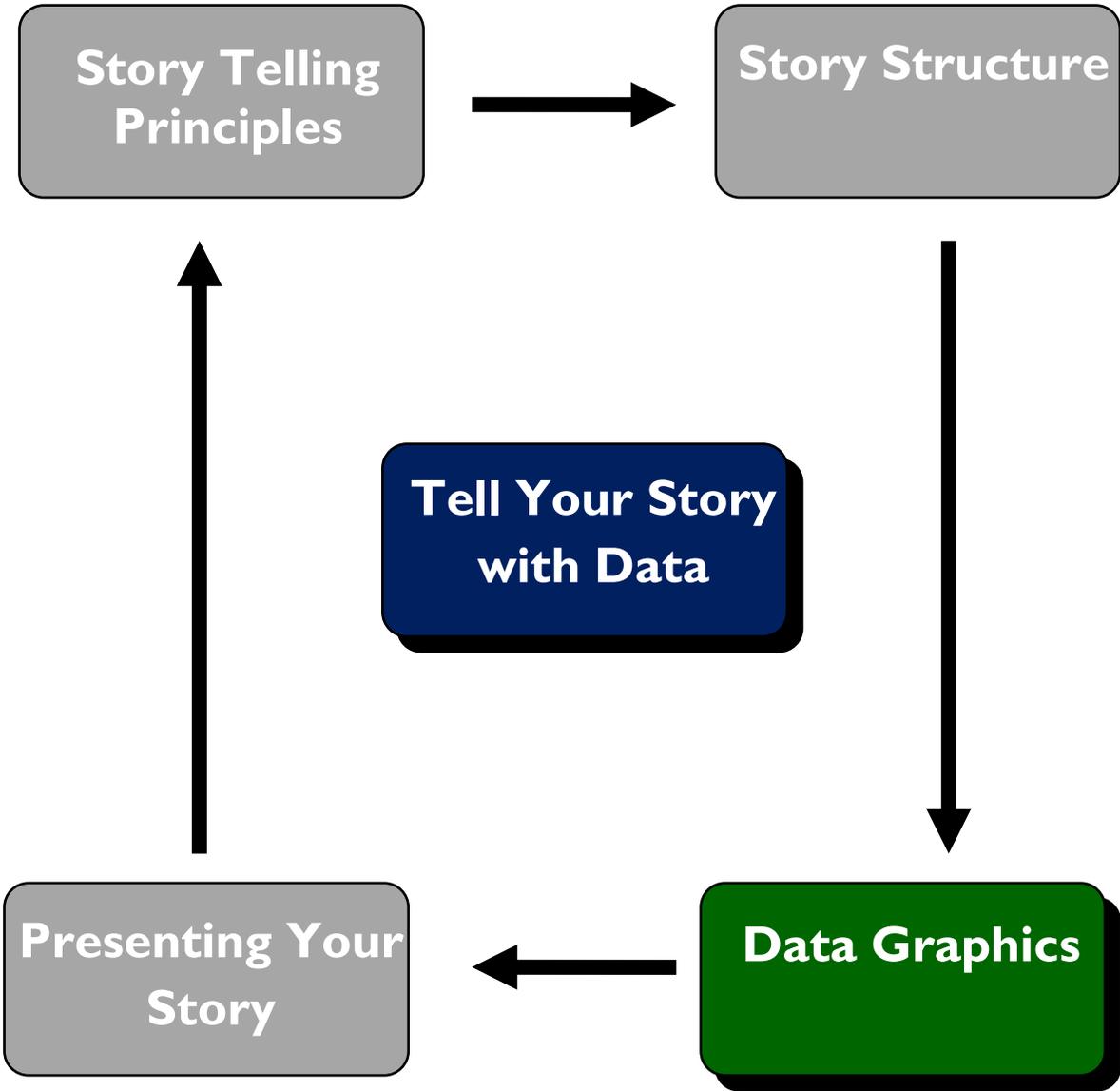
**Use analogies and metaphors.** If you can't come up with a story, try using a metaphor, such as this one provided by Smith: "If your old computer system were a car, what make and model would it be?"

**Stick the ending.** Withhold a key piece of information for the end of your story to create a surprise, like the name of the person or company the story is about

Bruzzese, A. (10DEC12). Tips for Effective Storytelling at Work. Retrieved from <https://www.quickbase.com/>

# Data Graphics

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# Data Graphics

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Presenting data in a consumable way is an extremely difficult challenge. Data graphics are the key tools that help you present information in a consumable way and effectively tell your stories. In order to do this, your data graphics must be relevant and understandable by your audience. Your graphics must be simple and must be able to draw their eye to the appropriate areas that you want to emphasize.

## Different Charts for Different Methods

Different chart types cater best to different methods. For example, scatter plots are best used to show distributions, while line charts (essentially, scatterplots with a defined trend) are better suited for relationships.

**Pie charts** do well when you're trying to communicate a composition, but make for poor comparisons or distributions

Graphs display quantitative information: numbers that measure performance predict the future and identify opportunities. The nature of quantitative information varies in some fundamental ways that tie directly to some of the choices you must make when graphing that information. Quantitative information consists not only of numbers, but also of data that identifies what the numbers mean.

If someone walked up to you, looked you in the eye, and said, "The answer is 24,901", you would probably be confused and understandably suspicious.

By itself, a number means nothing. However, if someone were to tell you that the circumference of the earth at the equator is 24,901 miles that would mean something. To be complete and meaningful, quantitative information consists of both quantitative data—the numbers—and categorical data—the labels that tell us what the numbers measure.

Graphs and charts are great because they communicate information visually. For this reason, graphs are often used in newspapers, magazines, and businesses around the world.

# What type of visuals work best?

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The most commonly used and easiest visuals to understand are the Bar Charts, Histograms, Pie Charts, and Line Charts.

A **bar chart** is a chart with rectangular bars with lengths proportional to the values that they represent. The bars can be plotted vertically or horizontally.

A **histogram** is a type of bar chart that consists of tabular frequencies, shown as adjacent rectangles, erected over discrete intervals (bins), with an area equal to the frequency of the observations in the interval.

A **pie chart** shows percentage values as a slice of a pie.

A **line chart** is a two-dimensional **scatterplot** of ordered observations where the observations are connected following their order.

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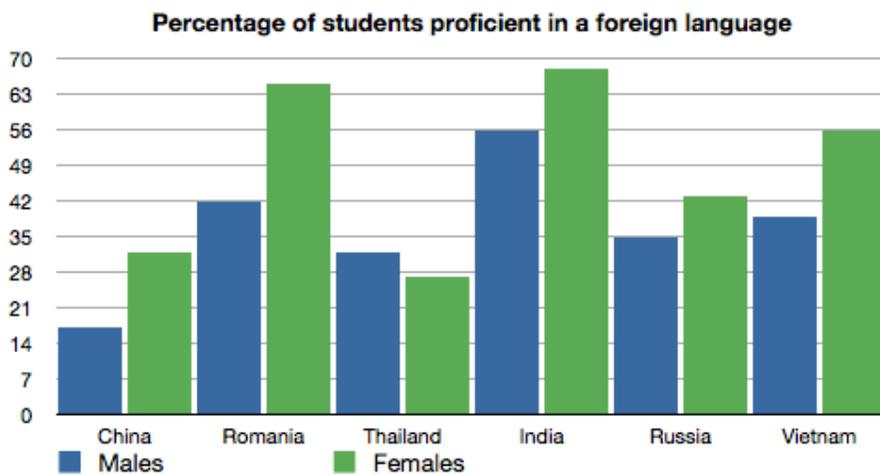
When you're putting together a chart, you're trying to show one of four things with the data you have: a *relationship* between data points, a *comparison* of data points, a *composition* of data, or a *distribution* of data.

- **A relationship** tries to show a connection or correlation between two or more variables through the data presented, like the market cap of a given stock over time versus overall market trend.
- **A comparison** tries to set one set of variables apart from another, and display how those two variables interact, like the number of visitors to five competing web sites in a single month.
- **A composition** tries to collect different types of information that make up a whole and display them together, like the search terms that those visitors used to land on your site, or how many of them came from links, search engines, or direct traffic.
- **A distribution** tries to lay out a collection of related or unrelated information simple to see how it correlates, if at all, and to understand if there's any interaction between the variables, like the number of bugs reported during each month of a beta.

## **BAR CHART/GRAPH**

A bar chart is a two-dimensional data visual that is made up of rectangular bars, each corresponding to a category and whose length represents the value of that category. Each bar represents a group of data with heights/lengths measured using percentages, dollars, etc.

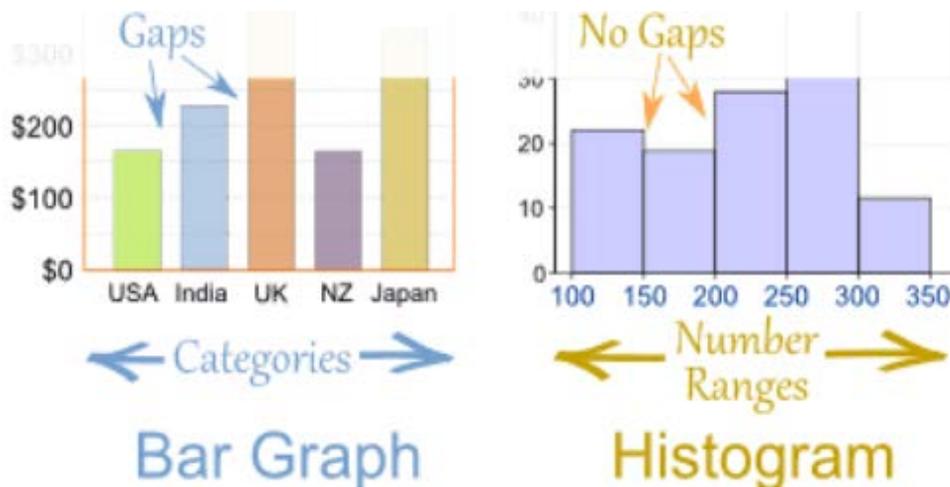
- Axes allow the display of two or more individual numeric values
- Good for displaying magnitude or comparative magnitude between groups of data
- Can show relative differences or patterns between/across groups
- Horizontal orientations (line chart) allow text labels to be placed in an easy-to-read position
- Vertical orientations are best for showing a comparative rise or fall in counts over levels of one or more variables



## Histogram

A Histogram is a type of bar chart. There are two differences, one is the type of data that is presented and the other is the way it is drawn.

1. Bar charts usually display categorical data or data that fits into categories whereas Histograms usually present continuous data. Numbers or time periods are good examples of this.
2. The difference in the way that bar graphs and histograms are drawn is that the bars in bar graphs are usually separated, while with histograms the bars are adjacent to each other.



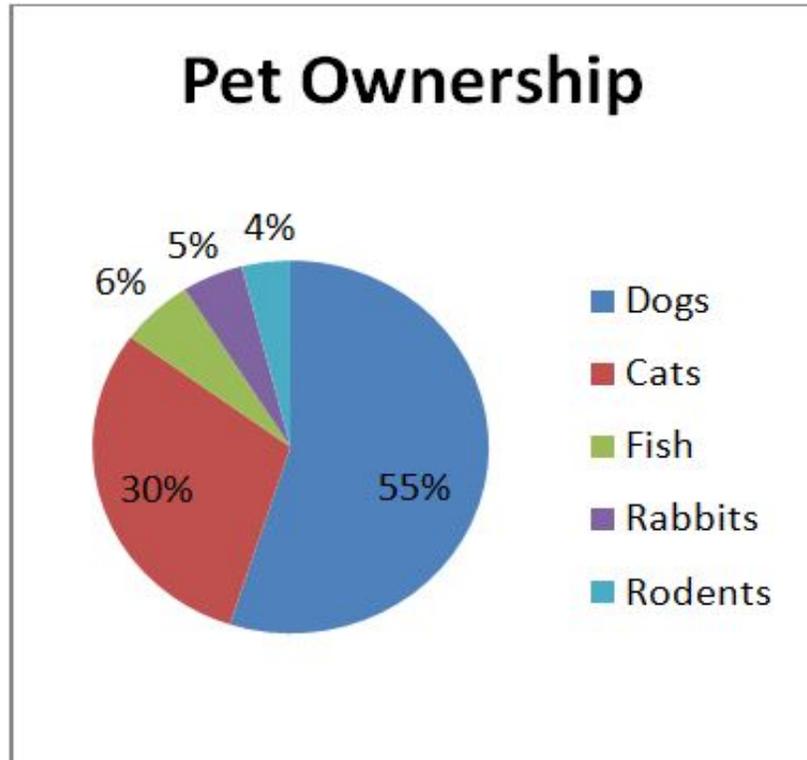
### Bar Charts and Histograms

Advantage	Disadvantage
<ul style="list-style-type: none"> <li>• show each data category in a frequency distribution</li> <li>• display relative numbers or proportions of multiple categories</li> <li>• summarize a large data set in visual form</li> <li>• clarify trends better than do tables</li> <li>• estimate key values at a glance</li> <li>• permit a visual check of the accuracy and reasonableness of calculations</li> <li>• be easily understood due to widespread use in business and the media</li> </ul>	<ul style="list-style-type: none"> <li>• require additional explanation</li> <li>• be easily manipulated to yield false impressions</li> <li>• fail to reveal key assumptions, causes, effects, or patterns</li> </ul>

## PIE CHART

- Show proportions/percentages, especially their comparison, for a total of 100%
- Display a “whole” with smaller parts and how they relate to each other
- Good for highlighting the largest or smallest piece of something

“Sacramento Co. Data”



Advantages	Disadvantages
<ul style="list-style-type: none"><li>• display relative proportions of multiple classes of data</li><li>• size of the circle can be made proportional to the total quantity it represents</li><li>• summarize a large data set in visual form</li><li>• be visually simpler than other types of graphs</li><li>• permit a visual check of the reasonableness/accuracy</li><li>• require minimal additional explanation</li></ul>	<ul style="list-style-type: none"><li>• do not easily reveal exact values</li><li>• Many pie charts may be needed to show changes over time</li><li>• fail to reveal key assumptions, causes, effects, or patterns</li><li>• be easily manipulated to yield false impressions</li><li>• too many variables makes it difficult to read</li></ul>

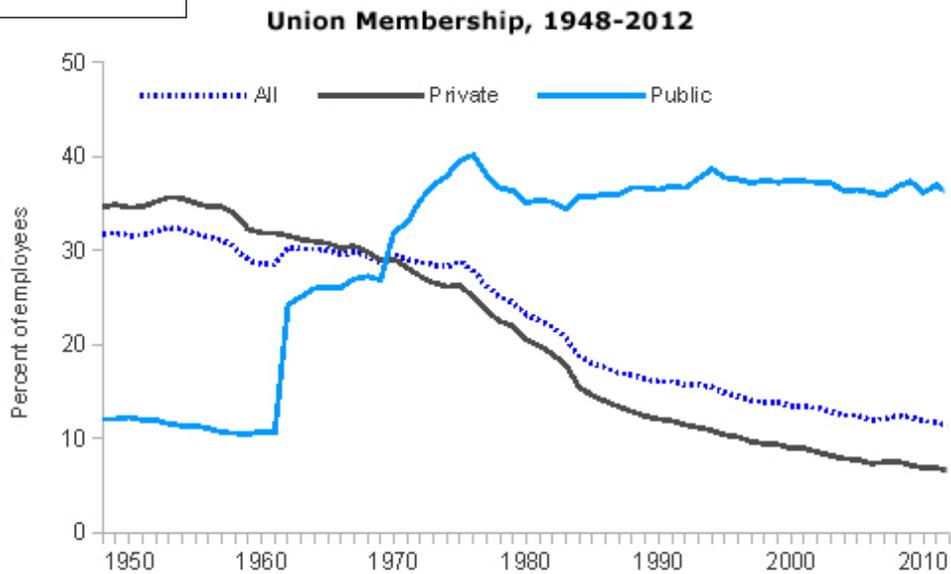
# LINE CHART

Good for showing:

- A connected sequence of data, such as trends over time
- Before and after differences

If numbers are going up, down, or remaining stable

“United States Data”



Source: Labor Research Association and Bureau of Labor Statistics.

Advantages	Disadvantages
<ul style="list-style-type: none"> <li>• It is easy to read.</li> <li>• A broken scale can be used when the data starts at a large number.</li> <li>• Easy to compare sets of data</li> <li>• They show patterns in data clearly, and how one variable is affected by the other</li> <li>• They enable the viewer to make predictions about the results of data.</li> </ul>	<ul style="list-style-type: none"> <li>• One particular data point cannot be effectively evaluated using this method.</li> <li>• It can only be used to show data over time.</li> <li>• You can change the way the data of a line graph appears, by not using consistent scales on the axis.</li> </ul>

# Bar Charts, Pie Charts, and Line Charts; The Dos and Do Not's

## Bar Charts/Histograms

Do	Do Not
<ul style="list-style-type: none"><li>• Use six or fewer bars per chart</li><li>• Use color/shading with strong contrast</li><li>• Use a bar or line to show a baseline value</li><li>• Use short and easy to understand titles, labels, key messages</li><li>• Select beginning and ending values and interval widths for axes that represent patterns in the data without distortion</li></ul>	<ul style="list-style-type: none"><li>• Use segmented or stacked bar charts to demonstrate how proportions compare to the whole</li><li>• Overlay line representation on top of the bars to indicate variance estimates or confidence levels</li></ul>

## Pie Charts

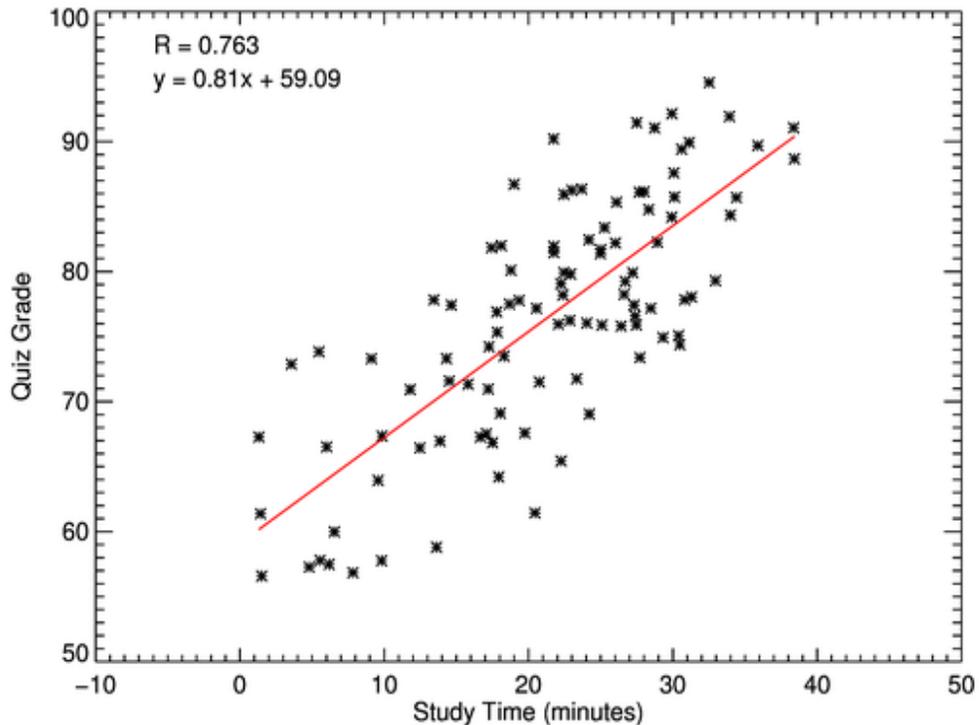
Do	Do Not
<ul style="list-style-type: none"><li>• Make sure the largest slice is pointed at 12 o'clock</li><li>• Display slices clockwise in descending order</li><li>• Use short labels and position them horizontally and outside the pie</li></ul>	<ul style="list-style-type: none"><li>• Show more than six slices</li><li>• Use shading or patterns that make slices indistinguishable</li></ul>

## Line Charts

Do	Do Not
<ul style="list-style-type: none"><li>• Use arrows or text to highlight key events or data</li><li>• Place labels close to their lines</li><li>• Select beginning and ending values and interval widths for axes that faithfully and ethically represent patterns in the data without distortion</li></ul>	<ul style="list-style-type: none"><li>• Add unnecessary labels or symbols</li><li>• Use more than four trend lines</li></ul>

## Scatterplot

According to Chartio, A **scatter plot** is a two-dimensional data visualization that uses dots to represent the values obtained for two different variables - one plotted along the x-axis and the other plotted along the y-axis.



Advantages	Disadvantages
<ul style="list-style-type: none"><li>• Can show large quantities of data</li><li>• Easy to see correlation between variables and clusters</li><li>• Range of data flow can be determined</li><li>• Maintains exact data value in the plotting</li><li>• Straightforward towards observations</li><li>• Quick overview and analytical tool</li><li>• Finding outliers</li><li>• Patterns between some dimensions</li><li>• Can focus the eye by changing the color specific dots</li></ul>	<ul style="list-style-type: none"><li>• Not always great for presentations</li><li>• Limited to the relationship between 2 variables</li><li>• Number of observations is limited</li><li>• Only used for quantitative variables</li><li>• Accuracy when rounding occurs</li><li>• All data can't be seen (too many points pile on top of each other)</li></ul>

## Decision Tree

A decision tree is a decision support tool that uses a tree-like graph or model of decisions and their possible consequences, including chance event outcomes, resource costs and utility.

Decision trees provide an elegant framework for combining options, contingencies, consequence probabilities, and outcome values to help you select the best option.

Decision trees map feasible options and potential consequences in a manner that makes it easier to understand and communicate the situation.

A Decision Tree Plan helps you build a decision tree diagram in an Excel worksheet using dialog boxes. Decision trees are useful for analyzing sequential decision problems under uncertainty.

Your decision tree model may include various controllable alternatives (e.g., whether to introduce a new product, whether to bid on a new project) and uncontrollable uncertainties (e.g., possible demand for a product, whether you're awarded a contract), arranged in chronological order.

A decision tree consists of 3 types of nodes:

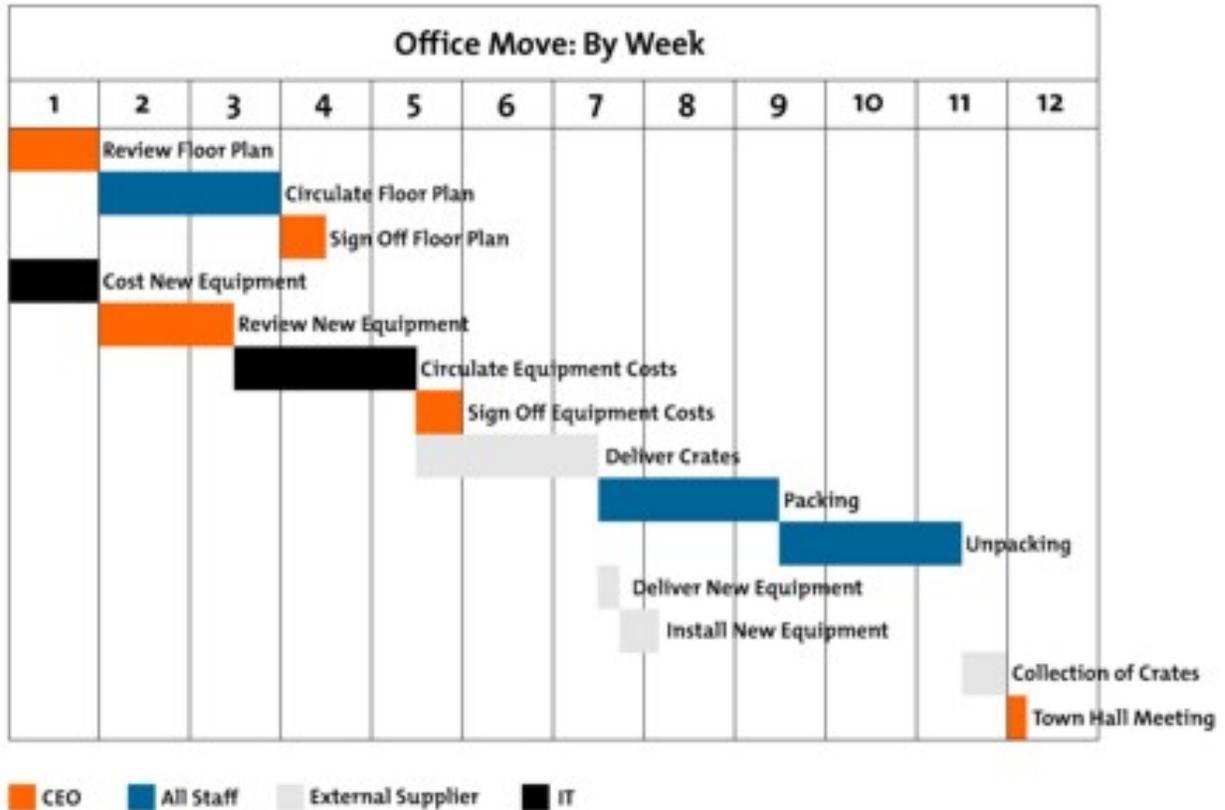
1. Decision nodes - commonly represented by squares
2. Chance nodes - represented by circles
3. End nodes - represented by triangles



Advantages	Disadvantages
<ul style="list-style-type: none"> <li>• Best when you need to evaluate and depict alternatives</li> <li>• Useful to illustrate various options and the impacts of each</li> </ul>	<ul style="list-style-type: none"> <li>• Difficult to evaluate every possible outcome, just those with major impacts</li> </ul>

## Gantt Chart

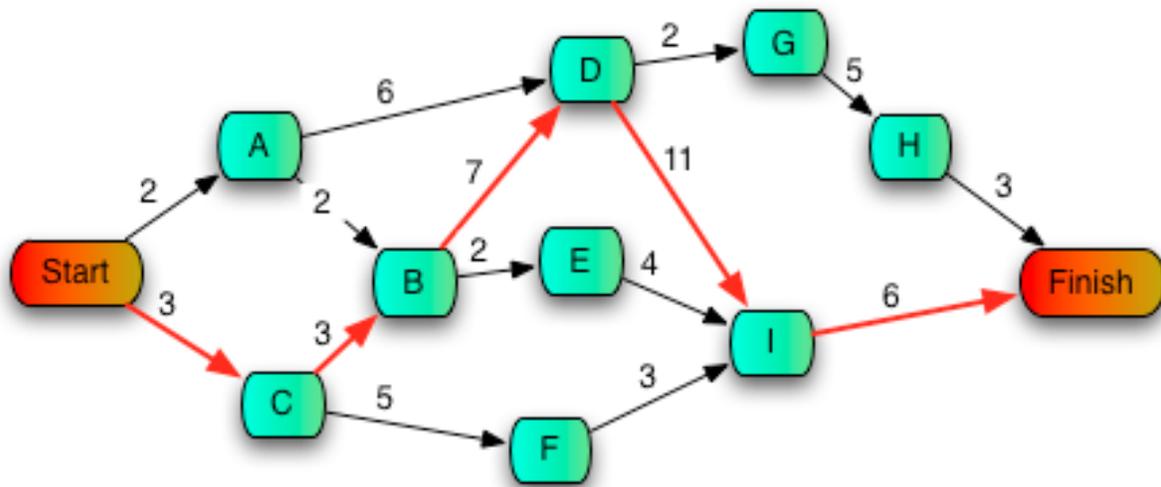
A chart in which a series of horizontal lines shows the amount of work done or production completed in certain periods of time in relation to the amount planned for those periods.



Advantages	Disadvantages
<ul style="list-style-type: none"> <li>• Allows for efficient organization</li> <li>• Helps establish timeframes</li> <li>• Highly visual</li> </ul>	<ul style="list-style-type: none"> <li>• Potentially overly complex</li> <li>• Need to be updated</li> <li>• Don't show the whole picture</li> </ul>

## PERT Chart

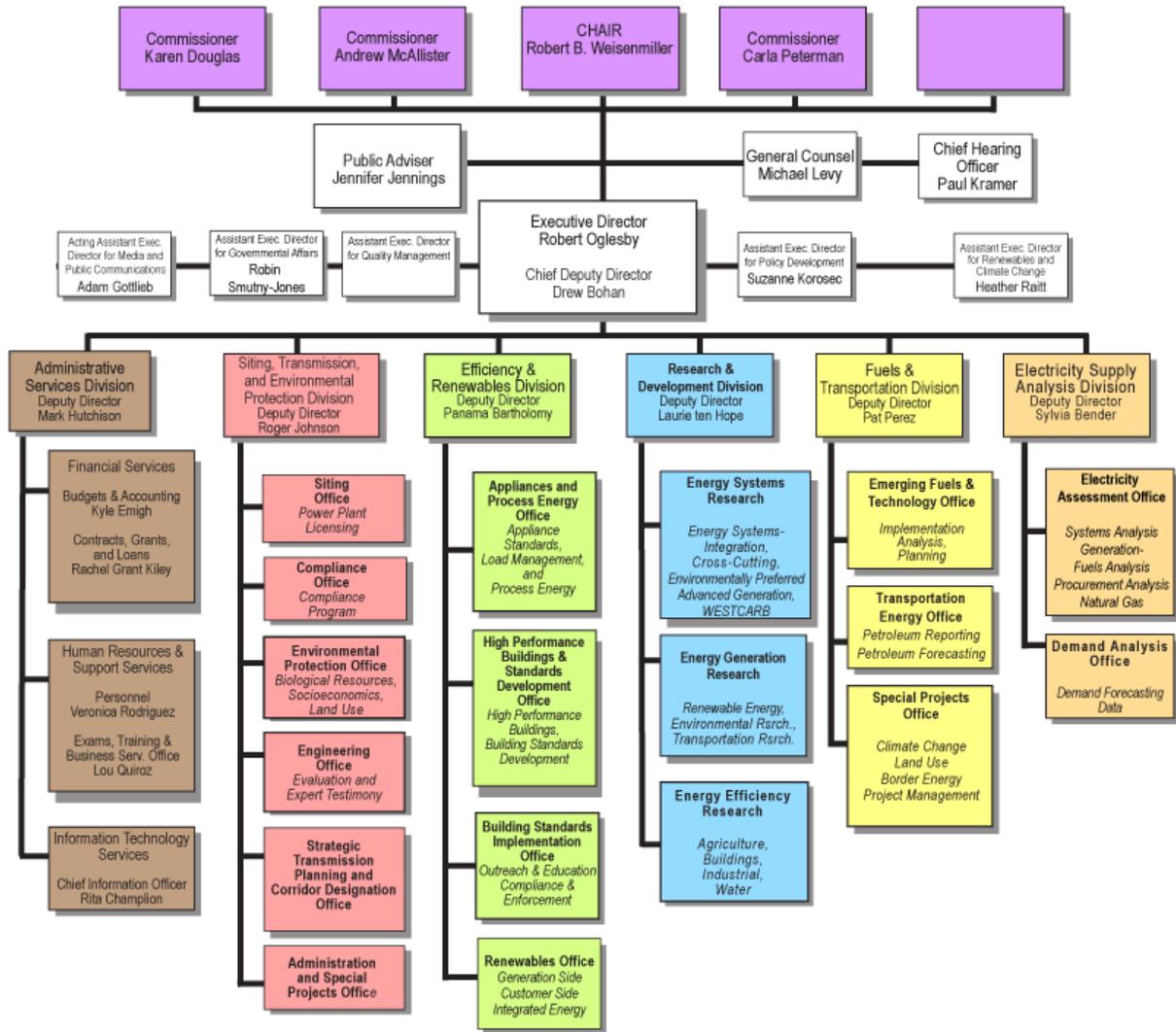
A **Program Evaluation Review Technique (PERT) Chart** is a graph that represents all of the tasks necessary to a project's completion, and the order in which they must be completed along with the corresponding time requirements. Certain tasks are dependent on serial tasks, which must be completed in a certain sequence. The PERT chart will reveal the Critical Path.



Advantages	Disadvantages
<ul style="list-style-type: none"> <li>• Activity analysis to measure resources required</li> <li>• Coordinates groups/departments to improve decision making</li> <li>• Works well for large project planning</li> <li>• Provides a visible critical path</li> </ul>	<ul style="list-style-type: none"> <li>• Can be inaccurate due to subjective analysis</li> <li>• Time focus</li> <li>• Resource intensive</li> <li>• Can be complicated and confusing</li> <li>• Prediction inaccuracies due to unseen events</li> </ul>

# Organizational Chart

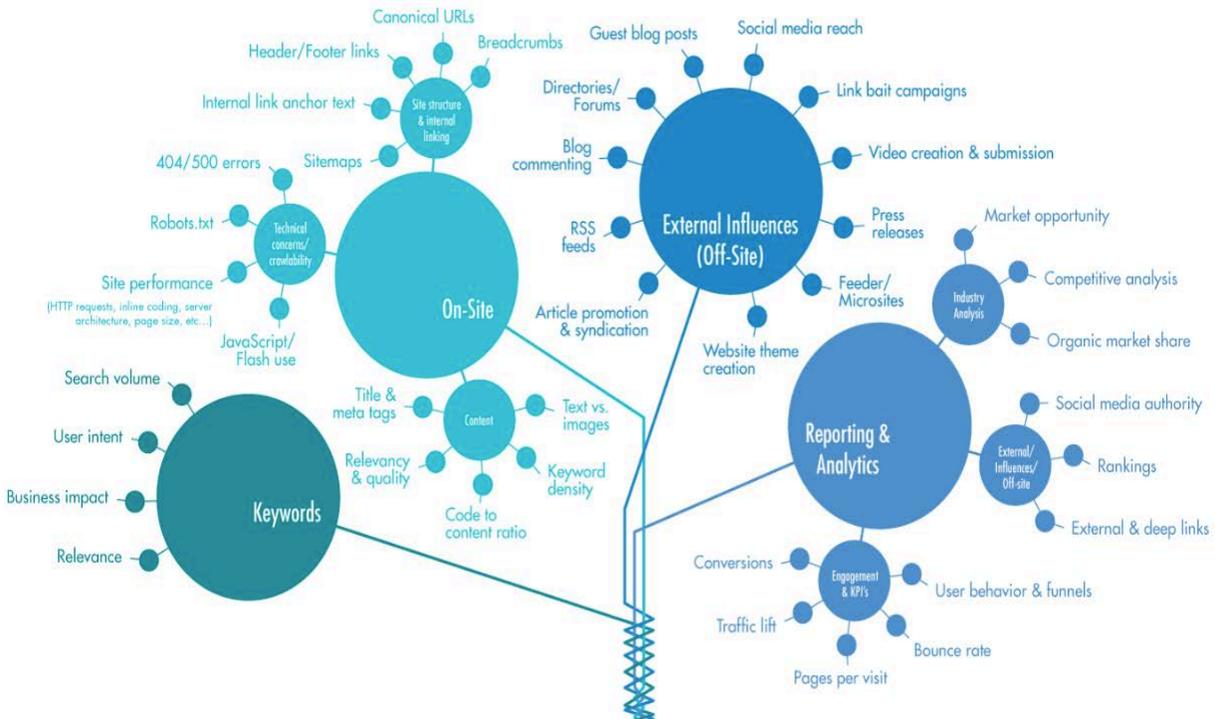
An **organizational chart** (often called **organization chart**, **org chart**, or **organogram**) is a diagram that shows the **structure** of an **organization** and the relationships and relative ranks of its parts and positions/jobs.



Advantages	Disadvantages
<ul style="list-style-type: none"> <li>• Shows clear reporting structure</li> <li>• Helps new employees</li> <li>• Helps manage workload</li> <li>• Makes planning easier</li> </ul>	<ul style="list-style-type: none"> <li>• Doesn't show informal channels</li> <li>• Must be maintained</li> </ul>

## Tree Chart/Mind Map

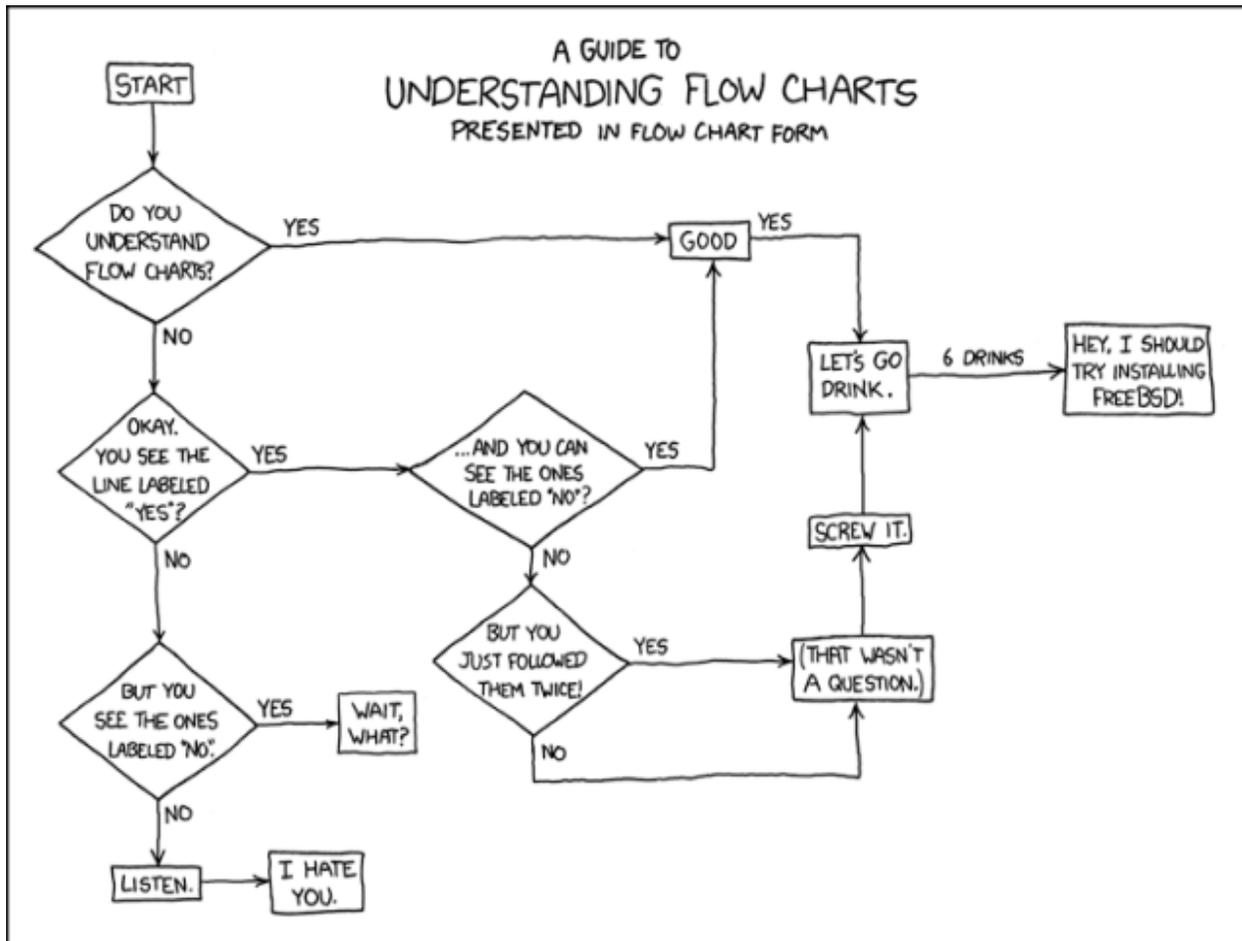
A diagram used to depict how separate pockets of information are connected. The diagram starts at a single node, with branches emanating to additional nodes, which represent mutually exclusive decisions or events.



Advantages	Disadvantages
<ul style="list-style-type: none"> <li>• It's more interesting and entertaining</li> <li>• Helps to identify and highlight the structural elements of a subject</li> <li>• Works without much technical equipment</li> <li>• Encourages all group members to participate</li> <li>• Compact way to summarize a lot of information</li> <li>• Very quick to review and refresh</li> </ul>	<ul style="list-style-type: none"> <li>• Mind maps can become complex if you use more than two branches</li> <li>• An individual mind map may be so personal it could be difficult for others to understand</li> <li>• You may have to redraw the map if you want to change some branches or sub-topics after the evaluation</li> </ul>

## Flow Chart

A diagram of the sequence of movements or actions of people or things involved in a complex system or activity.



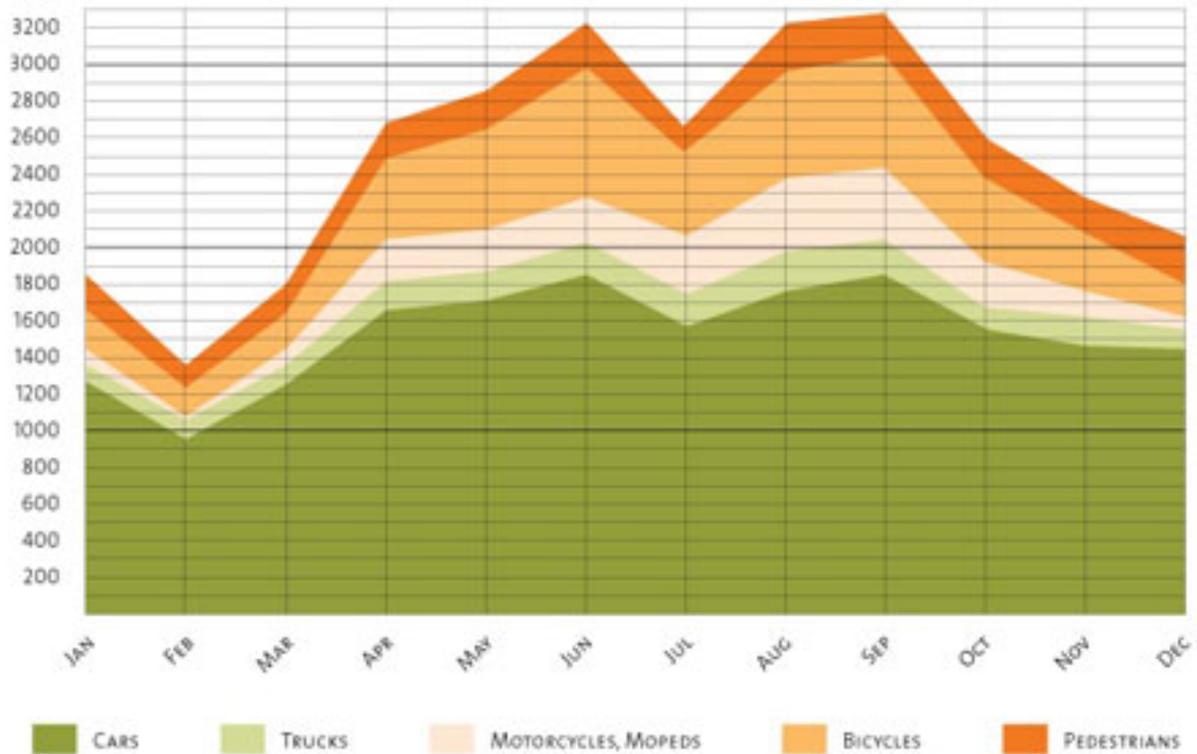
Advantages	Disadvantages
<ul style="list-style-type: none"> <li>• Good way to communicate details of a task or process</li> <li>• Excellent way to document stages of a process</li> <li>• Improves problem analysis</li> <li>• Improves process development</li> </ul>	<ul style="list-style-type: none"> <li>• Time consumers especially the more complex they are</li> <li>• Some tasks are difficult to represent using a flow chart</li> <li>• Changes in the process might force a redraw</li> <li>• People don't necessarily know what each symbol means</li> </ul>

## Area Chart

An **area chart** or **area** graph displays graphically quantitative data. It is based on the line **chart**. The **area** between axis and line are commonly emphasized with colors, textures and hatchings. Commonly one compares with an **area chart** two or more quantities.

### TRAFFIC ACCIDENTS 2005

Number of Persons Involved in Traffic Accidents by Mode of Transportation



Advantages	Disadvantages
<ul style="list-style-type: none"> <li>• Displays graphically quantitative data in a relatively simple format.</li> <li>• Able to chart cumulatively</li> </ul>	<ul style="list-style-type: none"> <li>• Can be more difficult to read than other charts and is viewed as less precise than other types of charts</li> <li>• Not as good comparing many areas</li> </ul>

## Cartogram

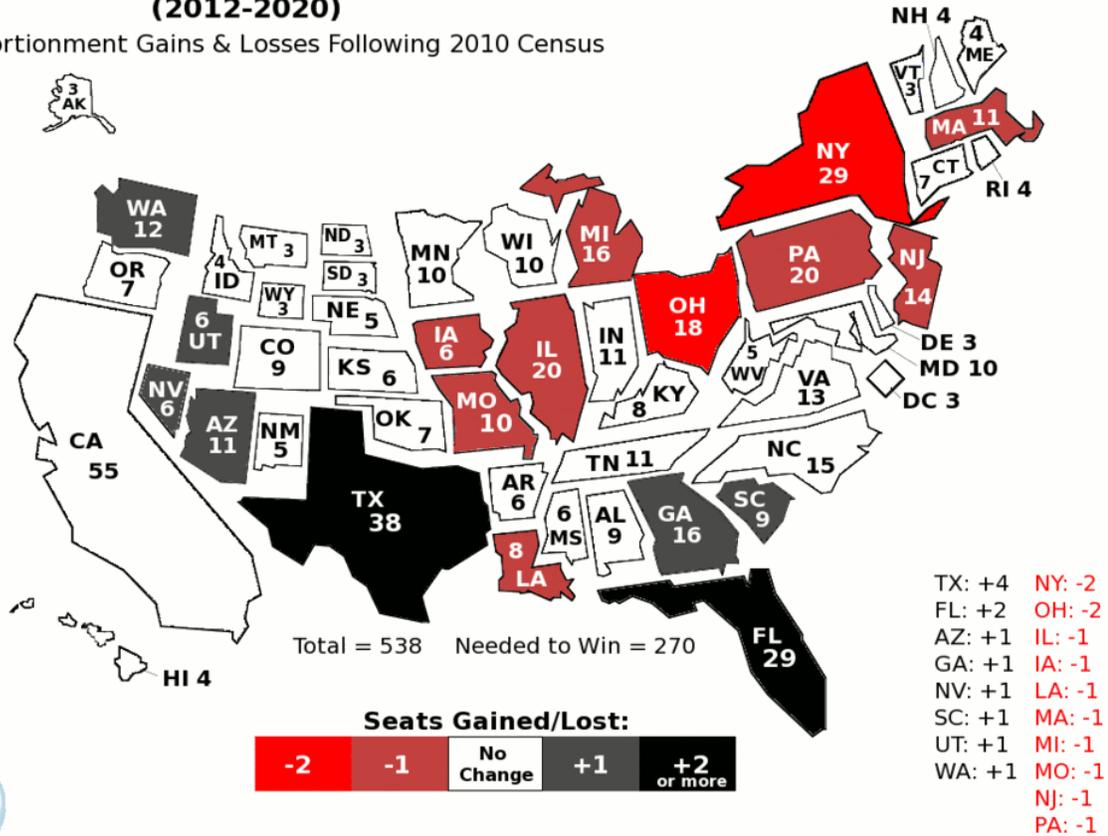
A map on which statistical information is shown in diagrammatic form.

1/2/11

# The Electoral College

(2012-2020)

Reapportionment Gains & Losses Following 2010 Census



Map Template Courtesy of Dr. Paul-Henri Gurian, University of Georgia

Advantages	Disadvantages
<ul style="list-style-type: none"> <li>Can add valuable information or values (such as populations) to geographic maps for better comparisons</li> <li>Helps organizations put resources in the right geographic areas versus the largest</li> </ul>	<ul style="list-style-type: none"> <li>Difficult to construct</li> <li>Comparison is very difficult if there are too many categories</li> </ul>

## Infographics

Infographics are visual images such as used to represent information or data. While charts or graphs are traditional options, there are many other visual images that are used to communicate data.



Advantages	Disadvantages
<ul style="list-style-type: none"> <li>• Easy to understand</li> <li>• Information is easier to retain</li> <li>• Catch the eye of the reader</li> <li>• Easy to share</li> <li>• Higher levels of viral potential</li> </ul>	<ul style="list-style-type: none"> <li>• Time consuming to prepare</li> <li>• Easy to misinterpret</li> <li>• Difficult to read online</li> <li>• Can be costly to produce</li> <li>• Can cause data overload if too much data</li> </ul>

# Tips for Helping Your Charts and Graphs Tell Stories

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1. Help your audiences' eyes follow a visual order
2. Make the data that you want your audience focus on stand out by using color
3. Keep it simple and minimal
4. Make it easy for brains find connections
5. Stay true to cultural conventions (i.e. humans perceive time left to right)

## **Additional Guidelines for Making Good Graphics**

- Decide on the point you wish to present, then chose the appropriate method.
- Emphasize one idea at a time in a figure.
- Use conventional graphing methods (eg; time almost always plotted along the X axis).
- Pay careful attention to the scaling of the graph.
- Always include a title – which should focus on interpretation of the data, not data itself.
- Graphs and tables should be self-contained, and stand on their own without reference to text.
- Clearly label to indicate values.
- Specify the units being used clearly.
- If possible mention the total sample size of the data set for which the graph or chart is made.
- Be sparing and consistent with use of color and fonts.

# Cleaning Up Your Charts (Reduce Clutter)

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Clutter is a killer when displaying data. The more clutter in a chart, the more time a person spends trying to orient and understand the chart. The more time a person spends trying to orient and understand the chart, the less time they spend listening to the speaker. In addition, simplicity and clarity reduce the probability of misinterpretation. Here are some recommendations from Annie Cushing (Senior SEO of SEER Interactive) and Presentation Pro.

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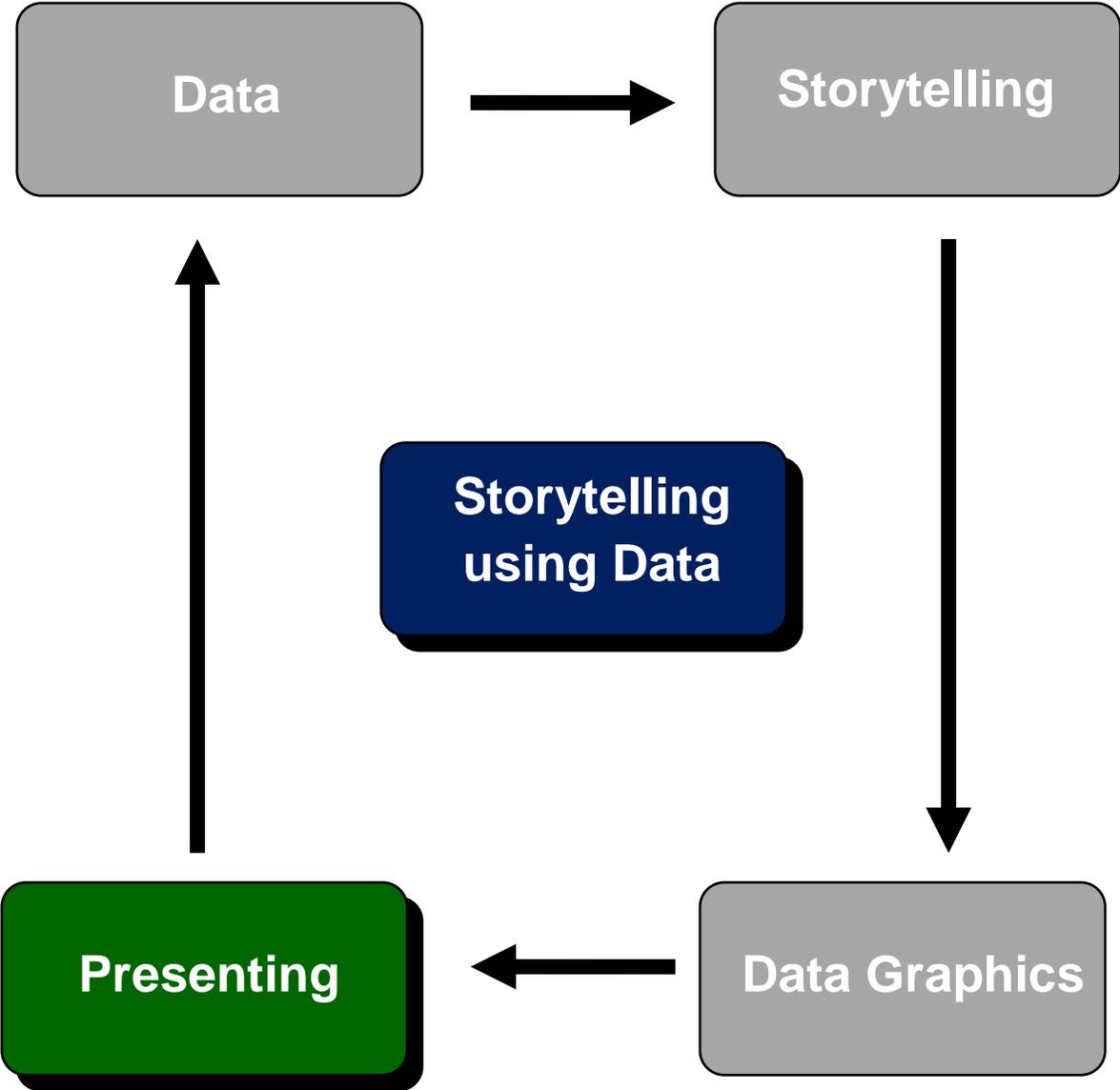
## **Rules for Using Numbers**

Numbers are best used to communicate findings when there is a need to be precise and concise.

- Limit yourself to communicating three or fewer numbers.
- Keep numbers simple by rounding to the nearest whole number
- Use actual numbers versus words
- Use familiar metrics
- When using tables:
  - Give cues and organizational clarity to facilitate movement through a table.
  - Make sure that column and row headings are clear and easy to understand
  - Strategically use white space, shading, and borders to help the eyes know where to go
  - Use boldfacing or color to draw attention to significant findings.

# Presenting

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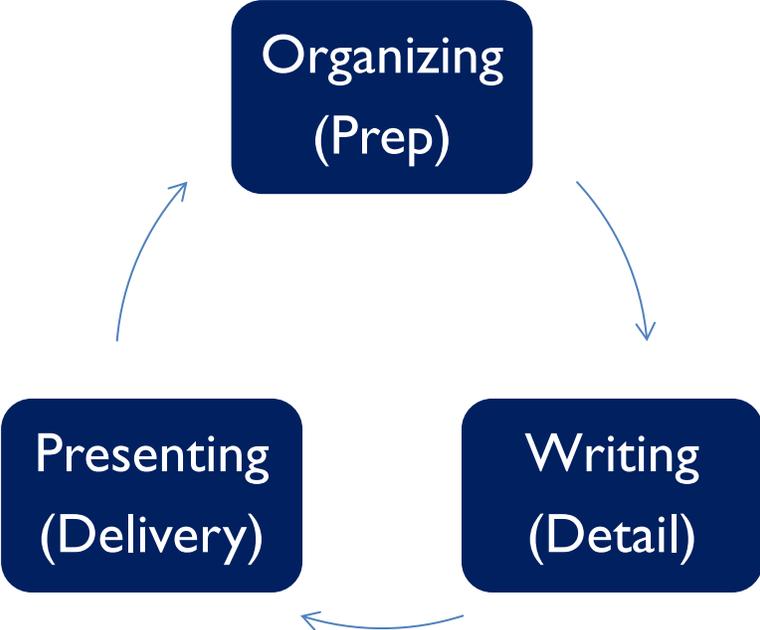


# Presenting

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Presentations are an essential part of our everyday life. Whether we're presenting data in a meeting, providing recommendations to a client, or planning a trip with our family, we're always presenting. The challenge for most of us is to present ourselves and the data in a memorable and persuasive way. If done effectively people listen, remember, buy-in, and take action. As a result, delivering more memorable presentations improves your performance, relationships, confidence, and the quality of your life.

## Presenting Components



# Organizing (Prep)

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Taking the time to organize your presentation is a vital step in ensuring a successful presentation of data. Organizing the presentation requires a number of key steps/considerations.

- 1) **Audience.** The most important factor of any effective presentation is the audience. Therefore, it is imperative to spend time in the beginning to thoroughly analyze your audience and develop a complete profile. Taking the time to consider their needs, wants, and values is extremely important to developing a presentation that will get buy-in.
- 2) **Goals.** Once the profile is established, define your goals including what you want to accomplish and what actions do you want your audience to take.
- 3) **Current Situation.** It's important to take the time to review the current situation including the current environment, current issues the organization might be facing, and other market factors. The current situation provides you and your audience with context and builds relevance to presented data.
- 4) **Key Points.** Begin developing your key points. Remember to limit your number to no more than 4-7 key points.
- 5) **Potential Concerns and Objections.** While it's important to take the time to develop your key points, it's just as important to spend time anticipating audience concerns/objections and your potential responses. Those people who can easily manage concerns/objections significantly increase their chances of buy-in.
- 6) **Development Details including Choosing Your Model and Method.** The next step is to choose the appropriate model and method that matches your presentation goals. Once the model and method are chosen, you can develop the key points and As part of the process, it is important that you set realistic personal deadlines for the completion of this phase.
- 7) **Choose Your Tools (Graphs).** Choosing the right tools (graphs) to communicate your data is extremely important. The right graph can provide your audience with understanding and inspire them to action. The wrong graph can paralyze your audience and throw them into melt-down mode.

The **Organization** section is designed to guide you through options and alternatives that will help you to be more effective in all of your data communications situations.

# PRESENTATION PREPARATION RUBRIC

<b>AUDIENCE</b>	<b>GOALS</b>
<b>CURRENT SITUATION</b>	<b>RECOMMENDATIONS/KEY POINTS</b>
<b>POTENTIAL CONCERNS AND OBJECTIONS</b>	

# Audience Identification

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In order to communicate the correct messages around data, you want to begin by identifying your audience. So you should start asking yourself things such as;

- “What level of expertise do they have?”
- “What are their interests in the topic?”
- “Do they have a background in the subject area?”

**You are likely to be successful if you use what is known about your audience.**

Effective communication starts with having a strong understanding of your audiences. It is important to note that the people with whom you wish to communicate have their own areas of expertise, but those areas of expertise may fall outside of science or public health. The scientific community shares a common culture, so people outside of that culture may not share the same terminology, beliefs, or interests.

# Audience Identification

## Contrasts between Scientists and Lay Audiences

	Scientists	Lay audiences
Sources and definition of acceptable evidence	Narrow	Broad
Belief in rational decision making	Strong	Variable
Acceptance of uncertainty	High	Low
Level of interest in scientific topic	High	Medium to low <sup>a</sup>
Quantitative and science literacy	High	Low
Ability and interest to review extensive amounts of data	High	Low

<sup>a</sup> Note: Except for audience members with high levels of involvement for a specific issue.

Source: *Making Data Talk: Communicating Public Health Data to the Public, Policy Makers, and the Press* by David E. Nelson, Bradford W. Hesse, and Robert T. Croyle (2009), Table 1.2, p. 14. By permission of Oxford University Press, Inc. ([www.oup.com](http://www.oup.com)).

No matter the audience, people generally have certain expectations when reviewing scientific data:

<b>Why</b>	<ul style="list-style-type: none"> <li>They expect to be told why they should believe or do what scientists and other health practitioners recommend.</li> </ul>
<b>How</b>	<ul style="list-style-type: none"> <li>They expect to be given the rationale for how these individuals reach their conclusions. Since people are influenced by pre-existing beliefs and other factors, they may not be convinced to change their thinking without a sound and logical rationale for doing so.</li> </ul>
<b>Action</b>	<ul style="list-style-type: none"> <li>Finally, audiences expect to know what to do with the information they receive. In other words, they want to know what action they or others should take.</li> </ul>

## Tips for Presenting Audience –Friendly Data

Tip	Example/Explanation
• Avoid terms not frequently used outside of the scientific community.	Cohort, longitudinal
• Avoid terms with multiple meanings.	Surveillance
• Avoid science and math concepts that can be misunderstood. If these term(s) or concepts must be used, be sure to explain them in an easy-to-understand way.	Proportions, relative risk
• Focus on the main message instead of detailed scientific arguments or outcomes.	When making decisions, many people use heuristics (shortcuts) rather than the rational decision-making model used by most scientists.
• Explain how the data may impact audiences.	Demonstrating impact can help audiences understand why the data are relevant to them.
• Present data in a distinctive way that helps you gain the attention of your audiences.	For a majority of people in the United States, health issues are of moderate-to-low interest. Presenting relevant and interesting information can reduce the likelihood that people will fill it out due to lack of interest.

## **Be Aware of Audience Tendencies**

People are not always well-prepared to receive and process messages containing quantitative data. Quantitative literacy (i.e., the skills required to apply mathematical operations) varies from person to person, and even the most educated audiences may have only a basic or intermediate level of familiarity with mathematical concepts. Common mistakes people make when interpreting numbers include:

- Misunderstanding probability estimates (people may believe that a risk of 1 in 200 is greater than a risk of 1 in 25).
- Misunderstanding percentages.
- Improperly converting proportions to percentages.

### **Cognitive processing limits**

Individuals have a limited capacity to process large amounts of information at one time and simplify or “chunk” the information to which they are exposed. The 7-digit telephone numbering system was based on research suggesting that people can optimally retain only 7 ( $\pm 2$ ) discrete pieces of information at a time.

### **Satisficing**

People tend to limit the amount of mental energy they spend obtaining information until they believe they have “enough” for their purposes. Studies show that visitors will usually leave a Web site within 15 minutes or less if they do not find the information they need.

### **Expectations of experts and the challenge of uncertainty**

Most lay audiences want experts with experience and credentials to provide definitive, prescriptive information.

To use a non-health example, people look to mechanics to definitively diagnose automobile problems — instead of estimating that there is a 30 percent chance that the alternator is the problem — as well as to recommend specific solutions.

### **Framing**

“Framing” is presenting data in a way that is consistent with common public frames or models.

- Emphasizing the possibility of a shorter life because of a poor diet is a loss frame.
- Associating rewards of exercising, such as looking fit and feeling good, is an example of a gain frame.

## **Scanning**

People often do a quick scan of written or visual material to decide if it interests them, draw conclusions about what the major points might be, and try to identify the bottom line.

When an Internet search for specific information returns hundreds or thousands of potential Web sites, people scan the first few results before deciding which link to follow.

### **Use of contextual cues**

People tend to look for cues to help them better process and understand information, especially in cases where the data presented is complex, detailed, or in an unfamiliar format.

Regular reports on education data can be of more use to audiences by highlighting what has changed since the last report.

### **Resistance to persuasion**

People have a natural resistance to persuasion and often engage in a practice of defensive processing, an approach that blunts messages that are inconsistent with current behavior.

People may blunt messages emphasizing that working more hours will help you make more money and be more successful, since those messages might be inconsistent with the person's own attitude towards work, life balance, and vision of success.

### **Role of emotion**

Emotions have the potential to be a motivating influence on behavior by heightening arousal, orienting attention, and prompting self-reflection.

Communicating that 440,000 Americans will die from smoking in a given year may cause a variety of emotional reactions based on the reader's own relationship or attitude towards smoking.

## **Be aware of audience biases**

There are also biases people have when interpreting data, particularly if they are not well-trained in statistical methods. For instance, people can process incoming information by using heuristic shortcuts, or highly ingrained, subconscious patterns that run automatically. These shortcuts can lead to systematic error and illogical reasoning.

### **Audience Biases that Influence Quantitative Data Processing**

<b>Shortcut</b>	<b>Explanation/Example</b>
<b>Representativeness heuristic</b>	<ul style="list-style-type: none"><li>• People can sometimes use their implicit knowledge and stereotypes about an object's category to make judgments about the object itself.<ul style="list-style-type: none"><li>— Many people perceive Harley-Davidson motorcycle riders who wear leather and have facial hair to be violent criminals and drug users. As a result, it is difficult to communicate that no matter what a person drives or how a person looks, that they may be peaceful, intelligent, successful, life loving people.</li></ul></li></ul>
<b>Anchoring and adjustment bias</b>	<ul style="list-style-type: none"><li>• People tend to be “anchored” by the first number they see or have in mind; any adjustments they make are strongly influenced by that initial value or anchor.<ul style="list-style-type: none"><li>— Physicians and patients who initially underestimate the chances of side effects only adjust their guess slightly (compared to the original number) once they are told they are incorrect.</li></ul></li></ul>
<b>Correlation equals causation</b>	<ul style="list-style-type: none"><li>• People have a strong tendency to believe that if two types of data are correlated, then one causes the other.<sup>17</sup><ul style="list-style-type: none"><li>— Demographic information may show that as the number of churches in a given geographic area increases so does crime. Although such a correlation could suggest that churches cause crime, demographic information shows that population density—a third variable—accounts for both the increase in churches and in crime.</li></ul></li></ul>
<b>Failure to consider randomness</b>	<ul style="list-style-type: none"><li>• People tend not to consider chance or randomness as explanations for sequences, events, or occurrences.<ul style="list-style-type: none"><li>— When clusters of birth defects occur, public speculation may try to attribute these clusters to a single cause (i.e., an environmental factor) when the occurrence may truly happen by chance.</li></ul></li></ul>

## Use strategies to overcome tendencies and biases

Health communicators can use a variety of factors about their audiences. Below are several tips that take these factors into consideration and can improve communication about public health data across a wide spectrum of groups:

**Determine whether data should be presented.** Are there sufficient data to support a science-based storyline? If so, are they appropriate for presentation to intended audiences?

**Be brief and concise.** Present the “bottom line” and use only a few data points to support it.

**Be complete and transparent in portraying statistics.** Word choice, as well as the selection or omission of data, can be highly influential in how audiences receive and interpret data. Avoid implication of a causal link between variables that are only associated through correlation.

**Identify and counter mistaken health-related lay audience beliefs.** Use messages that acknowledge the misconception, diplomatically state why it is inaccurate, and present an alternate explanation.

**Use familiar types of data and explain key scientific or mathematical concepts.** Choose formats that will likely be familiar (e.g., frequencies and round numbers) and supplement data that has the potential to be misunderstood (e.g., concepts of risk) with explanations or additional materials as needed.

**Address uncertainty directly.** Be honest about the tentative nature of the science, emphasize why scientists cannot make a definitive explanation, and work to answer questions about what uncertainty means for people.

**Ensure usability.** Select user-friendly formats (e.g., boxes that highlight key points, upfront summaries of information) so that audiences can process information more accurately and efficiently.

**Provide contextual information.** Present individual findings within their larger context, using tools such as comparison data and short text phrases that state the key findings as appropriate.

# Storytelling Model: SHARES

**Setting**

**Hindrance (Obstacles creating the problem)**

**Action**

**Result**

**Experience**

**Suggested Actions**

# Storytelling Model: PARLAS

**Problem**

**Action**

**Results**

**Learned**

**Application (How it Applies Today)**

**Suggested Actions**

# Storytelling Model: CHARQES

## Context

## Challenge

## Actions Taken

## Results in Quantifiable Numbers

## Evaluation of the Experience

## Suggested Actions

# Storytelling Model: CCARLES

## Context

## Challenge

## Actions Taken

## Results

## Lessons Learned

## Suggested Actions

# Presenting Keys

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1)

2)

3)

4)

5)

6)

7)

***“Storytelling is the most powerful way to put ideas into the world today.”***

- Robert McAfee Brown

***“Numbers have an important story to tell. They rely on you to give them a clear and convincing voice.”***

- Stephen Few

***“We are all storytellers. We all live in a network of stories. There isn’t a stronger connection between people than storytelling.”***

- Jimmy Neil Smith

***“Storytelling is an ancient and honorable act. An essential role to play in the community or tribe. It's one that I embrace wholeheartedly and have been fortunate enough to be rewarded for.”***

- Russell Banks

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