Designing great dashboards

Useful tips from Data Visualization & Information Architecture

Why this slidedeck?

After reading many useful papers and online resources on the topic of dashboards design, I realised I didn't have a single document collecting and organising all of the useful ideas I encountered. So the purpose of this slidedeck is to serve as a (work-in-progress) handbook a dashboards developer can get back to, in order to find inspiration, advice, and maybe, even endorsement. Use at your own risk!

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Outline

What are great dashboards like?

1. They are intuitive
2. They have clear goals
3. They follow information architecture principles
4. They leverage the strengths of data visualizations

Great dashboards are clear and intuitive

- They communicate information quickly
  - They display information clearly and efficiently
- Data is prioritized
  - All essential information is immediately accessible
- Information is displayed in a visual hierarchy
  - The design provides a coherent overview that includes sparse, clear initial data with additional opportunities to drill down for more

Great dashboards have clear goals

What kind of dashboard are you trying to create? Who is it for?

For example:

- **Analytical** dashboards: Identify trends to drive long-term decisions
- **Strategic** dashboards: focus on long-term key organizational performance indicators
- **Operational** dashboard: focus on what's happening now, tracking shorter timeframes for time-sensitive tasks and operational processes

Great dashboards follow information architecture principles

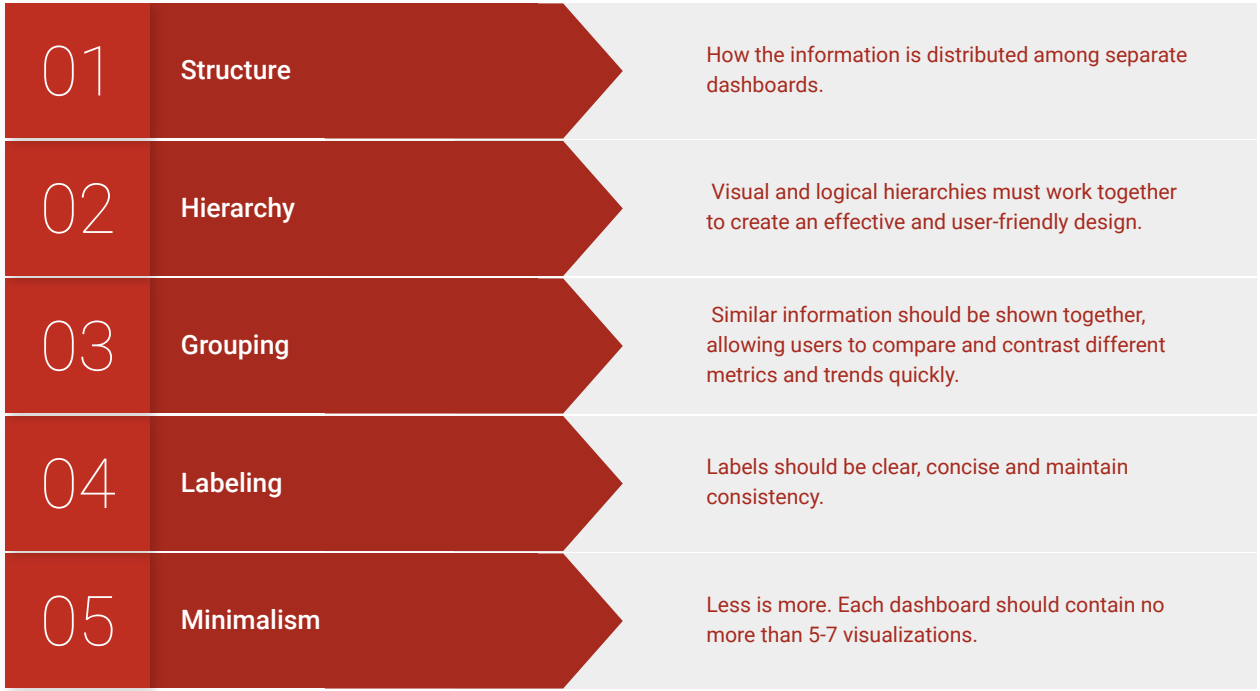
1. **Structure**. How the information is distributed among separate dashboards.
2. **Hierarchy**. Visual and logical hierarchies must work together to create an effective and user-friendly design.
3. **Grouping**. Similar information should be shown together, allowing users to compare and contrast different metrics and trends quickly.
4. **Labeling**. Labels should be clear, concise and maintain consistency.
5. **Minimalism**. Less is more. Each dashboard should contain no more than 5-7 visualizations.

Great dashboards leverage the strengths of data visualizations

1. Provide an ability to comprehend huge amounts of data
2. Reduce visual search time
3. Provide a better understanding of a complex data set
4. Reveal relations otherwise not noticed
5. Enable a data set to be seen from several perspectives simultaneously

APPENDIX 1

Key principles from Information Architecture

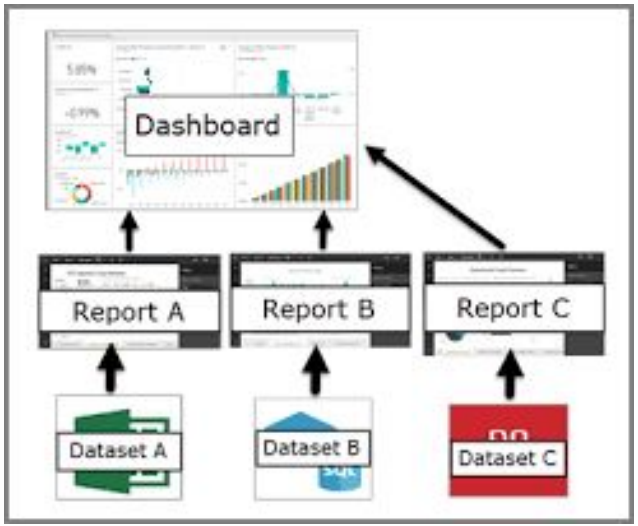


1. Structure

Creating a map of the structure of your dashboard application is key.

Multiple pages. Dividing information between different dashboards allows users to focus on a specific set of data or metrics and helps avoid overwhelming the users by dumping all the information at once on them.

Width and breadth of the information. A good structure allows users to grasp the available width of the information first, and then it allows users to focus on the area of interest and get into the depth of the information.

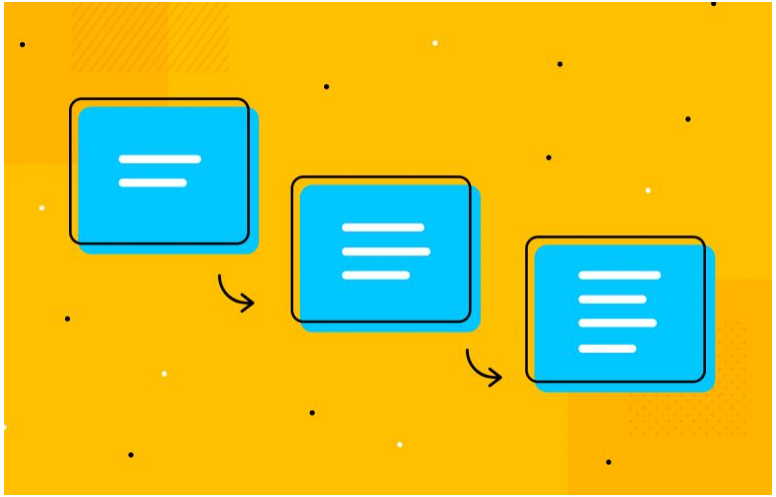


1. Structure technique: progressive disclosure

Progressive disclosure is a technique used to maintain a user's attention by **reducing clutter**.

Creating a system of progressive disclosure assists in creating a user-centric environment, which helps **prioritize user attention, avoid mistakes, and save time**. It also allows users to focus on the key features that matter to them and not be forced to go through all of the features—including the ones they don't need or are not interested in.

> Progressive disclosure defers advanced or rarely used features to a secondary screen, making applications easier to learn and less error-prone. – Jakob Nielsen



2. Hierarchy

Logical hierarchy. The organization and arrangement of information based on its significance or importance.

Visual hierarchy. The arrangement of elements on a dashboard that guides the user's attention through the most important elements on the page.

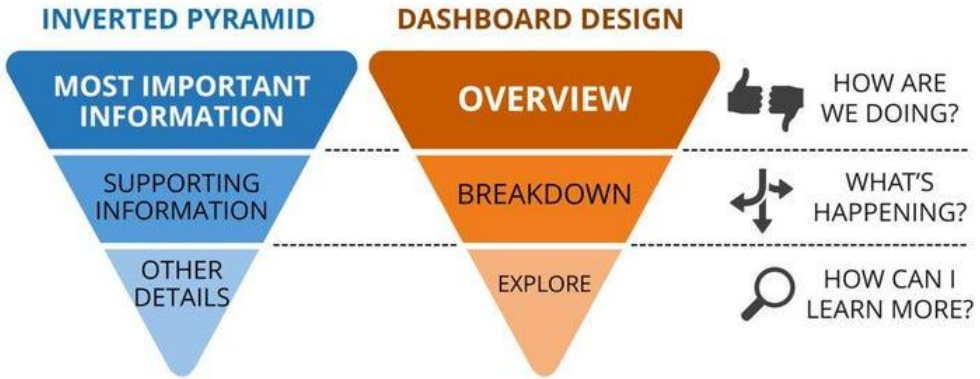
Visual and logical hierarchies must work together to allows users to quickly and easily identify the most important information and explore more details as needed.



2. Hierarchy: Logical

The **inverted pyramid** principle.

- Top-level overview that shows key metrics and trends
- A breakdown of these metrics with supporting information
- Detailed explanations that provide the ability to explore information further and elsewhere.



Present the essential data first while allowing access to more detailed data.

2. Hierarchy: Visual

It is determined by the **size**, **color**, **position**, and other visual characteristics of the elements.

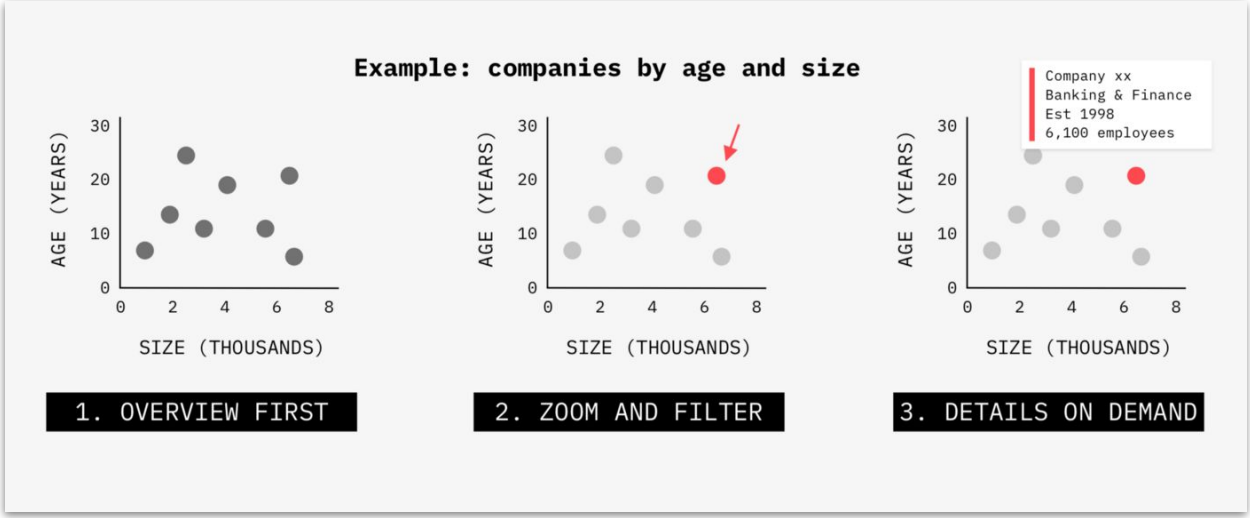
Lower-priority and infrequently-changing information should be placed towards the bottom region of the dashboard.

We know from usability studies that our eyes generally start at the **top-left region** of the page. As we read the contents of the screen, our eyes move from left to right. A good dashboard design takes advantage of this natural reading pattern.



2. Hierarchy technique: Overview, Zoom-in, Details on Demand

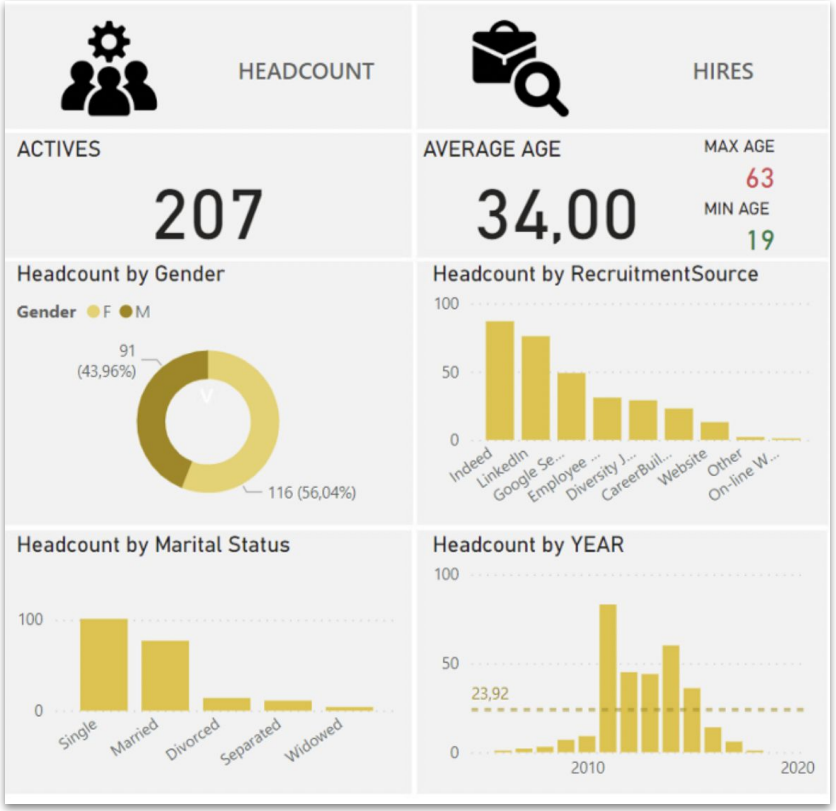
Ben Shneiderman at the University of Maryland proposed a mantra to characterize how users interact with the visualization of a large amount of information



3. Grouping

Grouping related information helps users understand and **discover connections** within them.

Pitfall: similar-looking dashboard components might unintentionally suggest relationships that don't actually exist in the data. E.g. the sameness of colors suggests there's a shared meaning among the dashboard components, even when there is not!



4. Labeling

Labels must be **clear**, **concise**, and **consistent** throughout the dashboard pages.

Avoid abbreviations and technical terms, as they can be confusing for users.

Labeling helps users to **understand** and **interpret** the data displayed and provide the **context**. With clear labels, users can easily find the information they are looking for, and they are able to quickly parse through the different sections of the dashboard.

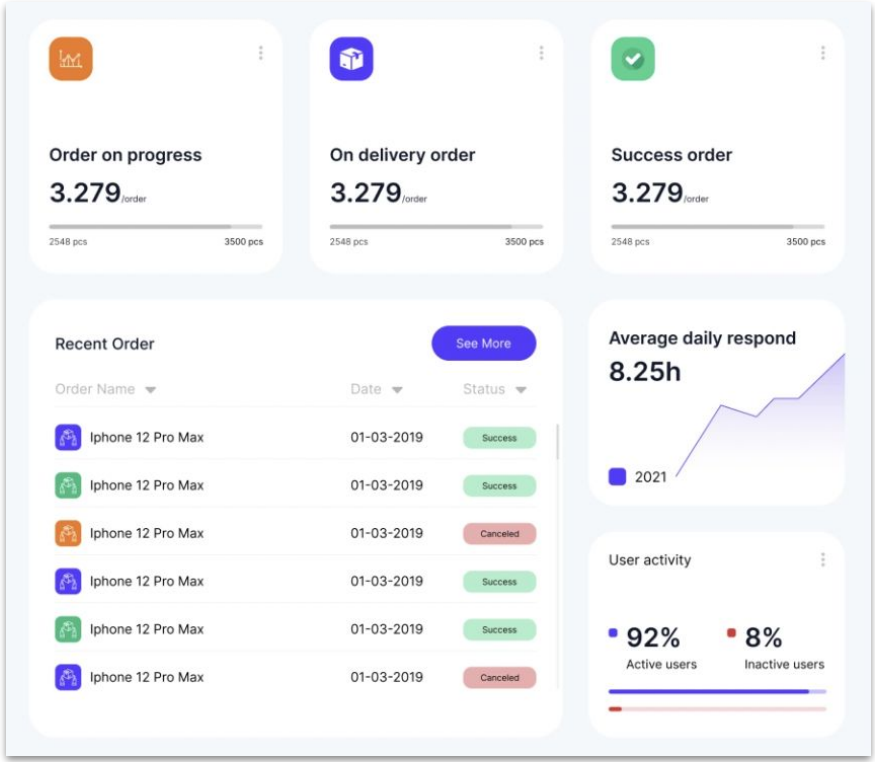


5. Minimalism

Less is more. Each dashboard should contain no more than 5-9 visualizations.

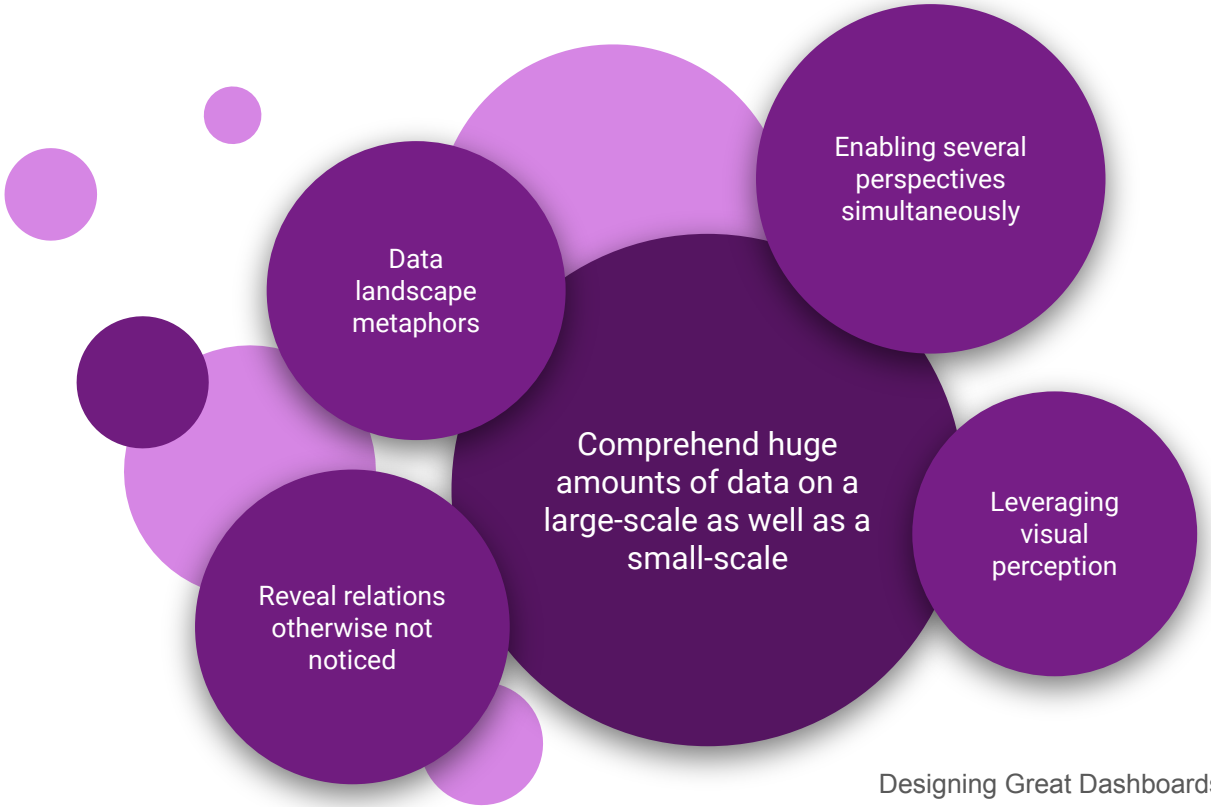
If you have more to say, use different pages.

Cognitive psychology tells us that the human brain can only comprehend around 7+-2 images in one time — this is the number of items you want in your dashboard. More than that just translates into clutter and visual noise that distracts and detracts from the dashboard's intended purpose.



APPENDIX 2

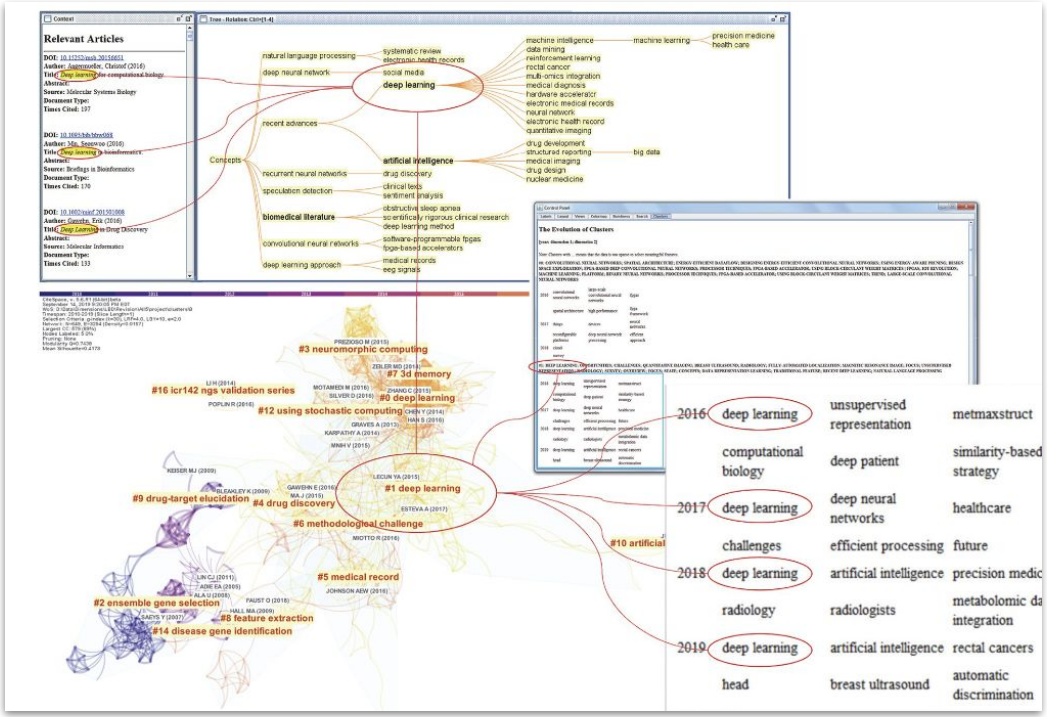
Key principles from Data Visualization



1. Present data on a large-scale as well as a small-scale

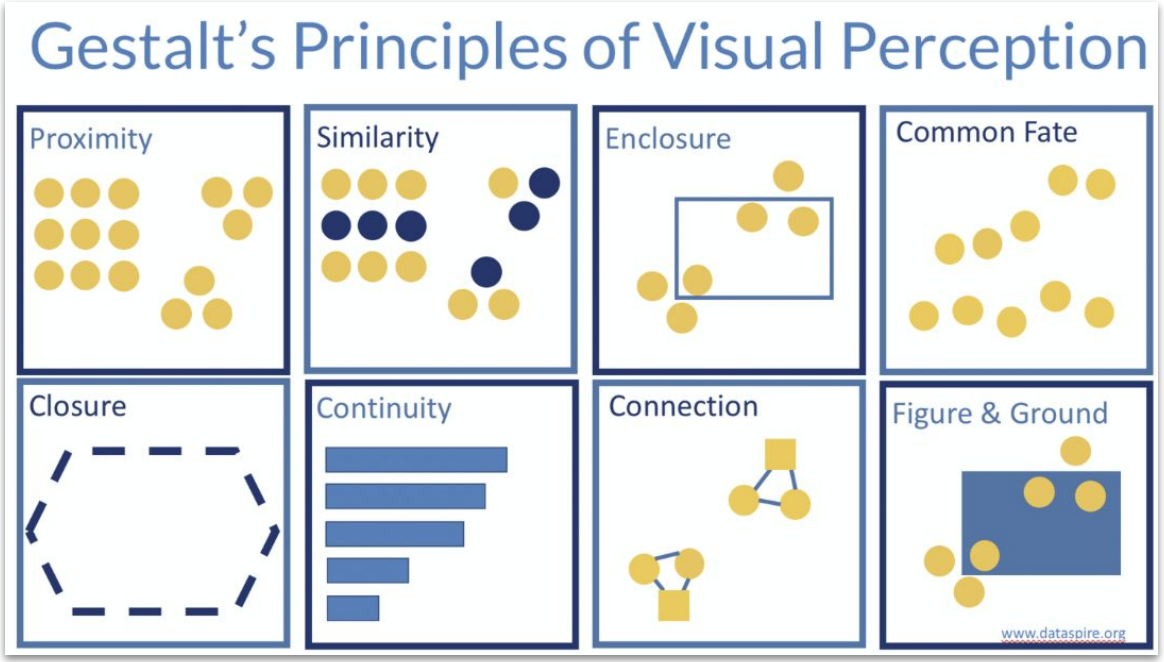
Users want to see the **big picture**, as well as **zooming in** in a dataset and navigate through individual records.

This is particularly effective when working with large datasets.



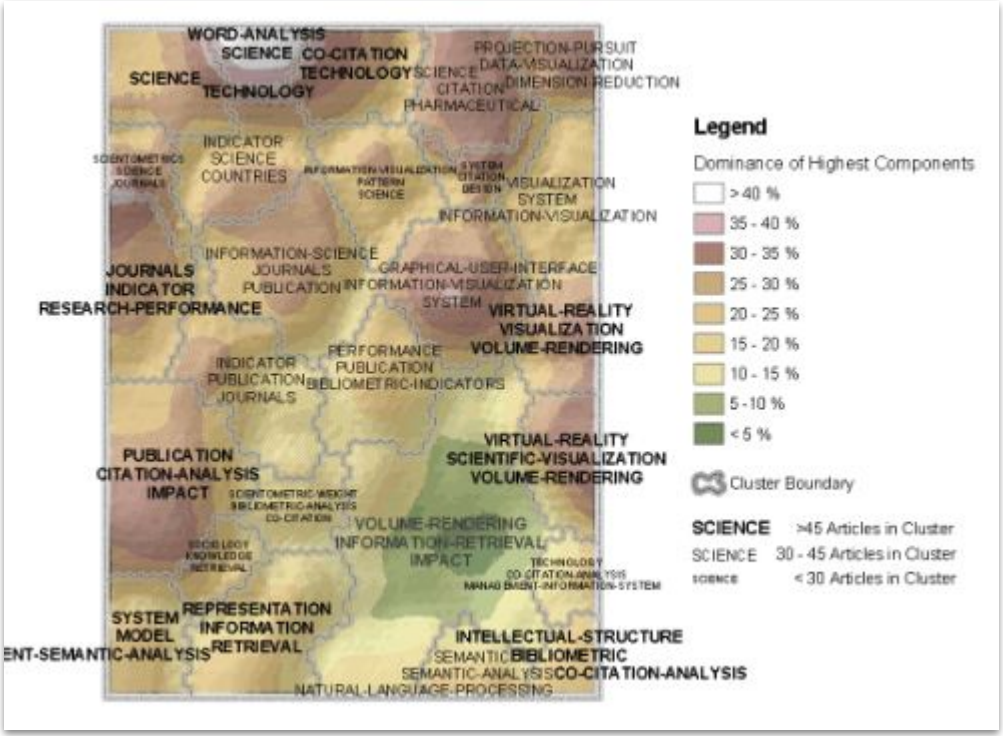
2. Leveraging visual perception

A key element of any successful visualization is to exploit visual perception principles, to reduce **visual search** time.



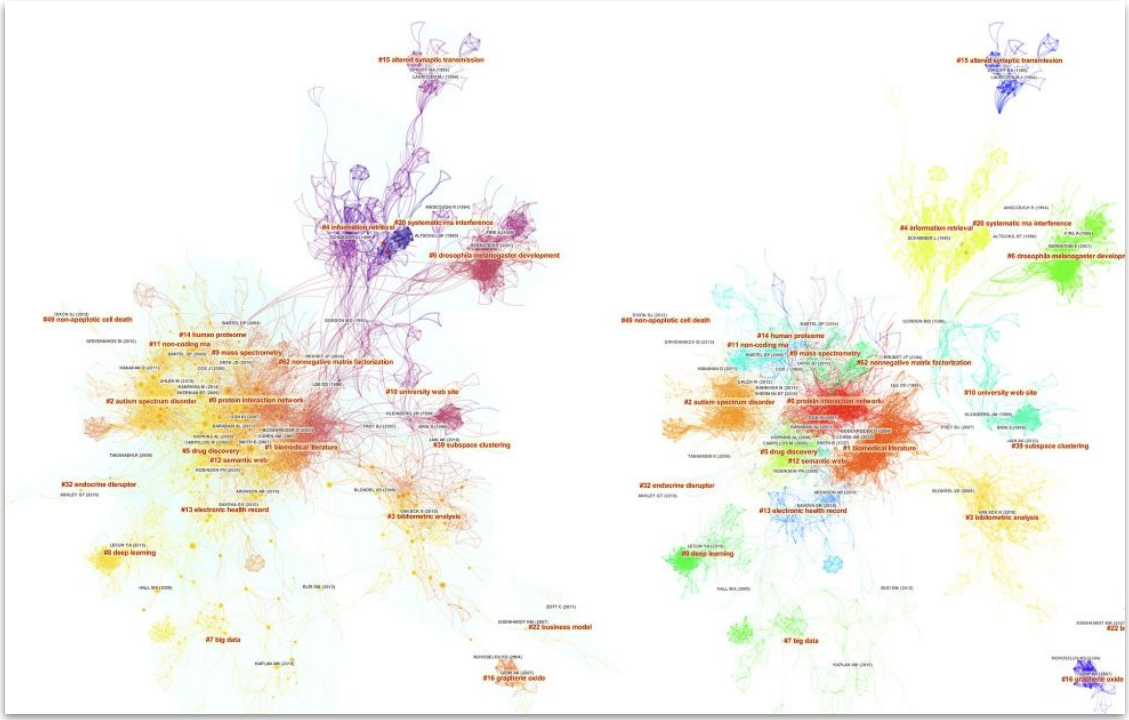
3. Data landscape metaphors

Provide a better understanding of a complex data set by exploiting familiar landscape metaphors.



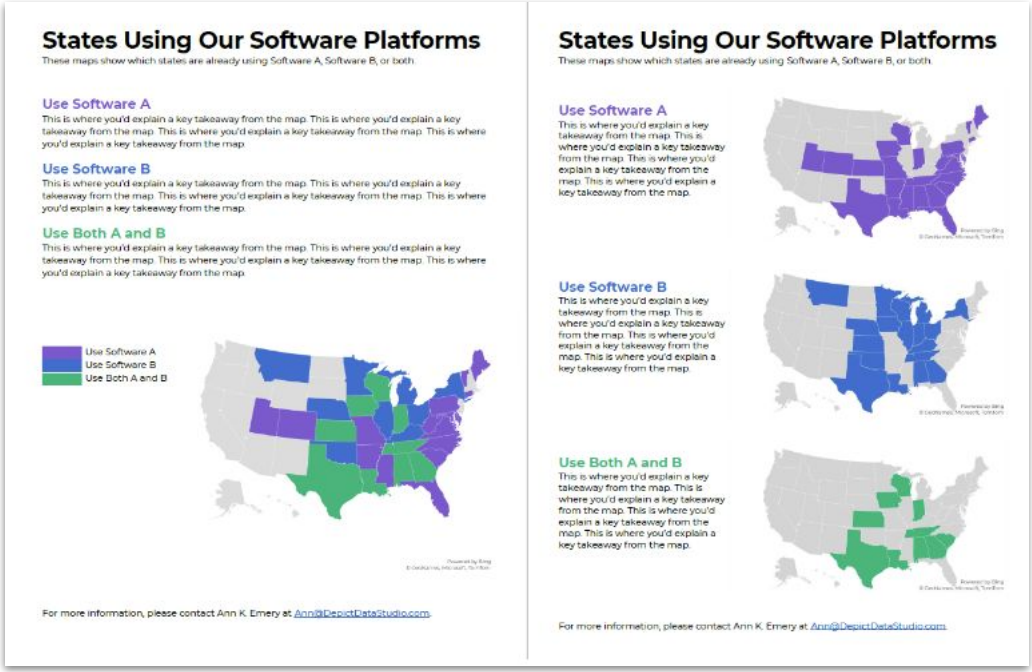
4. Revealing relations otherwise not noticed

By exploiting perception of **emergent** properties at the macro level.



5. Support several perspectives simultaneously

Multiple representations of the same information make it possible to compare and generate different insights from the same data set.



ONLINE RESOURCES

1. https://www.toptal.com/designers/data-visualization/dashboard-design-best-practices
2. https://medium.com/gooddata-developers/six-principles-of-dashboards-information-architecture-5487d84c20c4
3. https://www.nngroup.com/articles/dashboards-preattentive/
4. Börner, Chen, and Boyack. n.d. “Visualizing Knowledge Domains.” Annual Review of Information Science and Technology. https://cns.iu.edu/docs/publications/2003-borner-arist.pdf
5. Chen, Chaomei, and Min Song. 2019. “Visualizing a Field of Research: A Methodology of Systematic Scientometric Reviews.” PloS One 14 (10): e0223994
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7. https://medium.com/gooddata-developers/six-principles-of-dashboards-information-architecture-5487d84c20c4
8. https://www.toptal.com/designers/data-visualization/dashboard-design-best-practices
9. https://www.nngroup.com/articles/progressive-disclosure/
10. https://www.webfx.com/blog/web-design/design-strategies-for-information-dashboards/

Questions / feedback

Let me know..