

Creating Visualization Plots



Chase DeHan, PhD

LEAD DATA SCIENTIST - TESORIO

github.com/chasedehan

“The greatest value of a picture is when it forces us to notice what we never expected to see.”

John Tukey

Summary



Building basic plots

- - 1 dimensional plots (x)
- - 2 dimensional plots (x, y)

Adding layers and other elements

Combining with the tidyverse

End Result

- Able to start using ggplot for plotting!

**Syntax is quite different
from base R**

A bit of learning curve

**BUT, it becomes easy to
generate amazing plots**

Notes before starting

Creating Basic 1d Plots

Three Main Elements of ggplot

ggplot()

Function called to initiate the plots

aes()

Aesthetic layer used to tell ggplot how to represent the data

layers

Can add multiple layers to make a plot look the way desired

```
ggplot(dataframe, ... )
```

```
... .
```

ggplot function

Initiate the plots by passing the dataframe as the first argument

(Or, use the pipe → %>%)

```
ggplot(dataframe, aes(x = x_var) )
```

...

aes function

The second argument is the “aesthetic”

- Defines the mappings to columns in the dataframe
- There are others we will go into later

```
ggplot(dataframe, aes(x = x_var) )  
+ geom_histogram()
```

‘+’ layers

The **ggplot** function creates the relationships

- The layers dictate what actually gets rendered
- Must have at least one layer in order to display

One Variable Layers

`geom_area()`

`geom_density()`

`geom_dotplot()`

`geom_freqpoly()`

`geom_histogram()`

`geom_bar()`

Creating Basic 2d Plots

```
ggplot(dataframe, aes(x = x_var) )  
+ geom_histogram()
```

For a single variable

We just saw a single variable, but most plots use multiple variables

```
ggplot(dataframe, aes(x = x_var, y = y_var) )
```

...

Add a second ‘y’ argument to aes()

Previously, only used ‘x’

All we have to do is add the second dimension as ‘y’

```
ggplot(dataframe, aes(x = x_var, y = y_var) )  
+ geom_point()
```

Add a 2d geom layer

Choose the layer that achieves the objective

Many different options

Two Variable Layers

* There are many others, these are the most common

`geom_point()`

`geom_smooth()`

`geom_boxplot()`

`geom_errorbar()`

`geom_step()`

`geom_bar()`

Add Layers and Elements

Types of Layers

geom - type of plot

scatter, histogram, bar,
line, density, etc

stat - transform

summary, binning,
smoothing, qq-plot, etc

customization

theme, titles, gridlines,
axes ranges, etc

```
ggplot(dataframe, aes(x = x_var, y = y_var) )  
  + geom_point()  
  + geom_line()
```

‘+’ another layer

We can add any number of layers to achieve end result. They include:

- Type of plot
- Statistical transformations
- Themes and many other customizations

Visualize Summarized Data

```
dataframe %>%  
  ggplot(aes(x = x_var, y = y_var) )  
    + geom_point()
```

Using dplyr, we can add other elements

Just like we showed in previous modules, we can:

- Use the pipe (%>%)
- AND, add data manipulations before ggplot

```
dataframe %>%  
  group_by(group_column) %>%  
  summarise(mean_x_var = mean(x_var)) %>%  
  ggplot(aes(x = mean_x_var, y = group_column) )  
  + geom_point()
```

Can group by, summarise, and plot the results

group_by() %>% summarise() → creates a dataframe

Then, piped into ggplot

Summary



Building basic plots

- 1 dimensional plots (x)
- 2 dimensional plots (x, y)

Adding layers and other elements

Putting it all together

Now have a great foundation

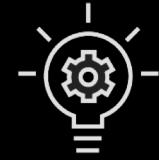
- And, combined with the rest of the tidyverse, can make magic happen!

—

—

—

—



Design Guidelines





General Guidelines

Tips

It is recommended not to use transitions between slides.

Keep your presentation moving to hold the viewer's interest. Have a visual change several times each minute.

Do not put any visuals in the lower right corner - it will be obscured by the watermark.

Use animations and visuals that are simple, straightforward, and have a clear purpose.

Aim for a flat style (avoid gradients and drop shadows).

Use only high resolution visuals that are not blurry or pixelated.

Follow copyright rules for all visuals.

Less Is More

We understand that course content can include highly technical information which requires a lot of important details.

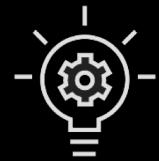
Minimizing your slide design doesn't necessarily mean you'll be providing less content in your course. The same amount of information can be displayed but should be split up between multiple slides.

Also, be sure to use sentence fragments instead of complete sentences on your slides.



This slide is **NOT** an example of a good course slide!





Typography

The official typeface for Pluralsight course content is **Gotham**. For code slides, **Roboto Mono** is included.

You received copies packaged with this presentation.
Please take a moment to install them.

If both words below look the same, then you've successfully installed Gotham. Hooray!

Gotham **Gotham**

Type size and weight standards

Slide Title

36 pt - Gotham Light

All slide titles must be in Titlecase. For help, visit:
<https://authors.pluralsight.com/titlecase-converter/>

Headings and Bullet Points

24 pt minimum - Gotham Medium

Body Copy

20 pt minimum - Gotham Medium





Color

Color is a powerful tool to help highlight talking points or objects.

Primary Colors

Orange #F15B2A	R 240 G 90 B 40	Uses: -Highlight text -Graphics
-------------------	-----------------------	---------------------------------------

Blue #2A9FBC	R 42 G 159 B 188	Uses: -Highlight text -Graphics
-----------------	------------------------	---------------------------------------

Dark Gray #404040	R 64 G 64 B 64	Uses: -Text on light background -Graphics
----------------------	----------------------	---

White #FFFFFF	R 255 G 255 B 255	Uses: -Text on dark background -Graphics
------------------	-------------------------	--

Secondary Colors

Plum #A62E5C	R 166 G 46 B 92	Uses: -Graphics
-----------------	-----------------------	--------------------

Green #9BC850	R 155 G 200 B 80	Uses: -Graphics
------------------	------------------------	--------------------

Purple #675BA7	R 103 G 91 B 167	Uses: -Graphics
-------------------	------------------------	--------------------





Pluralsight Icon Library

A Constant Look and Feel

Please use the Pluralsight icon library as your default source for visuals in your courses. Any supplemental graphics you choose must follow all standard legal and copyright rules.

Two Ways to Access Icons

1. A fully searchable library on the Author Kit:
authors.pluralsight.com/icon-library-search. New icons are added every few weeks. Just search, choose your color, then copy/paste the graphic into your slide.
2. A quarterly-updated .zip package available from the downloads page of the website. The .zip includes the most recent version of the slide deck template, the fonts, and all the available icons. This is great for working offline.

The Icon Library Is Always Growing

Authors are our best source for new icon ideas. Submit yours from the link at the top of the icon search page of the Author Kit.

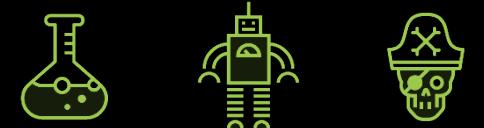
Abstract Ideas



Tech Objects



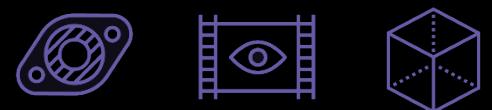
Non Tech Objects



People



Roles



Files





Changing the **Background Color**

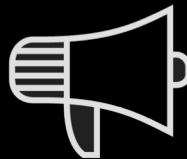
Changing the background color of a slide or shape can be a great way to add emphasis to something important.

However, it can also create clashes in colors between graphics and the background. Here are a few simple guidelines to help.

To change the slide background color, simply right-click. From the menu, select “Format Background.”

1. Use white/black graphics and type.

White graphics and type always look good on a dark color. If the background color is light enough, black graphics and text work as well. If you need to use a lot of color, then a colored slide might not be the best option.



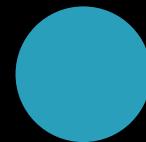
Big Announcement

2. Use colors in the color palette for the background color.

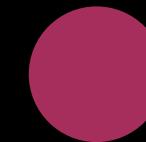
They're easily accessed in the “Format Background” menu.



#F15B2A



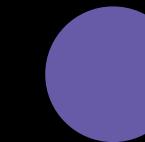
#2A9FBC



#A62E5C



#9BC850



#675BA7



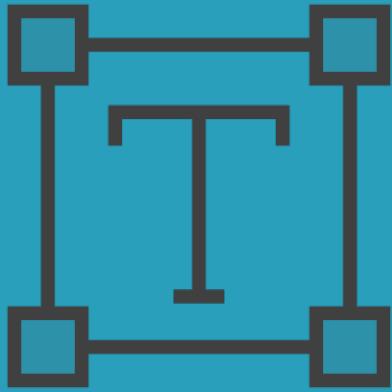
#404040



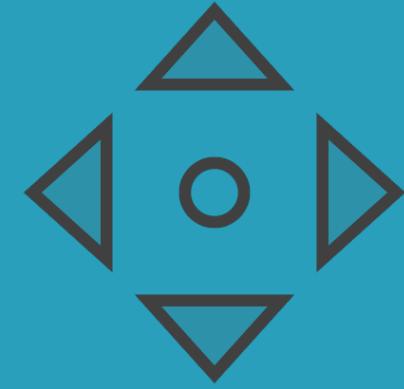
Example of Changing the Background Color



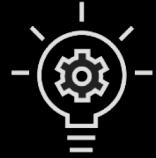
Make sure you choose a white or black icon, not another color



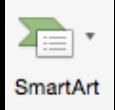
Change your font color to either black or white



Adjust the size and position of your graphics and text to fit your space



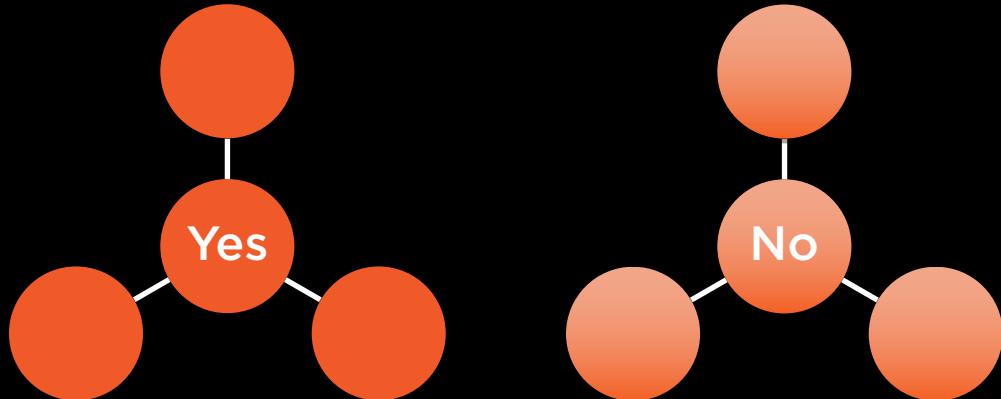
Using SmartArt



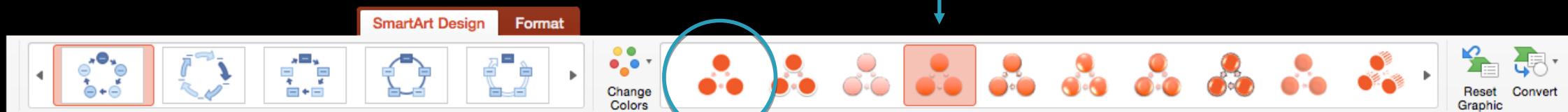
Available under the “Insert” menu, SmartArt provides a large variety of diagram options.

Please use a simple/flat design for your SmartArt. Reference the “yes” diagram to the right to see a good example of this. Compare the examples and be mindful of the following things:

- Do not use gradients
- Do not use 3-D effects
- Do not use drop shadows or inner shadows



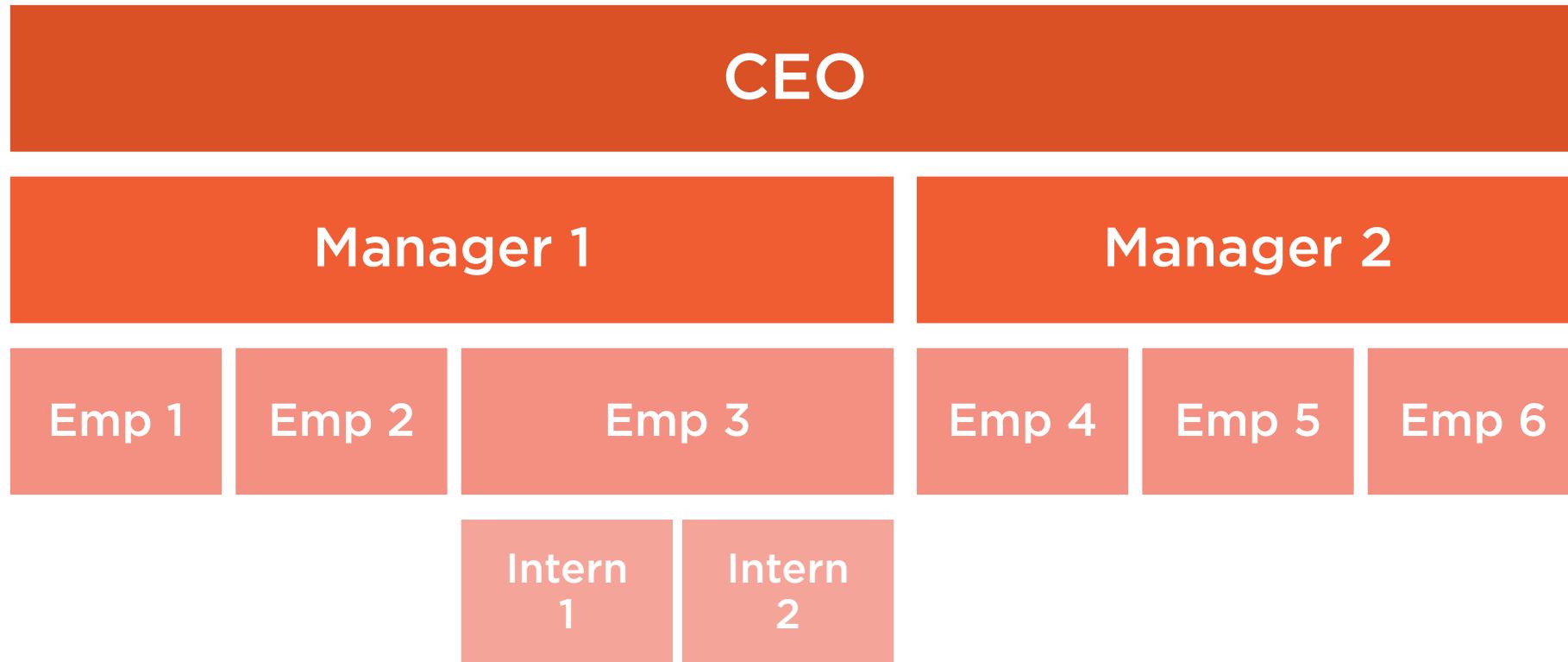
On some versions of PowerPoint,
this gradient-filled style is selected by default.



Choose this far left option.
It provides simple solid shapes.



SmartArt Example





Using the Layouts





How to Add a New Slide

Option 1

Look through all the example slides in this document and rework them to fit your own purposes.

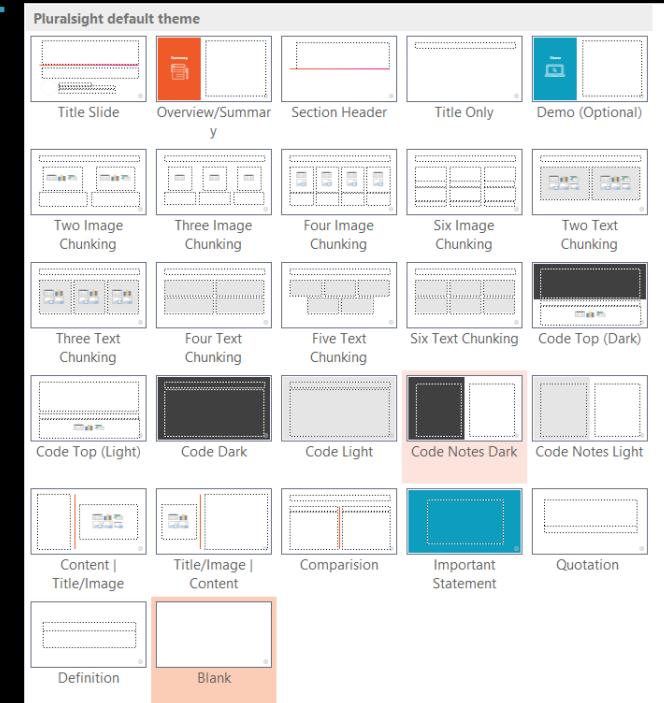
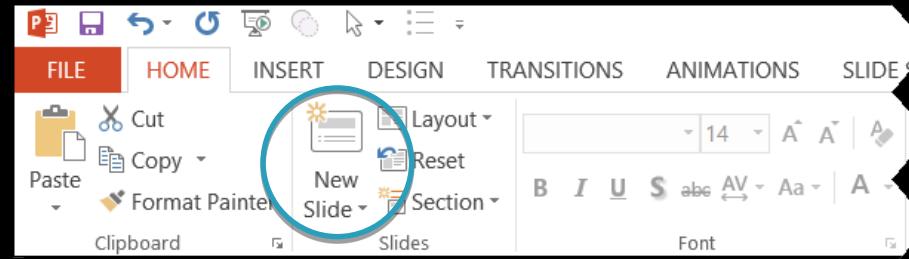
Option 2

1. From the “Home” tab, click on the arrow next to “New Slide.”
2. A dropdown menu of all the layouts will appear.

Alternatively:

Ctrl+M = New Slide

Ctrl+D = Duplicate Slide





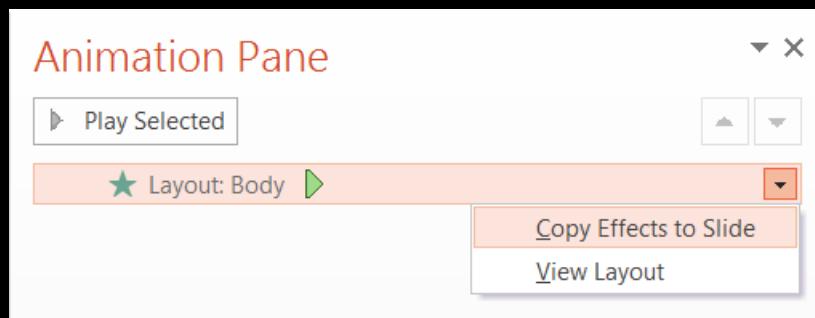
Some Slides Have **Animations Built In**

Switch to **Slide Show View** to preview the animations.

If you want to edit or remove the “built-in” animation:

PowerPoint for PC

From the Animation Pane, **right-click** on “Layout Body” and choose “Copy Effects to Slide”. You should now be able to make changes.



PowerPoint for Mac

While the Mac version of PowerPoint does not have the same option in the Animation Pane, you can do the same thing manually:

1. Create a blank slide
2. Go to the Master Slide you want to change
3. Select all using (CMD+A)
4. Go back to your new blank slide and paste (CMD+V)
5. Now the animation is editable from the animation pane





How to Choose Your **Author Headshot**

Requested Image Specifications

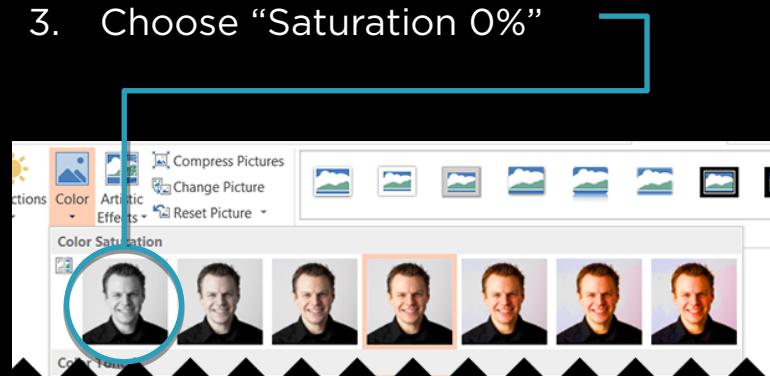
Image Size: 600 x 600 pixels or larger

Color Mode: RGB or Greyscale

File Type: JPEG or PNG

Desaturate your headshot

1. With the image selected click the “Picture Format” tab.
2. Click the “Color” tab
3. Choose “Saturation 0%”



Do's

- White background or wall
- Professional clothing
- Centered on face
- Shot at eye level



Don'ts

- Busy or dark backgrounds
- Poor lighting
- Artistic, iconic, or illustrated
- Poor resolution or focus
- No other beings in photo





Using the **Title Slide**

Module number **ONE**



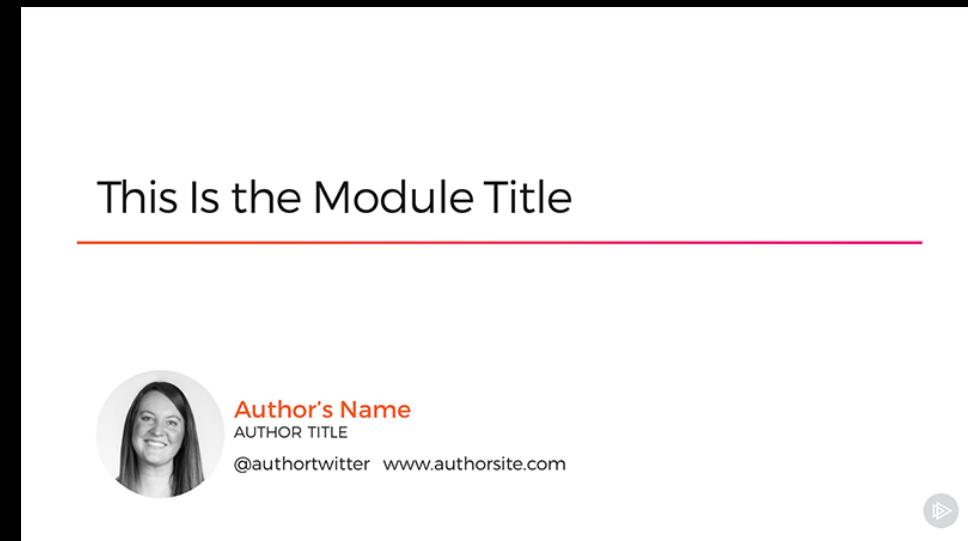
This Is the Title of Your Course

THIS IS THE FIRST MODULE TITLE

 Author's Name
AUTHOR TITLE
@authortwitter www.authorsite.com



Module number **TWO** and up



This Is the Module Title

 Author's Name
AUTHOR TITLE
@authortwitter www.authorsite.com





Visualizing Data in ggplot2

GETTING STARTED WITH GGPLOT2



Chase DeHan

LEAD DATA SCIENTIST - TESORIO

github.com/chasedehan

Understanding ggplot's Systems



Chase DeHan

LEAD DATA SCIENTIST - TESORIO

github.com/chasedehan



Using **Summary** and **Demo** Layouts

Slide Title

Click to add text

- Second level
- Third level
- Fourth level
- Fifth level

Overview/Summary Layout

Only use the Overview/Summary Layout at the beginning and/or ending of your module.

Keep the title of this slide to **two lines or less**.

Demo

Click to add text

- Second level
- Third level
- Fourth level
- Fifth level

Demo (Optional) Layout

Only use the **Demo Layout** when introducing a demonstration.



Summary



This bullet list is preset with animations

Use this layout to introduce and/or summarize the module

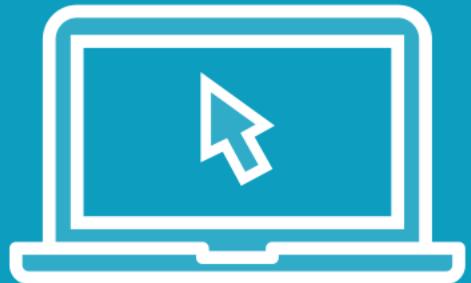
Don't just read a list of topics

Build excitement

Tell the viewer why this is important

- Where would they use this info on the job?

Demo



This bullet list is preset with animations

Use this layout to introduce your demo

How to do this one thing

- Why we do it
- How we do it

Then there's that thing

Don't forget to do this

We'll finish it off with this thing



Using the **Image Chunking Slides**

This screenshot shows a slide layout with a title bar at the top. Below the title bar are two rectangular boxes, each containing a small icon labeled 'Click to add image'. Underneath each icon is a text input field labeled 'Click to add text'.

Two Image Chunking

This screenshot shows a slide layout with a title bar at the top. Below the title bar are three rectangular boxes, each containing a small icon labeled 'Click to add image'. Underneath each icon is a text input field labeled 'Click to add text'.

Three Image Chunking

This screenshot shows a slide layout with a title bar at the top. Below the title bar are four rectangular boxes, each containing a small icon labeled 'Click to add image'. Underneath each icon is a text input field labeled 'Click to add text'.

Four Image Chunking

This screenshot shows a slide layout with a title bar at the top. Below the title bar are six rectangular boxes, each containing a small icon labeled 'Click to add image'. The boxes are arranged in two rows of three. Underneath each icon is a text input field labeled 'Click to add text'.

Six Image Chunking

These layouts can be used as an alternative to a bulleted list.

They're built specifically for **photos** or **graphics** and look especially awesome when you incorporate icons from the **Pluralsight Icon Library**.

See them in action in the next 4 slides.



Example of Image Chunking Two Items



Jill Anderson

Some information about this graphic goes here and four lines or fewer is best



John Doe

Some information about this graphic goes here and four lines or fewer is best

Example of Image Chunking Three Items



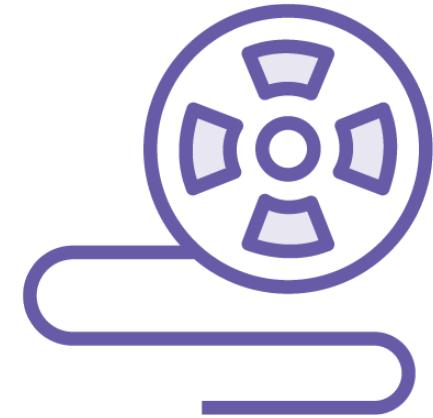
Clipboard

Some information
goes here; three lines
or fewer is best



Book

Some information
goes here; three lines
or fewer is best



Film

Some information
goes here; three lines
or fewer is best

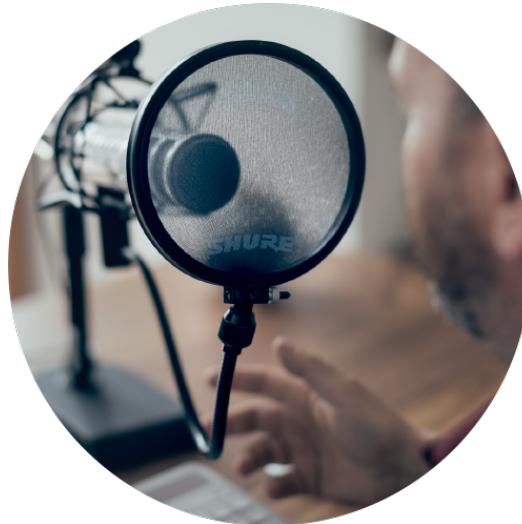
Example of Image Chunking Four Items



Write



Create



Record

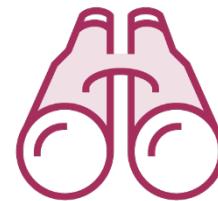


Learn

Example of Image Chunking Six Items



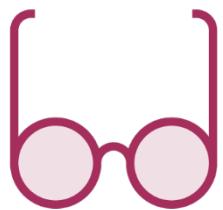
Address book



Binoculars



Camera



Eyeglasses

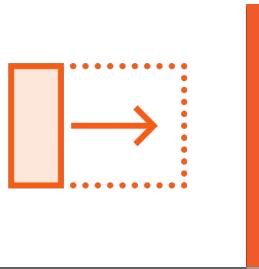


Megaphone

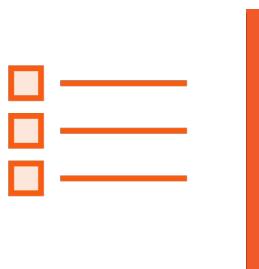


World

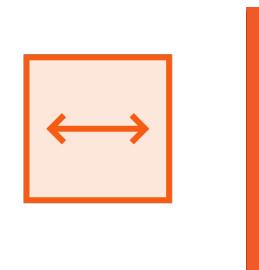
Icons with Bullets



An image chunking option for when you have longer text



Be concise and keep the text to 3 lines or shorter



Add relative icons on the left for each text item on the right

Icons with Bullets



An image chunking option for when you have longer text



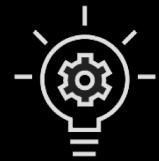
Two whole lines of text per image also fits nicely however, you should avoid using three lines



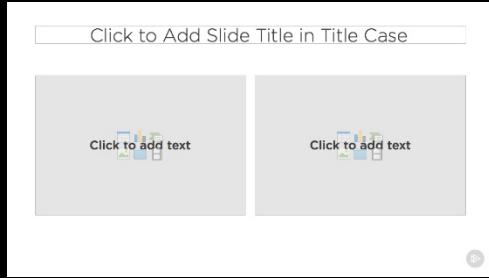
Add relative icons on the left for each text item on the right



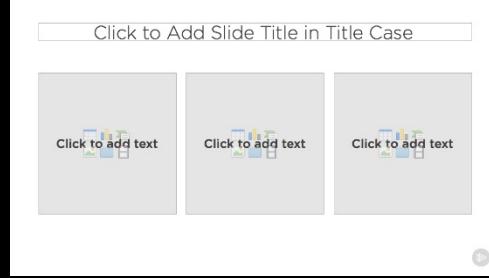
An alternative to bullets



Using the **Text Chunking Slides**



Two Text Chunking



Three Text Chunking

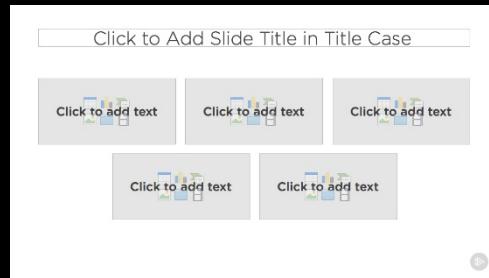
These layouts are intended to group chunks of text. Among other uses, they can be a great alternative to a bullet list.

Use **animations** to bring focus to the point you're speaking on one at a time, and/or use **color** to group points together.

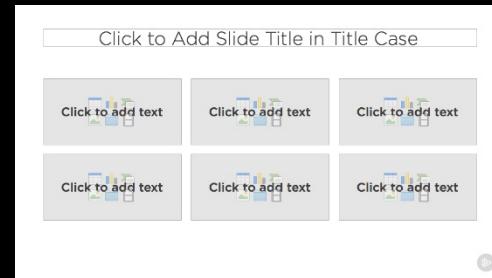
If you have more than six points to discuss, you may want to use a standard bullet list.



Four Text Chunking



Five Text Chunking



Six Text Chunking

We have provided some **example uses** of these layouts in the next few slides.



Text Chunking Two Items

Talking point one

Be concise and keep the text
to four lines or fewer

Talking point two

Be concise and keep the text
to four lines or fewer

Text Chunking Three Items

Talking point one

Be concise and keep
the text to four lines
or fewer

Talking point two

Be concise and keep
the text to four lines
or fewer

Talking point three

Be concise and keep
the text to four lines
or fewer

Text Chunking Four Items

This is the first talking point
that should be kept to three
lines or fewer

This is the second talking
point that should be kept to
three lines or fewer

This is the third talking point
that should be kept to three
lines or fewer

This is the fourth talking point
that should be kept to three
lines or fewer

Text Chunking Five Items

Talking point one

Keep the text to
three lines or fewer

Talking point two

Keep the text to
three lines or fewer

Talking point three

Keep the text to
three lines or fewer

Talking point four

Keep the text to
three lines or fewer

Talking point five

Keep the text to
three lines or fewer

Today's Mobile World

iPhone

Nexus 5

Lumia 950 XL

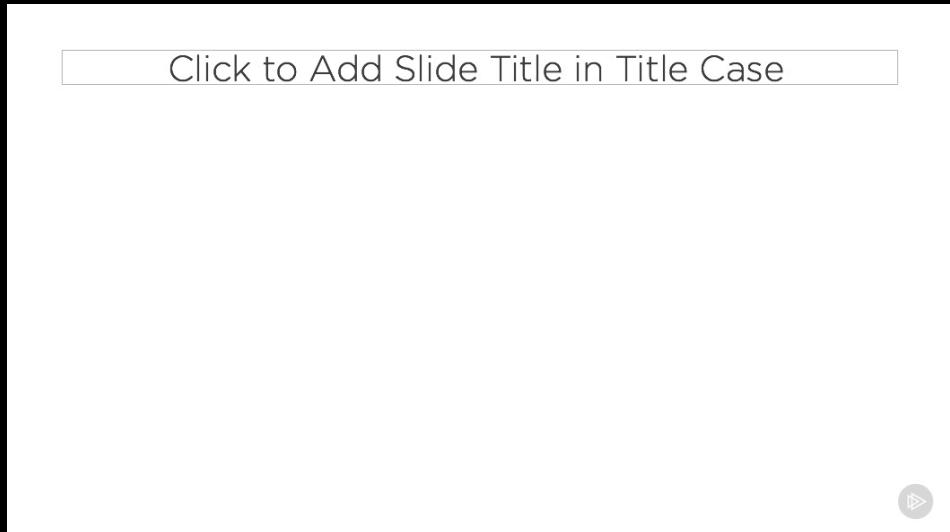
iPad

Nexus 7

Surface



Using the **Title Only Slide**



Title Only

This is the slide you'll want to use when you just need a big space for a diagram, chart, or graphic.

Make sure you check out the training videos available on the **Author Kit** for design best practices.

If you need help bringing your ideas for this space to life, contact your Editor about getting help from one of our **Content Graphic Designers**. In most cases, you just need to submit a rough outline and let our designers work their magic. However, in some special cases, your Editor can get you in touch with a designer directly.

We included some possible starting points for you in the next few slides.



Remember, we are here to help!



Customer Acquisition and Loyalty

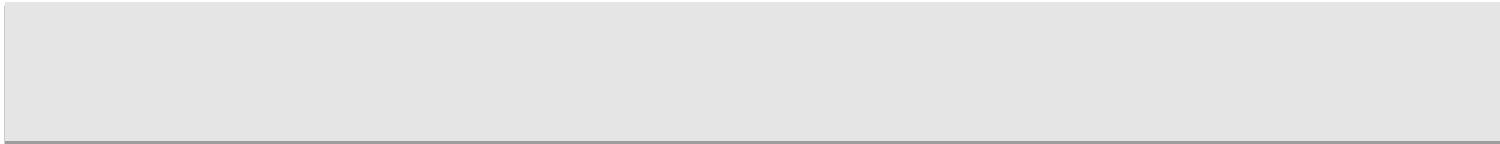
Observed higher sales



42%

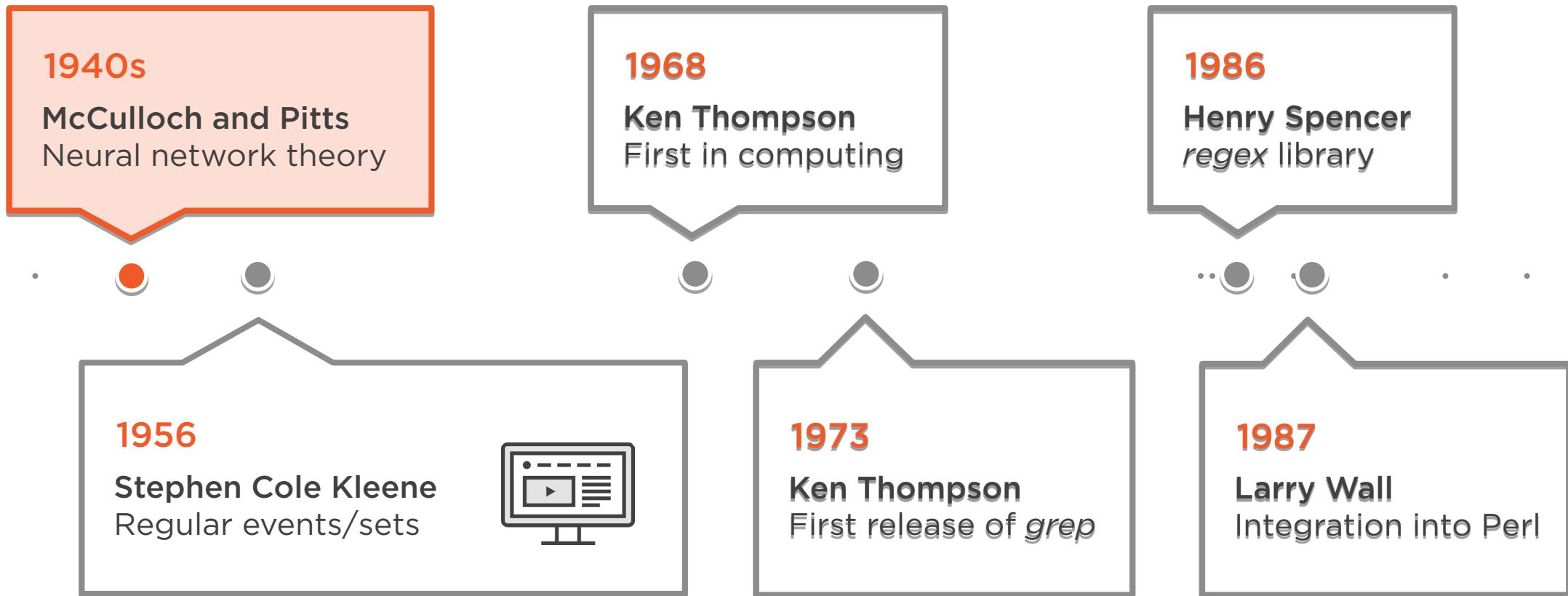
..

Observed more loyal customers

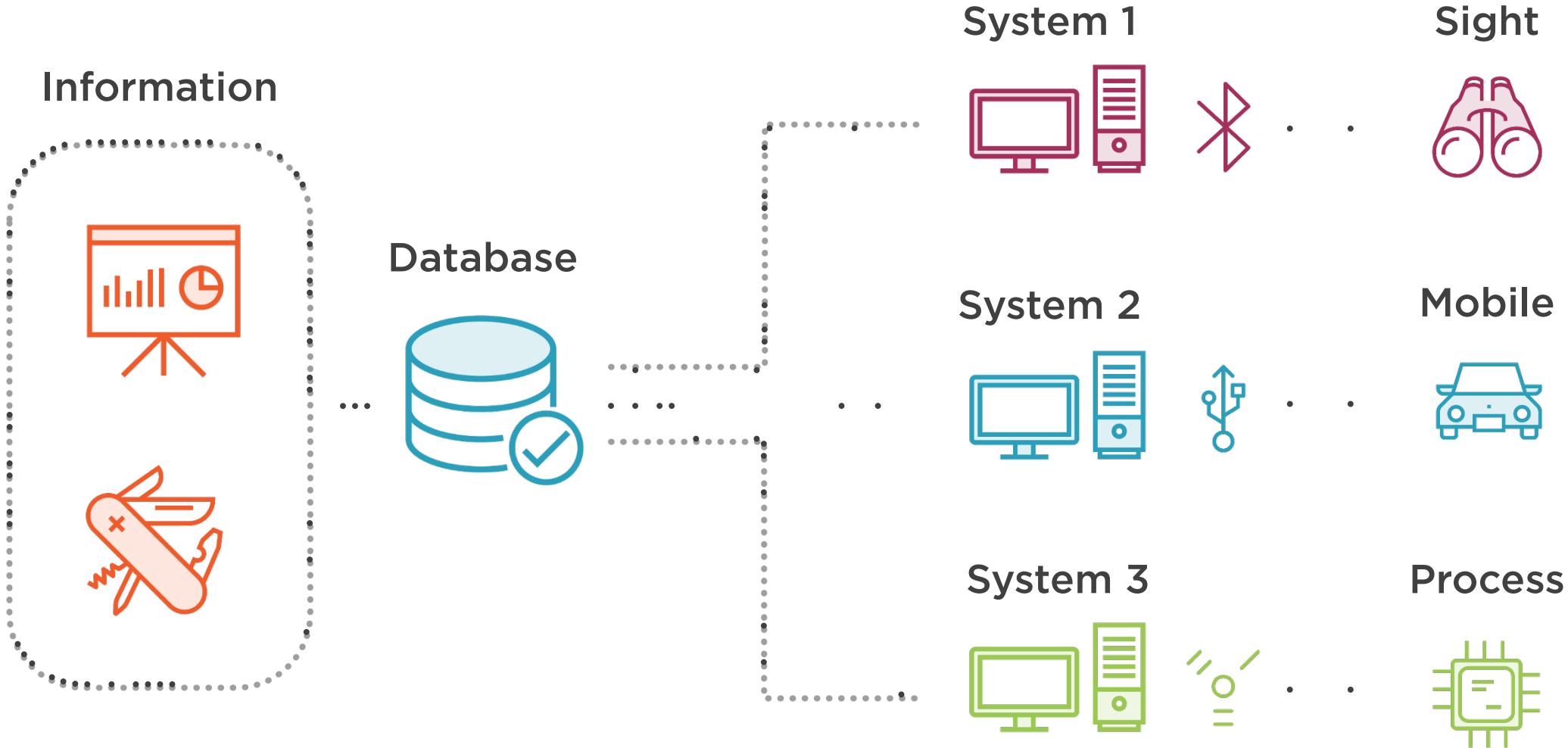


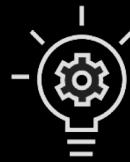
70%

Timeline of Events



Title Only Layout Example





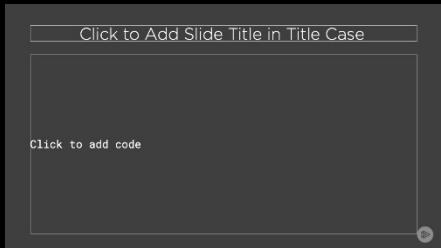
Using the **Code Slides**



Code Top (Dark)



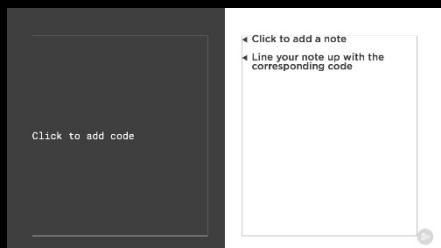
Code Top (Light)



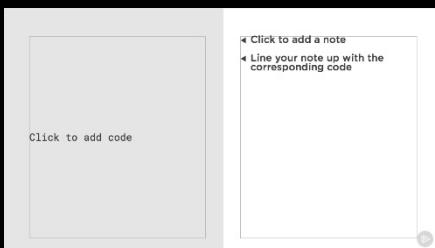
Code (Dark)



Code (Light)



Code Notes (Dark)



Code Notes (Light)

Code Top Layouts

Use when you need a slide title and info about your code



Make use of the color palette to highlight code.

We recommend using the **Roboto Mono** typeface for your code slides. However, if you use a different font for code in your demos, feel free to use that instead to reinforce a consistent look.

Code Layouts

Best for larger code snippets

Code Left Layouts

Great for annotating code structure



```
<div class="row carousel-indicators">  
    <div style="background-color:red;" class="col-md-4" data-target="#homeCarousel" data-slide-to="0" class="active">  
<div class="row carousel-indicators">
```

Slide Title in Titlecase

Information about the code above

```
<div class="row carousel-indicators">  
    <div style="background-color:red;" class="col-md-4" data-target="#homeCarousel" data-slide-to="0" class="active">  
<div class="row carousel-indicators">
```

Slide Title in Titlecase

Information about the code above

Code Snippet on Dark

```
<div class="row carousel-indicators">  
    <div style="background-color:red;" class="col-md-4" data-target="#homeCarousel" data-slide-to="0" class="active">  
        </div>  
        <div style="background-color:green;" class="col-md-4" data-target="#homeCarousel" data-slide-to="1">  
        </div>
```

Code Snippet on Light

```
<div class="row carousel-indicators">  
    <div style="background-color:red;" class="col-md-4" data-target="#homeCarousel" data-slide-to="0" class="active">  
        </div>  
    <div style="background-color:green;" class="col-md-4" data-target="#homeCarousel" data-slide-to="1">  
        </div>
```

Put code on this side

```
var proto = {  
  foo: 'Hello World'  
};
```

```
function Bar(){}  
Bar.prototype = proto;
```

```
var baz = new Bar();
```

```
console.log(baz.foo);
```

◀ Line up with these notes

◀ Set up prototype object

◀ Constructor function
and set prototype property

◀ Create instance

◀ Call inherited member

Put code on this side

```
var proto = {  
  foo:'Hello World'  
};
```

```
function Bar(){}  
Bar.prototype = proto;
```

```
var baz = new Bar();
```

```
console.log(baz.foo);
```

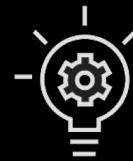
◀ Line up with these notes

◀ Set up prototype object

◀ Constructor function
and set prototype property

◀ Create instance

◀ Call inherited member



Using Bullet List Slides

We've provided some bullet list layouts to accommodate various quantities of information.

Content left | Title/Image right

Intended for bullet text that is shorter and titles/images that are larger

This diagram shows a slide layout with two main sections. On the left, there is a large white box containing placeholder text: "Click to add short text", followed by a bulleted list: "Second level", "Third level", "Fourth level", and "Fifth level". To the right of this box is a vertical red line. To the right of the red line is another white box with the placeholder text: "Click to Add Title or Click Icon to Add Graphic". At the bottom right corner of the slide is a small circular navigation icon.

Content | Image/Title

Title/Image left | Content right

Intended for bullet text that is longer and titles/images that are smaller

This diagram shows a slide layout with two main sections. On the left, there is a white box with the placeholder text: "Click to Add Title or Click Icon to Add Graphic". To the right of this box is a vertical red line. To the right of the red line is a large white box containing placeholder text: "Click to add longer text", followed by a bulleted list: "- Second level", "• Third level", "• Fourth level", and "- Fifth level". At the bottom right corner of the slide is a small circular navigation icon.

Image/Title | Content



Animation built in

Bullet alternative

Sentence fragments

List of things

Procedure list

Talking points

Title or Relevant Graphic

Animation built in

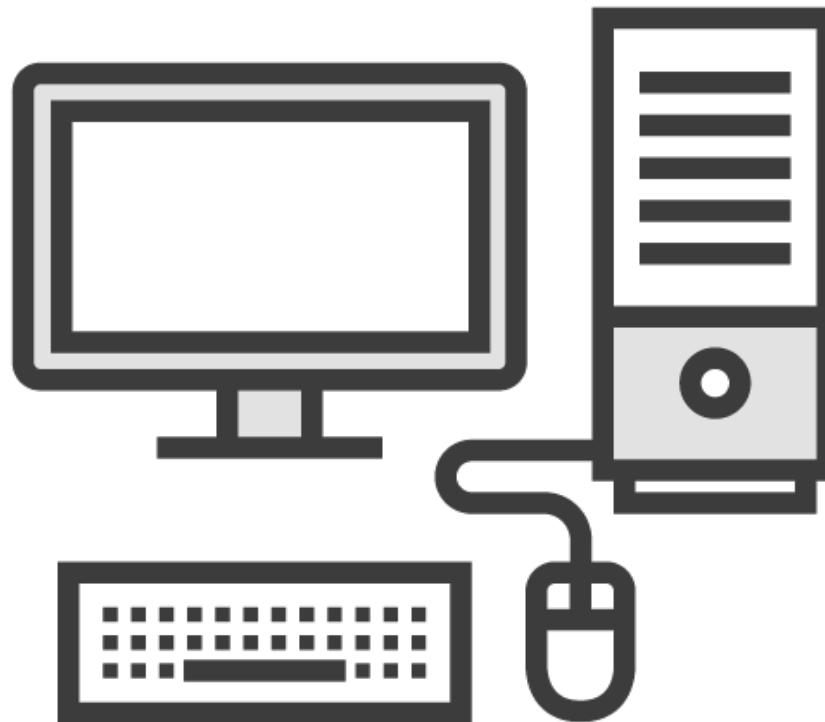
Bullet alternative

Sentence fragments

List of things

Procedure list

Talking points



Title or Relevant Graphic

Animation built in

Bullet alternative

Room for a bit more text

Use this layout for

- Longer sentence fragments
- List of things
- Procedure list
- Talking points



Animation built in

Bullet alternative

Room for a bit more text

Use this layout for

- Longer sentence fragments
- List of things
- Procedure list
- Talking points

Title Space with Image



Animation built in

Bullet alternative

Room for a bit more text

Use this layout for

- Longer sentence fragments
- List of things
- Procedure list
- Talking points



Graphic on left should fill the entire space

- Graphic must be high quality and royalty free

Graphic and text animation is built in



Photo Circle with Text

Move the text boxes to keep the text aligned with the image

Photos works better than an icons

Photos permitted for commercial use



Comparison Slide

Use this slide if you need to compare single items or groups of items.

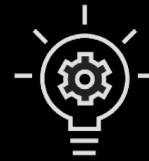
Click to Add Slide Title in Title Case

Compare item one	Compare item two
Click to add text	Click to add text



Comparison Example

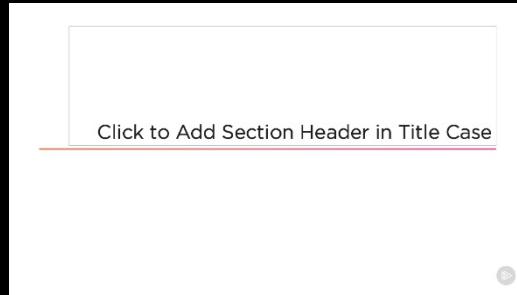
Functional group	Objectives
Configure and administer security	Manage vSphere storage virtualization
Configure advanced networking	Configure software-defined storage
Configure advanced storage	Configure vSphere storage multipathing and failover
Administer and manage resources	Perform advanced VMFS and NFS configurations and upgrades
Configure availability solution	
Deploy and consolidate vSphere	



Other Slides

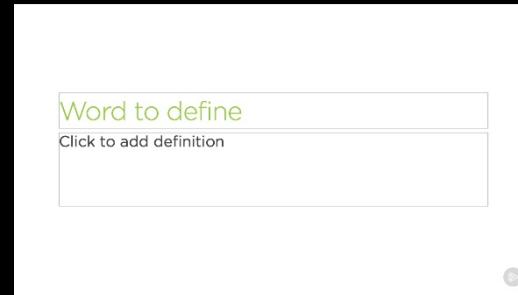
The following self-explanatory slides are a good way of adding diversity into the flow of your course.

Use them purposefully.



A slide template with a white background and a thin black border. Inside, there is a large white rectangular area with rounded corners. At the top left of this area, the text "Click to Add Section Header in Title Case" is displayed in a small, dark font. The entire slide has a thin black border.

Section Header



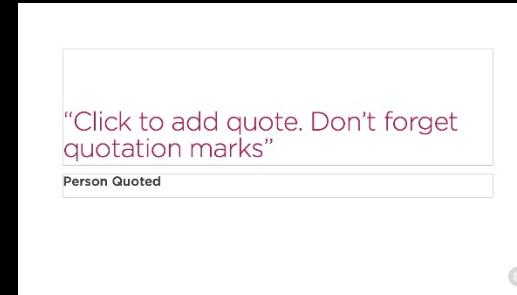
A slide template with a white background and a thin black border. Inside, there is a large white rectangular area with rounded corners. At the top left of this area, the text "Word to define" is displayed in green. Below it, the text "Click to add definition" is displayed in a smaller, dark font. The entire slide has a thin black border.

Definition



A slide template with a teal background and a thin black border. Inside, there is a large white rectangular area with rounded corners. The text "This is a short, important statement to bring attention to something." is centered within this area. The entire slide has a thin black border.

Important Statement



A slide template with a white background and a thin black border. Inside, there is a large white rectangular area with rounded corners. At the top left of this area, the text "Click to add quote. Don't forget quotation marks" is displayed in red. Below it, the text "Person Quoted" is displayed in a smaller, dark font. The entire slide has a thin black border.

Quotation



Section Heading

Word Definition

Here is where you put the definition. This is one of the few places where complete sentences are appropriate. Be sure to cite your source.

This is a short, important statement to bring attention to something.

“Using quotes in your slides can be powerful if used sparingly.”

Simone Garfunky