

# Putting Charts in Context

*Designing visualization ecosystems for your data*

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*Slides are at <http://ericagunn.com/community/>*

# My Context

**I design interfaces that help people engage with layered and interrelated data.**

**My current project supports a team of expert users in performing complex tasks on multi-dimensional data over a long periods of time to make good decisions, set strategy, assess progress and evaluate outcomes.**

# Agenda

**Part I: What is a visualization ecosystem?**

**Part II: Architecture and workflow**

**Part III: Charts within context**

**Conclusions and takeaways**

*Part I:*  
*Visualization Ecosystems*

# Interfaces are collections of tasks

## User activities

A team of expert users

Performing complex tasks

Multi-dimensional data

Long periods of time

Make good decisions

Set strategy

Assess progress &  
evaluate outcomes

## Tasks

Collaborate, handoff

Workflows, subtasks

Layers, context, compare

Iterate, compare, adjust

Inspect, compare

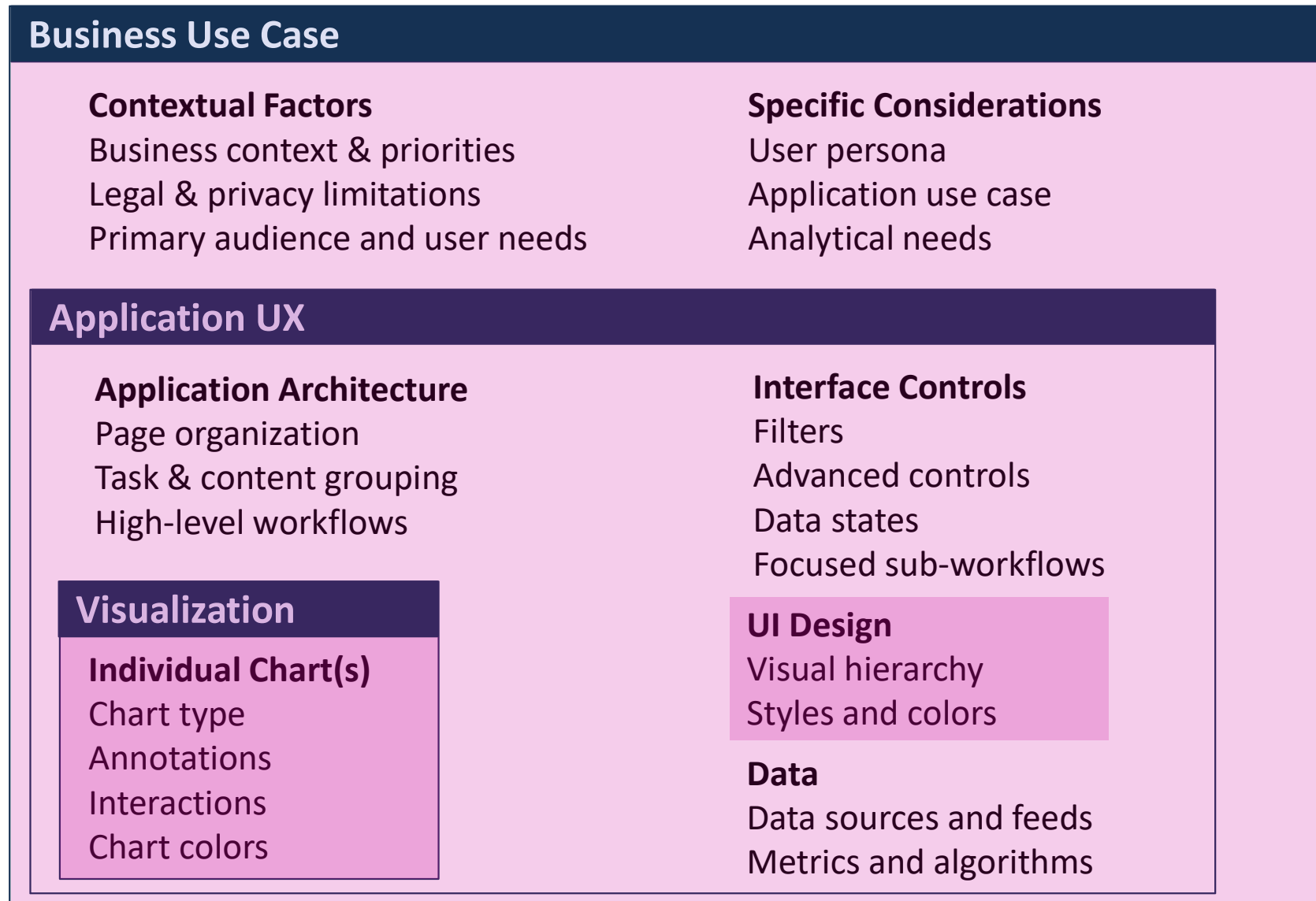
Overview, milestones

Set targets, compare

# **A visualization ecosystem is:**

**A collection of data, displays  
and controls to structure  
and support an analytical user task**

# The chart is only the beginning



# *Part II: Architecture*

## Common Patterns for Structuring Workflow

- Common architectures, and combinations
- Workflow metaphors
- Blending workflows for multiple persona

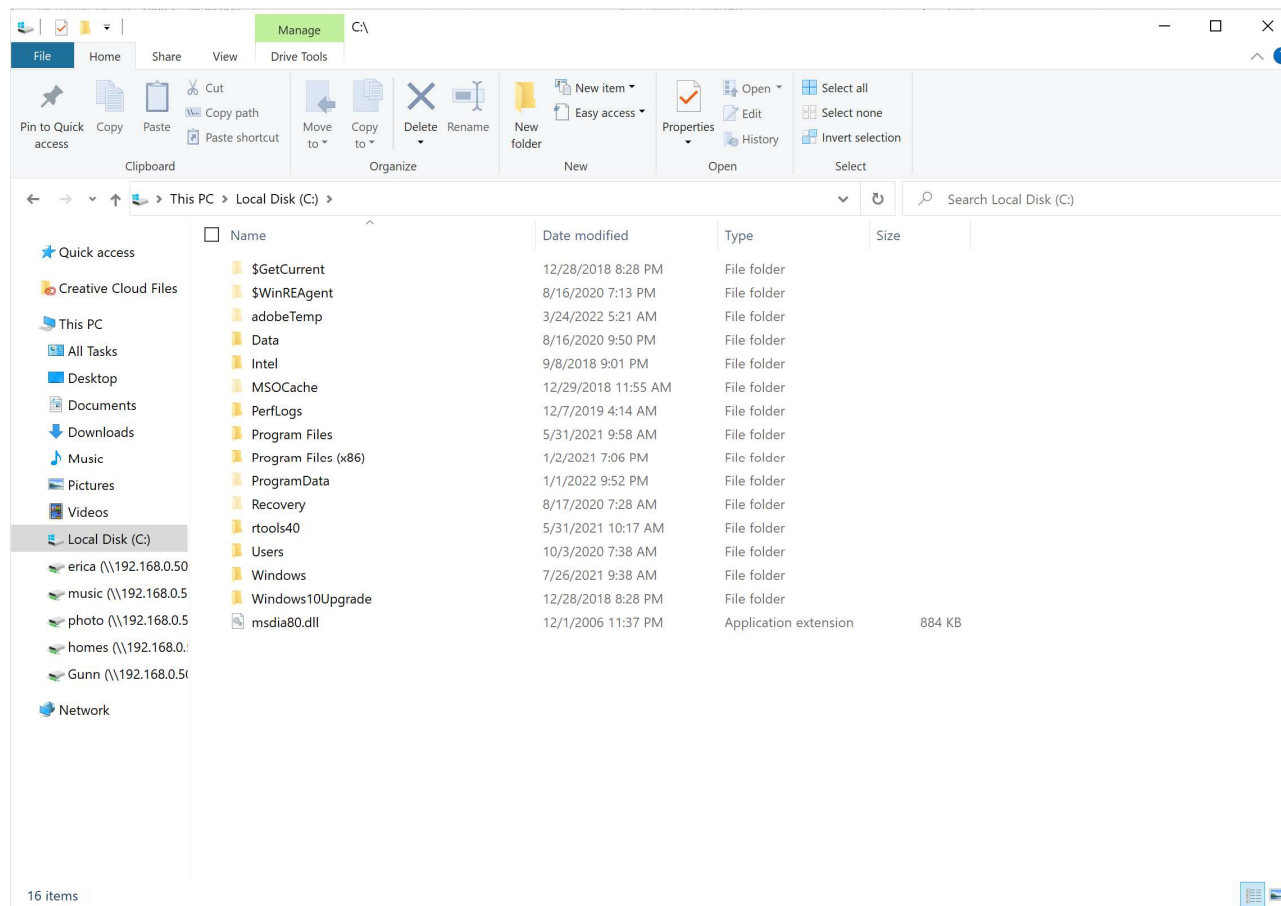


# Architecture creates structure

**Architecture creates a grouping and sequence of tasks, intended to support the preferences and workflow of a particular user persona**

# File Tree / Browser

Information organized in a pre-determined structure that users can navigate



# Search & shopping cart

Supports user query to retrieve data, saves to collection/cart

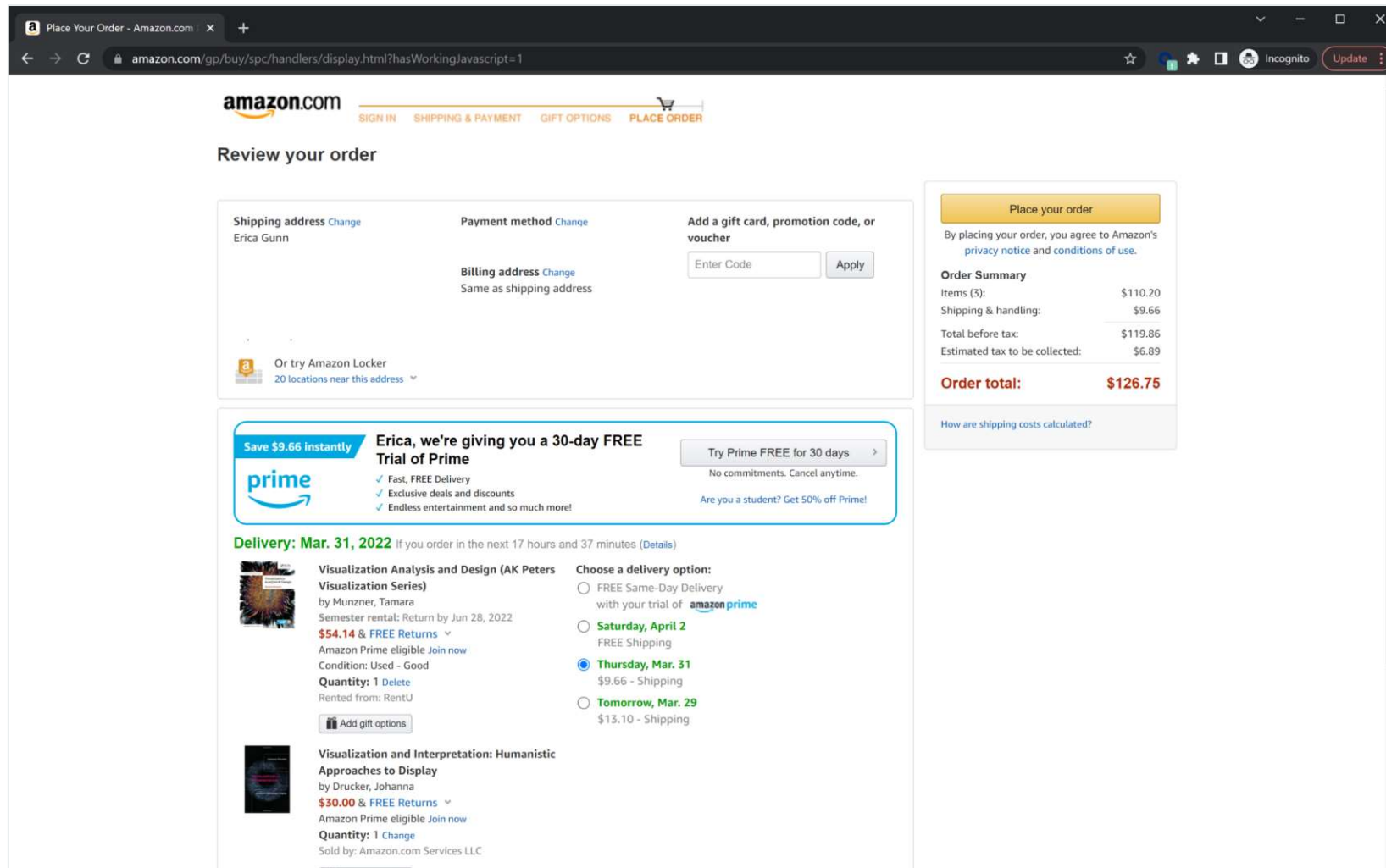
The screenshot displays the Amazon.com website interface. At the top, the navigation bar includes the Amazon logo, a search bar, and links for account and orders. Below this, a secondary navigation bar lists various product categories. The main content area is divided into several sections:

- Gift Card Offer:** A banner for a "\$60 instant gift card" with a current subtotal of \$110.85 and gift card savings of \$60.00, resulting in a cost after savings of \$50.85.
- Shopping Cart:** A section titled "Shopping Cart" with a "Deselect all items" link. It contains three items:
  - Visualization Analysis and Design (AK Peters Visualization Series)** by Tamara Munzner, priced at \$54.79. It is a semester rental, hardcover, and in stock.
  - Visualization and Interpretation: Humanistic Approaches to Display** by Johanna Drucker, priced at \$30.00. It is a hardcover, in stock, and eligible for free shipping and returns.
  - Better Data Visualizations: A Guide for Scholars, Researchers, and Wonks** by Jonathan Schwabish, priced at \$26.00. It is a paperback, in stock, and a #1 Best Seller in Library & Information Science.
- Sponsored Products:** A sidebar on the right titled "Sponsored Products related to items in your cart" featuring books like "Data For Executives...", "Everyday Business...", "Data Visualization in Python...", and "Business Strategy...".
- Checkout:** A yellow "Proceed to checkout" button is visible.

On the left side of the page, there are promotional banners for "Remote caregiving with Alexa" and "Deal of the Day".

# Wizard

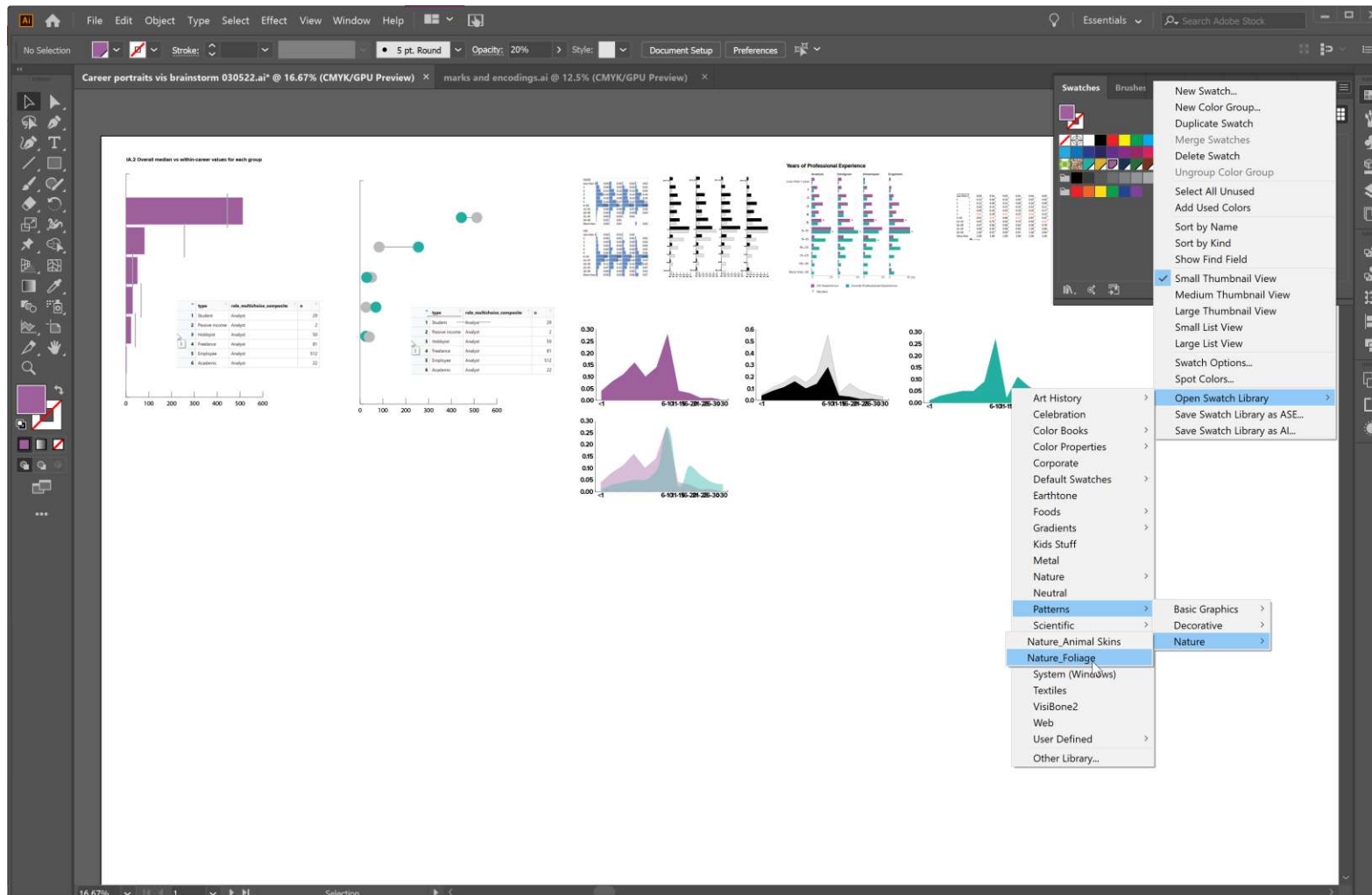
Breaks workflow into a linear sequence of tasks



Matching chart to task

# Command Center

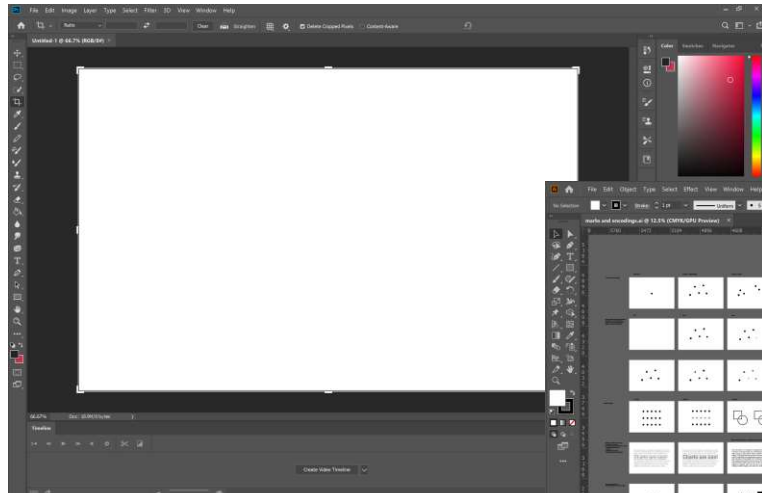
Puts all of the controls at your fingertips, maximizes work area, minimizes interruptions



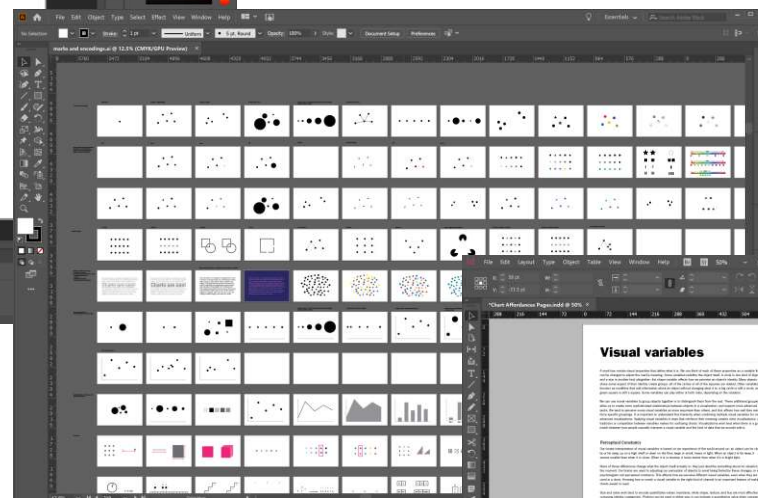
# Platform

Multiple workspaces and/or architectures fused together, with easy communication and transfer between them

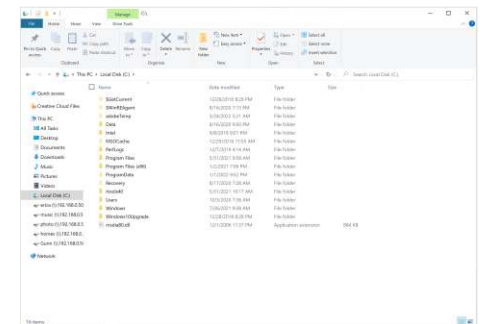
Photoshop (images)



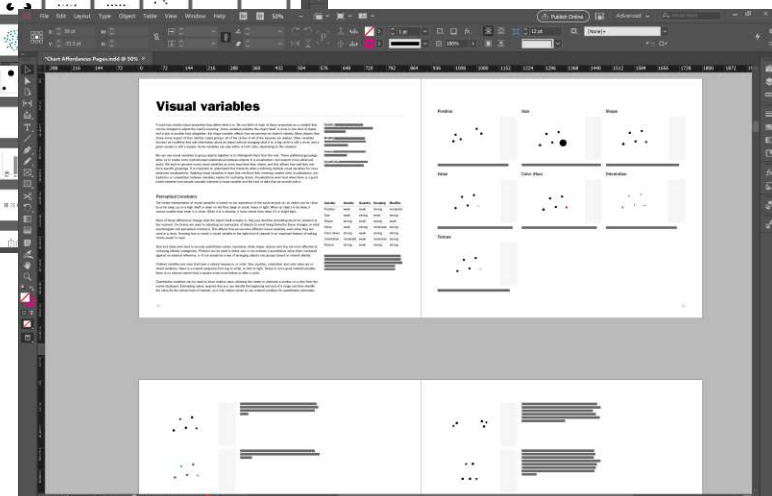
Illustrator (vector drawings)



File reference links



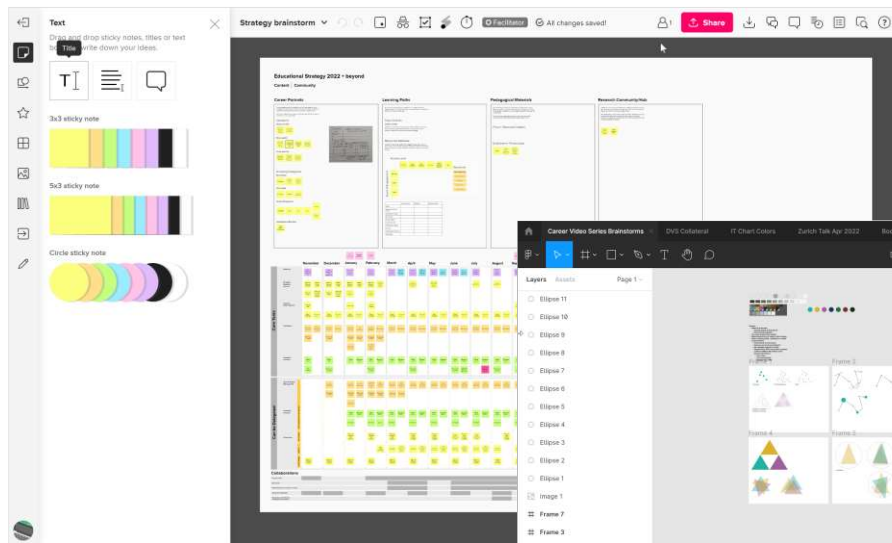
InDesign (Print layout)



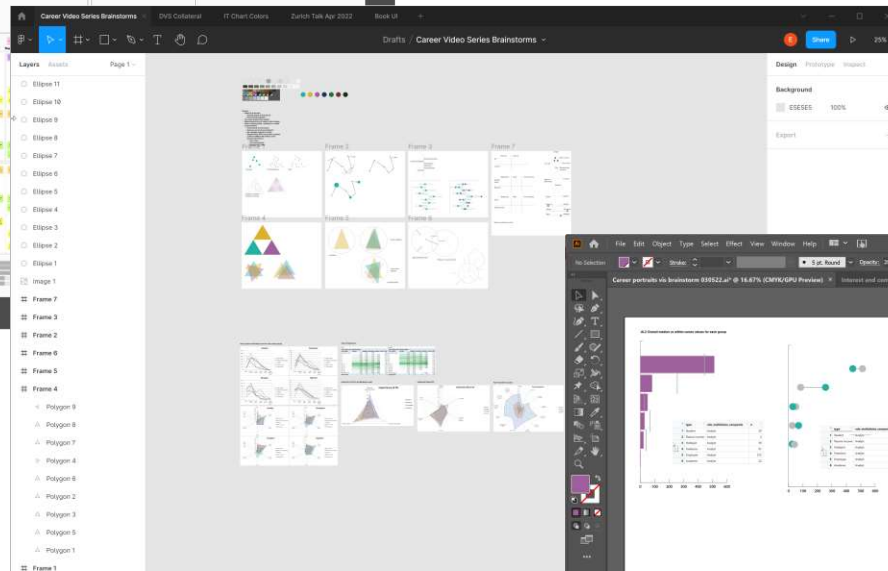
# Architecture vs. Affordances

Structure isn't everything. The task details also matter.

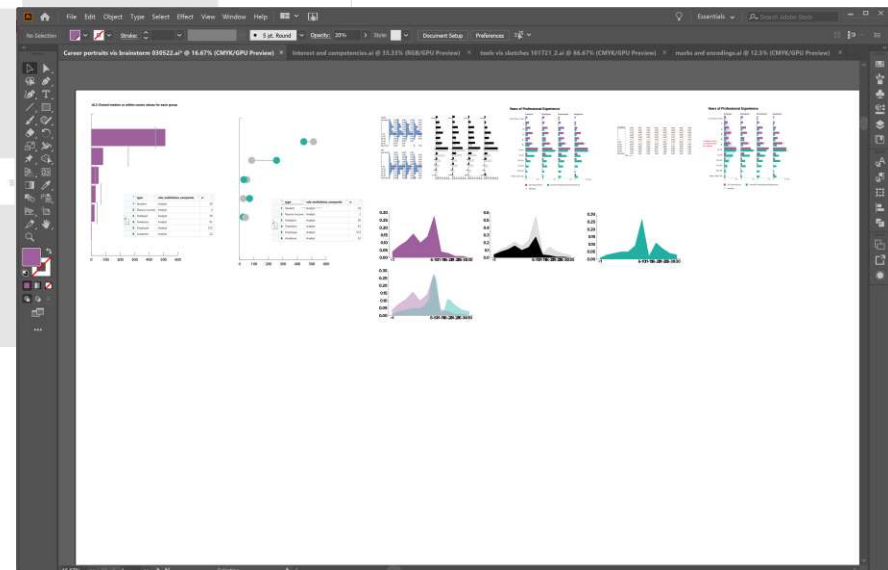
Mural (Post-its)



Figma (Simple drawings)



Illustrator (detailed control)



# Metaphors for Hierarchy & Workflow

The tools you need depend on what you are trying to do

Zoom in, see details



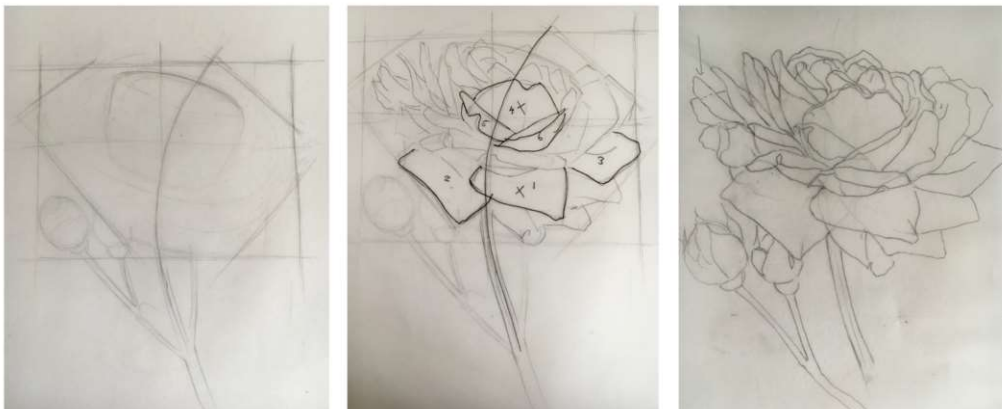
Create collection



Zoom out, see patterns



Add layers, or change perspective



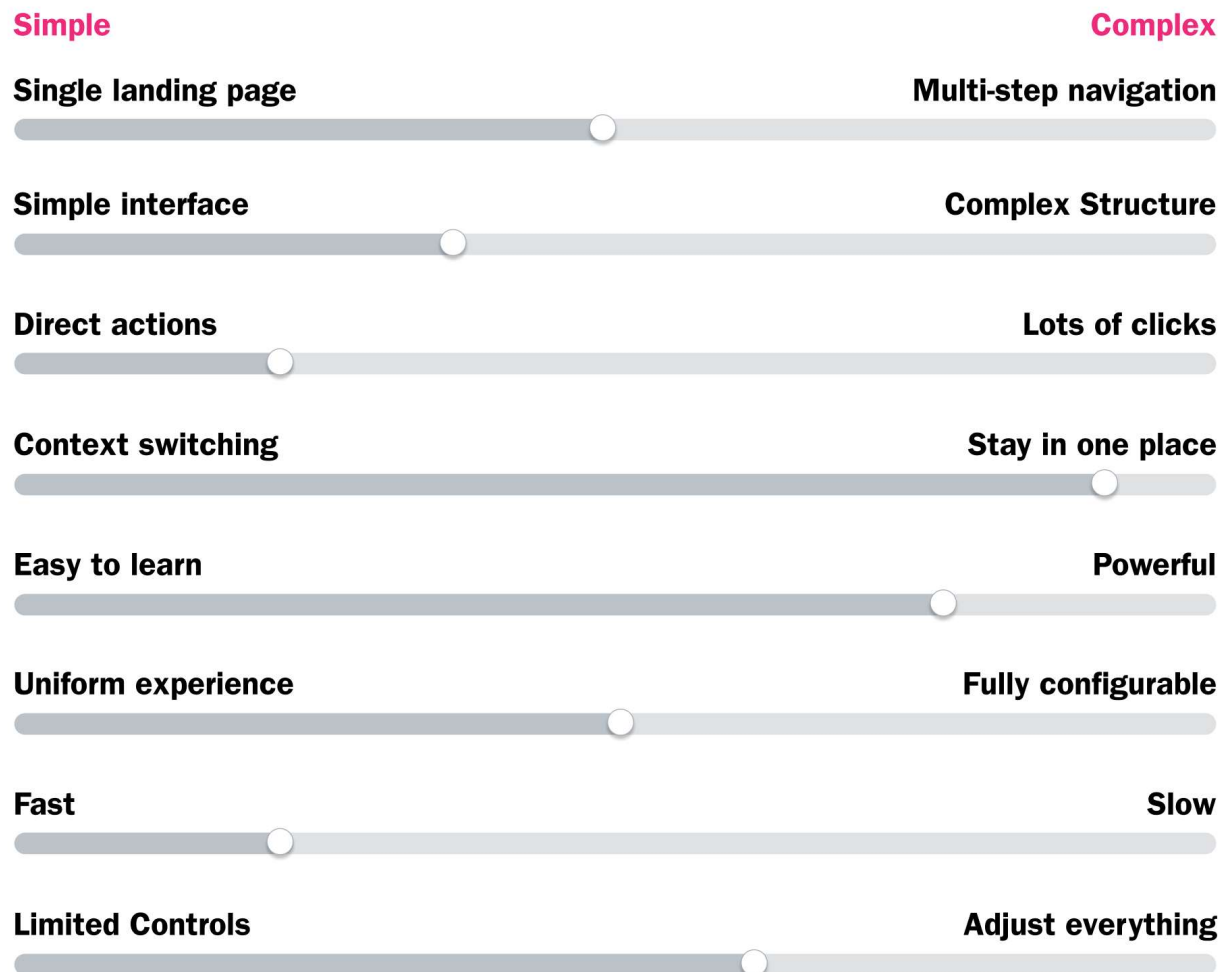
Compare & synthesize

Almost always, an expert user is doing all of these tasks, in iterative loops



# The right balance

Good architecture is about maximizing clarity and user choice while minimizing interruptions or disruptions to workflow



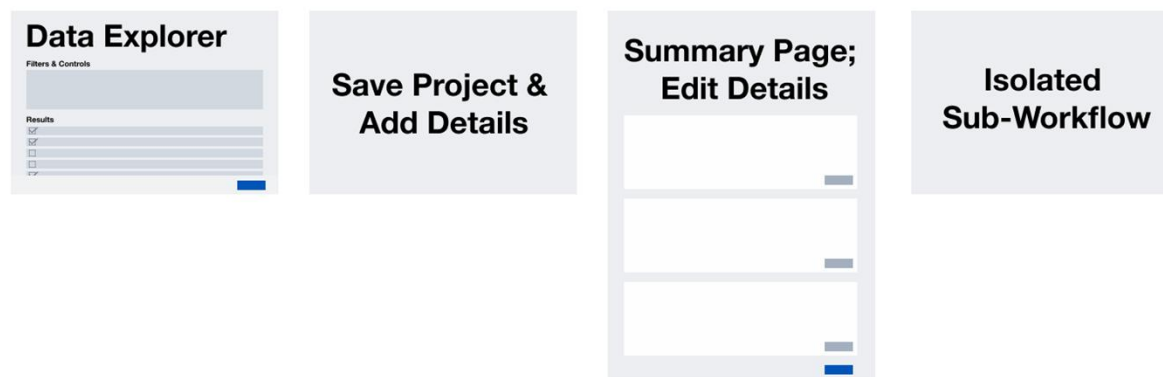
# Multiple Workflows

In some cases, your persona groups might be distinct enough to warrant different approaches

## Guided Workflow



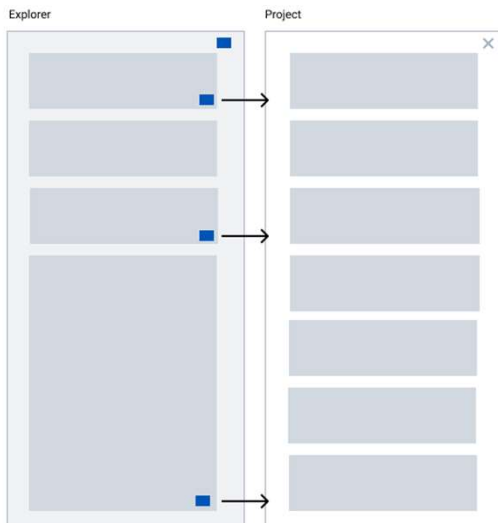
## Expert Workflow



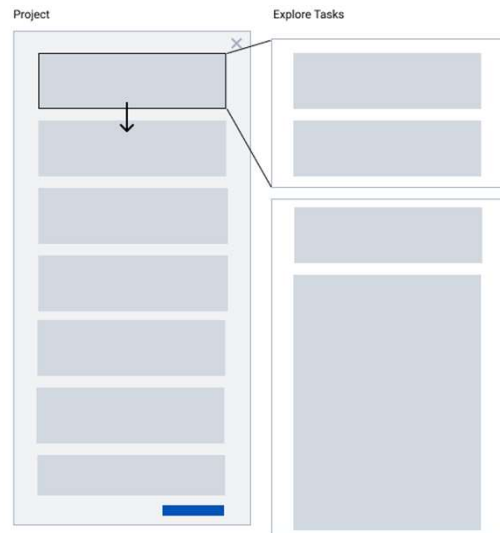
# Multiple Workflows

There are many different strategies for stitching two workflows together

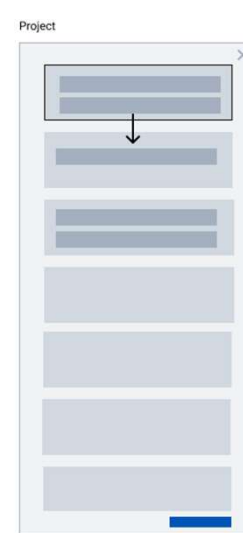
Explorer-Focused



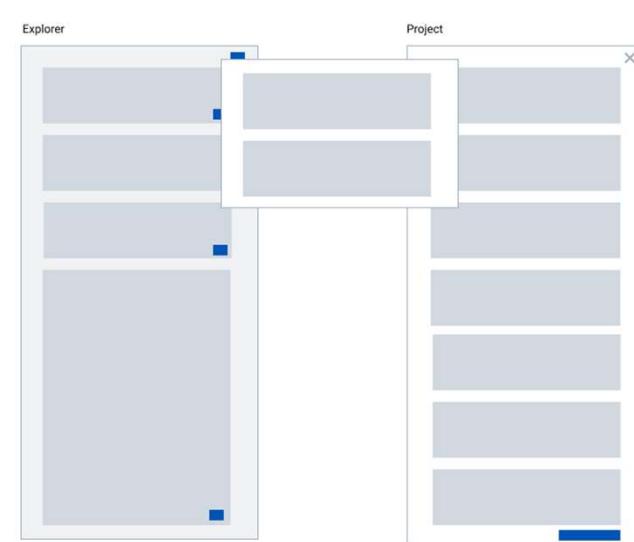
Project-Focused, Explorer Tasks



Project-Focused, Embedded Tasks



Parallel Paths



# *Part III: Charts in Context*

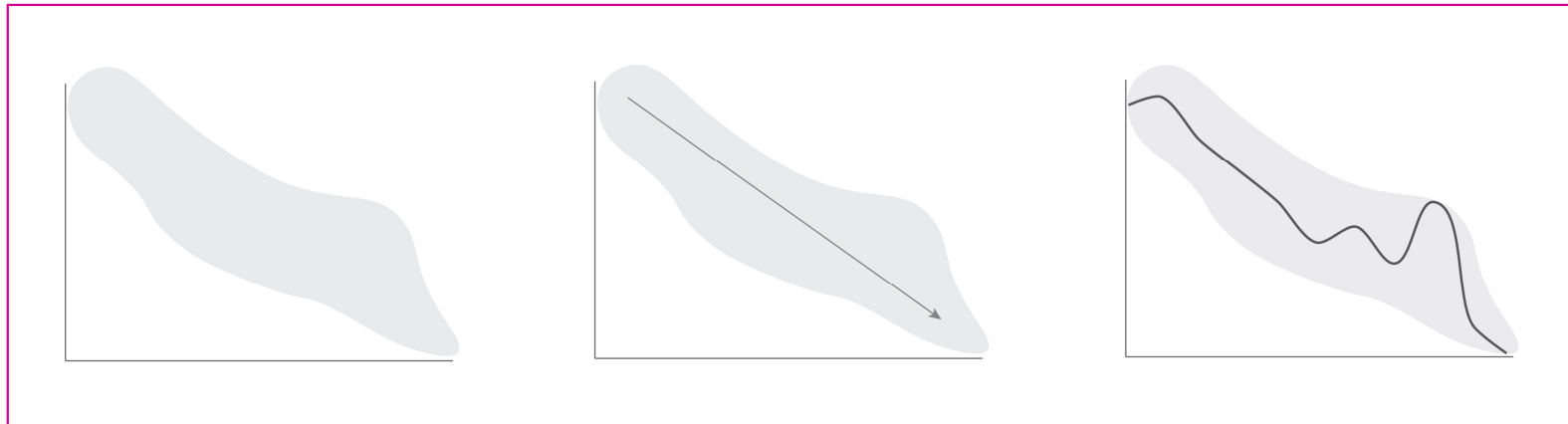
## Designing charts to work within an application

- What happens when people read a chart
- Case study in chart design

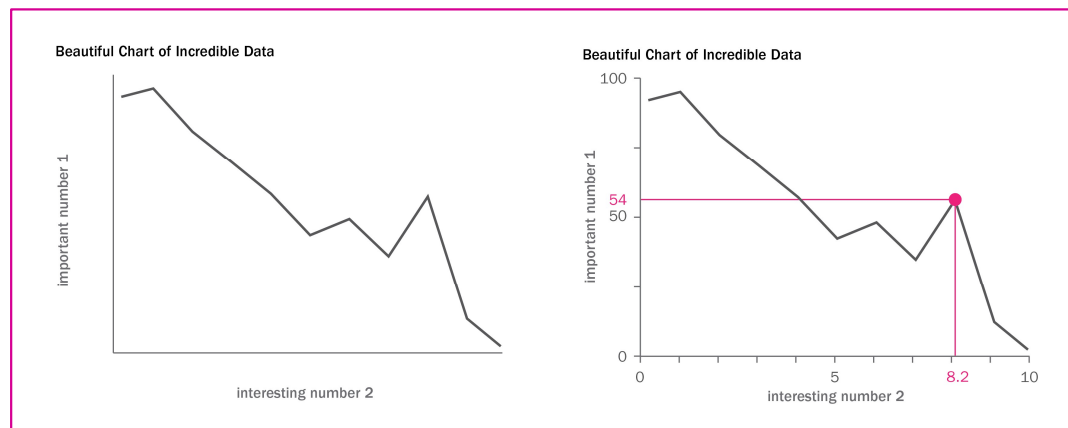
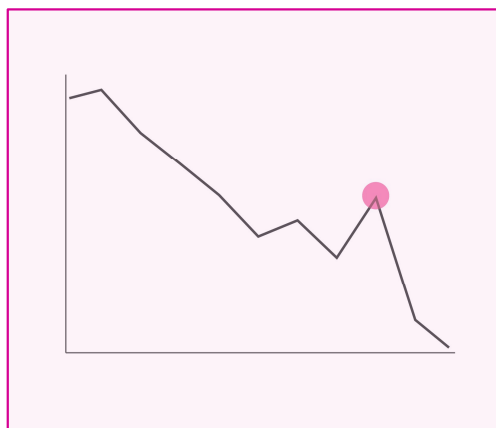
What is data visualization?

# Thinking, Visually

Reading a chart relies on two kinds of visual cognition



**Preattentive Processing:**  
*Fast, easily fooled*



**Attentive Processing:**  
*Slower, deliberate, more effortful*

**User Engagement:**  
Deciding to read the chart

# Connecting Chart to Persona



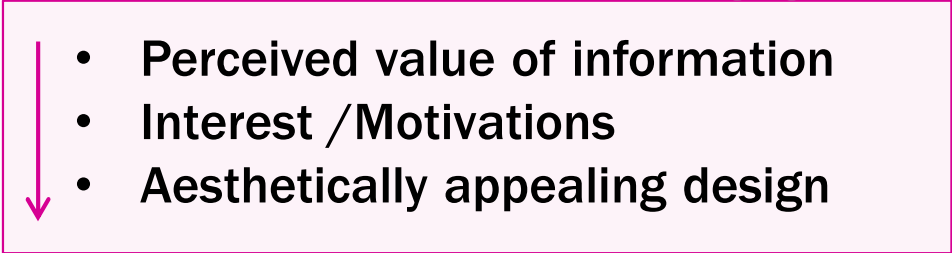
CEO

**“I want it to jump out at me, right off the page”**

*Preattentive Processing*

- Familiar encodings
- Gestalt principles
- Increase salience

*User Engagement*

- 
- Perceived value of information
  - Interest / Motivations
  - Aesthetically appealing design

*Attentive Processing*

**“First and foremost, a chart needs to be useful”**

- Appropriate chart
- Design decisions support the analytical task



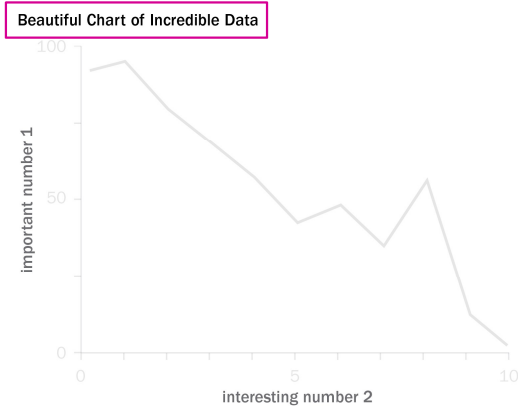
Data Analyst

What is data visualization?

# Journey to Understanding

A user understands a chart in a series of steps

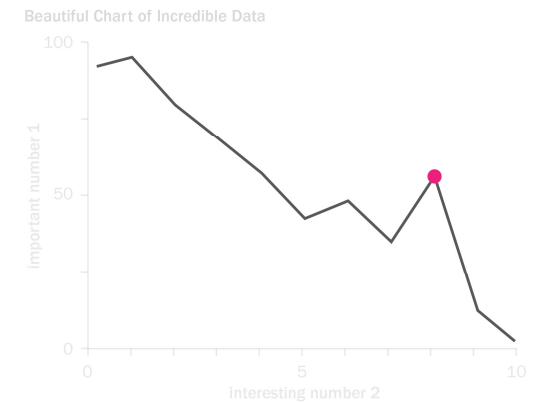
## External Identification



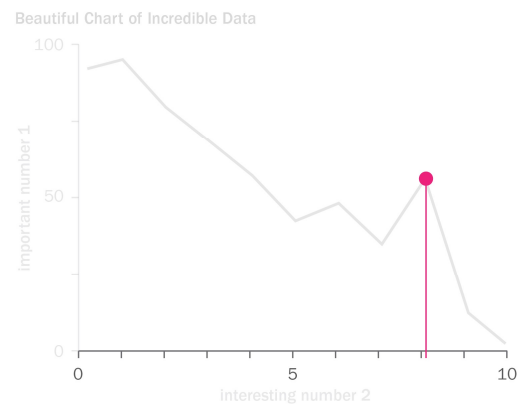
## Recognize Encoding



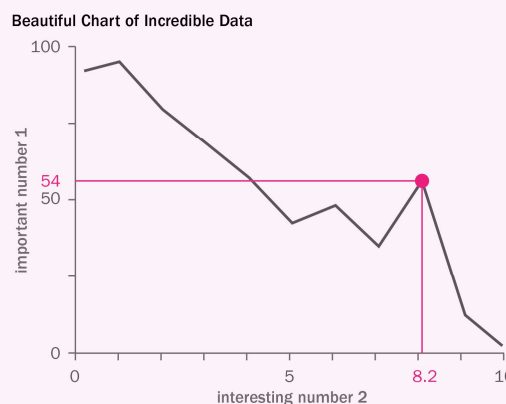
## Query Details



## Internal Identification



## Synthesis and Understanding

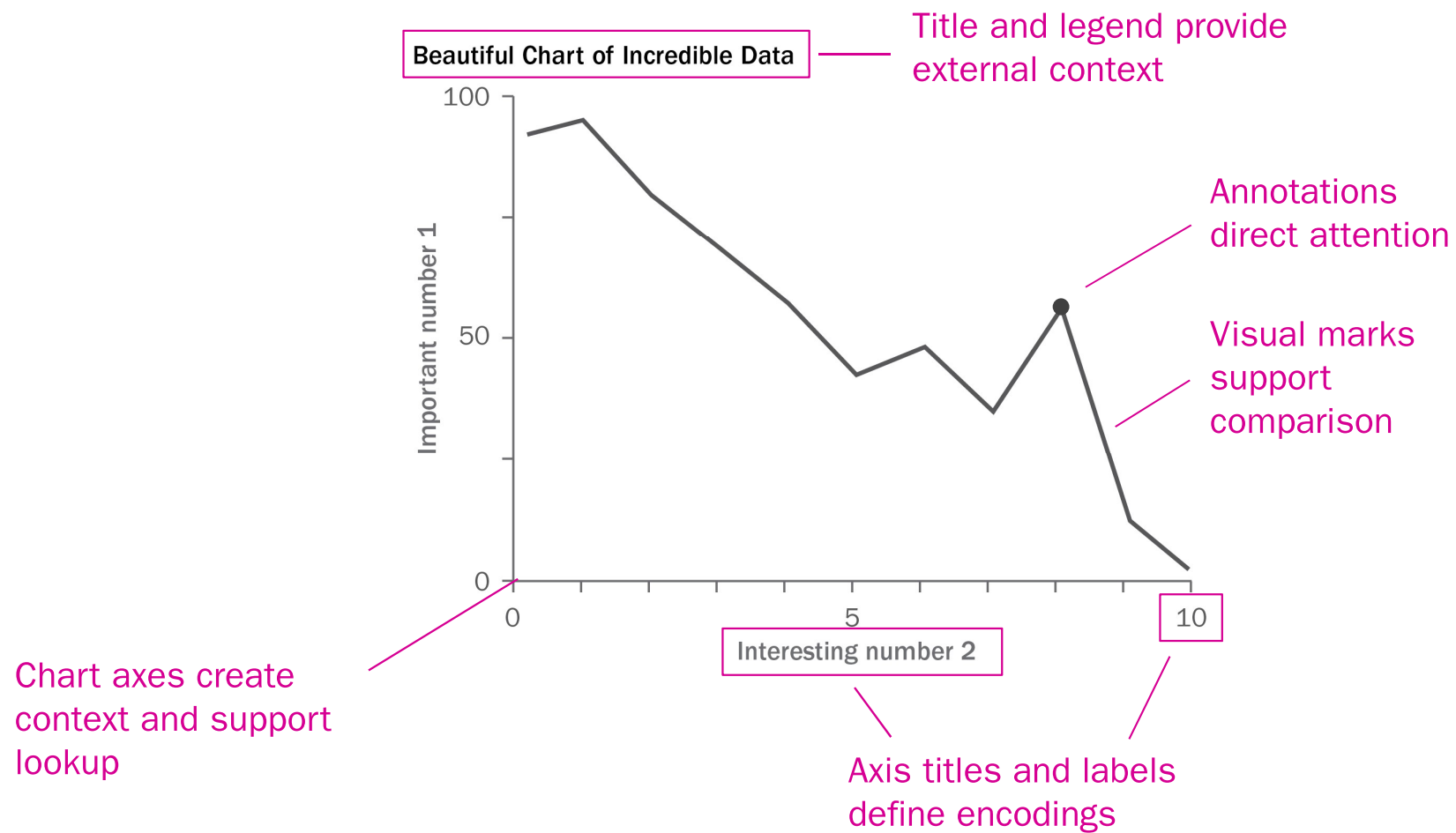


If we don't get our user here, the chart has not done its job.

What is data visualization?

# Anatomy of a Chart

Every part of a chart has a job to do



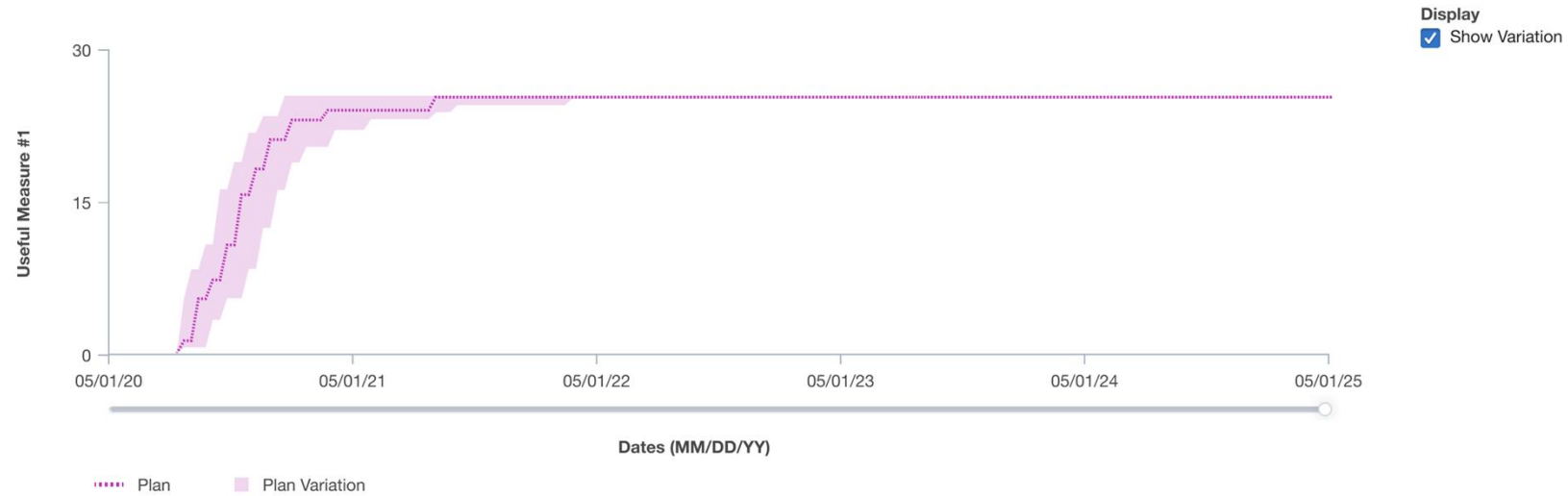


# Case Study

## Base chart

### First Chart of Important Measurements

Latest Data Date: 02/15/21

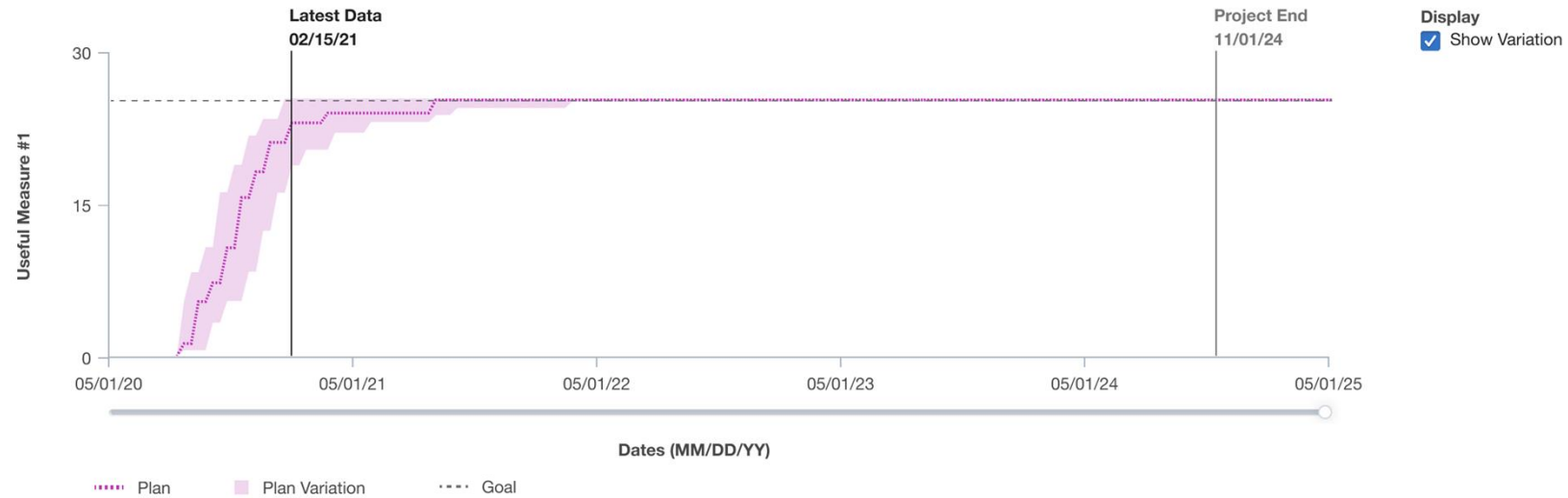


# Case Study

## & milestone and goal annotations

### First Chart of Important Measurements

Latest Data Date: 02/15/21

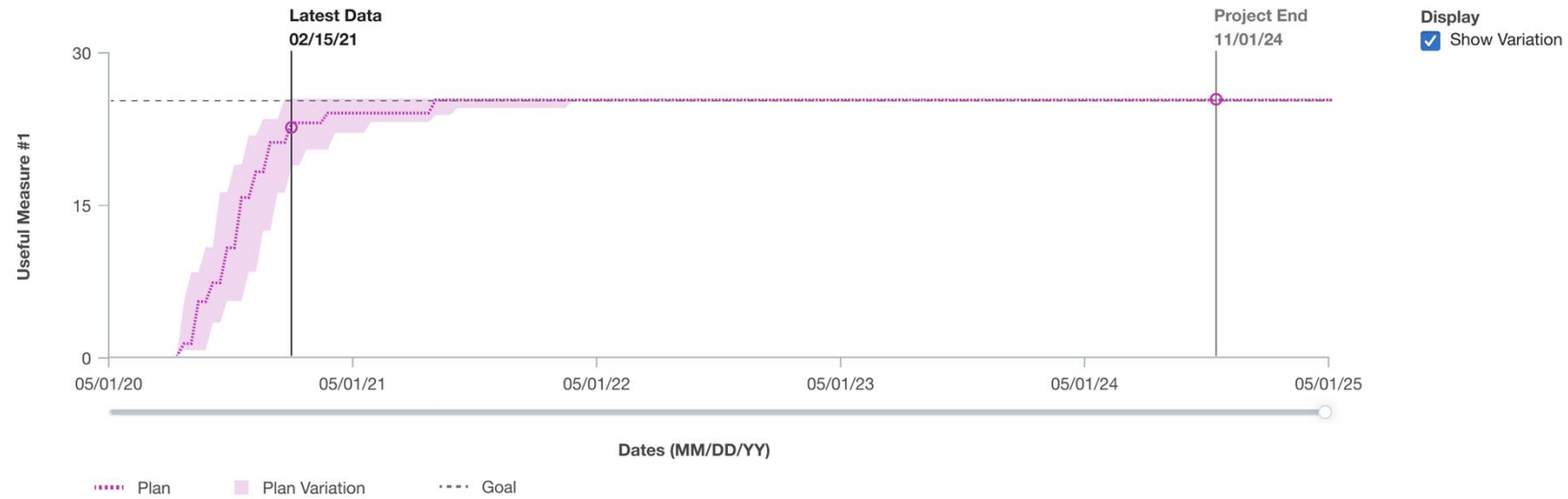


# Case Study

## & point annotations

### First Chart of Important Measurements

Latest Data Date: 02/15/21

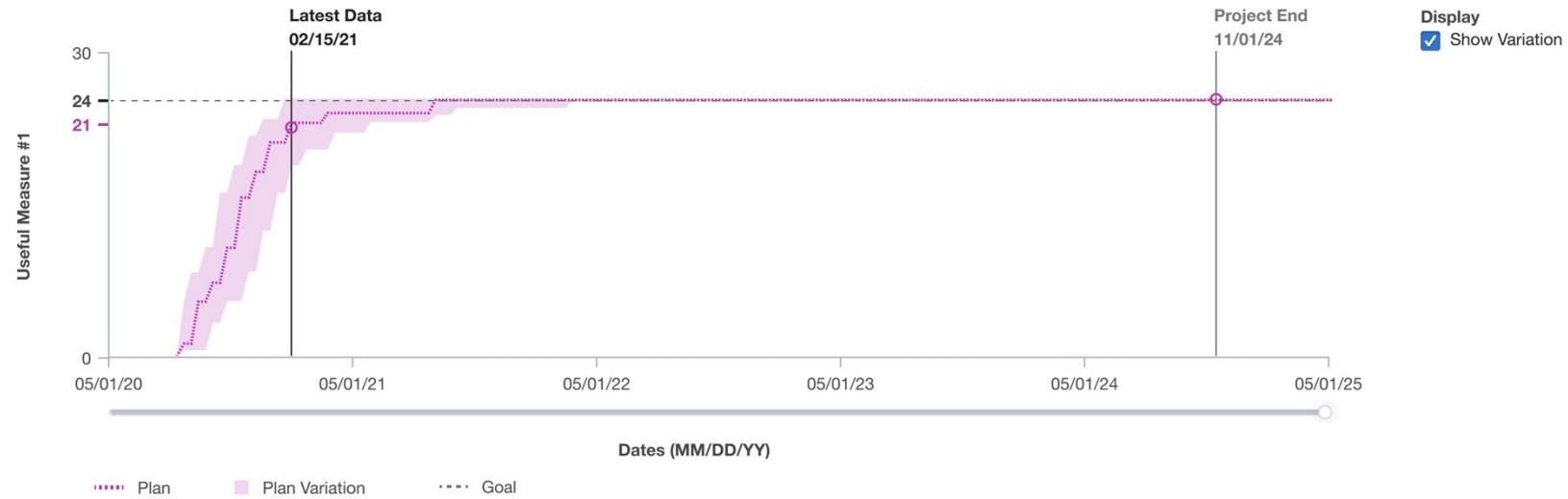


# Case Study

## & y axis labels

### First Chart of Important Measurements

Latest Data Date: 02/15/21

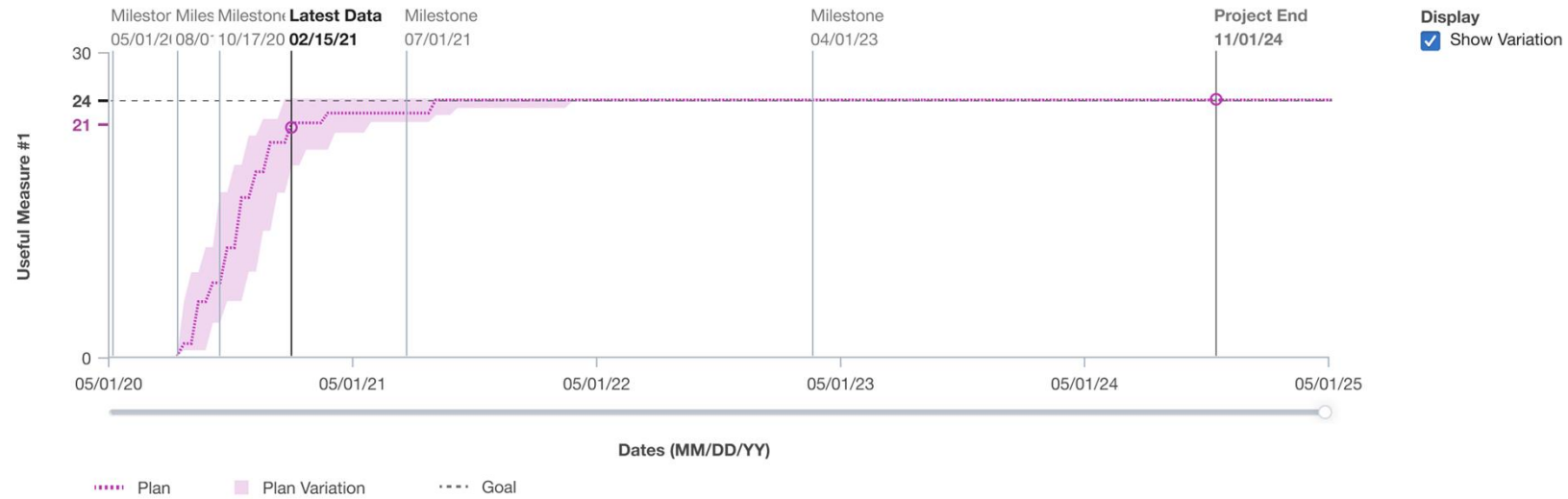


# Case Study

## & more milestones

### First Chart of Important Measurements

Latest Data Date: 02/15/21

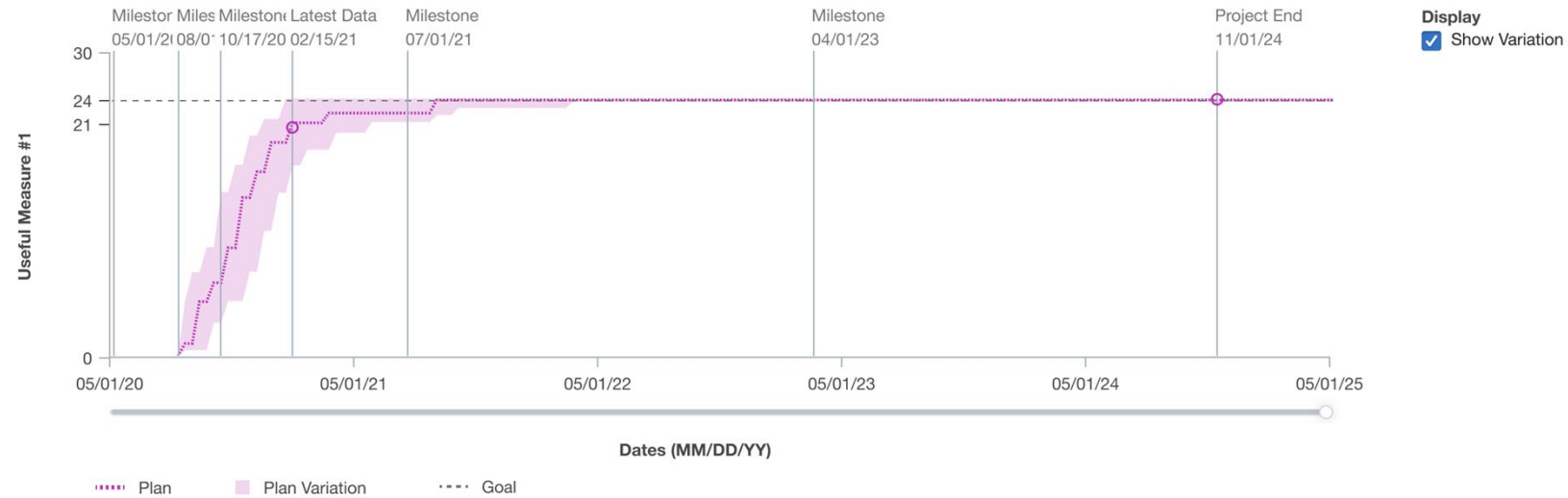


# Case Study

## Remove milestone hierarchy

### First Chart of Important Measurements

Latest Data Date: 02/15/21

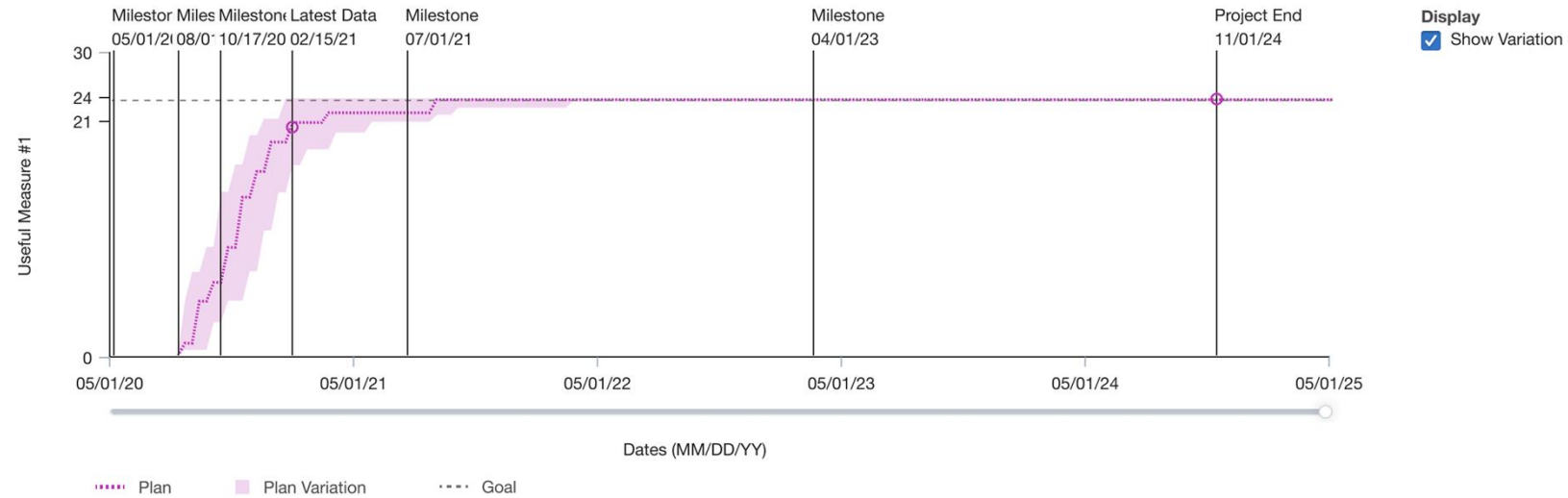


# Case Study

## Remove chart label hierarchy

First Chart of Important Measurements

Latest Data Date: 02/15/21

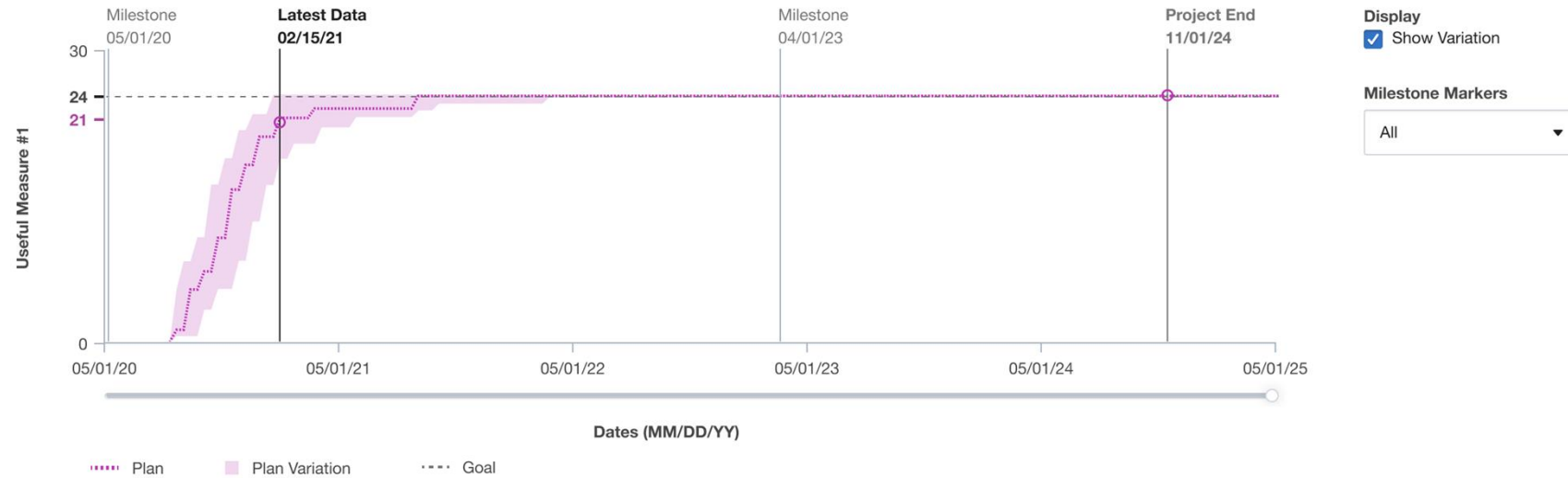


# Case Study

## & Milestone marker control

### First Chart of Important Measurements

Latest Data Date: 02/15/21



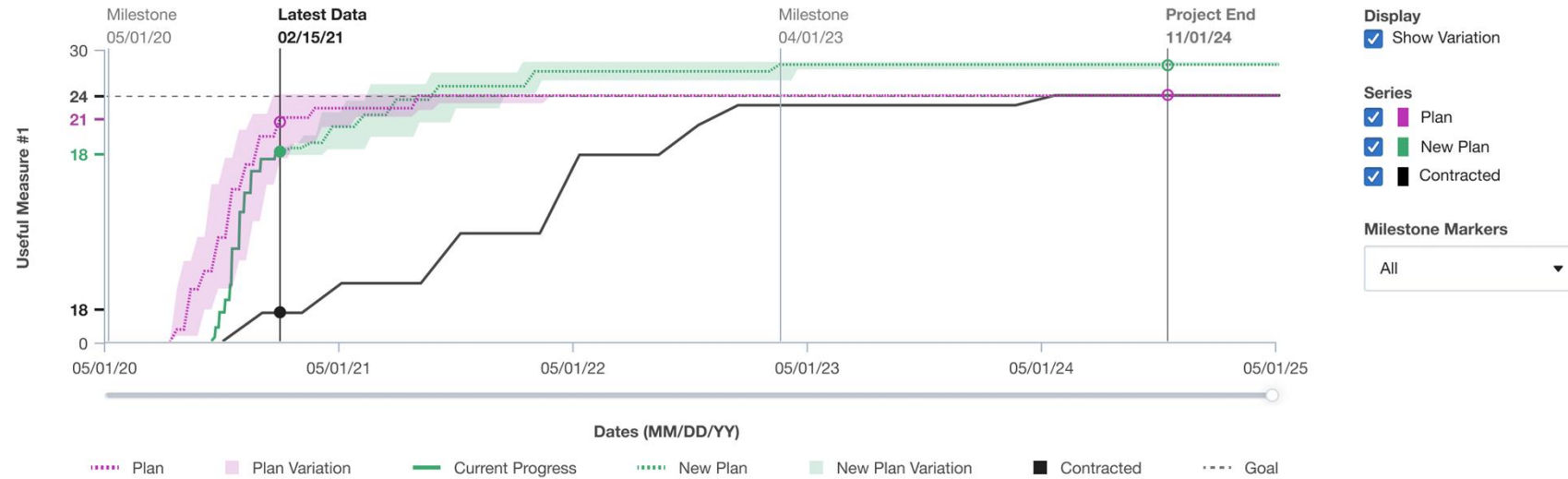


# Case Study

& more series!

First Chart of Important Measurements

Latest Data Date: 02/15/21

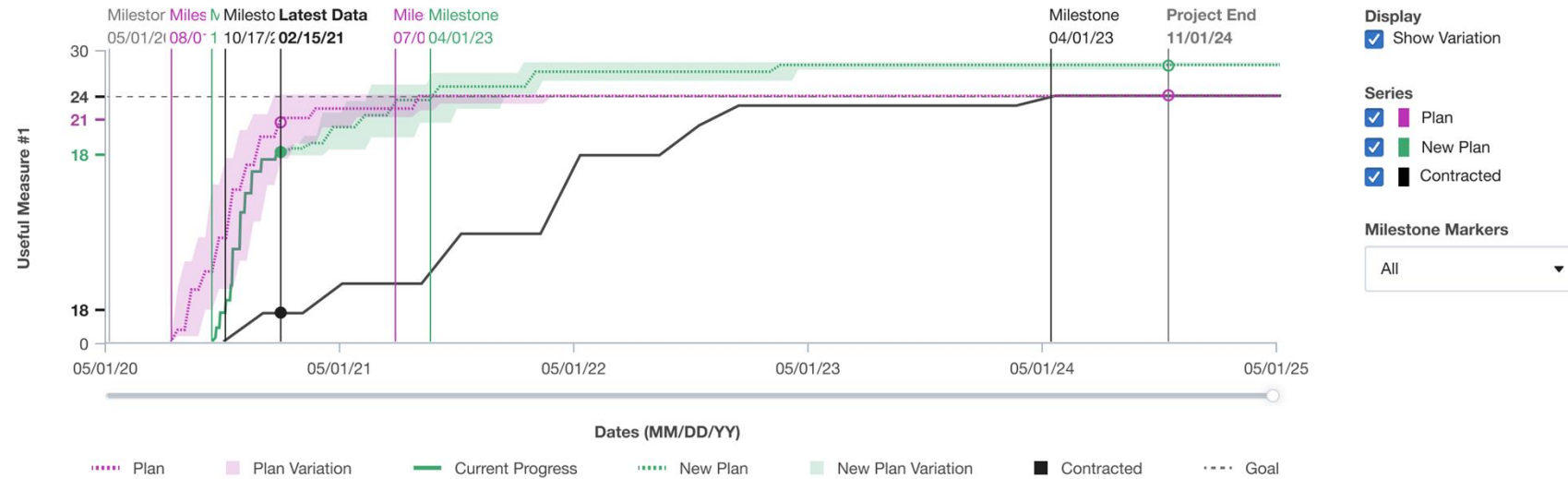


# Case Study

## Color for grouping vs color for salience

First Chart of Important Measurements

Latest Data Date: 02/15/21

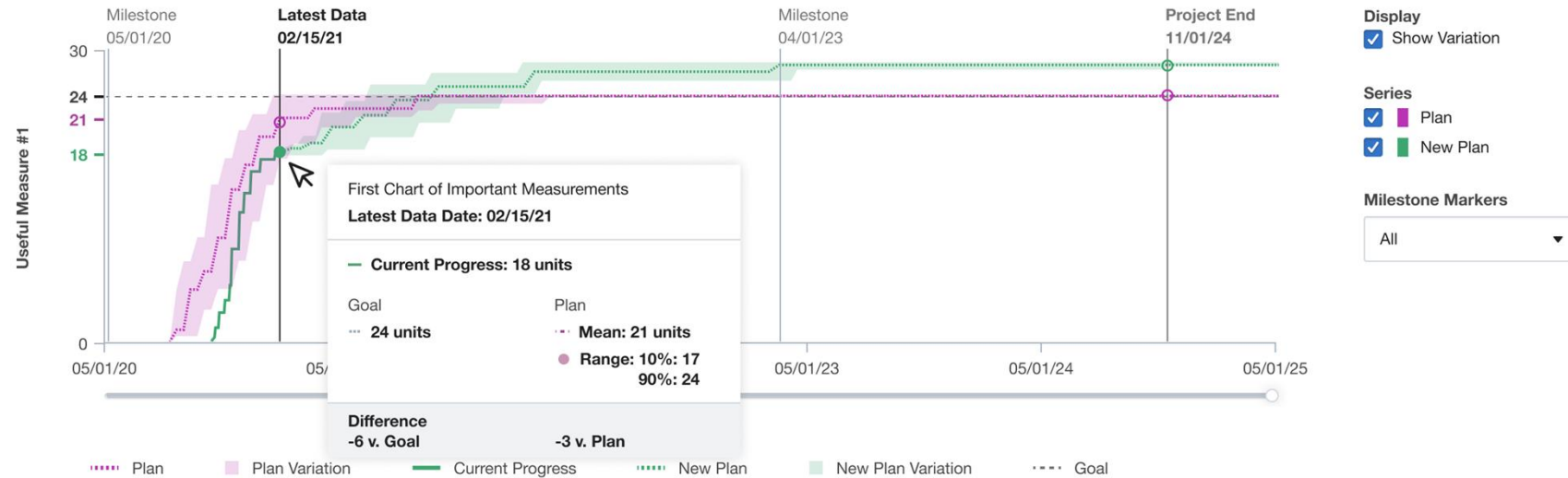


# Case Study

## & descriptive tooltip

First Chart of Important Measurements

Latest Data Date: 02/15/21

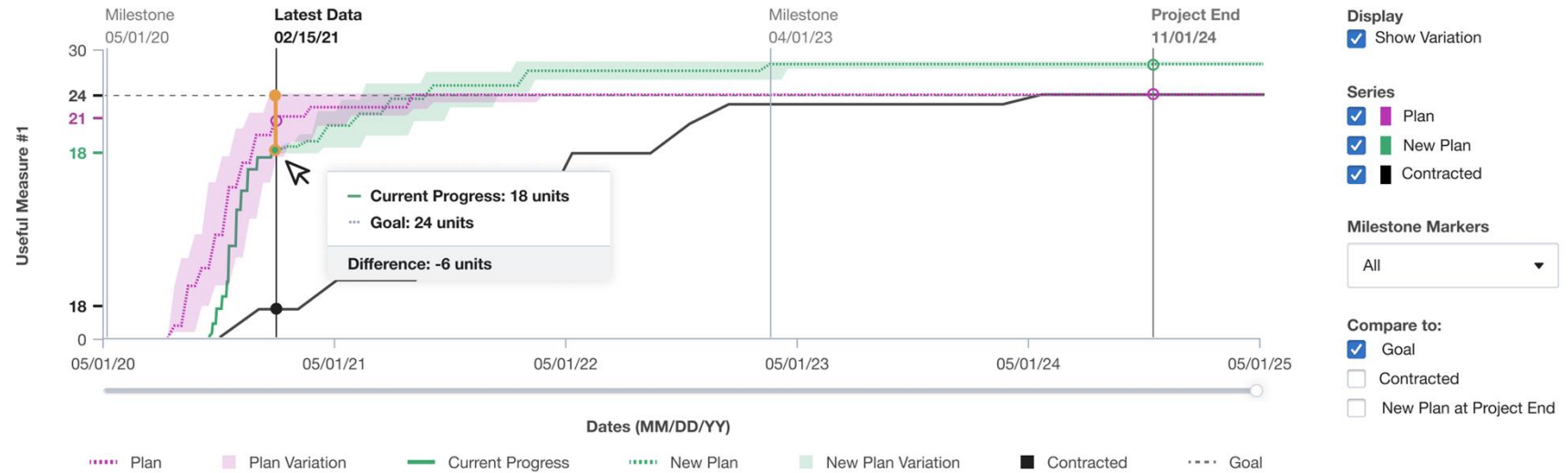


# Case Study

## Focus on chart comparisons

### First Chart of Important Measurements

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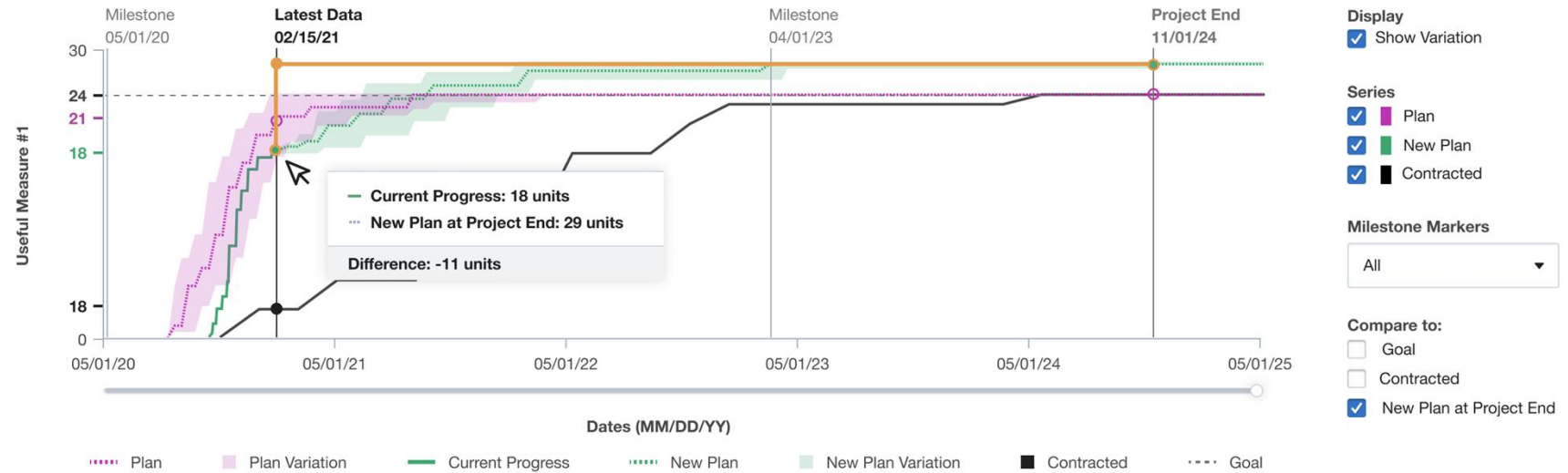


# Case Study

## & ability to control comparison reference

First Chart of Important Measurements

Latest Data Date: 02/15/21



# Case Study

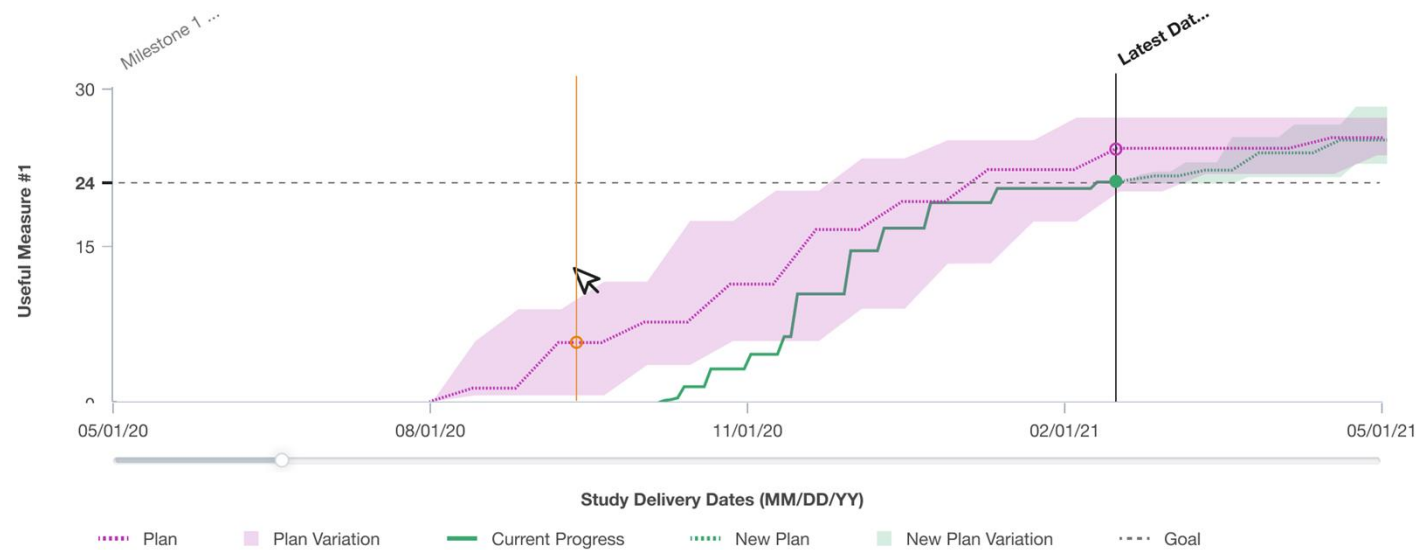
## Move chart controls, put tooltip in the interface

### First Chart of Important Measurements

Latest Data Date: 02/15/21

**Chart Display Controls** ▼

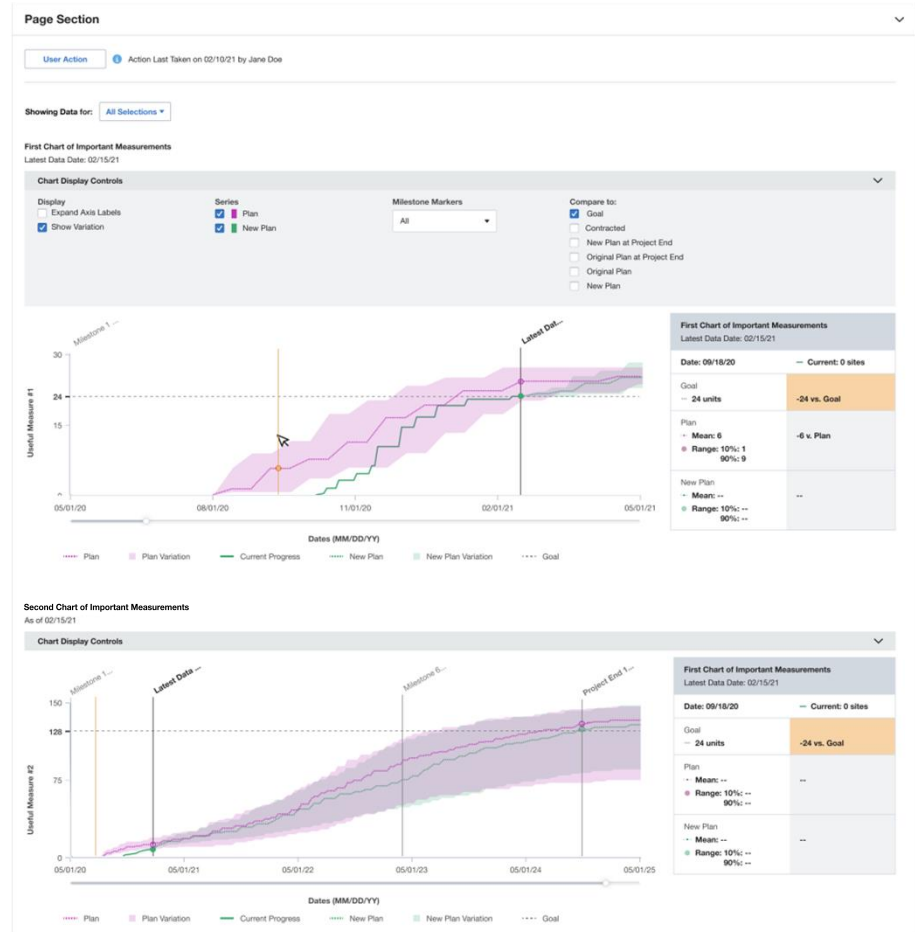
<p><b>Display</b></p> <p><input type="checkbox"/> Expand Axis Labels</p> <p><input checked="" type="checkbox"/> Show Variation</p>	<p><b>Series</b></p> <p><input checked="" type="checkbox"/> Plan</p> <p><input checked="" type="checkbox"/> New Plan</p>	<p><b>Milestone Markers</b></p> <p>All ▼</p>	<p><b>Compare to:</b></p> <p><input type="checkbox"/> Goal</p> <p><input type="checkbox"/> Contracted</p> <p><input type="checkbox"/> New Plan at Project End</p> <p><input type="checkbox"/> Original Plan at Project End</p> <p><input checked="" type="checkbox"/> Original Plan</p> <p><input type="checkbox"/> New Plan</p>
--	--	--	--



First Chart of Important Measurements	
Latest Data Date: 02/15/21	
<b>Date: 09/18/20</b>	<b>Current: 0 sites</b>
Goal --- 24 units	-24 vs. Goal
Plan --- Mean: 6 ● Range: 10%: 1 90%: 9	-6 v. Plan
New Plan --- Mean: -- ● Range: 10%: -- 90%: --	--

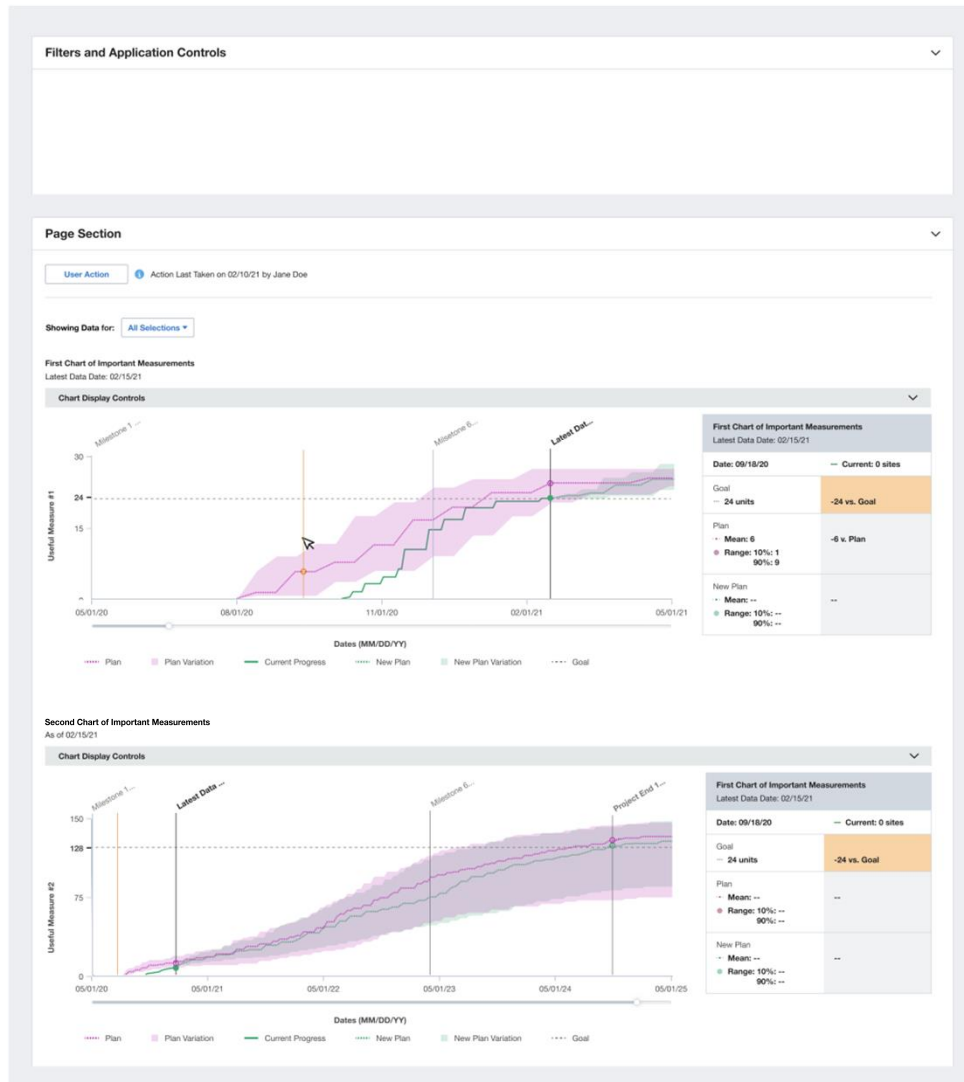
# Case Study

## Shared & Collapsible chart controls



# Case Study

& Filters, customer configurations, and other system controls





# Questions to Ask

Things to think about when designing a new chart or function

Does the user really need this functionality? How often, and how critical is it?

What does the user need to see, and when?

Does the user understand how to read the chart? Can annotations help with that?

Can we set smart defaults and let the user choose what they need?

Can we move complex or contextual controls out of the chart?

Are there functions that should be shared between charts?

How does the chart respond to changes in data?

Will the chart context change based on temporary application states (filters, etc.)?

Will the chart display be the same for all clients? Is it used in more than one place?

How will the chart use case grow & adapt over time?

# Takeaways

A few parting thoughts on designing chart ecosystems

The “right chart” entirely depends on the user, the context, and the specific task.

The chart is only a tiny part of the broader ecosystem, and needs to function within its context.

In general, the chart itself should be as simple as possible. Auxiliary functions and controls should be handled by the interface.

Always look for the minimal amount of complexity that will get the job done. Add as much control as necessary — and no more.

“Intuitive” is always a matter of context, and of task.

# Want to learn more?



[www.datavisualizationsociety.com](http://www.datavisualizationsociety.com)

- **Slack Group: 14,000+ members, 70+ channels**
- **Nightingale Publication**
- **Tutorials, Fireside chats, Office hours with experts, and more!**

# Keep in touch!



**@EricaGunn**

Data Visualization Society Slack

[www.ericagunn.com](http://www.ericagunn.com)

*Slides are at <http://ericagunn.com/community/>*