Easy Data Discovery with Smart Data Transitions

Data Animations and Transitions

What does your data communicate? Can you see the correlations and insights hiding in your data? Visual analytics tools that let you explore data, rather than simply view it, result in a better understanding of the underlying data as well as providing opportunities for deeper insights. Smooth, animated data transitions makes interactive data analysis and visualization even easier, allowing users to easily follow data changes and quickly see data correlations and trends.

In their visualization study, "Animated Transitions in Statistical Data Graphics," Jeffrey Heer and George G. Robertson of the University of California, Berkeley (2007) conducted two controlled experiments to assess the efficacy of animated transitions. They found that participants significantly preferred animation over static transitions and that appropriately designed animated transitions significantly improve graphical perception of analysis. Their study provides strong evidence that, "with careful design, animated transitions can improve graphical perception of changes between statistical data graphics." In their study they noted that, "overall, subjects were highly enthusiastic about animated data graphics, and felt that it facilitated both improved understanding and increased engagement. The vast majority of participants wanted to use animated data graphics in their own analysis and presentation."

Data Discovery and Animation in Data Visualization

Data discovery allows you to quickly and easily analyze your data in a meaningful way. Data discovery is typically easier when the data is visualized (rather than when the data is in a tabular display, row by row). The discovery process is powered by interactions such as filter, sort, drill-down/up, zoom, etc. These interactions help you to understand how the data behaves under different scenarios and ultimately enables you to gain insight and draw some conclusions.

Data animations enable you to easily convey changes over time or the transitions between states and help to show a full data process and path where it is difficult to express with static graphics or text alone. The concept of data animation has been known for a while in the data visualization space but is often used only for the sake of making the data visualization look a bit more visually appealing ("sexy") rather than contributing to the data discovery process. Oftentimes, users would like to make sure that gauge needles can be animated just because it looks "cool." Often after they start using the animation on the visualizations they "get tired" of those animations as the "cool" effect is not as exciting as it was at first; now it's just a waste of time as they need to wait until the animation is done loading the data so they can see the actual data value. The data transitions in Dundas BI are designed to allow the user to comprehend each type of change made to a visualization when the data changes. These real-time, animated changes are readily visible, greatly enhancing data analysis. Dundas BI data transitions ensure that users quickly understand the relationship between the current and previous views without effort, see trends more easily, and present their data more effectively.

> "Data transitions can readily support your data discovery by helping you better understand the effect of the interaction you applied to your data."

Data discovery becomes much smarter with animations and transition changes added to your data visualization, including

- Change the axes of the chart
- Reorder the data or filter the data
- Change the data or re-visualize the data

Each data transition is independent and allows users to explore and interact for an in-depth data discovery and analysis.

Dundas BI features a canvas-like environment where users can drag and drop measures, dimensions, or predefined metric sets and then customize for discovery. The visual discovery environment within Dundas BI includes an intuitive drag-and-drop dashboard designer to provide visual data discovery. To make visualizations more immediately explorable, the "Re-visualize" button and visualizations menu in Dundas BI provides the ability for users to sort, filter, and drill up and down, with best-practice animations that visually show the user the impact of changing dimensions within visualization outputs.

How Data Transitions Enable Data Discovery

> “A good data visualization will let you interact directly with that data, drill down into its details, see it from multiple perspectives, and draw your own conclusions.”

At Dundas we believe that data transitions, if applied correctly can do much more than just add cool effects to your data visualizations. Data transitions can readily support your data discovery by helping you better understand the effect of the interaction you applied to your data. A well-known example is the illustration by Hans Rosling of “200 Years That Changed the World.” In this example, Rosling uses interactive animations to visualize how all the countries of the world have developed since 1809, showing the change in life expectancy and income per person over the last two centuries. Rosling demonstrates how moving the data points over time can help the user better understand the trend changes that may be too complex to spot compared to a single image or a series of static images. See 200 Countries, 200 Years, 4 Minutes.

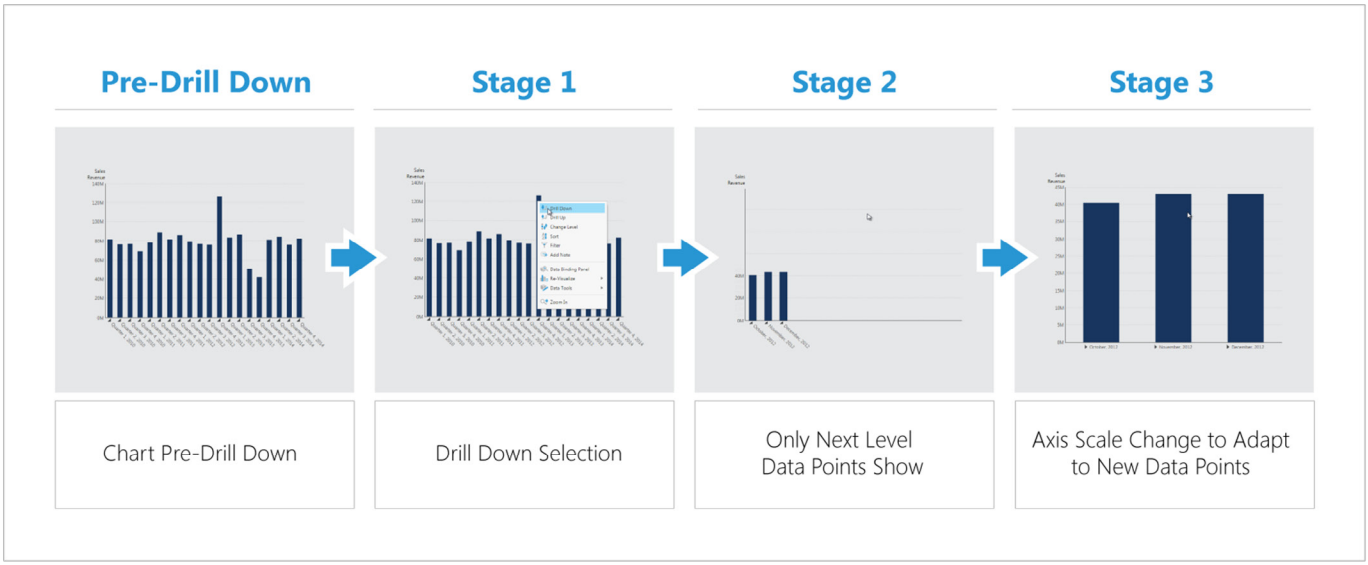
Data Transitions in Dundas BI

In Dundas BI, transitions are built-in and designed to easily allow the user to identify and comprehend each type of change made to a visualization when the data changes. Data transitions are applied by default on any data interaction users may apply. Each interaction will drive a transition that helps the user better understand the data changes he/she just triggered, for example, a drill down. A drill down breaks the data into distinct categories. For example, when the user selects a certain time period and point showing data at the quarter level and wants to drill down to see the data at the month level, instead of having the chart show the data across all the months of the selected quarter at once or using a random animation, Dundas BI chart is using smart transition that will display the changes to the user in stages:

Stage 1: The user notices that higher number in the third quarter and wants to drill down into it to break it down.

Stage 2: The user will notice the data points change by having all the non-selected quarter data points disappear and having the selected quarter data point split into 3 different points (one for each month of that quarter). This helps the user notice what the selected data points represent (in this case 3 different months).

Stage 3: The axis range will now change to reflect the appropriate range of the new data points (the 3 months). This is important as the user may start by viewing data at the one level that could, for example, range in the millions and then drill down into another level that ranges in the thousands. Having the transition done in stages rather than at once will help the user notice the range change and better grasp the magnitude of the data points.



Similar concepts apply for other data interactions:

Drill Up—The data points will be joined to form one data point that reflects the level change and appropriate grouping at the new level.

Sorting—The data point movements are staggered or spread out slightly to allow the eyes a better chance to follow each movement.

Filtering a Trend—Newly added data points will show in order to reflect the trend changes over time.

Re-visualizing from a Stacked Bar to a Side-by-side Bar Chart—The stacked bars will split up into the different series but keep the grouping cluster, helping support the user's understanding of the different series and the overall group they belong to.

Visual encoding such as shape, color, and size can be used to visually differentiate data dimensions. It's important that users clearly understand why a change is happening, and what is changing, so that the data transition is easily followed and data discovery is enhanced.

Benefits of Animated Data Transitions

- Improves perception of changes between statistical data graphics
- Helps tell the story of data changes through time in a meaningful way
- Improves user interaction and understanding
- Enhances visual presentation and communication of the cause-and-effect relationships

A good data visualization will let you interact directly with that data, drill down into its details, see it from multiple perspectives, and draw your own conclusions. Interactive visualizations offer different ways to segment, filter, zoom, aggregate, analyze, and extract the data; they make it possible to view the data set from different perspectives or scales simultaneously.

"In a visualization, animation might help a viewer work through the logic behind an idea by showing the intermediate steps and transitions, or show how data collected over time changes. A moving image might offer a fresh perspective, or invite users to look deeper into the data presented" according to Danyel Fisher in *Animation for Visualization: Opportunities and Drawbacks*.

Built-in transitions, like in Dundas BI, provide the exploring user a better understanding of the data when conducting data discovery. They help explain a point vividly and dramatically. The user clearly sees what is transforming without having to think about it. The eyes will just follow the changes, helping the mind better identify the true impact of your data interactions and resulting data values.

Dundas BI's powerful visualization capabilities include best-practice animations and data transitions to illustrate how data changes as metrics and dimensions are adjusted. With these built-in data analytics tools along with the ability to easily design and customize interactive data visualizations, dashboards, and reports, users are empowered to analyze, collaborate, and present their data, information, and results more thoroughly, effectively gaining deeper insight, and, ultimately, improving business performance.

About Dundas

Dundas Data Visualization is a leading, global provider of Business Intelligence (BI) and Data Visualization solutions. Dundas offers easy to use self-service, single BI experience allowing users to connect, interact and visualize powerful dashboards, reports and advanced data analytics for any data, on any device. Our flexible BI platform is fully supported by a consultative and best practice solutions approach. For over 20 years, Dundas has been helping organizations discover deeper insights faster, make better decisions and achieve greater success. www.dundas.com