


# The visualization of public information: Describing the use of narrative infographics by U.S. municipal governments

Public Policy and Administration  
2022, Vol. 0(0) 1–24  
© The Author(s) 2022  
Article reuse guidelines:  
[sagepub.com/journals-permissions](https://sagepub.com/journals-permissions)  
DOI: 10.1177/09520767221140954  
[journals.sagepub.com/home/ppa](https://journals.sagepub.com/home/ppa)  


**Stephanie Dailey**

Department of Communication Studies, Texas State University, San Marcos, TX, USA

**Briana Gilmore and Nandhini Rangarajan\*** 

Department of Political Science, Texas State University, San Marcos, TX, USA

## Abstract

Narrative infographics present information in a visual, easy-to-understand format and are organized such that the information conveys a story. Public administrators are increasingly using narrative infographics to disseminate information, yet research has yet to investigate exactly how this technological form of storytelling is being used. To fill this gap, we use narrative theory to guide our exploration to uncover how U.S. municipal governments are using narrative infographics. We analyzed 322 infographics using visual content analysis, coding each infographic by government function, policy area, usability factor, and narrative elements. Our research shows that narrative infographics are widely used at the municipal level, most notably for informing the public about various issues but more specifically for communicating information about planning, evaluation and risk. Public health and safety were most frequently addressed by municipal government infographics. Furthermore, we discuss implications of this research for public affairs research, education and practice.

## Keywords

Data visualization, municipal governments, narrative infographics, U.S. cities

---

\*All authors contributed equally to this paper.

## Corresponding author:

Nandhini Rangarajan, UAC 351, Department of Political Science, Texas State University, 601 University Drive, San Marcos, TX 78666, USA.

Email: [nr11@txstate.edu](mailto:nr11@txstate.edu)

## Introduction

As stewards of the public good, government entities have an important responsibility to inform, educate, and engage citizens. Information asymmetry naturally exists between the government and public (Piotrowski and Van Ryzin, 2007). Accessible provision of information by the government and effective dissemination of communication to its citizens is a way to make the relationship more equitable and enhance governmental transparency (Matheus and Janssen, 2020; Piotrowski and Van Ryzin, 2007). This can lead to legitimacy, greater public trust, and confidence in government operations (Armstrong, 2011; Bimber, 1999). With the enactment of “open government” and freedom of information laws, citizens now expect transparency from the government and direct access to public information (Fung, 2013; Lee et al., 2020). Evans and Campos (2013: 172) observe that “if the primary goal of open government is to engage citizens, then current initiatives must be re-evaluated and new approaches explored—shifting beyond data delivery.” They rue the unintended consequences of open government initiatives that burden citizens with the “herculean” task of making sense of data. Open government, they assert, is not just about publication of digitized data but also about efforts aimed at encouraging citizen engagement, participative and collaborative dialogue between policymakers and citizens (p. 173).

In the current study, we explore how government entities can help encourage engagement, participation and collaboration and disseminate public information transparently through *narrative infographics*—images that visually depict information—which have become a progressively more popular and effective way to share complex textual information in a visual, easily understood, and digestible format (Dunlap and Lowenthal, 2016; Smiciklas, 2012). Narrative infographics, which are visually powerful and engaging, facilitate comprehension of important information (Isett and Hicks, 2018). Despite the prevalence of narrative infographics, scholars understand little about how public administrators are using this new communication tool.

## Government-citizen communication

The news media has traditionally served as an intermediary between the government and the public. However, the advent of the Internet has provided a platform for national, state and local governments to communicate directly with constituents (CommGAP, 2009). With governments at different levels facing various crises, government to citizen communication must be an ongoing, engaging, iterative process (Hyland-Wood et al., 2021). In the current study, we focus on municipal government communication, since research demonstrates that “city respondents report communicating more frequently with their primary publics than do federal and county respondents” (Horsley et al., 2010: 284).

City governments use a variety of communication tools to facilitate the dissemination of information to the public, with the Internet being one of the most cost-effective tools available. A visit to one’s municipal government’s Web site would reveal a great deal of information directly relevant to you and your community. There, you may find a recycling, compost, and trash schedule; the latest local crime statistics; information on

community assistance resources; power outage reports; and life-saving public health guidelines during a pandemic. This information can be presented as text, visual graphics, or a blend of both.

Municipal governments can take advantage of online communication methods available to reach citizens, such as by posting information to the city Web site or via social media channels like Facebook or Twitter. In a recent report discussing digital communication for richer community connection, Pandit et al. (2022) observe that there has been a revolution in the way governments communicate with citizens across the world. They suggest that new platforms for communication and engagement, entirely new forms of engagement and the critical need to communicate with, gather input from and build trust with communities have challenged government communication.

Government managers regard information as an important ingredient of accountability (Tippett and Klusers, 2010). Welch and Wong (2001, p.531) find that civil servants who are more active, professional and who view themselves to be legitimate policy makers are more likely to enhance the level of interactivity in government communication which is directly associated with accountability. According to Welch and Wong (2001), “Interactivity represents a fundamental change in the accountability relationship between citizenry and government” (p. 531).

Democratic transparency requires that information should be easily accessible, especially when the information enables citizens to protect themselves against risks to their interests and well-being (Fung, 2013). However, simply making information available to the public is just one notion of transparency; the presentation and organization of that information in such a way that the public can easily understand and interpret it is another important factor (Fung, 2013; Matheus and Janssen, 2020). Research has found that releasing large amounts of textual information can overwhelm citizens and causes higher levels of information overload, which also negatively impacts their perception of a Web site’s usefulness (Lee et al., 2020). They argue that public disclosure policies aimed at providing more information and increasing transparency may not have the desired effects since “citizens may be unable to process and understand all disclosed information and may thus feel information fatigue rather than a sense of transparency (Lee et al. 2020: 2).” Reimagining the presentation of complex textual information is one way to overcome these cognitive barriers and reduce the risk of information overload. Furthermore, when information is shared narratively in story-form, citizens report better understanding, less overload, and feel more compelled to share the information with others (Barbour et al., 2016). Lee et al. (2020: 9) also note that problems such as misinterpretation of information or dilution of information by infomediaries can be mitigated “if the original information provider, the government, is the one visually reconstructing the information.” Furthermore, extrapolating from McCrorie et al’s (2016) observation about health care infographics, a visually oriented approach to governance can help mitigate language and disability barriers thereby helping citizens make informed decisions.

The main objective of this paper, therefore, is to examine and describe the use of infographics by municipal governments. Using a visual content analysis approach, this paper examines a sample of narrative infographics used by municipal governments to describe the different government functions that are served by such narrative

infographics, to describe the policy areas that are served by such narrative infographics and to understand the design factors that contribute to the usability of these narrative infographics. To this end, the paper is organized as follows. First, to better understand the use of narrative infographics in the public sector, we ground our work in narrative theory, which we explain first. Second, we describe the methods used to procure and examine the sample of narrative infographics used in this study. Third, the results of this study are presented in detail followed by a discussion of the findings of this research. Particularly, we discuss the applicability of this research to extant literature on open government, transparent governance and public accountability. We conclude the paper with a discussion of the contributions and limitations of this work and direction for future research.

### *Theoretical focus: The narrative paradigm*

Narrative theory, and in particular, Walter Fisher's (1984) narrative paradigm helps explain the utility of stories for government entities. Fisher refutes the rational world paradigm—the belief that humans make decisions based on data, logic, and facts—with the narrative paradigm, which “holds that humans are storytellers who experience and understand the world as a series of narratives or stories” (Krizek, 2017: 4). In short, our society consists of *homo-narrans*: people who use narratives to make sense of the world and communicate that understanding to others. The narrative paradigm implies that stories and storytelling are the primary way through which people connect facts, comprehend complex environments, and make decisions. As Weick and Browning (1986: 255) explain: “The claim that people make bad decisions because they had bad information may mask the true problem, which is that the information they have is good enough but it is not sufficiently tied together with good reasons and narration so that it can be processed and remembered.” In sum, the narrative paradigm suggests that the best way to communicate and persuade people is through stories: messages with a beginning, middle, and end that “are configured into a temporal unity by means of a plot” (Polkinghorn, 1995: 5).

Research has demonstrated narrative's utility in public policy and affairs messaging. For example, Barbour et al. (2016) tested the effects of narrative versus non-narrative messages for CDC messaging about global public health. The authors report several benefits of using stories in this context. In particular, they found that narratives are more transporting (i.e., immersive) than non-narrative messages, which had strong effects on outcome variables, including more positive perceptions of the Centers for Disease Control (CDC, henceforth) reputation and increased support for the global public health mission.

In other work, Brewer (2021) showed how coalitions use policy narratives to strategically advance their goals. This work underscores the value of narrative elements, like characters, in directing policy issues. Yet scholars still understand little about a specific kind of narrative—the narrative infographic—and its role in disseminating information in the public sector.

## Narrative infographics

An infographic is a form of data visualization that summarizes complex information to tell a condensed, comprehensible story (Huettner, 2014; Siricharoen and Siricharoen, 2015). Infographics (a portmanteau for “information graphic”) often include data visualizations, like charts, graphs, and maps, along with other types of illustrations, text, and narrative elements—such as titles, subtitles, and a conclusion or call-to-action—to tell a story (Huettner, 2014). Segel and Heer (2010) helpfully define narrative infographics as “visualizations intended to convey stories” (p. 1146).

For this reason, infographics are sometimes called “storygraphics” (Otten et al., 2015: 1902). Here we use the term narrative infographics. The story told by an infographic should accurately represent the data, clearly emphasize key points, and detail possible future action (Brigham, 2016; Huettner, 2014). In their analysis of 58 narrative visualizations, Segel and Heer (2010) found several design strategies that support storytelling with data, and highlight the potential application of narrative infographics in “fields ranging across journalism, sports, public policy, and finance” (p. 1140). Scholars contend that well-designed narrative infographics are a “valuable tool to convey key issues of complicated public and policy interest” (Otten et al., 2015: 1903). Like narratives, in general, infographics can overcome various communication barriers such as information overload, time constraints, and literacy challenges, while effectively reducing the information gap between government and the public (Otten et al., 2015). Visuals in infographics can also “improve memory and recall” (Dunlap and Lowenthal, 2016: 44).

Because of these benefits, more government entities are using narrative infographics, and public affairs programs are even teaching students how to create infographics in their courses (Manoharan and Rangarajan, 2022a). Empirical research, however, has been slow to follow. Currently, scholars have summarized information on effective data visualization (Isett and Hicks, 2018) and have created visualization tools (Slingsby et al., 2014), but the goal has primarily been to disseminate information (i.e., research) for public servants, not the general public. Limited research exists that focuses on the use of infographics in the public sector, particularly municipal governments, as a tool to disseminate information to citizens. How can narrative infographics help better inform the public? To fill this gap, this study sought to describe how infographics are used by U.S. city governments, focusing on the 37 U.S. cities with populations that exceed 500,000 individuals, based on U.S. Census Bureau estimates as of 1 July 2019.

## Method

This study uses content analysis to code 322 narrative infographics. Content analysis is one of the most common methods of data collection for descriptive studies that seek to code and categorize data, which researchers employ to make valid inferences about a communicated message, its sender, and even its audience (Weber, 1990: 9). Specifically, this research uses *visual* content analysis to understand the various aspects of the narrative infographics that are produced and shared by municipal governments in the U.S.

In this form of content analysis, “content” refers to the visual units “produced as isolable, self-contained, or separate, like... framed images” (Van Leeuwen and Jewitt, 2001: 15). Content analysis is useful for this study because it can systematically measure the content using quantitative analysis such as simple descriptive statistics, and qualitative analysis to identify common themes in the data (Johnson, 2014). Content analysis classifies content by “reducing it to more relevant, manageable bits of data” (Weber, 1990: 5).

In locating narrative infographics, we chose to focus on cities in the United States with a population over 500,000. The parameter on population was determined based on the direct relationship between city population count and allocation of federal funds (Hotchkiss and Phelan, 2017). Combined with tax revenue collected from a larger population, it can be inferred that the U.S. cities with the largest populations have greater access to the financial and specialized labor resources necessary to develop and curate narrative infographics. In other words, our rationale for focusing on cities with a population of over 500,000 was based on the assumption that cities with more financial and labor resources may be able to invest in the creation of narrative infographics. Table 1 presents the list of 37 U.S. cities that have a population count exceeding 500,000 based on U.S. Census Bureau estimates as of 1 July 2019, as well as the number of infographics that were located for each city.

We collected narrative infographics—the unit of analysis for this research study—by searching each municipal government’s Web site for the term “infographic.” If the search result yielded an infographic that matched the parameters of a “narrative infographic” as defined in the literature review, it was selected to be analyzed as part of the data set. Not every search result of an “infographic” met the definition of our research. A city may have tagged or labeled an item as an infographic, but upon observation of the visual unit, the item was determined to meet the definition of another type of marketing collateral such as a brochure, flyer, or diagram, rather than a narrative infographic, at least for the purposes of this research. Examples of these include a trifold Water Landscape Guide from Sacramento, California; a rainwater harvesting diagram from Tucson, Arizona; and a two-page flyer on affordable housing from a Seattle, Washington councilmember’s office. A total of 1110 search results were reviewed, resulting in a final data set of 322 narrative infographics, collected from the websites of 32 of the 37 cities in the study.

A coding sheet was developed from the literature to analyze the 322 narrative infographics, using both quantitative and qualitative methods to categorize each unit’s purpose, function, usability, and design. The coding sheet (provided in Appendix A) categorizes each infographic based on municipal government function, policy area, infographic usability, and infographic design elements (Brigham, 2016; Huettner, 2014; Mauldin, 2015; Otten et al., 2015; Siricharoen, 2013; Siricharoen and Siricharoen, 2015). Before analyzing the full data set, researchers initially examined 20 randomly selected infographics to vet the coding sheet by coding the infographics and finding consensus on the parameters of a narrative infographic and how it should be coded. This internal procedure resulted in the refinement of the coding sheet and established parameters for coding and analysis. This well-defined and consistently employed coding mechanism was

**Table I.** Sample of U.S. cities in ascending order of population.

City	State	Population	Region (Division)	Number of Infographics
Atlanta	Georgia	506,811	South (South Atlantic)	5
Sacramento	California	513,624	West (Pacific)	6
Mesa	Arizona	518,012	West (Mountain)	4
Fresno	California	531,576	West (Pacific)	0
Tucson	Arizona	548,073	West (Mountain)	3
Albuquerque	New Mexico	560,513	West (Mountain)	2
Milwaukee	Wisconsin	590,157	Midwest (East North Central)	6
Baltimore	Maryland	593,490	South (South Atlantic)	11
Louisville	Kentucky	617,638	South (East South Central)	7
Memphis	Tennessee	651,073	South (East South Central)	2
Las Vegas	Nevada	651,319	West (Mountain)	0
Portland	Oregon	654,741	West (Pacific)	6
Oklahoma City	Oklahoma	655,057	South (West South Central)	0
Detroit	Michigan	670,031	Midwest (East North Central)	7
Nashville	Tennessee	670,820	South (East South Central)	8
El Paso	Texas	681,728	South (West South Central)	13
Boston	Massachusetts	692,600	Northeast (New England)	3
Washington	District of Columbia	705,749	South (South Atlantic)	33
Denver	Colorado	727,211	West (Mountain)	5
Seattle	Washington	753,675	West (Pacific)	23
Indianapolis	Indiana	876,384	Midwest (East North Central)	0
San Francisco	California	881,549	West (Pacific)	20
Charlotte	North Carolina	885,708	South (South Atlantic)	22
Columbus	Ohio	898,553	Midwest (East North Central)	11
Fort Worth	Texas	909,585	South (West South Central)	0
Jacksonville	Florida	911,507	South (South Atlantic)	0
Austin	Texas	978,908	South (West South Central)	7
San Jose	California	1,021,795	West (Pacific)	7
Dallas	Texas	1,343,573	South (West South Central)	18
San Diego	California	1,423,851	West (Pacific)	9
San Antonio	Texas	1,547,253	South (West South Central)	7
Philadelphia	Pennsylvania	1,584,064	Northeast (Middle Atlantic)	21
Phoenix	Arizona	1,680,992	West (Mountain)	14
Houston	Texas	2,320,268	South (West South Central)	2
Chicago	Illinois	2,693,976	Midwest (East North Central)	14
Los Angeles	California	3,979,576	West (Pacific)	5
New York City	New York	8,336,817	Northeast (Middle Atlantic)	21

Source (Cities, Regions and Populations): U.S. Census Bureau.

used to overcome issues relating to both reliability and validity, and to ensure the results are meaningful (Van Leeuwen and Jewitt, 2001).

The analysis of narrative infographics focused specifically on the following five classification criteria: (1) classification by government function with subcategories of government functions such as public information, reporting and dissemination, risk communication, city population demographics, and planning; (2) classification of infographics by policy area; (3) classification of infographics by type of creator; (4) classification of infographics by usability factor; and 5) classification of infographics by design elements. These classification criteria were chosen because they help understand *how* narrative infographics are used by governmental entities, *who* creates these infographics, and *what* specific aspects of infographics in terms of design enhance their usability in municipal government. These dimensions were developed upon extensive review of the government municipal websites. Through observation, these categories were devised from the way that government websites organized information in core functions based on the government's responsibility to inform and educate the public on topics that affect citizen interests such as city projects and initiatives, services, demographics and statistics, as well as various risks to public health and safety that threaten their interests. The section below presents the results of the visual content analysis of narrative infographics organized by these five classification criteria.

## Results

### *Classification by government function*

This study's first set of results pertain to the classification of infographics by government function. We suggest multiple categories of municipal government infographic functions that expand upon public information. We operationalized each infographic's function using the following categories: *public information*, *reporting and dissemination*, *risk communication*, *city population demographics*, and *planning*. Table 2 summarizes these results, which are explained in detail next.

Infographics were coded *public information* (29.2%,  $n = 94$ ) if its principal, overarching intent was to simply advise the public on a particular topic such as providing information on a city service or process, or defining city activities and terms. For instance, the Atlanta, Georgia Municipal Court shared an infographic answering general questions about the functioning of its services, court procedures and hours of operation. An infographic from the Tucson, Arizona Water Department illustrated the urban water cycle. As part of a program sponsored by a city councilor, the city of Albuquerque, New Mexico shared an infographic illustrating the process of using a homeless assistance helpline. In a final example, the Bureau of Budget and Management in Baltimore, Maryland created one infographic explaining the budget process, and another outlining differences between the capital versus operating budgets. Figure 1 provides additional examples of infographics that were analyzed in this study.

Ninety-four (29.2%) of the 322 infographics in the study used infographics as a *reporting and dissemination* tool to provide program assessments, year-end and



**Table 2.** Infographic classification by Government function.

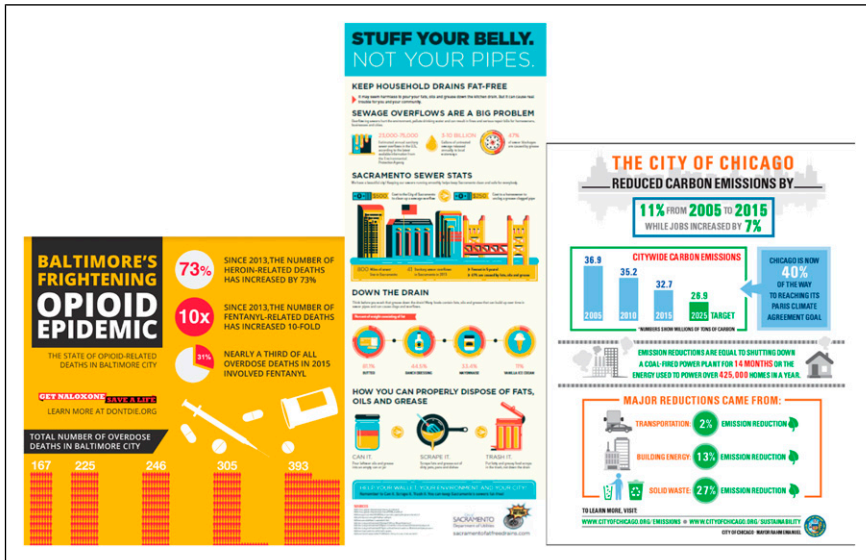
Government function	Frequency	Percentage
Public Information	102	31.7
Reporting and dissemination	94	29.2
Risk Communication	72	22.4
City population demographics	31	9.6
Planning	23	7.1
Total	322	100.0

benchmarking statistics, community survey results, and research findings. For example, the New York City Housing Authority created an infographic that revealed the findings of a mobile services study. Through a Community Development Block Grant Program, the city of San Diego, California shared infographics demonstrating statistics for its Housing and Urban Development (HUD) programs for fiscal years 2016, 2017, and 2018. The Portland, Oregon Bureau of Transportation created an infographic recapping the “Adaptive Biketown” 2017 Pilot program.

Infographics were coded *risk communication* (22.4%,  $n = 72$ ) if the graphic conveyed information specific to risks and potential hazards that could negatively impact the public. The Phoenix, Arizona Human Resources Department shared an infographic created by the U.S. Centers for Disease Control and Prevention (CDC) that explains how face masks reduce the risks of spreading and contracting the COVID-19 virus. The Denver, Colorado Public Health and Environment Department created a two-page infographic on radon home safety. The Austin, Texas Public Health Department shared an infographic created by the nonprofit organization Safe Kids Worldwide that addressed drowning dangers for children.

Infographics that presented city census and demographic information regarding its population were coded *city population demographics* (9.6%,  $n = 31$ ). The Planning Department of Washington, D.C. shared a number of these types of infographics that presented statistics of the city’s elderly population, disabled resident population, millennial population, Black population, Hispanic population, veteran population, and female population.

The remaining infographics were coded *planning* (7.1%,  $n = 23$ ) because they provided information on various city project proposals, propositions, and initiatives. Examples include a roadmap of proposed street changes from the Sustainable Streets Division of San Francisco Municipal Transportation Agency (SFMTA) in San Francisco, California; a 6-year capital investment plan description from the City of Philadelphia, Pennsylvania Office of the Director of Finance; and an annual cultural plan overview from the Chicago, Illinois Department of Cultural Affairs and Special Events.



**Figure 1.** A sample of U.S. city infographics included in Study. 1. Baltimore, Maryland; 2. Sacramento, California; 3. Chicago, Illinois.

### Classification by policy area

Additionally, each infographic was categorized based on the area of public policy addressed by the information in the graphic. Table 3 presents the various policy areas, and the number of infographics that addressed each policy area.

Of all the infographics, 19.3% ( $n = 62$ ) were coded as *public health*. These infographics were often produced or shared by the city's health department. For example, the Austin, Texas Public Health Department shared an infographic demonstrating the signs of heat-related illness. An infographic from the San Francisco, California Department of Public Health informs pregnant women of the risks associated with Zika virus and travel. The San Antonio, Texas Metropolitan Health District shared an infographic focused on diabetes health and prevention. Existing research suggests that public health-related infographics are common and promote healthy actions and behaviors such as eating healthy, exercising, and engaging in hygiene practices that prevent illness (Featherstone, 2014).

The infographics that presented information relating to *public safety* represented 8.4% ( $n = 27$ ) of the total number of infographics. Infographics centering on public safety include 13 infographics produced by the Charlotte-Mecklenburg Police Department (CMPD) in Charlotte, North Carolina, which demonstrated crime and other statistics from their annual end-of-year report. The city of Dallas, Texas shared an infographic created by the Institute for Urban Policy Research, providing annual report statistics for a city

**Table 3.** Infographic classification by policy area.

Policy area	Frequency	Percentage
Public health	62	19.3
Public safety	27	8.4
Housing	26	8.1
Animal services	18	5.6
Budget	17	5.3
Diversity	16	4.9
Transportation	14	4.3
Emergency Management	14	4.3
Education	12	3.7
Community engagement	12	3.7
Census data analysis	11	3.4
Sustainability	9	2.8
Environment	8	2.5
Accountability practices	8	2.5
City planning	7	2.2
Energy	7	2.2
Water	6	1.9
Human Rights	6	1.9
Waste Management	6	1.9
Infrastructure	5	1.6
Taxes	5	1.6
Finance	5	1.6
Culture	4	1.2
Other*	17	5.3
Total	322	100.0

domestic violence task force. Infographics shared by a councilmember with the city of Seattle, Washington focus on police reform and police accountability legislation.

Furthermore, 8.1% ( $n = 26$ ) of all infographics were coded as *housing*. These addressed various aspects of home ownership, housing affordability, renting, and homelessness. The city of Seattle, Washington has a Renting in Seattle Resource Center that provides infographics on renting in the city. An infographic shared by the Metropolitan Development and Housing Agency in Nashville, Tennessee shared statistics from an annual Point-in-Time Count of the city's homeless population. The City of Milwaukee, Wisconsin Department of City Development presented an infographic in a report that describes a lease-to-own program.

### *Infographics by government function and policy area*

Finally, we explored overlaps among government functions and policy areas. As shown in [Table 4](#), of the 62 infographics coded as *public health*, 48 (77.4%) were also coded as *risk*

**Table 4.** Analyzing infographics by function and policy area.

Policy area	Government function				City population demographics
	Evaluation	Public information	Risk communication	Planning	
Public health	2	11	48	1	
Public safety	16	8	3		
Housing	10	12		3	1
Animal services	17	1			
Budget	5	10		2	
Diversity					16
Transportation	7	6			1
Emergency Management		1	13		
Education	7	4			1
Community engagement	5	2		5	
Other*	25	47	8	12	12
Total	94	102	72	23	31

*communication*, demonstrating a strong connection between the two categories. The infographics conveyed risks to public health associated with communicable infections, illnesses, and chronic diseases, and medical conditions such as measles, hepatitis, diabetes, hypertension, Zika virus, and coronavirus. These infographics frequently explained how to reduce the spread and minimize exposure to these illnesses.

Eleven public health infographics did not convey risk; rather, they offered general information related to a relevant public health topic. Therefore, they were classified as *public information*. These infographics presented information on youth sport health and training preparation, pregnancy facts, benefits of tap water, healthy eating, and navigating healthcare law.

Evaluations were the primary function of 16 infographics coded as *public safety*, representing 59.3% of all public safety infographics. The other eight public safety infographics coded as *public information* shared content relating to a city's police recruitment and application process, resident information bulletins on arbitration and the S.W.A.T. Unit and Warrant Service, the complaint process with Commission's Law Enforcement Bureau (LEB), police reform and accountability legislation. The infographics coded as *animal services* ( $n = 17$ ) were also primarily evaluations of a single city department. Dallas Animal Services in Texas created 16 of these infographics that shared monthly statistics including adoptions, intakes, service calls, and live release rates.

Approximately 15.8% of infographics coded as *budget* provided public information like those mentioned earlier, which detailed Baltimore's budget process and explained the differences between the capital and operating budgets. Other cities, including San Diego, California, Chicago, Illinois, and Milwaukee Wisconsin, also shared infographics that

provided an overview of the budget and explained how it works, as well as offered proposed budget briefings and recommendations.

It is also interesting to note from [Table 3](#) that all 16 infographics (100%) coded as centering on *diversity* were concurrently coded with the function of *city population demographics*. For this study, biodemographic diversity can be defined as the “differences among organizational members in immediately observable biological attributes, such as gender, race, and age” ([Moon and Christensen, 2020](#): 143). Infographics were frequently used to celebrate biodemographic diversity as a way to commemorate annual observances such as Black History Month, Women’s History Month, Hispanic Heritage Month, Latinx Heritage Month, or the anniversary of the Americans with Disabilities Act passage. In particular, the Washington, D.C. Planning Department created several infographics that incorporated census data, providing a snapshot of the city’s population by race, gender, or disability as a way to celebrate the annual observances.

Emergency management also involves strategic communication to help the public understand the various risks posed by certain emergency situations, as well as how to prepare for and respond to these emergencies. Thirteen of the 14 (92.9%) infographics coded as *emergency management* were also categorized as *risk communication*. These infographics demonstrate the importance of managing risks associated with potential radiation incidents, accidents, and exposure, as well as with potential floods, tornadoes, and other natural disasters.

### *Classification by type of creator*

Many of the emergency management infographics providing risk communication were not created by the city that shared the infographic. Instead, they originated from an outside source. For instance, the city of El Paso, Texas shared infographics that were created by U.S. Federal government agencies, including the Centers for Disease Control and Prevention (CDC) and the Federal Emergency Management Agency (FEMA).

[Table 5](#) reveals that 46 infographics (14.3%) of the total could be positively identified as originating from an outside source. Of these infographics, 41.3% ( $n = 19$ ) were sourced from a *federal government agency*, such as the CDC; 36.9% ( $n = 17$ ) were sourced from a *nonprofit organization*; and 17.4% ( $n = 8$ ) were from an *academic source*, such as a university, student project, or research institute.

The remaining 276 infographics either did not specify a source; referenced the city as a general source; or cited a particular city source such as a city department, agency, office, program, coalition, council, commission, board, facility, or other such source. A list of sources can be found in the coding sheet at the end of this study (see [Appendix A](#)).

### *Classification of infographics by usability factor*

The next set of paragraphs categorize infographics using a framework presented by [Siricharoen and Siricharoen \(2015\)](#), which established four major types of infographics based on usability: *statistical*, *process*, *timeline*, and *location*. *Statistical* infographics present data visualizations such as pie charts, bar graphs, line charts and visual diagrams

**Table 5.** Infographics identified as originating from outside source.

Outside source	Frequency	Percentage
Federal government agency	19	41.3
Nonprofit organization	17	36.9
Academic source	8	17.4
Corporation	1	2.2
Publication	1	2.2
Total	46	100.0

**Table 6.** Infographic design by usability factors.

Usability factor	Frequency	Percentage
Statistical	162	50.3
Process	28	8.7
Timeline	8	2.5
Location	4	1.2
Other	120	37.3
Total	322	100.0

that illustrate numerical values. These infographics present numerical and statistical data, such as annual point-in-time counts from city homeless population tracking initiatives, city demographic statistics of race, age, and gender, annual and quarterly city program and department performance statistics, and report and survey results. *Timeline* infographics illustrate a chronology of events (these infographics present timelines on city program, planning and development initiatives) while *process-based* infographics illustrate the various steps involved in a process or procedure (for example, how to contact a homeless assistance helpline, how a city budget process works, how to flush your water heater, understanding the special elections process for mayor and council vacancies, and how to participate in a city council meeting). A *location-based* infographic conveys geographically relevant information such as live or interactive maps (Siricharoen, 2013). These infographics visualized a new street multi-use plan, a proposed parking plan, a greenway project proposal, and residential health outcomes based on geographic location.

As shown in Table 6, a total of 202 infographics (62.7%) were placed into the categories established by the existing framework. We argue that a fifth category could be added to this framework to classify infographics that present non-statistical information in a visual format. Therefore, the remaining 120 infographics were classified as other. Examples of non-statistical infographics from the study present textual information on city laws, health and illness prevention guidelines, proper health and hydration in youth sports, and emergency preparedness guidelines.

### Classification of infographic design elements

The infographics were further assessed by their use of various design elements, including *icons, diagrams, graphs and charts, photographs, maps, and tables* (see [Figure 2](#)). The icon was the most frequently incorporated design element in the infographics analyzed in this study; 89.1% of all infographics ( $n = 287$ ) incorporated at least one icon into its design. Any small graphical symbol or simple graphical unit was considered an icon, including clip art.

Of these 287 infographics, 42.9% ( $n = 123$ ) incorporated a *moderate* number of icons (6–14) in the overall design; 41.5% ( $n = 119$ ) incorporated a *minimal* number of icons (1–5) in its design; and 15.7% ( $n = 45$ ) incorporated an *excessive* number of icons (15 or more) in its design.

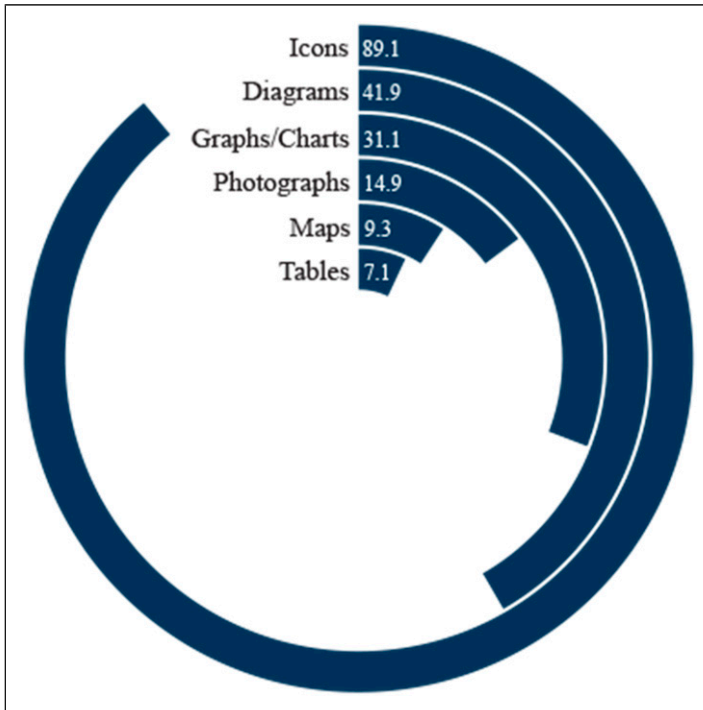
*Diagrams* were the second-most used design element; 41.9% ( $n = 135$ ) incorporated at least one diagram into its design. For this study, diagrams included pictorial unit depictions, process or timeline illustrations, broad illustrations or backgrounds, and other schematic representations that do not fit the other categories of graphical elements.

Precisely 100 infographics (31.1%) incorporated at least one *graph or chart* to visualize statistical information. The most common devices included bar charts, donut charts, pie graphs, and line graphs. It is also critical to note here that not all infographics classified as having a *statistical* usability factor incorporated graphs and charts into their design. An infographic was considered statistical in usability if it visualized statistical or numerical information in other ways, such as with color, font size or style.

*Photographs* (14.9%,  $n = 48$ ) and *maps* (9.3%,  $n = 30$ ) were less common, and *tables* were the least used graphic element, with only 7.1% ( $n = 23$ ) infographics incorporating at least one table in its design. While many infographics created table-like sections within its design layout using colors and lines, these were not considered “tables.” For this study, a table is an object that logically organizes data or information in rows and columns. [Figure 3](#) shows examples of infographics that used design elements discussed in this paper.

### Classification of infographic narrative elements

Since the focus of this study is on narrative infographics, each infographic was analyzed for its use of certain elements that add clarity to the narrative presented within the infographic. [Figure 4](#) demonstrates that 97.5% ( $n = 314$ ) infographics included a *title*. Captions and annotations were the most incorporated elements aside from a headline; 84.8% of infographics ( $n = 273$ ) incorporated at least one *caption* into its layout, and the same number of infographics incorporated at least one *annotation*. Any text that accompanied a graphic element (such as a graph, chart, diagram, icon, table, photograph, or map) was classified as a caption. Annotations were characterized as standalone text that emphasizes key observations from the data or information presented in the infographic. Furthermore, 77.6% ( $n = 250$ ) of infographics included *subheadings*, while only 35.7% ( $n = 115$ ) included an *introduction*, introductory sentence, or brief text beneath the headline.



**Figure 2.** Percentage of infographics using design elements.

Other infographic elements are considered essential to its overall validity, including a source, date, and call to action that redirects the public to learn more by visiting a Web site, contacting a phone number, accessing a full report, etc. Of the total, 85.4% ( $n = 275$ ) indicated a *source* on the infographic, while 50.3% ( $n = 162$ ) indicated a *date* of creation, last updated, or last reviewed on the infographic. Finally, 28.9% ( $n = 93$ ) included a redirect *call to action* that encouraged further action.

## Discussion

The overarching objective of this research was to understand the use of infographics in municipal governments. Cities can help citizens comprehend complex government processes and procedures by simplifying and visualizing them in an infographic. Using a visual content analysis approach, this research examined 322 infographics created by cities to explain their budget process, to explain the differences between the capital and operating budget, information on renting in the city, municipal program facts, utility information, and so on. In doing so, this work has both theoretical and practical implications that are discussed below.

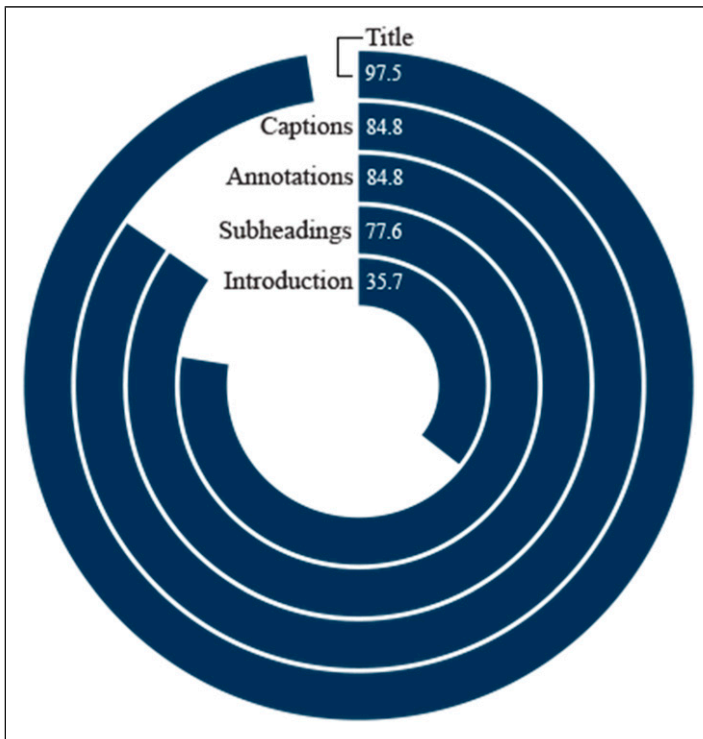




**Figure 3.** Examples of infographics using various design elements. 1. Use of icons – Austin, Texas; 2. Use of diagrams – San Antonio, Texas; 3. Use of graphs – San Jose, California; 4. Use of photographs – Washington, DC; 5. Use of maps – Portland, Oregon; 6. Use of tables – Phoenix, Arizona.

*Theoretical implications*

*Theorizing infographics as a new narrative form.* To begin, the current study advances narrative theory by highlighting how government entities are using the narrative infographic in line with the narrative paradigm. As the narrative paradigm holds, citizens are storytelling humans that send and receive information through narratives. Previously, scholars have conceived of narrative broadly. Barthes (1996), for example, has included oral and written language, pictures, gestures, myth, legend, fables, tales, short stories, epics, history, drama, comedy, pantomime, paintings, movies, local news, and conversation as narrative. Riessman (2008) added health records, organizational documents, and folk ballads to the long list of narrative forms. Here, we add to the narrative literature by



**Figure 4.** Percentage of infographics using narrative elements.

theorizing infographics as a new narrative form. More than providing examples of how narrative infographics are being used by US cities, we contribute to theory by demonstrating how public administrators are using infographics as another narrative form. Because narrative infographics are disseminated through the Internet and spread via social media, demonstrating narrative infographics as a form of narrative broadens the scope and trajectory of future research on narratives. For example, this work exemplifies and adds to [Boje's \(2019\)](#) recent claim that storytelling organizations are being transformed into *virtual organizations* that are sustained through digital discourse and narrative. Many researchers who study narrative infographics (as [Segel and Heer, 2010](#), admit) are not experts in the study of narrative. By showing infographics as a powerful combination of lists and stories ([Browning, 1992](#)) in the context of public administration, this study opens up opportunities for communication scholars to explore this new form of narrative.

*Infographics for government-citizen communication.* In addition, our work fills a gap in research about infographic use, as scholars have not explored infographics as a tool for municipal governments to broadcast information to citizens. As government-citizen communication continues to evolve—from messages solely from top-level government executives to messages from personnel at all organizational levels—this study

contributes to scholarship by demonstrating how infographics can be used as a novel tool to directly communicate with constituents. By understanding how city governments are using infographics, this study answers calls for more empirical work on government communication, which “remains an under-researched topic” (Manoharan and Rangarajan, 2022a: 2).

This study expands upon existing studies (such as Dolamore et al., 2022; Isett and Hicks, 2018) by examining a specific form of visualization, the narrative infographic. Dolamore et al. examined the use of imagery in non-profit policing organizations. We build on this work by exploring the use of a specific kind of image, *the narrative infographic*, in the context of municipal governments, describing its use in numerous policy and administrative contexts. The current study also expands the work of Isett and Hicks (2018), who provide a broader discussion of data visualization and its use in public service with a few specific examples of data visualization initiatives in government.

*Extending open government initiatives.* Furthermore, the use of narrative infographics can be powerful way to enhance the quality of public information sharing, citizen participation, transparency, and open government initiatives. Given that images are an important mode of communication and “persistent element of our culture” (Dolamore et al., 2022: 170), the narrative infographic which can sometimes be a single image or a composite of images plays an important role in government communication. Since information is a key ingredient of accountability, packaging it effectively into narrative infographics has the potential to enhance accountability and reduce information fatigue. In addition to facilitating the important government functions of providing public information, reporting and dissemination, risk communication etc., narrative infographics can play an important role in effecting action and behavior change. In light of calls to envision open government initiatives as ways to enhance citizen engagement (Evans and Campos, 2013), this research can thus represent a stimuli to think at narrative infographics as an effective way to advance engaged and participative governance which are central goals of the open government initiative.

This paper provides public managers an in-depth introduction to the narrative infographic by teasing apart its characteristics, design elements, creators and through the context of municipal use of narrative infographics, shows specific ways in which such infographics can be used to enhance public good. Given that storytelling, narrative competence and capacity are essential public management and administrative skills (See for example Manoharan & Rangarajan, 2022b), this research shows the narrative infographic’s place in advancing the narrative paradigm in the practice of public administration. Dolamore et al. (2022: 184) observe Lee et al. (2020) that not much research has examined the importance of images in public administration and policy. Our study fills that gap by examining a specific kind of image, the narrative infographic, and its potential role in community engagement and participation, as well as its potential for helping achieve policy and administrative goals. In short, this work underscores the importance of the narrative infographic in an administrator’s information toolkit.

### *Practical implications*

This study has important practical implications for public administrators and policy makers. It showed that the narrative infographic is quite widely used at the municipal level, as 32 of the 37 cities communicated vital information to citizens using infographics. In alignment with the narrative paradigm (Fisher, 1984), public administrators understand that stories are not a diversion—they are a powerful way to communicate facts and help people make sense of complex information. This research elucidates several key ways in which municipal governments are using narrative infographics, which have implications for other government entities seeking to do the same.

As shown in Table 2, municipal governments use infographics for various functions. However, the most interesting use of infographics was for evaluative purposes. Cities *evaluate* their own progress on various dimensions and towards many goals. Visuals documenting such progress are shared as infographics for public consumption. Almost a third of all infographics (29.2%,  $n = 94$ ) coded in this study fell under the category of evaluation.

A second result that stood out was the connection between public health and risk communication. As shown in Table 3, public health infographics constituted the greatest percentage of total infographics classified by policy area (19.3%,  $n = 62$ ). Governments use infographics to communicate various risks to public health so that citizens can prevent, detect, and respond to these health risks. City governments included in this research used infographics to disseminate information regarding COVID-19 guidance, masks, vaccinations, etc. Most emergency management infographics conveying information to help citizens protect themselves from the risks posed by natural disasters such as floods and tornadoes, radiation incidents, etc. were also coded as risk communication.

If a city government does not have the resources to create infographics in-house, they can share infographics from other reputed sources, including federal government agencies, nonprofit organizations, universities, and research institutes. Some cities such as Detroit, Michigan, Columbus, Ohio, and El Paso, Texas repurposed infographics produced by U.S. Federal government agencies, including the Centers for Disease Control and Prevention (CDC), Environmental Protection Agency (EPA) and the Federal Emergency Management Agency (FEMA) to communicate certain critical information to their citizens.

As shown in Figure 2, the most frequently used design element is the icon. Governments do not have to design complex charts/graphs, diagrams, illustrations, maps, etc. An infographic can be created by using simple icons (i.e., clipart), colors, font sizes and styles, etc. to facilitate the communication of visual information. Governments should consider the various elements that were assessed in this study to help with the design of a narrative infographic, such as by including a prominent headline, an introductory statement, captions for the design elements, annotations to highlight key points, and subheadings to break up the sections. Inclusion of a source, as well as a date of creation/last updated/last review, will let people know how relevant, timely, and trustworthy the information is. Finally, public organizations should include a call to action that invites people to learn more by visiting the government Web site, encouraging them to read the

full report, etc. to encourage further engagement with the visual content that simplifies complex information for citizens.

## Conclusion

Public communication is an important governmental function and the use of visual tools such as the narrative infographic enables and enhances effective communication. Effective creation and use of the narrative infographic for public administrative and policy communication complements traditional methods of communicating critical governmental information. This research does not establish correlation between the use of narrative infographics by municipal governments and citizen engagement. It also does not evaluate the quality of infographic design based on appeal, comprehension, or retention or the efficacy of communication and usage of narrative infographics by citizens. While this study filled some important gaps in the literature on the use of narrative infographics its limitations could be addressed by future research. This study used only the word “infographics” as a search term and therefore may not have included an exhaustive list of infographics. Future research could expand on this research by identifying infographics using other search terms on municipal websites to guarantee inclusion of a wider subset of infographics. Since this study only examined infographics from big cities (i.e. those with a population of 500,000 or more), it has excluded narrative infographics from smaller cities. Future studies could address this by using a research design that allows for inclusion of infographics from smaller cities as well. While this study *described* the use of infographics at the municipal level, future studies could *explain* the effect of infographics on comprehension and retention of information, efficacy of communication and behavior change. Future research could examine the impact of infographics on public accountability, effectiveness of public services, and policy accomplishment. Future research could examine the differential impact of static versus interactive narrative data visualization (see for example, [Isett and Hicks, 2018](#)) on effectiveness of public services and policies, and on increased citizen contribution to the achievement of public policies. The impact of narrative infographics on public policy implementation could be mediated by citizen behavior. In other words, future studies could examine how narrative infographics influence positive citizen behavior which in turn could aid the accomplishment of public policy and public service goals. The value-added benefits of specific communication strategies ([Ho and Cho, 2017: 229](#)) such as narrative infographics could be measured. Future studies could also examine the use of infographics by other governmental units such as state level organizations or even take an international comparative approach by looking at the use of infographics in international cities. Communicating the importance of creating and understanding infographics such that they facilitate storytelling is important. Nurturing such skills (see for example, [Manoharan and Rangarajan, 2022b](#)) in current and future students of public administration will help cultivate evidence-based narrative competence in students.

### Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

### Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

### ORCID iD

Nandhini Rangarajan  <https://orcid.org/0000-0002-0334-8032>

### Supplemental Material

Supplemental material for this article is available online.

### References

- Armstrong CL (2011) Providing a clearer view: an examination of transparency on local government websites. *Government Information Quarterly* 28(1): 11–16.
- Barbour JB, Doshi MJ and Hernández LH (2016) Telling global public health stories: narrative message design for issues management. *Communication Research* 43(6): 810–843.
- Barthes R (1996) Introduction to the structural analysis of narratives. In: Onega S and Landa JAG (eds) *Narratology: An Introduction*. New York, NY: Longman.
- Boje DM (2019) “Storytelling organization” is being transformed into discourse of “digital organization. *Management* 22(2): 336–356.
- Bimber B (1999) The Internet and citizen communication with government: does the medium matter? *Political Communication* 16(4): 409–428.
- Brewer AM (2021) Strategic policy narratives: a narrative policy study of the Columbia river crossing. *Public Policy and Administration* 36(4): 496–517.
- Brigham TJ (2016) Feast for the eyes: an introduction to data visualization. *Medical Reference Services Quarterly* 35(2): 215–223.
- Browning LD (1992) Lists and stories as organizational communication. *Communication Theory* 2(4): 281–302.
- Evans AM and Campos A (2013) Open government initiatives: challenges of citizen participation. *Journal of Policy Analysis and Management* 32(1): 172–185.
- Ho ATK and Cho W (2017) Government communication effectiveness and satisfaction with police performance: a large-scale survey study. *Public Administration Review* 77(2): 228–239.
- CommGAP (2009) *The Contribution of Government Communication Capacity to Achieving Good Governance Outcomes*. Washington, DC: Report on the roundtable held at The George Washington University’s Elliott School for International Affairs. February 19.
- Dolamore S, Sowa JE and Edwards LH (2022) Depicting the work of police foundations on social media: a visual communication analysis. *Journal of Public and Nonprofit Affairs* 8(2): 168–194.

- Dunlap JC and Lowenthal PR (2016) Getting graphic about infographics: design lessons learned from popular infographics. *Journal of Visual Literacy* 35(1): 42–59.
- Featherstone R (2014) Visual research data: an infographics primer.
- Fisher WR (1984) Narration as human communication paradigm: the case of public moral argument. *Communication Monographs* 51: 1–22.
- Fung A (2013) Infotopia: Unleashing the democratic power of transparency. *Politics & Society* 41(2): 183–212.
- Horsley JS, Liu BF and Levenshus AB (2010) Comparisons of US government communication practices: expanding the government communication decision wheel. *Communication Theory* 20(3): 269–295.
- Hotchkiss M and Phelan J (2017) *Uses of Census Bureau Data in Federal Funds Distribution*. Washington, DC: U.S. Census Bureau. U.S. Department of Commerce. <https://www2.census.gov/programs-surveys/decennial/2020/program-management/working-papers/Uses-of-Census-Bureau-Data-in-Federal-Funds-Distribution.pdf>
- Huettner BP (2014) Review of four books on infographics. *Technical Communication* 61(4): 269–272.
- Hyland-Wood B, Gardner J, Leask J, et al. (2021) Toward effective government communication strategies in the era of COVID-19. *Humanities and Social Sciences Communications* 8(1): 1–11.
- Isett KR and Hicks DM (2018) Providing public servants what they need: revealing the “unseen” through data visualization. *Public Administration Review* 78(3): 479–485.
- Johnson G (2014) *Research Methods for Public Administrators*. New York, NY: ME Sharpe.
- Krizek RL (2017) Narrative and storytelling. In: Scott CR, Barker JR, Kuhn T, Keyton J, Turner PK and Lewis LK (eds) *The International Encyclopedia of Organizational Communication*. West Sussex, UK: John Wiley & Sons. (pp. 1-17).
- Lee T (David), Lee-Geiller S and Lee B-K (2020) Are pictures worth a thousand words? The effect of information presentation type on citizen perceptions of government websites. *Government Information Quarterly* 37(3).
- Lee T, Lee B. K and Lee-Geiller S (2020) The effects of information literacy on trust in government websites: Evidence from an online experiment. *International Journal of Information Management* 52: 102098. [https://www.sciencedirect.com/science/article/pii/S0268401219310461?casa\\_token=gAgQMWc-TaUAAAAA:CLBiCKJ8vKbpEepkOe5jGnFwoR3-zevWXDBCcgHmFfN0czdV4PT023Cp4Mge-ectWzpigOjffg](https://www.sciencedirect.com/science/article/pii/S0268401219310461?casa_token=gAgQMWc-TaUAAAAA:CLBiCKJ8vKbpEepkOe5jGnFwoR3-zevWXDBCcgHmFfN0czdV4PT023Cp4Mge-ectWzpigOjffg)
- Manoharan AP and Rangarajan N (2022a) Communication pedagogy in public affairs programs: Insights from a study of MPA and MPP curricula. *Teaching Public Administration*: 01447394221084492.
- Manoharan AP and Rangarajan N (2022b) Public administrators as storytellers: nurturing narrative competence to enrich their professional identity. *Administrative Theory & Praxis*: 1–12.
- Matheus R and Janssen M (2020) A systematic literature study to unravel transparency enabled by open government data: the window theory. *Public Performance & Management Review* 43(3): 503–534.
- Mauldin S. K (2015) *Data visualizations and infographics*. Lanham, Maryland: Rowman & Littlefield.



- McCrorie AD, Donnelly C and McGlade KJ (2016) Infographics: healthcare communication for the digital age. *The Ulster Medical Journal* 85(2): 71.
- Moon K-K and Christensen RK (2020) Realizing the performance benefits of workforce diversity in the U.S. federal government: the moderating role of diversity climate. *Public Personnel Management* 49(1): 141–165.
- Otten JJ, Cheng K and Drewnowski A (2015) Infographics and public policy: using data visualization to convey complex information. *Health Affairs* 34(11): 1901–1907.
- Pandit A, Mariani J, Keene C, et al. (2022, March). *Designing for Inclusive Engagement: Digital Communications for Richer Community Connection*: Deloitte. [https://www2.deloitte.com/content/dam/insights/articles/us175195\\_cg\\_gov%27t-trends-designing-for-inclusive-engagement/DI\\_Govt-trends-inclusive-engagement.pdf](https://www2.deloitte.com/content/dam/insights/articles/us175195_cg_gov%27t-trends-designing-for-inclusive-engagement/DI_Govt-trends-inclusive-engagement.pdf)
- Polkinghorne DE (1995) Narrative configuration in qualitative analysis. *International Journal of Qualitative Studies in Education* 8(1): 5–23.
- Piotrowski SJ and Van Ryzin GG (2007) Citizen attitudes toward transparency in local government. *The American Review of Public Administration* 37(3): 306–323.
- Riessman CK (2008) *Narrative Methods for the Human Sciences*. Thousand Oaks, CA: Sage.
- Segel E and Heer J (2010) Narrative visualization: telling stories with data. *IEEE Transactions on Visualization and Computer Graphics* 16(6): 1139–1148.
- Siricharoen WV (2013, May) Infographics: the new communication tools in digital age. In *The International Conference on e-Technologies and Business on the web* 169–174. [https://www.researchgate.net/profile/Waralak-Siricharoen/publication/256504130\\_Infographics\\_the\\_new\\_communication\\_tools\\_in\\_digital\\_age/links/0c9605232e6f666b1f000000/Infographics-the-new-communication-tools-in-digital-age.pdf](https://www.researchgate.net/profile/Waralak-Siricharoen/publication/256504130_Infographics_the_new_communication_tools_in_digital_age/links/0c9605232e6f666b1f000000/Infographics-the-new-communication-tools-in-digital-age.pdf)
- Siricharoen WV and Siricharoen N (2015, May) How infographic should be evaluated. In *Proceedings of the 7th International Conference on Information Technology (ICIT 2015)*, 12–15 May 2015, Amman, Jordan, pp. 558–564.
- Slingsby A, Dykes J, Wood J, et al. (2014) Designing an exploratory visual interface to the results of citizen surveys. *International Journal of Geographical Information Science* 28(10): 2090–2125.
- Smiciklas M (2012) *The Power of Infographics: Using Pictures to Communicate and Connect with Your Audiences*. Indianapolis, Indiana: Que Publishing.
- Tippett J and Kluvers R (2010) Accountability and information in local government. *World Journal of Management* 2(3): 22–33.
- Van Leeuwen T and Jewitt C (2001) *Handbook of Visual Analysis*. Thousand Oaks, California: SAGE.
- Weber RP (1990) *Basic Content Analysis (No. 49)*. Newbury Park, California: SAGE.
- Welch EW and Wong W (2001) Global information technology pressure and government accountability: the mediating effect of domestic context on website openness. *Journal of Public Administration Research and Theory* 11(4): 509–538.
- Weick KE and Browning LD (1986) Argument and narration in organizational communication. *Journal of Management* 12(2): 243–259.