

Process and Workflow of Data Visualization Part 1

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Goal for this Week

- Understand the broad process of what should be done to create a visualization
- This will correspond to the first stage of your course project

Four Stages of a Visualization Project

- Formulating a brief
 - Definitions and requirements
- Working with data
 - Characteristics and qualities of data
- Establishing your editorial thinking
 - What will you show?
 - Bridge between data work and design work
- Developing your design solution
 - Creating the visualization itself

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Formulating a Brief

- The “brief” establishes the definitions and requirements of a project.
 - Expectations
 - All relevant information
 - Constraints
- Before embarking on the process, be clear on the overall goals of the visualization
- Answer the 5 “W’s”:
 - Who
 - What
 - When
 - Where
 - Why

Audience (Who)

- The most important factor: understand your audience!
 - Who is expected to make use of your visualization? What do you know about them?
- Familiarity:
 - Expert? Proficient? Novice? General Public?
- Knowledge:
 - What is already known? What is their reference point?
- How many
 - One person? Small group? Many disconnected people? Large-scale public?

Data (What)

- What do you actually have to work with?
- What are the variables?
 - Independent/Dependent?
 - How many dimensions?
- What relations are available?
 - Hierarchies?
 - Connections?
- How can it change?
 - Static/Dynamic?
 - Able to add more?

Frequency (When)

- How frequently will a user interact with the data?
 - One viewing?
 - One interactive session?
 - Multiple viewings?
 - Repeated interaction?
 - More general framework?

Accessibility (Where)

- How will it be shown?
 - Print?
 - Focus (standalone)
 - Supporting
 - Video?
 - Interactive Application?
- How will it be used?
 - Static?
 - Interactive?
- Environment of use
 - Boardroom
 - Coffee Shop
 - Cockpit
 - Prop

Purpose (Why)

- What is the goal for creating your visualization?
 - Conveying a message?
 - Supporting a narrative?
 - Compact information?
 - Allowing exploration?
 - Gaining insight?
- What will occur as a result of using your visualization?
 - Increase understanding?
 - Make decisions?
 - Take action?

Working With Data

- Need to understand what is and is not in the data set itself
- We will return to this next class

Editorial Thinking

- Analogy to photography
- Angle:
 - From what “direction”(s) will you approach the data?
- Framing:
 - What context will you give to the visualization?
 - What data is and is not in view?
- Focus:
 - What will you highlight as most important?

Production Cycle (Similar to Other Software)

- Conceiving ideas
- Wireframing and storyboarding
- Developing prototypes or mock-ups
- Testing
- Refining and Completing
- Launching the Solution

A Nested Model for Visualization Design and Validation (from Tamara Munzner)



Domain Situation

Data/Task Abstraction

Visual encoding/Interaction Idiom

Algorithm

Task Abstraction

- As you move toward design, it helps to think of the goal of your work in more abstract terms
 - Map the why into generalized terms
- Generally {action, target} pairs
- This can be combined with a more abstract view of data, from which we can identify or create a suitable idiom for visualization/interaction

Actions

- Analyze
- Search
- Query

Actions

- Analyze
 - Consume
 - Discover vs Present
 - Enjoy
 - Produce
 - Annotate, record
 - Derive
- Search
- Query

Actions

- Analyze
- Search
 - Target and Location
 - Each can be either known or unknown

	Target Known	Target Unknown
Location Known	Lookup	Browse
Location Unknown	Locate	Explore

- Query

Actions

- Analyze
- Search
- Query
 - How much data:
 - One: Identify
 - Some: Compare
 - All: Summarize

Targets

- How aspect of the data is wanted?
- All data:
 - Trends
 - Outliers
 - Features
- Attributes
- Specific Data Types

Targets

- How aspect of the data is wanted?
- All Data
- Attributes:
 - Distribution
 - Extremes
 - Dependency
 - Correlation
 - Similarity
- Specific Data Types

Targets

- How aspect of the data is wanted?
- All Data
- Attributes
- Specific Data Types:
 - Network Data:
 - Topology
 - Paths
 - Spatial Data
 - Shape
 - Area

Abstract Data

- Combining action/target concepts helps eliminate the domain dependence
 - And allows you to understand what good options are for idioms/visualization approaches to use
- For a visualizations, it's not just one task
 - Some tasks can lead to others
 - Or many tasks can be taken together

Next Discussions

- Next class
 - Discussion of data handling and abstraction
- Next week (and following)
 - Principles for good visualization design
- Let's look at an example...