

Figure 4.2
The “Making Visible the Invisible” commission at Seattle Central Library (from “Fast Facts: George Legrady Artwork at the Seattle Public Library’s Central Library,” Seattle Public Library, accessed September 26, 2016, https://www.spl.org/Documents/branch/CEN/georgelegrady_art.pdf).

Visualization Infrastructures to Support Data Understanding

The second real-world case study comes from Seattle Central Library’s well-known project “Making Visible the Invisible.”³ In this project, a large, open 19,500-square-foot space was dedicated to information retrieval and publicly accessible computer research. Six large LCD screens were installed horizontally behind the librarians’ main information desk, featuring real-time calculated visualizations generated by custom-designed statistical software using data received each hour. This data consists of a list of checked-out items including books, DVDs, CDs, and so on, and visualizations are created using the collective aggregate data. These visualizations serve several important purposes. First, the flow of information can be calculated mathematically, analyzed statistically, and represented visually to showcase the circulation scenarios of the collections in the library. From a community-serving perspective, these visualization snapshots are good indicators of what the community of patrons considers interesting and useful information at any given point in time. Figure 4.2 shows an example of how information visualization was used to reveal checkout patterns from the Seattle Central Library.

Infographics to Deliver Library Messages

The third real-world application of information visualization applied to a library setting has played an important role in promoting library events and activities and has showed how information visualization can be used to deliver library messages. Figure 4.3 is one of the most widely discussed infographics in the library field—the most controversial books infographics. For example, the *Daily Infographic* features this infographic in its blog post on “the best information

design and data visualization from the Internet.”⁴ Its focus is the display of the most controversial books of 2009. This infographic uses different colored darts to distinguish why books have been challenged by parents. These reasons include if the text contains nudity, offensive language, drugs, homosexuality, suicide, sexism, violence, is sexually explicit, unsuited to the age group, anti-family, or against someone’s religious viewpoint. As shown in figure 4.3, most of the books were challenged for more than one reason. Some interesting facts can be drawn from the infographic. For example, according to the infographic, in 2009, whether *To Kill a Mockingbird* handled racism appropriately or not remained a debate. The popular vampire series *Twilight* could not dodge the censorship bullet either, as parents felt it was both unsuited to its target age group and sexually explicit.

Information Visualization for Storytelling

In another powerful example, we see how information visualization can be used for storytelling and to engage users. Figure 4.4 demonstrates how the storytelling concept can be enhanced through information visualization, as presented by Manav Tanneeru and Toni Pashley from CNN.com at the VisWeek 2010 workshop “Telling Stories with Data.”⁵ The figure shows the Home and Away project from CNN.com, which presents military casualties in Iraq and Afghanistan.⁶ The visualization tool connects the locations of each trooper’s birth and death, along with some demographic information. It uses the circles to represent each location. When you hover over a circle with your mouse, it either displays the number of casualties that took place at that location or shows the name of the deceased and highlights the location on the map where they passed away. Further, the visualization is integrated with CNN’s iReport platform,

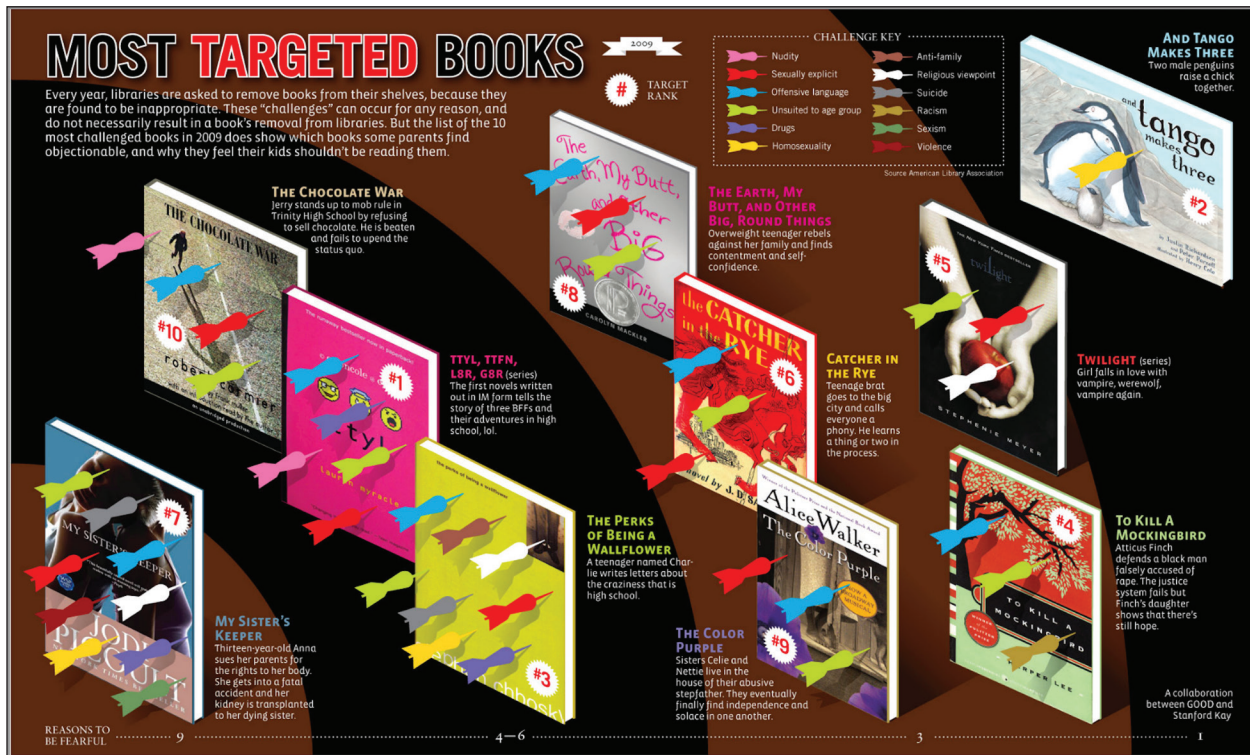


Figure 4.3 Infographic for “The Most Controversial Books in America” (from Stanford Kay, “Transparency: The Most Controversial Books in America,” GOOD, last modified May 6, 2010, <https://www.good.is/infographics/transparency-the-most-controversial-books-in-america>).

allowing family and friends of the deceased to tell their personal stories. In this instance, information visualization is used not only as a tool for discovery and data analysis but also as a powerful medium for communication. Clearly, and in a compelling manner, this example shows that information graphics can do more than just present numbers. They offer a medium for individuals to tell their story, engage and convince their readers, and invite them to make a personal connection to the data. This example brings insights into how a library might use its data to connect and engage with the community more effectively by encouraging its patrons to share their stories and experiences with the library through the use of information visualization.

Information Visualization for Library Data Assessment

Information visualization can also be used for data assessment. Recent research has shown how information visualization could be adopted for library decision making through visualizing library assessment data. For example, Sarah Murphy’s work at Ohio State University has been significant in highlighting data assessment.⁷ Murphy shared examples of

incorporating information visualization into the Ohio State University Libraries’ assessment program. In particular, information visualization applications are shown to be used to assess libraries through the metrics of ARL ranking, daily gate count, research services, and many more.

Information Visualization for Libraries: The Research Perspectives

So far, several real-world use cases of information visualization applications in the library setting have been shown. Much of the research discussed in earlier chapters on information visualization in libraries focused on how it could enhance the interface and user environment, thereby improving activities and user experiences.⁸ The research discussed in this chapter is significant because it indicates how information visualization can improve the services that a library offers and the evolution of these improvements through the years. Over the past years, several researchers have attempted to understand how implementing information visualization can help libraries enhance their performance and serve their patrons better. One such attempt was made by Zachary Pousman, John Stasko, and Michael Mateas.⁹ The authors state that the use of visualization



Figure 4.4
 CNN.com's Home and Away Visualization (from "Casualties," CNN, accessed October 25, 2016, www.cnn.com/SPECIALS/war.casualties).

models provides amplified cognition as well as deep insights for expert user populations. Further support for this conclusion is documented in another study conducted by Tanja Mercun and Maja Zumer.¹⁰ This study stipulates that information visualization presents an interactive mechanism for browsing, exploring, and analyzing. The authors further state that these features of information visualization increase people's ability to perform these activities, which in turn helps people to reason from large amounts of information, build new knowledge, and discover and better understand relationships and information space. Mickey Garrison and his peers at Ferris State University published a summary of the benefits of information visualization.¹¹ According to them, information visualization helps users focus on information that matters the most to them. It extends beyond this as well, also helping users to see patterns, make connections, and draw conclusions from the data. The authors add that information visualization makes the data accessible to all users and not just those who possess advanced analytic skills.

Throughout much of this content, it's been noted that data visualization helps the human brain to process data faster and more effectively than text-based information. This feature of data visualization has helped it grow in popularity, now becoming mainstream to many individuals in the professional and academic communities. It enhances the ability to comprehend and process large-scale heterogeneous collections of data, such as those held by libraries. For example, previous research stated that the different layers of information that libraries contain mainly

make it difficult for users to comprehend data.¹² This research also mentioned that the layered information presented by the data, such as heterogeneous collections, adds a risk of getting lost in the details and generalities of the data. However, information visualization or visualizations of libraries can greatly reduce this confusion by enabling the data to be viewed and interpreted at different granularity levels.¹³

To further expand on the perspective of how information visualization helps enhance user experiences, researchers Jeremy Buhler, Rachel Lewellen, and Sarah Murphy stated that information visualization can help libraries produce flexible, in-depth, online dashboards.¹⁴ Additionally, they stated that these dashboards are full of filters and annotations that provide custom visualizations and context. They also mentioned that with the help of information visualization, libraries can blend data from a large number of sources and create dynamic, interactive graphics. This feature of information visualization, according to the authors, simplifies the process of accessing data and makes data easily available to both a libraries' internal and external stakeholders. This research adds another strong support that shows how information visualization can enhance library services and programs through better connecting with its users, stakeholders, and the overall community.

In Lauren Magnuson's book, she agrees and states that providing raw data and nothing else is just not enough.¹⁵ Magnuson emphasizes that it is important for libraries to present data in a way that is understandable, transparent, and compelling. She adds that

information visualization helps library users understand data better because it provides context, illustrates trends, showcases patterns, and enables interactive exploration of data.

As far as the benefits of data visualization to libraries are concerned, they extend beyond simply reducing the budget to buy materials. The significance of this can be brought to light from the example that Finch and Flenner show in their work. They state that accurate information visualization in libraries provides avenues for staffing and service, resource expenditures, scholarly relationships, and instructional outreach, as well as providing opportunities for robust collection development.¹⁶

The use of information visualization in libraries also aids in ongoing management of different programs, such as a device-lending program. For example, in a study by Joyce Chapman and David Woodbury, the role of information visualization in aiding ongoing management of a device-lending program in a library is examined. The authors found that visualization of data of the device-lending program helped in revealing unrecognized patterns in lending.¹⁷ This feature of information visualization, the authors added, helped the staff of the library to not just make more informed purchasing decisions but also to modify systems and workflows in ways that better met the needs of users.

Conclusion

In order for libraries to stay competitive and remain beneficial to their users, they are now required to understand and invest in information visualization. The benefits of doing so go beyond the budgetary advantages of having less need to purchase resources, such as books, and extend to giving people access to the information they need. Furthermore, the ability to more easily process and interpret data through the use of information visualization is significant in relaying messages and themes and providing an easier-to-understand format to great amounts of information. These progressive, forward-thinking technologies will be essential in paving the way for a stronger future where resources can be shared on a global level as well as extend to even the smallest communities.

Notes

1. Barrie Hayes, Hong Yi, and Andrés Villaveces. "Information Visualization Services in a Library? A Public Health Case Study," *Bulletin of the American Society for Information Science and Technology* 35, no. 5 (2009): 13–18.

2. Ibid.
3. "Fast Facts: George Legrady Artwork at the Seattle Public Library's Central Library," Seattle Public Library, accessed September 26, 2016, https://www.spl.org/Documents/branch/CEN/georgelegrady_art.pdf.
4. Quotation from Igor Ovsyannykov, "Informative Infographic and Data Visualization Websites," under "15. Daily Infographic," Inspirationfeed, December 6, 2011, <http://inspirationfeed.com/inspiration/illustrations/informative-infographic-and-data-visualization-websites/2>; infographic from Stanford Kay, "Transparency: The Most Controversial Books in America," GOOD, last modified May 6, 2010, <https://www.good.is/infographics/transparency-the-most-controversial-books-in-america>.
5. Nathan Yau, "Telling Stories with Data, a VisWeek 2010 Workshop," FlowingData, November 11, 2010, <https://flowingdata.com/2010/11/11/telling-stories-with-data-a-visweek-2010-workshop>.
6. "Casualties," CNN, accessed October 25, 2016, www.cnn.com/SPECIALS/war.casualties.
7. Sarah Anne Murphy, "Data Visualization and Rapid Analytics: Applying Tableau Desktop to Support Library Decision-Making," *Journal of Web Librarianship* 7, no. 4 (2013): 465–76.
8. Jannette L. Finch and Angela R. Flenner, "Using Data Visualization to Examine an Academic Library Collection," *College and Research Libraries*, forthcoming.
9. Zachary Pousman, John T. Stasko, and Michael Mateas, "Casual Information Visualization: Depictions of Data in Everyday Life," *IEEE Transactions on Visualization and Computer Graphics* 13, no. 6 (2007): 1145–52.
10. Tanja Mercun and Maja Zumer, "Visualizing for Exploration and Discovery," *Information + Visualization*, 2010, <http://infovis.fh-potsdam.de/readings/Mercun2010.pdf>.
11. Mickey Garrison, Deb Holdren, Peg Votta, Rosemary Collins, and Robin Taylor, "Data Use through Visualizations and Narratives," *SLDS Spotlight*, National Center for Education Statistics, March 2013, https://nces.ed.gov/programs/slds/pdf/spotlight_data_use_visualization.pdf.
12. Weijia Xu, Maria Esteve, Suyog D Jain, and Varun Jain, "Interactive Visualization for Curatorial Analysis of Large Digital Collection," *Information Visualization* 13, no. 2 (2014): 159–83.
13. Ibid.
14. Jeremy Buhler, Rachel Lewellen, and Sarah Murphy, "Tableau Unleashed: Visualizing Library Data," *Research Library Issues*, no. 288 (2016): 21–36.
15. Lauren Magnuson, *Data Visualization: A Guide to Visual Storytelling for Libraries* (Summit, PA: Rowman & Littlefield, 2016).
16. Finch and Flenner, "Using Data Visualization."
17. Joyce Chapman and David Woodbury, "Leveraging Quantitative Data to Improve a Device-Lending Program," *Library Hi Tech* 30, no. 2 (2012): 210–34.