GYMNASIUM

INFORMATION DESIGN AND VISUALIZATION FUNDAMENTALS

Lesson 1 Transcript

Defining Information Design

ABOUT THIS HANDOUT

This handout includes the following:

- A list of the core concepts covered in this lesson.
- The assignment(s) for this lesson.
- A list of readings and resources for this lesson including books, articles and websites mentioned in the videos by the instructor, plus bonus readings and resources hand-picked by the instructor.
- A transcript of the lecture videos for this lesson

CORE CONCEPTS

1. Information Design is defined as the practice of presenting information, in a structured way, to effectively communicate a particular subject with clarity and efficiency. It is a discipline that covers a broad set of skills including cartography, statistics, motion graphics, animation, design, programming and web development. These skills are rarely covered by any single person, and so information design tends to be a highly collaborative pursuit.
2. Information graphics and information/data visualizations are both part of the larger discipline of information design, but are often viewed as having different ultimate purposes. Information graphics tend to present a particular story and perspective through their presentation of information. Information/data visualizations are often thought of as being tools to help someone make discoveries and explore a set of data and make their own conclusions.
3. This lesson defines nine tenets to help you think about how to create successful information designs. Tenet number one is Design Humanistically. There is a near constant flow of information, which in itself can have a very inhuman scale, and so as designers we need to bring that back to a scale of what we can see and understand. We want to design in a humanistic way that is dictated by our intended viewer, as opposed to being driven by the needs of the creator or by the data itself.
4. Tenet number two is Don't Just Tell When You Can Show. Specifically, the goal for information designers is to present the evidence of a story visually.
5. Tenet number three is Seeing Leads to Understanding. Successful information design and visualizations must engage, inspire and inform us and at the same time use appropriate design forms as to not mislead our audience.
6. Tenet number four is Provide Insight and Clarity. The best information designs provide insight by making the invisible, visible. The best designs can retain the complexity of the subject matter, and clarify at the same time.
7. Tenet number five is Communicate Effectively. Information graphics first priority is to communicate effectively, clearly, and honestly. When done well, the result can be very pleasing aesthetically too.
8. Tenet number six is Form Follows Function. The aesthetic choices you make in your graphics should be made in the service of the function of that graphic, and the function should similarly inform those aesthetic choices. It is a delicate balance, and the best graphics are the ones that achieve this.

9. Tenet number seven is Communicate Honestly. Designers have an obligation to be as honest as possible when communicating visually. This may mean changing the form of your graphic based on available data.
10. Tenet number eight is Apply the “So what?” test. The visualization of a topic should say something and clarify something that simply telling could not otherwise accomplish.
11. Tenet number nine is Know Your Audience. Applying the “So what?” test should be based on an understanding of your audience and specifically that your subject matter is clarified by a visual approach.

ASSIGNMENTS

1. Quiz
2. Find one example each of a chart, a map, an animated infographic and a data visualization that resonates with you.

   Explain why they are good examples of information design using some of the tenets of good information design we have learned in this chapter and then post your results in the Gymnasium forum.

INTRODUCTION

This is Information Design and Visualization Fundamentals, an online course developed by Aquent. In this first lesson, we will begin to understand what information design and visualization is, and start to become familiar with the many forms that projects within these disciplines can take. First, an introduction.

My name is Graham Roberts. I'm a senior graphics editor at The New York Times, where I produce visual journalism projects for both print, and digital platforms. To begin, let's talk about the format of the course and what you'll be learning.
This course will be a quick, and useful introduction to the field of information design, and visualization. You will learn design, and visual principles, as well as some practical tools, and resources to get you started.

You'll be given the chance to create work of your own through a number of hands-on projects, throughout the six lessons. Depending on your skill level and experience, the work you complete here could end up in your portfolio. This is not a beginner's course, in the sense that we assume you are familiar with the tools of the trade, such as sketching, Adobe Photoshop, and Illustrator.

Information design, and visualizations can be print-based, as well as interactive. I will be discussing both types throughout the course. But, it's rare that a single person has all of the skills to do both. Regardless of your skill set, we feel that if you have two or three years of professional design experience under your belt, this is the perfect course for you.

To help you along the way, I'll be providing homework assignments, as well as a brief quiz at the end of each lesson, to help you to reinforce the concepts learned. There's a forum associated with this course on the classroom site. You can post links to your assignments, as well as ask questions on the forum. Although teaching assistants are available on the forum to help you by answering questions, and reviewing assignments, your best resources will be your fellow classmates.

Okay, enough housekeeping. Let's get started by talking about how information graphics and visualizations, are playing an increasingly important role at media outlets like the Times, and others. While graphics have long been a part of how we communicate, the proliferation of high-resolution screens from the desk, to the home, to the lap, to the pocket, has made the possibilities for visual storytelling greater than ever before. New technologies, like high-speed internet, modern web browsers with HTML5 and JavaScript, and fast, high-quality video, has changed the landscape for how we can engage our readership.
Our business is to create powerful, engaging stories, and graphics play a major role in achieving this.

In fact, graphics are so essential to readership now that the current record for most viewed article of all time on newyorktimes.com is a graphic we recently produced that used a dialect quiz in order to create a map that would guess your geographic point of margin in the United States. Our team has a wide set of expertise because, as you will discover through this course, information design is a discipline that spans a large set of skills.

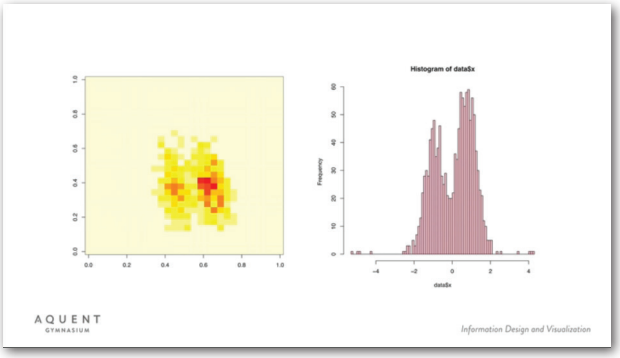
From cartography to statistics, to motion graphics and animation, to design, programming and web development, these skills are rarely covered by any single person. Information design tends to be a highly collaborative pursuit, but, while the skills required can vary widely, let's define the purpose of information design as the practice of presenting information in a structured way and to effectively communicate a particular subject with clarity, and efficiency.

There is a near constant flow of information, which in itself can have a very inhuman scale. So, as designers, we need to bring that back to a scale of what we can see and understand. We want to design in a humanistic way that is dictated by our intended viewer, as opposed to being driven by the needs of the creator, or by the data itself.

In this class, we will be focusing on information graphics and data visualization, a subset of a broader field of information design. Within these fields, we use visual communication and design skills to create clear, and compelling explanations. Ultimately, all of the visualization skills mentioned should come together toward this end.

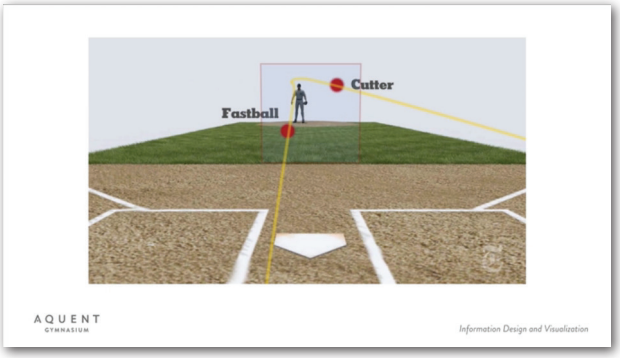
So, why is communicating visually such an effective way to explain complicated subjects? Well, we are a visual species, and much of our brain is devoted to processing visual information. Our minds are not very good at looking at a table of numbers, and making conclusions. But, take those same numbers, and visually represent them, and our minds can very quickly begin to understand patterns, and make meaningful inferences.

In an increasingly complex, and abstract world, diagrams, graphics, and visualizations help tremendously in our ability to understand. While we can use written language to tell, it's sometimes much more effective to show, to present the evidence of a story, visually.



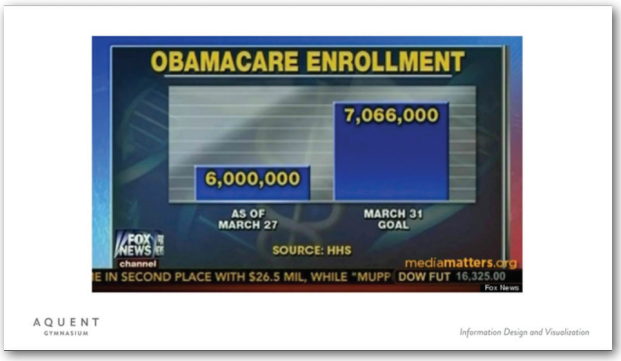
For example, I can tell you that Mariano Rivera is one of the greatest pitchers to have ever played the game. I can tell you that he's incredibly consistent in hitting certain parts of the plate. I can tell you that his fastball and cutter look very similar, but can end up in very different locations. But, it's much more powerful to show you the evidence of this.

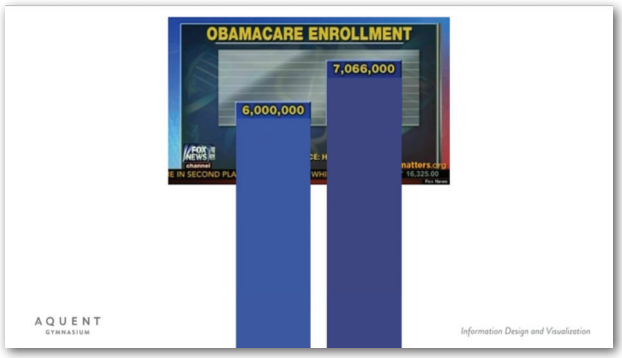
That is what we did in this New York Times graphic from a few years ago. By collecting data of every pitch Mariano Rivera threw, across an entire season, and showing evidence of these points through heat maps, animation, and other visualization techniques, we create a much more compelling argument about why he is so great.



In successful visualizations, seeing leads to understanding. And, as in any medium, it must engage, inspire, and inform us. At the same time, the way we process what we see makes for a strong moral obligation to present truth and carefully consider how we design visual displays of information.

Since a reader will more strongly encode what they see, it's important when designing that we're always very clear about what we want to convey, and choose appropriate design forms, so as to not mislead our audience. For example, take this graphic about the US Affordable Care Act enrollment. Clearly, this graph is highly misleading about enrollment, and encourages the audience to believe that there is a huge discrepancy between the actual number, and the goal number of enrollments. In fact, the graphic should look like this; a much different picture of the information, I think you would agree. You have to wonder if this was simply biased journalism, since this was a highly partisan issue, or if basic rules of visualization were not understood.





So, to recap, changes in technology have created a world of new opportunities for information design work. A wide variety of skills can be utilized to create this work, which can take many forms. We want to make sure we design in a way that respects our reader, whose mind is best adapted to processing visual representations of information. And, with the power of visuals comes an obligation to be truthful.

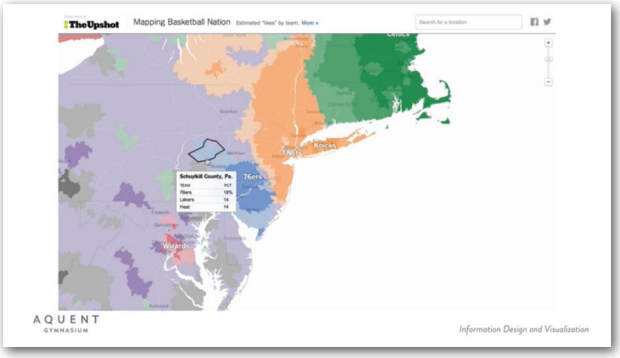
Coming up, you'll explore some of the forms that visual information design can take, as well as a survey of the types of skills required to make typical examples of this work, including infographics, charts, interactives, and more.

WHAT DOES VISUAL INFORMATION DESIGN LOOK LIKE?

It can take many forms, from diagrams to charts to maps to motion graphics. They can be static or interactive, standalone or integrated into stories. Let's take a look at some examples.

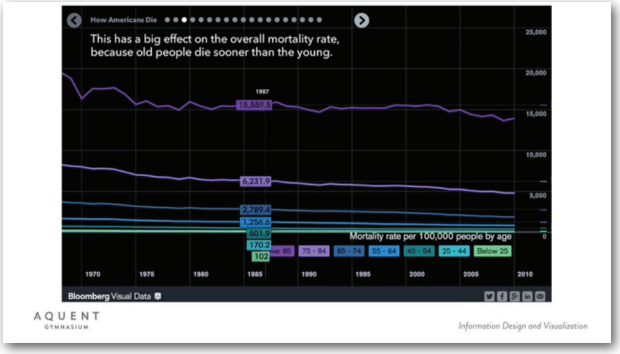
Here's an infographic from the Washington Post that shows us the challenge of the incredible depth faced when searching for the wreckage of missing Malaysia Flight-370. What I love about this piece is that it uses the power of design to engage us as readers and communicate this great depth in a very experiential way. It's not only clear and accurate, it's highly memorable. A graphic like this can be made mostly with vector drawing products, like Adobe Illustrator and some basic HTML skills. A team of one to three could put this together.

This graphic, from the MIT Upshot Blog, uses cartography and data visualization to display how basketball fans root across the country, pulling data from Facebook. This is a successful piece for a number of reasons. It lets you see the broad picture, but at the same time it lets you explore down to the county level to find the parts of the country that you, the reader, might find the most interesting. And paired with this is a separate series of maps used to annotate and use reporting gathered to highlight some of the more interesting things to pay attention to, rather than leaving the onus on the reader to discover this on their own.

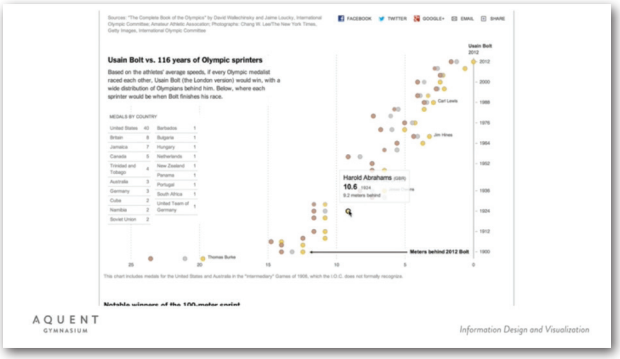


Graphics like this are made using HTML, CSS, and JavaScript skills, including JavaScript libraries like d3, developed in part by my colleague, Mike Bastock. d3 allows for powerful pairing of visuals and data in a web-native way. A team of two to four would work on something like this.

Here's a graphic from Bloomberg called "How Americans Die." It uses the stepper format, which is an interactive structure that tends to guide readers in a linear, narrative way through a set of data. Here, the story is carefully built to maximize understanding of the topic, while also giving readers some ability to explore the data.



A project like this uses HTML, CSS, and JavaScript libraries like jQuery. A team of one to four is likely. And here we have a motion-based infographic from the Times that I worked on that places Usain Bolt's record-breaking run in the London 2012 Olympics, in the context of all medalling sprinters since the dawn of the modern Olympics in 1896.

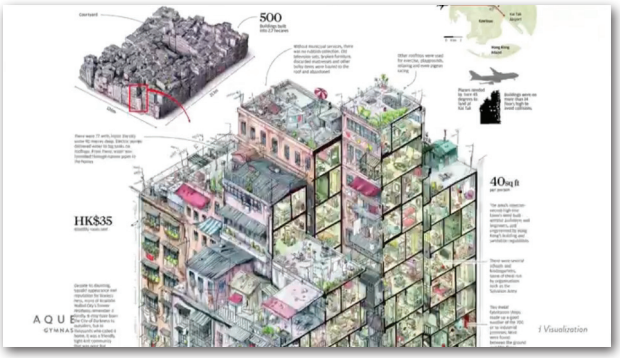


The key with the graphics of this type is to distill all of the reporting we've done on a topic, and what we found notable and interesting about the data visualization, into an engaging, linear, and narrative presentation to really pull readers into the story, one that hopefully teaches the reader a ton about the topic in a short amount of time.

Notice that the page of the graphic has been designed to include a more traditional charting of the results as well, for further exploration, as well as some photography and callouts of some of the more notable runners to pay attention to it. Projects like this use 3D packages like MAYA and Poser, motion graphics applications like Adobe After Effects, as well as Adobe Photoshop and auto production software for music and voiceover, and charting tools like R.

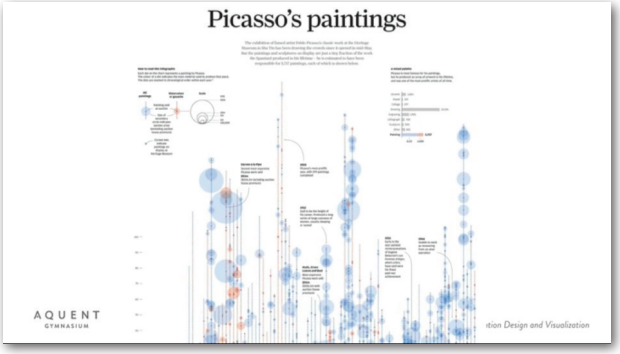
The page itself employs HTML, CSS, and JavaScript. The piece was actually developed with only two people and some occasional help from a third. And for good measure, let's look at some static print graphics. The focus these days may have leaned heavily towards digital, but print is still very much alive, and static graphics can speak volumes.

Here's a great one from the South China Morning Post about the Kowloon Walled City. The piece marked the 20 anniversary of the demolition of what was a giant city within a city, made up of squatters living lawlessly. The imagery is striking and the illustration incredibly engaging, but also very informative.



Most of what a graphic like this would require to produce is strong illustration skills and a product, likely Illustrator, to layout and annotate the graphic. A team of one to three would work on something like this.

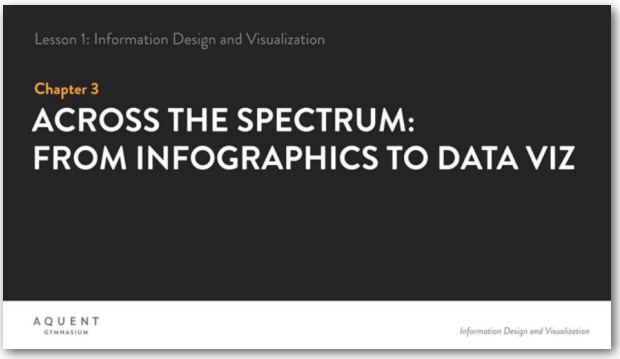
I also love this print piece of theirs. It uses a static data visualization to display every sale of Picasso's paintings over his incredibly long and successful career. It also cleverly includes an explanation of his different painting periods, which is a nice added element. A piece like this can be made entirely within Illustrator and requires a strong design sense and an understanding of how to display data effectively.



This was likely produced by a team of two to three, based on the amount of research. And take note of the use of annotation throughout to help bring the reader in and make sense of it and not let it become too overwhelming. In the next chapter, we'll look at the main goals of different kinds of projects along the spectrum of information design and understand better why the best are successful.

ACROSS THE SPECTRUM: FROM INFOGRAPHICS TO DATA VIZ

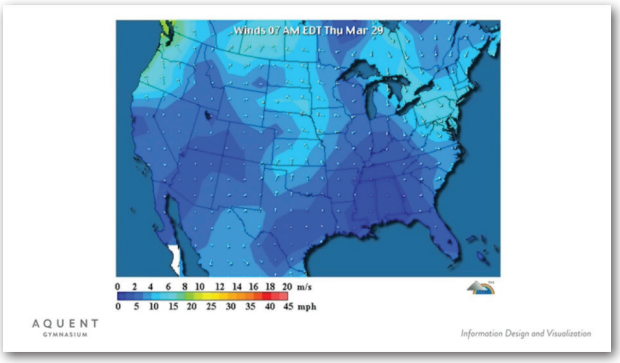
We've just seen a wide variety of information designs taking many forms. Within this set, we saw both what is traditionally referred to as infographics as well as information visualizations. Information graphics, and information visualizations are both part of the larger discipline of information design, but are often viewed as having different ultimate purposes. Most of what we produce as information designers however, does not fall strictly on one end or the other, but tends to fall somewhere between on this continuum.



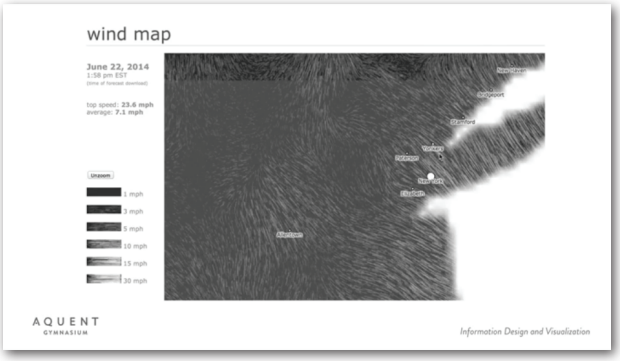
While information graphics in their purest forms, (charts, maps, diagrams, et cetera), tend to present a particular story, and perspective through their presentation of information, visualizations are often thought of as being tools designed to facilitate an audience's ability to make discoveries, and explore a set of data, or other information, and make their own conclusions. Some of the most successful information designs allow the audience to do both, guiding a reader toward the most interesting elements of the story, but also allowing deeper investigation, should they have their own interests, based on their own particular perspective.

One excellent example is an interactive live wind map, designed by Fernanda Viegas and Martin Wattenberg. I'm not alone in admiring this project, as it now resides in the Museum of Modern Art's collection. I also had the pleasure of speaking on some panels with Fernanda, and so can share some of the insights she presented about the project. The maps take wind, something invisible and hard to describe, and give us a live presentation of this data that immediately makes it possible to see, and understand the patterns.

Wind maps, Fernanda explains, are nothing new. Wind maps have been around for a long time, but until this project, were often difficult to read, and did not communicate effectively the flow of the wind in an intuitive way. They usually combined heat maps and arrow vectors, like this. The beauty of this new interactive wind map is that it allows us to see both direction and intensity, with no additional effort.



Additionally, we can zoom into the parts of the country we may care about, and explore our own hometowns in greater detail. Another interesting element is the idea of a saved gallery of interesting wind moments. Here, we can see some of the most dramatic presentations of wind on the map, like Hurricane Sandy making landfall.

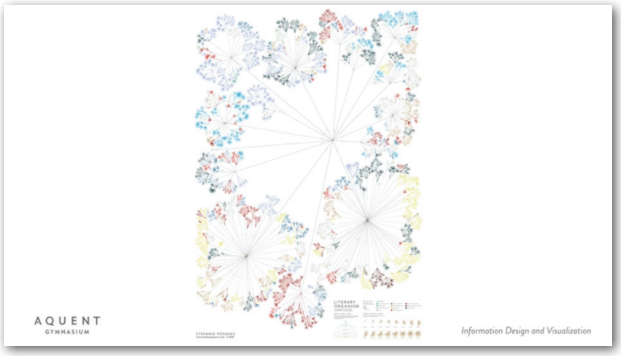


The best information designs provide insight by making the invisible, visible, and the wind map does just that. Information design is not just about simplifying. The best designs can retain the complexity of the subject matter and clarify at the same time. Up next, an investigation of what we should hope to ultimately accomplish with our graphics, and visualizations.

DEFINING VISUALIZATION'S GOALS

Many of these graphics, I think you would agree, are beautiful, and aesthetically pleasing, but are they art? Well, defining what is, and is not art, is definitely beyond the scope of this class, but I would argue that being art, and being beautiful is not the first calling of this type of work. An infographic should first and foremost be understandable, and communicate effectively and clearly. Of course, there are also some gray areas.

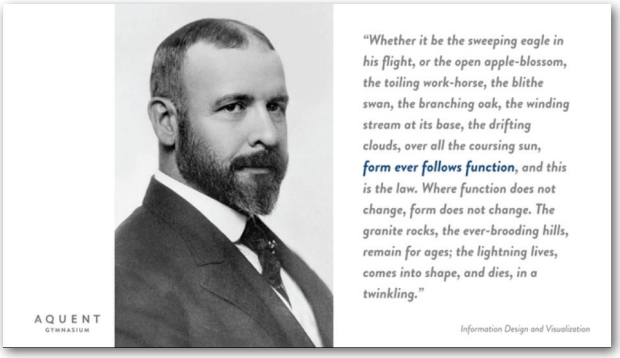
Stefanie Posavec is a fantastic designer, whom I had the pleasure to meet at the information graphics conference Malofiej in Pamplona, Spain, where we were both speakers and judges. Her work uses data, but as she explained in her presentation, more as a framework - as a focused set of limitations to ultimately create works of art. This piece, for example, analyzes Kerouac's "On the Road", creating branches for every major theme throughout the book. The piece is meant to be consumed as art, and therefore it does not succeed, or fail, on its ability to be the most clear communicator of the subject matter.



There's nothing wrong with this approach, and I respect the work greatly, but it's important, I believe, to take note of this distinction. In this class, we're focused on using visual language as a communication tool, as the shortest distance between the data and understanding, and not as a means towards an aesthetic solution. I'm not going

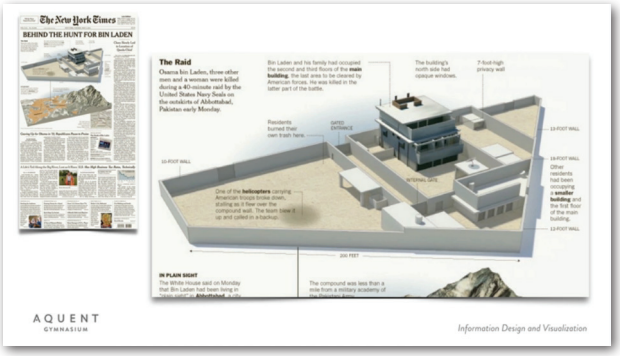
to teach you to make art with data. I'm going to teach you how to communicate effectively with information, and data. Our information designs ultimately have to function in this goal to communicate.

I'm a great fan of mid-century furniture design, which I find to be simultaneously beautiful, and functional. They have beautiful line and proportion, but at the end of the day, you have to be able to sit in them, and they have to hold the weight of the sitter, and be relatively comfortable and ergonomic. In fact, their beauty is a direct result of this functionality, and for me, this is great inspiration when creating graphics. You have to be able to sit in your graphic, and it has to support the weight.



In other words, it must stand up to the weight of its responsibility to communicate effectively, clearly, and honestly. When done well, the result can be very pleasing aesthetically, too. In other words, infographics should adhere to the common phrase: form follows function. This was originally coined by the American architect, Louis Sullivan. The original quote reads, *"whether it be the sweeping eagle in his flight, or the open apple-blossom, the toiling work-horse, the blithe swan, the branching oak, the winding stream at its base, the drifting clouds, over all the coursing sun, form ever follows function, and this is the law. Where function does not change, form does not change. The granite rocks, the ever-brooding hills, remain for ages; the lightning lives, comes into shape, and dies in a twinkling."*

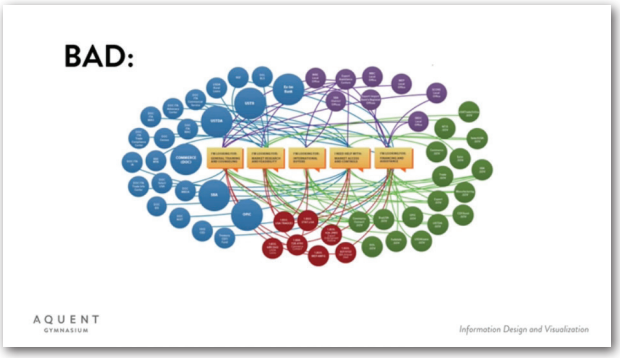
We might also want to consider the thoughts of a student of Sullivan's, a gentleman some of you may have heard of, Frank Lloyd Wright. He famously stated:
"Form follows function, that has been misunderstood. Form and function should be one, joined in a spiritual union." The aesthetic choices you make in your graphics should be made in the service of the function of that graphic, and the function should similarly inform those aesthetic choices. It's a delicate balance, and the best graphics are the ones that achieve this.



Coming from a journalism background, the moral obligation that comes with visual communication is something I consider especially, but I believe anyone designing to communicate visually should take this seriously. For instance, when creating this infographic about the raid that captured Osama bin Laden, for the front page of The Times, it was important to be very clear about what we did, and did not know, and at the time the details were still very sketchy. So, rather than create something with too much realism, I decided on a more diagrammatic style that would hopefully convey where we had more information, and where we had less.

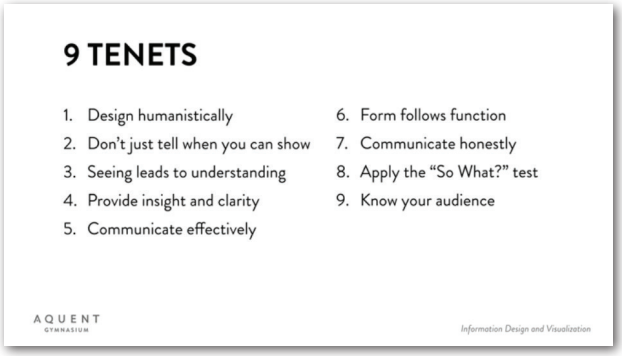
Your graphics and visualizations should also be subject to the "so what" test. It can be tempting to visualize a subject simply because it can be done. New tools allow us to create increasingly complex visualizations, but there should be a reason why you've decided to use a particular visual language to tell the story. The visualization of the topic should say something, and clarify something that simply telling could not otherwise accomplish.

There are many data visualizations out there that look impressive, but on further scrutiny, may not be so good at telling us something new, or interesting about the subject matter.



Take this graphic by Aaron Koblin, showing flight patterns across the United States. It's clearly a beautiful project, but does it pass the "so what" test? There aren't annotations, or necessarily clear patterns revealed to me personally, so I'm not sure what this graphic ultimately communicates. On the other hand, to another audience, for instance, one with more expertise about flight patterns, this may be more revealing. Knowing your audience is incredibly important when designing, and once your audience is known, and well considered, it's important to apply the "so what" test to your work, and to make sure that your subject matter will be clarified by your decision to use a visual approach in your communication.

Hopefully, now you understand a little bit more about our topic than you did before. So, let's quickly review our nine tenets of information design and visualization. Design humanistically. Don't just tell when you can show. Seeing leads to understanding. Provide insight and clarity. Communicate effectively. Form follows function. Communicate honestly. Apply the "so what?" test. Know your audience.



Now that you have a bird's eye view of the field, we'll turn our attention to, how to get started. Specifically, the next lesson begins to get into the visual design principles you'll need to understand in order to design effective information graphics, and visualizations. Having an understanding of how your design decisions will be absorbed by your audience, will help you to communicate effectively.

The first assignment is a quiz. Each lesson in the course has one, and it's designed to help you reinforce the concepts covered in the lesson. Quizzes are available on the classroom site after this video is done. For assignment two, find three examples of an information graphic, or data visualization online, and identify how effective you believe it is, and why, referencing the tenets we have learned in the lesson.

After you've finished your assignment, post a link to it in the classroom, and then find one of your classmates assignments, and take some time to look it over, and offer feedback. That's it for now. I'll see you in the next lesson.