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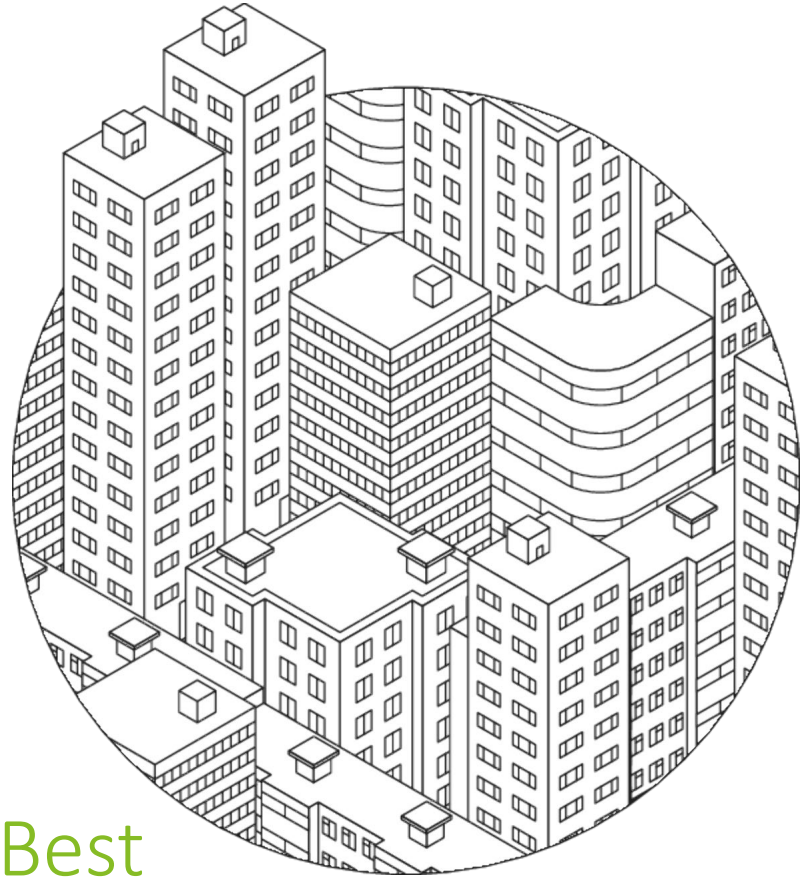

Data Visualization and Best Practices Report

Deloitte Recommendations

September 2022

MAKING AN IMPACT THAT MATTERS since 1845

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Deloitte LLP ("Deloitte", "we", "us", etc.) has provided this report to Shorefast. This report outlines recommended data and methods to support informed and place-specific economic development across Shorefast communities. This report also provides unique and novel methodologies to collect and report the data, and other strategic considerations for each community. This report was funded by Deloitte in partnership with Shorefast and the Deloitte Social Innovation Fund.

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We believe that our analyses must be considered as a whole and that selecting portions of the analyses, or the factors considered by it, without considering all factors and analyses together, could create a misleading view of the issues related to the report. Amendment of any of the assumptions identified throughout this report could have a material impact on our analysis contained herein. Should any of the major assumptions not be accurate or should any of the information provided to us not be factual or correct, our analyses, as expressed in this report, could be significantly different.

Overview and Table of Contents

Project Background

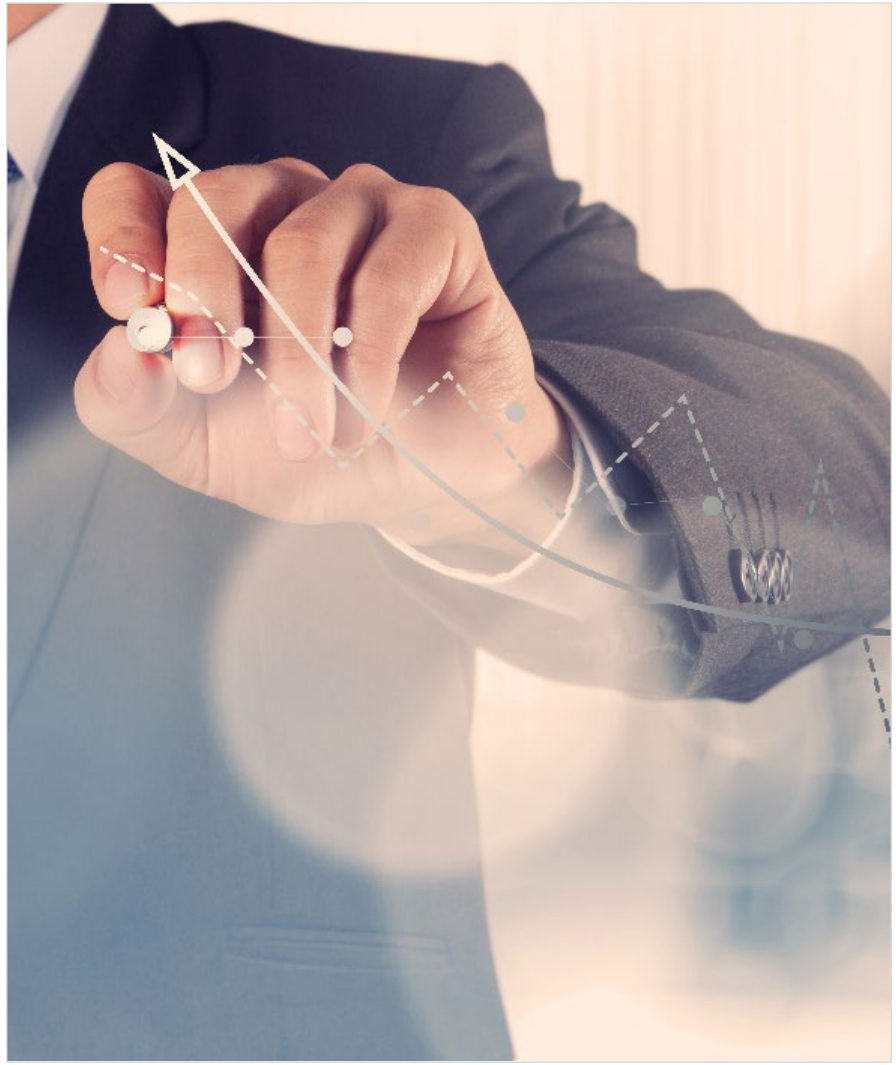
The Shorefast Community Economies Initiative aims to support place-based approaches to economic development

The Shorefast Community Economies Initiative ("The Initiative ") is a "pan-Canadian initiative founded on the understanding that the unit of change is community, that capital must be employed to empower communities, and that place-based approaches are needed to deliver lasting solutions that scale."[1] Five communities across Canada have been engaged by Shorefast to contribute to the Initiative, which include: South Vancouver Island, BC; Hamilton, ON; London, ON; Prince Edward County, ON; and Fogo Island, NL.

Together, the participating communities are working to engage in knowledge sharing around best and promising practices for community-based economic development. The regions will also inform the development of tools to amplify their knowledge of their communities. The five current participating communities represent the first cohort towards Shorefast's longer-term vision of a Community Economies Network. The Initiative is tackling identifying the following focus areas:

- **Collaborative and Governance** Structures that are needed to advance local economies.
- How to **Build Capacity** at the local community level.
- What **Data** is needed, where to get it, who controls it, and where to store it.
- How to **Attract and Retain Capital** in communities.
- How **Policy Environments** will enable local economic agency.
- The role of **Philanthropy** in community economic development.

Deloitte has been engaged by Shorefast to develop a report outlining recommended data, unique and novel methodologies, and strategic considerations to support data-informed and place-specific economic development across the five communities who participated in consultations with Deloitte.



Overview of Methodology

Deloitte executed 3 key activities to support Shorefast's Community Economies Initiative

Data Collection and Overview

- Discussion and dialogue with the Shorefast leadership team about the context of The Initiative and current observations on data in economic development in Canada today.
- Reviewing existing community development data, analysis and Initiative materials, as well as relevant public Statistics Canada census metropolitan area (CMA) level community data.
- Developing research questions to each Initiative community to identify key gaps and areas of challenge related to data, as well as connecting with Statistics Canada to discuss availability of non-public economic and community data.

Target Consultations

- Targeted consultations with:
  - 2-8 stakeholders at each of the Initiative communities to identify the overall economic development context, as well as anticipated topic areas/themes within economic development data for each community between May and July of 2022.
  - Presentation and consultation on preliminary findings at Shorefast Community Economies Pilot Gathering on June 10th in London, ON.
- Synthesizing key findings and confirming a set of 5-10 meaningful data metrics/themes per community.

Recommendations on Analytics & Visualization

- Developing a report outlining recommended data per community, unique and novel methodologies to collect and report the data, and other strategic considerations.
- Additional advice on other features of the Data Hub for Fogo Island and Prince Edward County including:
  - Governance and execution considerations (e.g., data sharing, storage);
  - Visualization features/formats, leading practices; and
  - Broader risk, security or data sharing considerations.

The Purpose of This Report

As part of our work with Shorefast, Deloitte has developed a set of recommendations and leading practices in visual analytics, and economic development that could guide communities in the development of a Data Hub.

- Our recommendations and considerations can be viewed as guidance on building a Community Economy Indicator Dashboard to report on economic development data that could be applicable to any community in Canada.
- We provide recommendations for user-centered design and data visualization best practices to consider for the development of a data asset.
- We provide example scenarios for the branding of the proposed asset alongside considerations for communities.
- We have identified governance and capacity building recommendations to help communities move the Data Hub Initiative forward.
- We have identified key skills required to operationalize the Data Hub.

This report is part of a series of work Deloitte was engaged to complete with Shorefast. Deloitte was engaged to develop analyses and recommendations for a Community Economy Indicator Dashboard; provide insights into what data gaps exist and solutions to bridge or improve them for the five communities consulted; and provide advanced recommendations on leading ways to measure economic forces that are aligned with Shorefast's place-based and community driven approach to create regenerative, equitable and redistributive economic development.

Section 1: Leading Practices in Visual Analytics & Community Economy Indicator Dashboard Recommendations

Leading Practices in Visual Analytics

User-centered design is an approach that could help Shorefast, and its partners develop assets accessible to all types of economic developers

Visual Analytics & Design Thinking

Visual Analytics & Information Design represents the **clean and effective presentation of information** and involves a multi-disciplinary approach to communication.

Rooted in simplicity and user-centered design, it encompasses principles from graphic design, data architecture, design thinking, psychology, user experience, communication theory, typography, and data science.

Given Shorefast's initial foray into data visualization through the Data Hub, this approach can support and enhance the development of additional data assets.

Through a **user-centered design approach,** Shorefast can ensure that products are designed and built for the intended end-users of the solution and apply design best practices to ease the consumption of data for their specific use-cases.

1. Audience

- Who is your audience?
- What do you want to communicate to them?
- Once you give them that information, what do you want them to do with it?

2. Purpose

- Thought leadership?
- Communication purposes?
- Analytics or data discovery?
- Current assessment?
- Operational?
- Future forecasting?

3. Simplicity

- Reduce the amount of information you need in order to answer your business questions.
- Less, but better — because it concentrates on the essential aspects, and the products are not burdened with non-essentials.

Leading Practices in Visual Analytics – The User Experience

The Forward Design Process can help Shorefast and its partners to develop an easy-to-access economic development tool

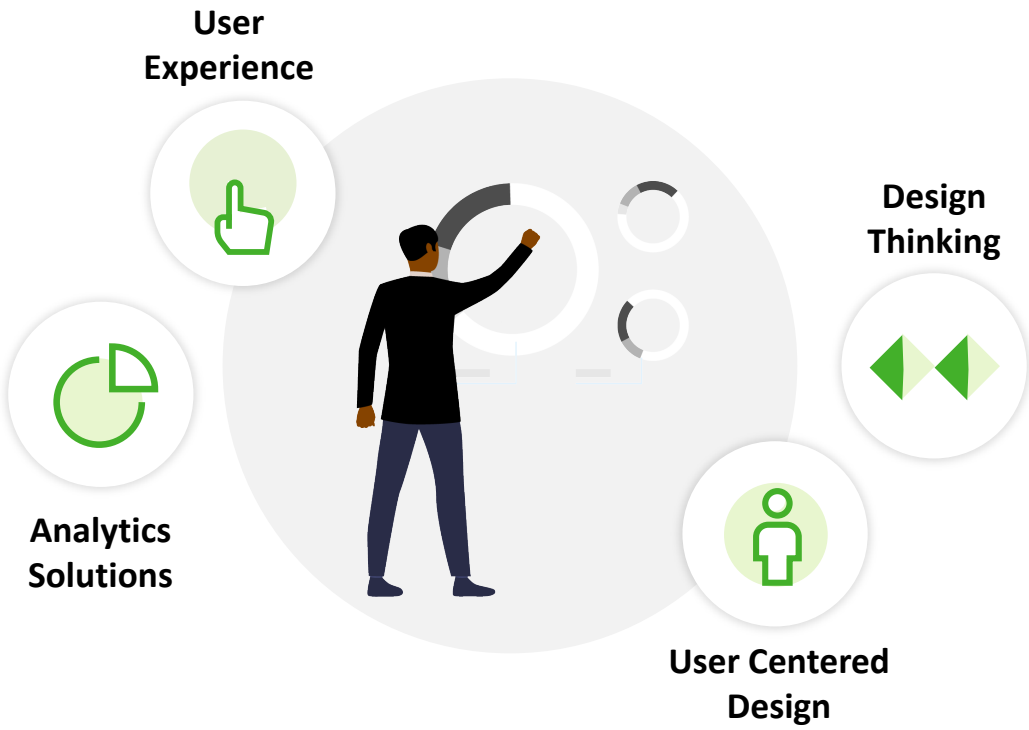
Forward Design is a creative problem-solving methodology that **helps build meaningful data and analytics solutions that work for the people who use them.**

This **interactive and co-creative process** centers on **empathy for end-users**, their **day-to-day needs** and **pain points** to help them **determine what problems to prioritize**, **which insights will drive value**, and **align on a clear vision** for their analytics journey.

Forward Design is purpose built to deliver effective analytics solutions. This approach draws from the best of a variety of design disciplines and tailors them to the data and analytics journey of an organization.

In the context of economic development, this could mean understanding that:

- Many Canadian communities may not have dedicated data specialists or prior experience with analytics solutions
- Communities face a diverse and broad range of issues, some of which are very localized
- Public-facing data assets may need to be able to speak to a broader audience of community members
- Sourcing and analyzing data sets can be a resource-intensive endeavour

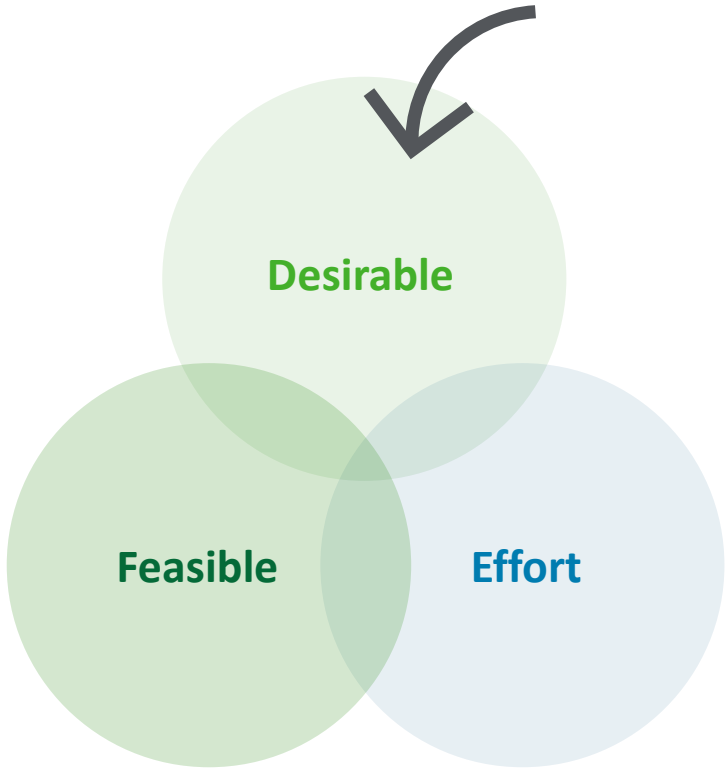


Leading Practices in Visual Analytics – Problem Framing

For end-users in economic development, there are many considerations that could inform how Shorefast advances the Data Hub

Importance of problem framing

We recommend framing problems from the user's perspective and starting with what's desirable - **putting user needs first.**



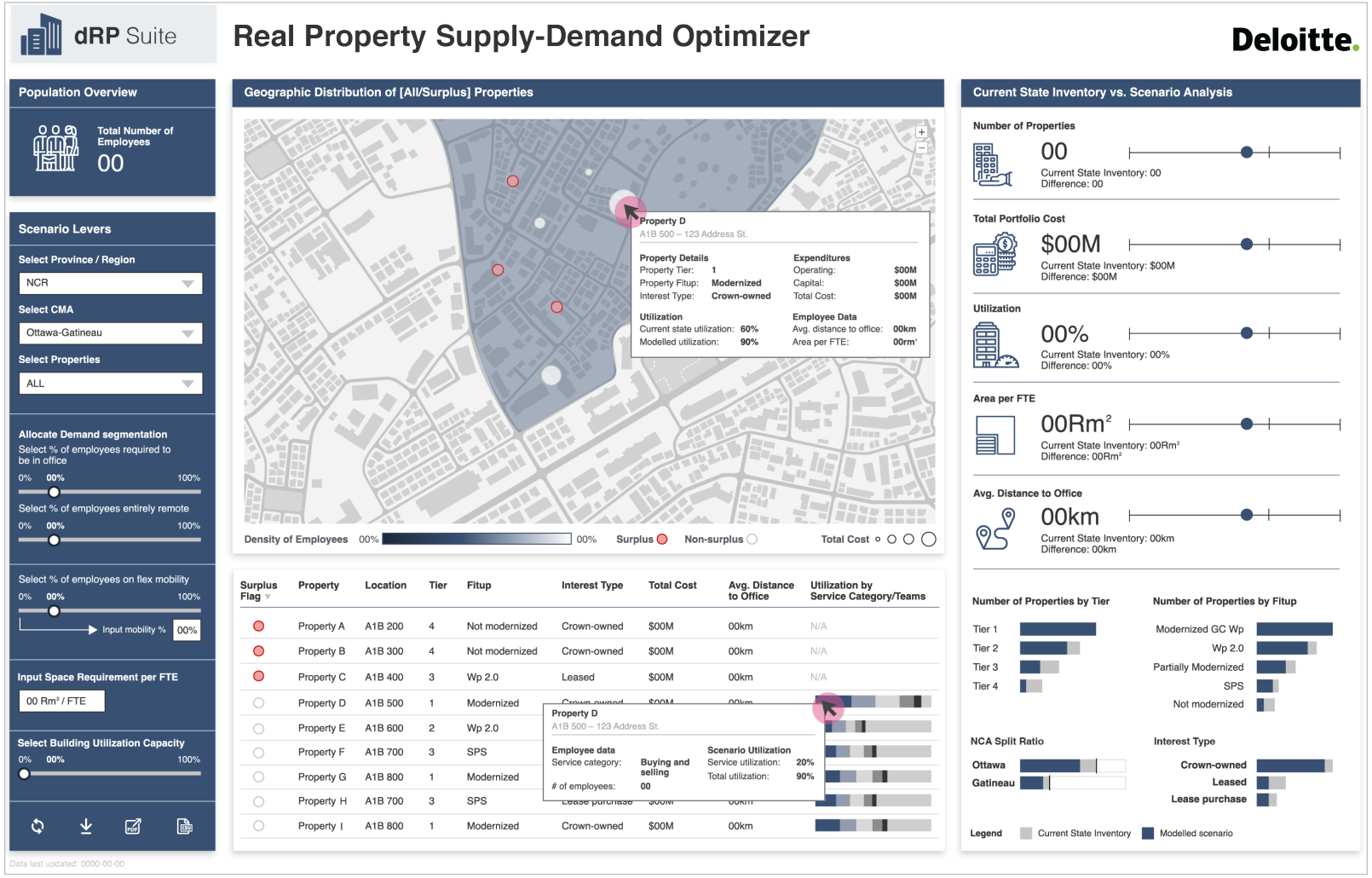
When creating solutions, Shorefast should frame the problem in three ways:

- What's **valuable** from a user perspective?
  - *Does the user want this?*
  - *Example considerations:*
    - *Is the Data Hub complementary to other similar efforts amongst Canadian communities?*
    - *How would a user know to access and use the tool?*
    - *Is the tool providing insight that cannot be found elsewhere? Will users actually utilize the tool?*
- What's the **effort** from a business perspective?
- *Should we do this?*
  - *Example considerations*
    - *Investments in expertise/employees*
    - *Data acquisition/licensing costs*
    - *Hosting/infrastructure costs*
    - *Time spent to gather requirements, interview stakeholders, and develop the solution*
- What's **feasible** from a capability perspective?
  - *Can we do this?*
  - *Example considerations*
    - *Is there stakeholder buy-in?*
    - *What role/positioning would Shorefast as an organization need to have?*
    - *What is the long-term ownership/maintenance plan?*
    - *Are the potential investments to build the solution reasonable?*

Leading Practices in Visual Analytics – Intuitive Design

Dashboard interactions should be simple and intuitive to the user

Figure 1: Example dashboard illustrating simple and intuitive user interaction (Deloitte, 2022)



User experience should be **intuitive and thoughtful**, your users should not have to "think" to use your dashboard.

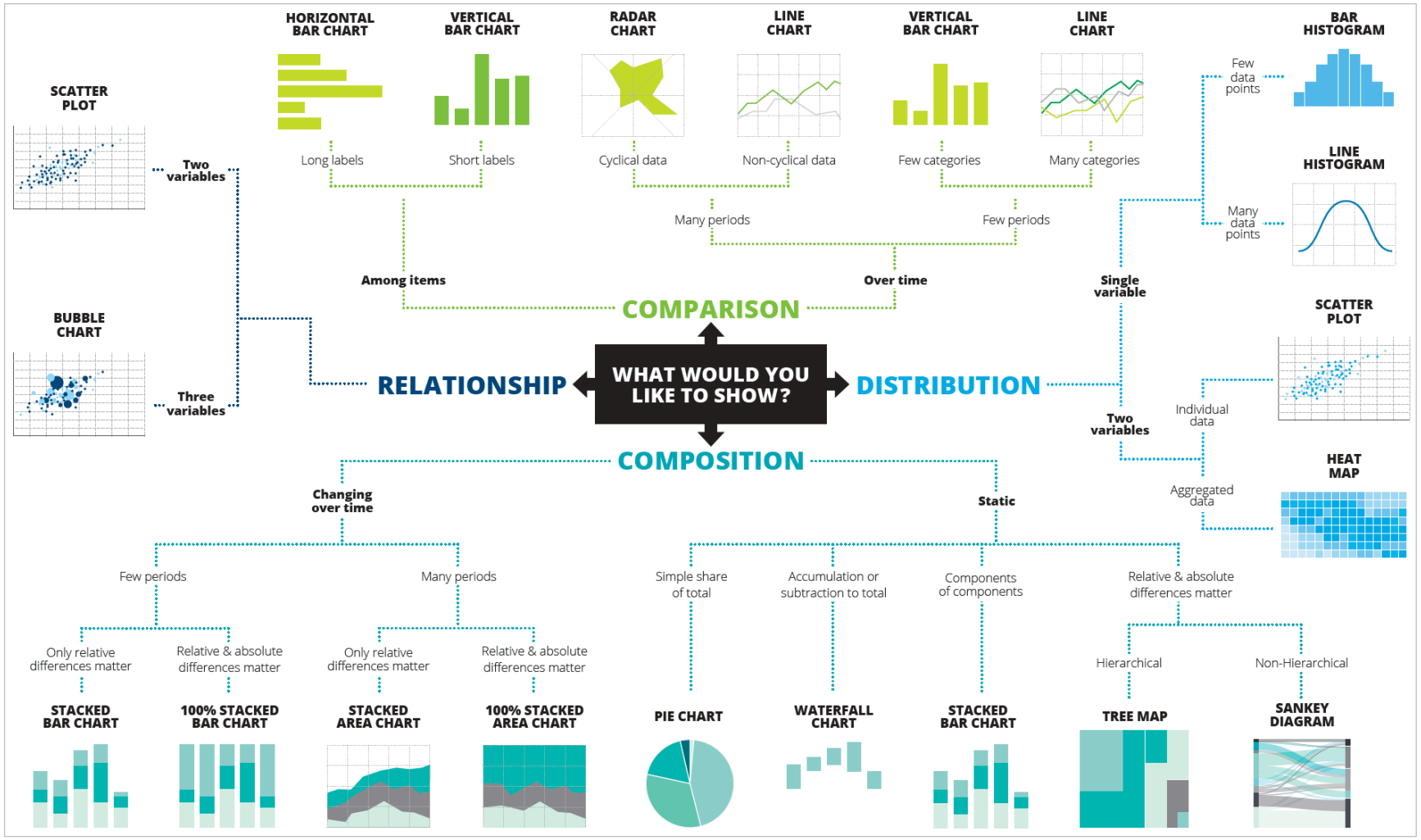
Guidance:

- Dashboards should contain **the core functionalities** to facilitate the analysis and nothing more.
- Every element on a dashboard should have a clear purpose and work together to deliver insights to the user.
- For example, in Figure 1 the dashboard allows the user to filter using drop down menus and sliders which are simple to understand and use. Sections are labelled appropriately to aid the user's understanding.

Leading Practices in Visual Analytics – Chart Type

Choose the chart type that best fits the analysis and data is critical to effective visualization

Figure 2: Example of chart types for data visualization



Think about dashboards **as tools to convey insights**, we want this process to be as simple as possible.

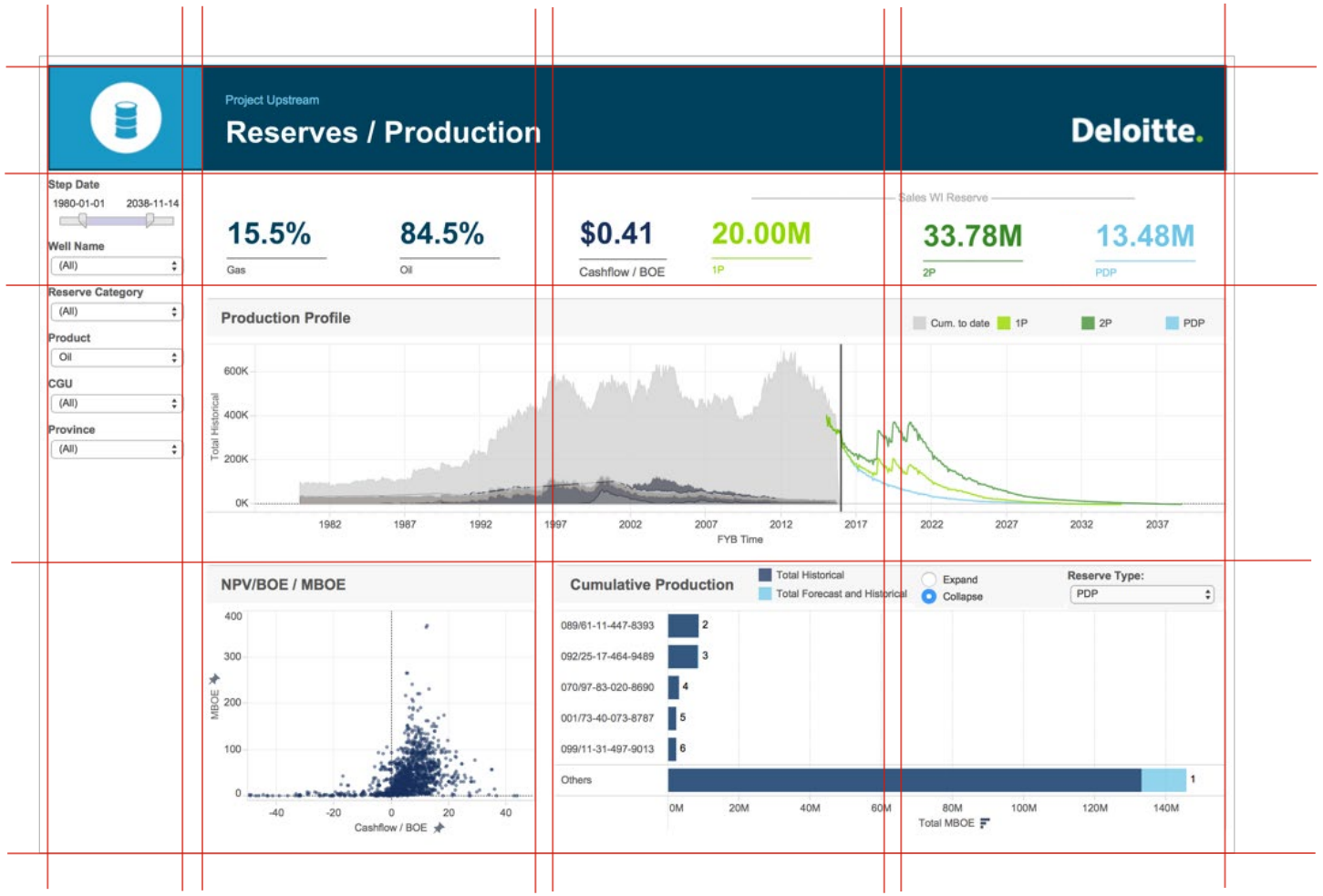
Guidance:

- Picking the **right chart for the right type of data** is key to making an intuitive dashboard.
- In Figure 2, the chart type selected is dependent on the type of analysis and data. Instead of selecting the chart type first, understand what type of analysis you want to do with the data
- For additional detail on visualization best practices for specific chart types, please refer to Appendix A.

Leading Practices in Visual Analytics- Consistent Structure and Flow

Dashboards that are part of the Data Hub should be developed in a consistent and simple structure for proper flow

Figure 3: Example of dashboard structure (Deloitte, 2022)



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Simplicity and structure go hand in hand — grids provide **a consistent structure and flow**.

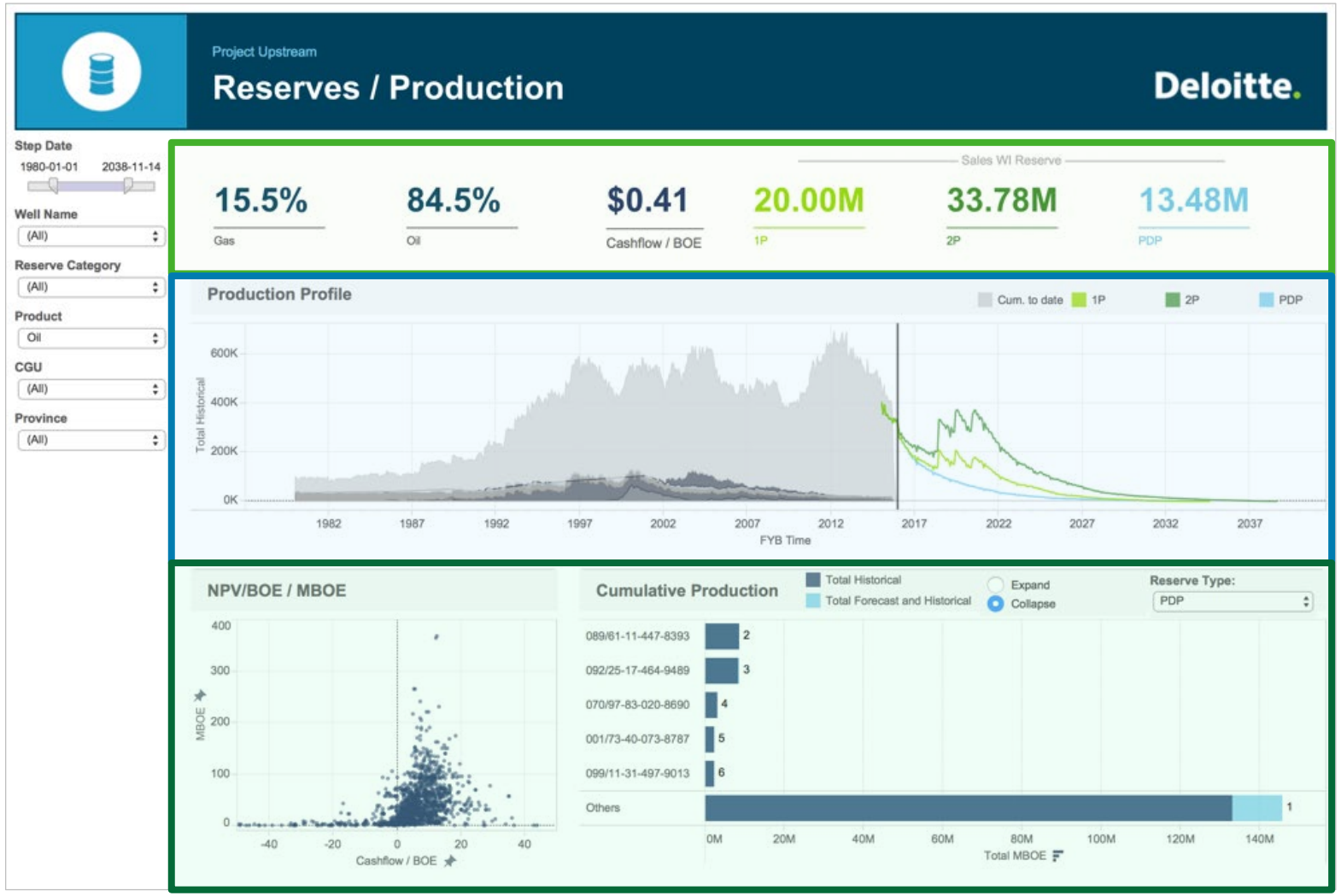
Guidance:

- For all dashboards or assets underneath the umbrella of the Data Hub, keep **fonts, colours and overall design simple** to not distract from the message of your dashboard.
- Using a consistent structure across different dashboards enhances the user familiarity with the layout and enhances their understanding.
- Figure 3 illustrates a dashboard organized in a grid structure. Users can read the information from top to bottom and left to right. This makes the dashboard simple for a user to follow and consume the information.
- Maintaining a consistent visual identity across different dashboards/views can help to enhance the brand identity/ of the tool.

Leading Practices in Visual Analytics – Narrative Structure

Use progressive disclosure to build narrative structure in dashboards

Figure 4: Example of progressive disclosure in a dashboard (Deloitte, 2022)



Impactful dashboards have good **narrative structure**. Progressive disclosure is an approach for structuring a dashboard to a **tell a story with the data**.

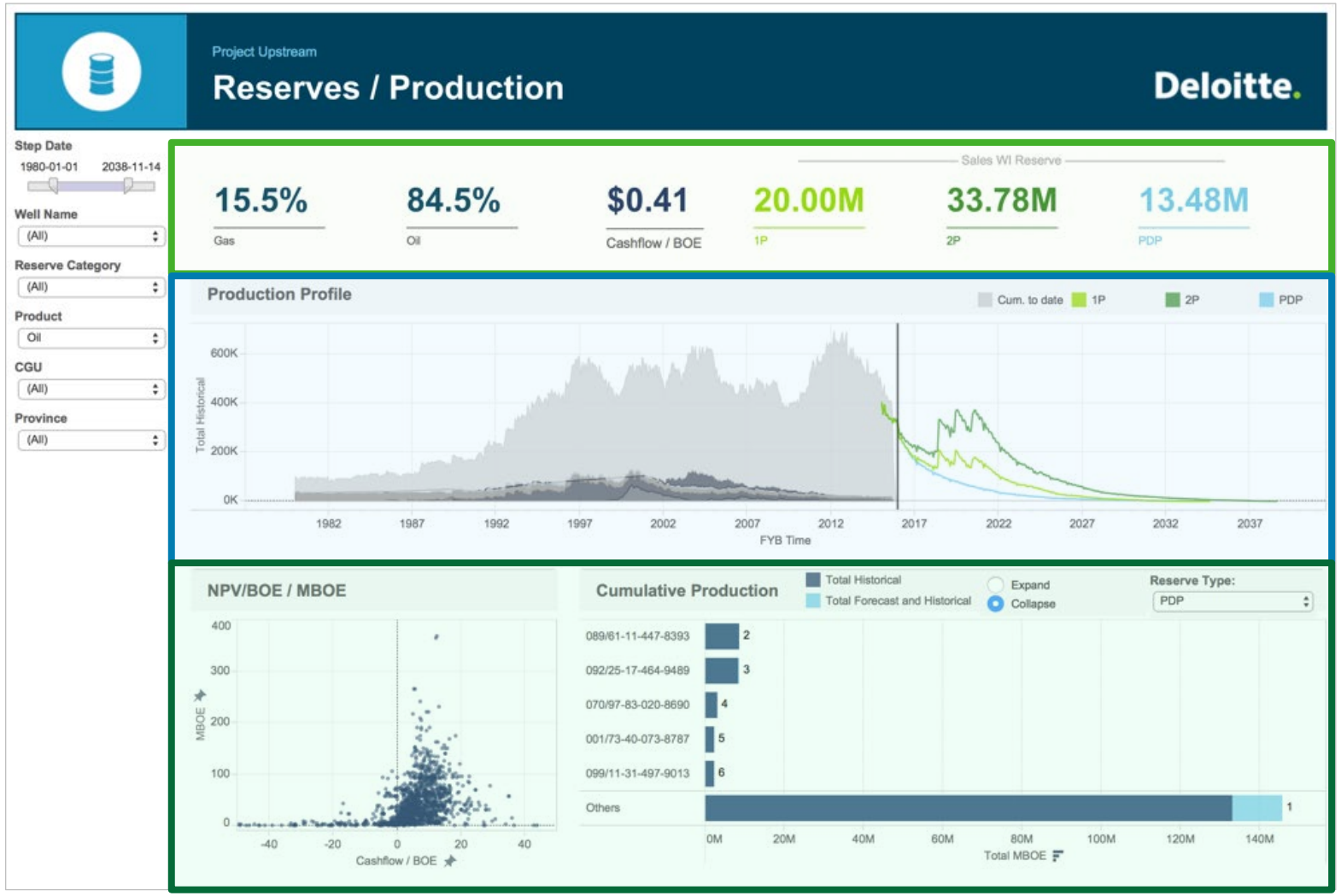
Guidance:

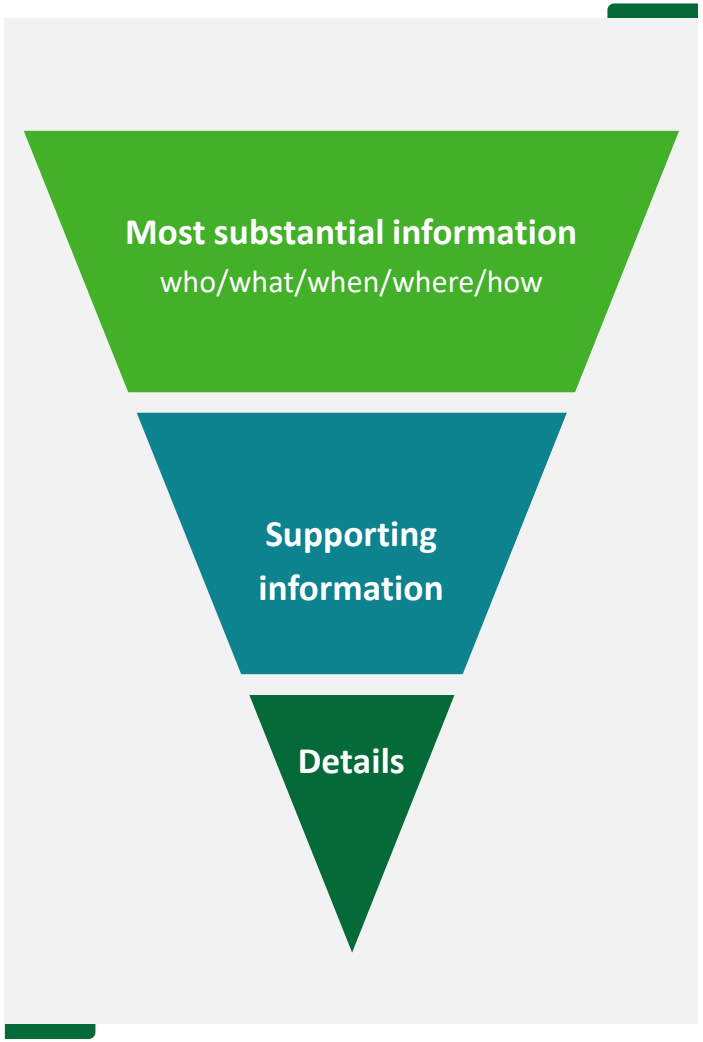
- Start with the **most important information** at the top of the dashboard and **more detailed views** in the sections below.
- Present information at multiple levels, giving users the ability to easily see connections and patterns in the data
- In Figure 4, the top-line metrics provide the most important information. The second level provides supporting information while the third level provides the most detail

Leading Practices in Visual Analytics – Progressive Disclosure

Progressive disclosure involves communicating top-line findings first, with substantiating evidence to follow

Figure 4: Example of progressive disclosure in a dashboard (Deloitte, 2022)





Section 1A: Leading Practices for Data in Economic Development

Considerations

Leading Practices in Data and Economic Development

Communities should balance several factors when identifying meaningful data for policy purposes as part of the Hub

Normalizing community-driven data in policy discussions

Community-driven development programs have shown that given access to information, technical and financial support community members can identify priorities and local development challenges. This is seen in the Ground Truth 2.0 project, please see page 43 of the Recommendations for Measuring a Community Economy report for more details. It showcases that residents can collectively agree on their priorities and when supported with the appropriate resources can generate the required data to answer their questions and support their initiatives.[212]

Collecting the right data – CART principles can help qualify if data is meaningful

The CART principle for monitoring activities and metrics is described below: [213]

- **Credible:** data needs to be high quality, consistent, and analyzed accurately. It is important to frame correctly the issue and question you are trying to answer.
- **Actionable:** only collect data that you can commit to use and analyze. Based on the findings derived from the data, community members should understand if there are actions that need and can be executed based on existing resources.
- **Responsible:** ensure that benefits of collecting data outweigh the costs. It needs to consider not only direct costs of collecting data but also opportunity costs which is the idea that the money and time spent to collect the data could have been used elsewhere. It is also important to consider the cost to respondents, and always ensure their privacy is maintained. The benefits must also be considered, as collecting too little data can be detrimental to groups by not highlighting where the problem lies.
- **Transportable:** collect data that can be used for other purposes and placed in a generalized context. Transportable data needs to be transparent which allows communities to share their data.

Meaningful digital data can come in many forms

As the data landscape changes, communities should consider advancing together in collecting data from multiple sources using the CART principle. Digital data sources relevant to economic development can be classified into four types:

- **Data exhaust** consists of passively collected data obtained from people's use of digital devices, and real-time data collected by organizations
- **Online information** consists of news medias and social medial interactions
- **Physical sensors** consists of data from satellites or infrared imagery
- **Resident reporting** is information actively produced by residents

This categorization can help communities to take stock of what type of data they do have and help to develop organized repositories of data.

Ensuring trust and privacy

The trust that residents have on government bodies and community organizations impacts how much data they are willing to share. As outlined on pages 39 and 74 of the Recommendations for Measuring a Community Economy report privacy concerns are an increasing concern for sharing data for both individual community members and private companies.

Data visualization is the main way that communities release their data. When publishing data, communities should ensure that data is not identifiable, and re-identification via linking is not possible. **Data sets published need to be cleaned of any sensitive attributes and quasi-identifiers (such as age, gender, zip codes) in order to ensure the privacy of the owners of the data.**[216,223]

Leading Practices in Data and Economic Development (continued)

To get the buy-in required to leverage the full breadth of data available to communities, several factors can be considered

Requirement for specific forms of analyses making can support the case for data assets and investments

When communities mandate that key decisions and policy discussions require specific forms of analyses or thresholds of data to inform choices, this can create demand and momentum for communities to invest in data and data expertise.

- For example, if a new public-private partnership requires an economic impact assessment to be completed via Input-Output modelling this can stimulate the demand for specific research and analyses

Consideration should ensure analysis requirements are meaningful and focus on more than conventional forms of economic value (e.g., GDP) as a means of helping support further investment in the required data to conduct analysis. For example, if communities mandate the need to show effects on inclusion or ESG targets as part of investment business cases, communities may develop expertise and capacity in the evaluation of these types of metrics in the long term.

Building resources and expertise

Evidence suggests that many governments are not using its existing data to its fullest potential. Many governments may not know how to harness their existing data. Reasons may include legacy technology is still being used, which is slow, outdated and in many cases expensive to maintain. Additionally, information collected may be stored in different siloed platforms. This makes it challenging for data to be compared and pooled with other datasets.

Additionally, due to a decreased cost in collecting data in the recent years many communities may be spending significant resources on data assets but may not have the resources required to analyze and visualized the data collected. This leads to wasted time and effort.

Cities should invest in technical tools, employee knowledge, and skillset. Cities should collect high-quality, valid, and credible data. It is vital to understand when to measure impact and when not to measure it. Investments are particularly important for unstructured data. A way to optimize these investments is to identify what are the most common forms of unstructured data produced by the community and invest in technology that analyzes that type of data. Moreover, some studies suggest that allocating a resource dedicated to the analytics team is essential for success.[220,221,222]

Participating in the open data movement

The open government movement which consist of the government looking to strengthen the relationship among government, residents, and community stakeholders along with a goal to increase government transparency has led to the opening of data portals and increased resident engagement. Additionally, technological developments and new tools for big data, data mining, graphic tools paired with an increase in e-government efforts has stimulated an increase in applications for public agencies. These movements have increased the use of data visualization among governments.[218,219]

Leading Practices in Data Visualization in Economic Development (continued)

Communities can consider entering into more meaningful relationships with local companies and ensuring the full experience of its residents are reported

Fostering an inclusive governance & performance management environment

An inclusive governance model for a shared data asset consists of a multi-stakeholder model (i.e., the government, individuals, NGOs, private sector, academia). **Governments should build structures and platforms that allow residents and other sectors to have meaningful participation in governance. Data visualization is a tool to support inclusive governance.**[217] For example, as seen on page 42 of the Recommendations for Measuring a Community Economy report, Phoenix has built an online tool for community members to provide their opinions in budgeting by balancing Phoenix's budget with their own priorities.

Performance management refers to the process of ensuring that goals are met in an efficient manner. **Data visualization allows decision makers to make data-driven performance decisions.** Community members can identify areas that are not meeting city targets, and where more funding should be concentrated.

Investing in meaningful partnering with private sector providers

While government reporting on key economic figures (e.g., sectoral performance, demographics etc) continues to be a valuable source of information for communities to draw from, consideration should be given into partnering with private data providers as part of 'regular business' rather than as a one-off data purchase. Moreover, consideration should be given to leveraging discussions with companies related to corporate-social responsibility or community-engagement to enter data sharing partnerships as a complement or substitute for traditional corporate engagement (e.g., donations etc.).

Moving away from reporting the average only

Communities should move away from reporting population averages, and instead look at the individual experience of various groups. For example, instead of reporting total average income in the region, communities could consider reporting income by race, gender, postal code, or other classifications. By doing so it could highlight any income gap and inequality persisting in the economy. Running comparative analysis of different metrics ensures a full picture of what individuals are experiencing in the community and the quality of the socioeconomic outcomes of different groups. Communities should also keep in mind intersectionality of different groups, and how that impacts socioeconomic outcomes. More information on intersectionality can be found on page 24 of the Recommendations for Measuring a Community Economy report.

Ensure metrics are commensurable

Community benchmarking is helpful for regions to identify areas of strength and improvement within their communities. However, it is important to ensure a fair comparison of metrics that adjust for difference in the size or characteristics of a community. For example, it is unfair to compare the gross domestic product (GDP) of Toronto to Prince Edward County due to difference in population size. Nevertheless, the GDP per capita is a more meaningful comparison as it adjusts for the different population sizes of the community. Similarly, if one is to compare GDP overtime it is important to look at measures of real GDP (rather than nominal GDP) which accounts for inflation. Measures of real GDP reflect changes in volume overtime and excludes any price effects which allows economic growth to be more appropriately analyzed.

Section 1B: Recommendations to Guide Shorefast's Community Economy Indicator Dashboard /Data Hub Initiative

Recommendations

Recommended Metrics

We recommend that Shorefast communities consider profiling specific metrics under five themes as a baseline as part of the Data Hub

Overview of our recommendations:

Recognizing the Economic Dashboard can serve as a valuable aspirational goal and format, and that each community is confronting a unique set of policy questions, a baseline level of data tracking and reporting across the country could help to support greater data maturity in economic development. Based on our review of leading practices, experience in economic development and engagement with select communities, we recommend communities consider investing in a 'baseline' set of metrics categorized in the following groups:

- Core economic features
- Diversity, Equity, and Inclusion
- Community Driven Metrics
- Resident Experience
- Environment, Social, Governance (ESG)

We note that we expect our recommended metrics to complement classical, ongoing reporting Canadian communities are investing in now (e.g., top line figures related to population, GDP, etc.).

Some points of guidance to frame our recommendations:

- The metrics outlined on pages 22 to 24 are recommended to all communities, but derivations or spin offs to suit other communities could be useful.
- Assessment of the feasibility of each metric to be measured by Canadian communities was not considered. Instead, recommended metrics reflect ensuring a broad, meaningful range of metrics to complement 'classical' economic development figures (e.g., GDP)
- While metrics are communicated at a general level on pages 22 to 24, we recommend considering investing in reporting that further segments information by gender and by race where applicable for more meaningful data.
- Additionally, we recommend investing in location quotients (LQ) to estimate core economic metrics across smaller regions.
- We recommend being cognizant of data deficit, which may lead to "data invisibles" who are often women, elderly, children, migrants, indigenous populations and slum dwellers who are not accounted for in the formal economy.[224]
- We recommend several visualization approaches on pages 22 to 24. We provide further details and best practices of visualizations on Appendix A.
- We note that many of our recommended metrics are currently included, or within the potential scope (if data were available) of the Vital Signs initiative.*

* Vital Signs is a community-driven data program led by the Community Foundations of Canada and local community foundations. Local data collected is used to provide insights on indicators of quality of life, and support locally-relevant solutions. Data collected aligns with the UN's Sustainable Development Goals (SDGs), and includes topics such as housing, poverty, safety, environment, and local arts.

Recommended Metrics

We recommend that Shorefast communities consider profiling specific metrics under five themes as a baseline as part of a consolidated Data Asset in addition to classical economic data

Theme	Metric	Example Sources	Example Optimal Visualization Approach	Example Required Resources/Investment
Core Economic features Note: location quotients (LQ) can be used to estimate core economic metrics across smaller regions.*	• Employment (by sector or industry, proportion of workers in full-time and part-time, self-employed)	• Data from labour force surveys or local government analyses • Vicinity Jobs reports • Conference Board of Canada (paid data)	• Line graph: employment trends over time period, reflecting macroeconomic environment	• Resource(s) to conduct and analyze local labour force survey • Vicinity Jobs provides detailed information at a fee.
	• Unemployment (by sector or industry, proportion of workers in full-time and part-time, self-employed)	• Data from labour force surveys or Statistics Canada/Census data • Conference Board of Canada (paid data)	• Line graph: unemployment trends over time period, reflecting macroeconomic environment	• Resource(s) to conduct and analyze local labour force survey
	• Building permits, housing starts, home sales	• Statistics Canada • Canada Mortgage and Housing Corporation (CMHC) • Canadian Real Estate Association (CREA)	• Heat map: where colors reflect number of building permits • Line graph: housing starts and home sales over time period, reflecting macroeconomic environment	• Data from the example sources are available in the public domain
	• Population and demographic characteristics (population, age, sex)	• Statistics Canada/ Census data • Conference Board of Canada (paid data)	• Line graph: population trend analysis over time period	• Data from the example sources are available in the public domain
	Key Limitations: Economic metrics can be categorized a leading, coincident, or lagging. Lagging indicators reflect the fallout of events. For example, when the economy declines, firms cut hours of work before they layoff workers. This means the unemployment rate increases after the economy declines. Coincident indicators say how the economy is doing a point in time. Leading indicators provide a signal about the future. As such, there are limitations with respect to economic metrics. Mainly, lagging indicators, such as unemployment, often tell the story of 'what has happened' in the economy, rather than 'what will happen'.			
Diversity, Equity and Inclusion	• Poverty gap: equal to the difference between the ratio of the number of people of color below the poverty line to the total number of people of color and the ratio of number of white people below the poverty line to the total number of white people.	• Data from government collected datasets such as Census and surveys.	• Heat map: where colors reflect different gaps and spreads • Line graph: show the change of the poverty gap over the years	• Data from the example sources are available in the public domain • Resource(s) to analyze and build visualization of data.

* The Location quotient (LQ) is a way of quantifying how concentrated a particular industry, cluster, occupation, or demographic group is in a region as compared to the nation. It can reveal what makes a particular region "unique" in comparison to the national average. In more exact terms, location quotient is a ratio that compares a region to a larger reference region according to some characteristic or asset. Suppose X is the amount of some asset in a region (e.g., manufacturing jobs), and Y is the total amount of assets of comparable types in the region (e.g., all jobs). X/Y is then the regional "concentration" of that asset in the region. If X' and Y' are similar data points for some larger reference region (like a state or nation), then the LQ or relative concentration of that asset in the region compared to the nation is (X/Y) / (X'/Y'). Source: https://www.economicmodeling.com/wp-content/uploads/2007/10/emsi_understandinglq.pdf

Recommended Metrics (continued)

We recommend that Shorefast communities consider profiling specific metrics under five themes as a baseline as part of a consolidated Data Asset in addition to classic economic data

Theme	Metric*	Example Sources	Example Optimal Visualization Approach	Example Required Resources/Investment
Diversity, Equity and Inclusion (continued)	• Foreign labour force (migrant stock: migrant stock age 20-64 % of population, underemployment of foreign labour force, average wages of foreign labour force)	• Data from labour force surveys	• Bar chart: comparison of foreign labour force per industry • Line graph: employment trends over time period, reflecting macroeconomic environment	• Resource(s) to conduct local labour force survey to obtain information on migrant labour opportunities, under unemployment, average wages, and to analyze data.
	• Net-income Gini: measures the extent that net distribution of income (post-tax/post-transfers) deviates from a perfectly equal distribution	• Data from labour force surveys • Data from census	• Line graph: show the change of Net-Income Gini over the years	• Resource(s) to conduct local labour force survey to obtain data on average wages and analyze data.
Community Driven Metrics	• Hate crime incidents: count of physical, verbal, hate propaganda, vandalism, threats, and online incidents.	• Data from police reports • Data from community platforms	• Plotted on a map to show were incidents take place (categorized by type of incident)	• Resource(s) to build community platform leveraging police data (partnership would be required) and analyze data.
	• Community safety (e.g., % of population that feels safe walking alone after dark or crime severity index which tracks both prevalence and seriousness of police-reported crimes.)	• Data from local surveys for local perception on safety • Data from Statistics Canada for the crime severity index	• Line graph to show the change overtime of community safety feeling. • Doughnut chart to show % of population feeling safe.	• Resource(s) to conduct local survey (include questions such as: do you walk alone in the community, what safety precautions do you take, what do you do if a stranger asks for your help) and analyze data. • Data from the example sources are available in the public domain
	• Community Vitality – Social Relationships (% of population that reported somewhat strong sense of belonging to community).	• Data from local surveys for local perception on belonging to community	• Line graph to show the change overtime of sense of belonging to community. • Doughnut chart to show % of population feeling safe.	• Resource(s) to conduct local survey (e.g., on a four-point scale what is the sense of community belonging an individual has) and analyze data.

* More information for the metrics outlined on the Recommendations for Measuring a Community Economy report.

Recommended Metrics (continued)

We recommend that Shorefast communities consider profiling specific metrics under five themes as a baseline as part of a consolidated Data Asset in addition to classic economic data

Theme	Metric*	Example Sources	Example Optimal Visualization Approach	Example Required Resources/Investment
Resident Experience	• Housing Affordability: could be measured by analyzing whether a family earning median income could qualify for a mortgage loan on a median-priced family home.	• Income data from Statistics Canada • Housing data from brokers, real estate boards, CHMC	• Heat map: where colors express average housing affordability of certain neighborhoods.	• Data from the example sources are available in the public domain • Resource(s) to analyze data and build visualization approach.
	• Rent Burden: number of renters that pay over 35% of their income on rent over total number of renters.	• Income data from Statistics Canada • Rental data from online platforms such as *Rentals.ca, Realtor.ca* • Rental data from real estate boards	• Bar graph: can look at severely and moderately rent burden. • Line graph to show change overtime.	• Data from the example sources available in the public domain
	• Access to essential amenities, goods and services per region (e.g., neighborhood, postal code). • Essential amenities can be defined as: childcare, parks and open spaces, community facilities, fresh food, health care & pharmacies, financial services, and internet service. • Access can be defined as: areas with more than 50% of households within ½ mile of an essential amenity.	• Data from sources such as: OpenStreetMap, Foursquare	• Heat map: where colors express average distance of a neighborhood from essential amenities.	• Foursquare data available for a fee • OpenStreetMap is available in the public domain. • Resource(s) to analyze data
	• Job quality index: measures different components of job quality such as wages, working conditions, working time, work-life balance, and training.[119]	• Data from labour and company surveys. We recommend analyzing job quality per sector.	• Line graph to show the change overtime • Bar chart to compare job quality index of different sectors.	• Resource(s) to conduct local labour force, company survey and analyze data.

* More information for the metrics outlined on the Recommendations for Measuring a Community Economy report.

Recommended Metrics (continued)

We recommend that Shorefast communities consider profiling specific metrics under five themes as a baseline as part of a consolidated Data Asset in addition to classic economic data

Theme	Metric*	Example Sources	Example Optimal Visualization Approach	Example Required Resources/Investment
ESG	• Waste generation per region (e.g., per neighborhood or postal code)	• Data from Statistics Canada • Data from implementing smarter waste generation software such as Sensoneo	• Line graph to show the change overtime	• Data from the example sources available in the public domain • For more specified data: Resources to purchase software to track waste generation • Resource(s) to analyze data.
	• Air quality of the community	• Data from sources such as: IQAir • Data set up by provinces: such as Ontario and BC. • Air quality monitoring devices	• Line graph to show the change overtime	• Data from the example sources available in the public domain • For more specified data: resources to purchase air quality monitoring devices • Resource(s) to analyze data.
	• Carbon intensity of GDP: measure of how much carbon economies emit (from the consumption of petroleum, natural gas, coal, and natural gas faring) for every dollar of GDP they produce	• Government of Canada: Facility greenhouse gas reporting	• Line graph to show the change overtime	• Data from the example sources available in the public domain

* More information for the metrics outlined on the Recommendations for Measuring a Community Economy report.

Example Software Options for Data Visualization

There are several potential visualization tools for Shorefast to consider for the development of the Community Economy Indicator Dashboard data asset

The table below provides considerations for three selected data visualization tools. These tools are commonly used in industry and some communities may already have experience or knowledge of them. It should be noted that Shorefast has previously developed Data Hub assets using ArcGIS but has not indicated a tool preference for the Community Economy Indicator Dashboard asset.

	Tableau	Power BI	ArcGIS Online
Overview	• A suite of applications for developing and sharing data visualizations: – Tableau Desktop – Windows/iOS application to develop reports – Tableau Cloud – online SaaS to share reports and collaborate	• A suite of applications for developing and sharing data visualizations. Part of the Microsoft Power platform – Power BI Desktop – Windows application to develop reports – Power BI Service – online SaaS to share reports and collaborate	• Web-based mapping software to build and share interactive map-based dashboards • Shorefast partner ESRI utilizes ArcGIS for visualization
Enterprise Deployment	• Can be run on existing infrastructure (Linux, Windows, public cloud, on-premise)	• Must migrate to Azure. On-premise deployment of Power BI requires Data Gateways	• Cloud-based; can operate on any device with an internet connection
Data Source Integration	• Supports common data sources and cloud databases	• Supports common data sources and cloud databases. May require Data Gateways for some data sources. • Includes built-in Power Query data prep tool	• Supports file based data sources (e.g. CSV, Microsoft Excel), open standards, and native ArcGIS sources (e.g. hosted layers)
Reporting, Dashboards, and Data Visualization	• Supports all common visualization types • Easy to format and customize visualizations and create dashboards with interactions • Can handle large volumes of data quickly	• Supports all common visualization types • Easy to format and customize visualizations and create dashboards with interactions • Performs better when volume of data is limited. May drag with large amounts of data. • Intuitive user interface that is based on other Microsoft products	• Primary use is for visualization of geographic information with maps. • Geo-enrichment feature allows for users filter, drill down, and explore data using maps • Limited number of chart types • Limited ability to format and customize charts
Estimated Directional Cost *	• Free version can be downloaded. Sharing within organization requires license: – Tableau Viewer - $15 per user/month – Tableau Explorer - $42 per user/month – Tableau Creator - $70 per user/month	• Desktop software is free to download. Sharing within organization requires license: – Pro License - $10 per user/month – Premium License - $20 per user/month	• ArcGIS Creator - $845 per user/year • ArcGIS Viewer - $170 per user/year
Sharing Capabilities	• Tableau Cloud – a Tableau-hosted site where reports can be uploaded and shared. Access to Tableau Cloud is included with license purchase.	• Power BI Service – platform to share reports and collaborate	• Sharing via ArcGIS Online platform

* Note that actual costs may be higher. The given costs are estimates based on public information.

Example Data Governance Recommendations and Considerations

Shorefast should consider their data governance strategy for the Community Economy Indicator Dashboard and future Data Hub assets

	Recommendations	Considerations
Data ownership	• Communities should manage and control their own localized datasets and data assets even if they are being leveraged/uploaded into a central shared asset	• Roles and responsibilities for data ownership should be clearly defined. For example, datasets should have an assigned owner to manage dataset and control access. • Communities should have the required skillsets for management of data
Data storage	Storage options can vary depending on the capabilities, resources, and data maturity of the community. Examples of data storage options: • Shared network drive • Structured Query Language (SQL) Database • SharePoint • Cloud storage: Microsoft Azure, Google Cloud, ArcGIS Hub	• Datasets should be stored in one central location to avoid data duplication and simplify access and data governance • Data catalogs should be utilized to manage datasets and support data discovery for users • Shared network drive may not be appropriate for any sensitive data due to the need for access control • For smaller communities with limited resources, network drive or Structured Query Language (SQL) database storage may be more feasible options • Communities with more resources and larger, complex, or sensitive datasets may require SharePoint or a cloud storage platform
Public/ audience roles	• Community leaders and end users should be involved in the design and testing phase of the Hub to ensure maximum impact • Consume and share assets to grow user base of the data hub in the public • Public-facing data assets should be designed to meet accessibility guidelines (e.g., Web Content Accessibility Guidelines (WCAG)) to be accessible by people with disabilities to ensure full community participation • Provide commentary and suggestions for new reporting via structured feedback requests	• To further gain buy-in, consideration could be given to developing structured feedback gateways for users to provide feedback (e.g., focus groups, comments inbox or an ongoing resident/ expert advisory panel)

Section 1C: Aspirational Data Asset Examples

Additional Aspirational Examples

In this section we outline examples of data assets and key learnings that Shorefast can apply

The following slides present data assets with economic development and socioeconomic elements. These examples were developed by Deloitte by data visualization and economic experts.

Thus, they can be viewed as aspirational examples for Shorefast and partner communities.

For each example, we provide a detailed description of the project and relevance for Shorefast.

Canada’s Economic Recovery Dashboard

Shorefast can apply key learnings from this dashboard to the development of future assets

In March 2020, Deloitte developed a COVID-19 Economic Recovery Dashboard that provides insight into the path towards COVID-19 recovery. Specifically, this Dashboard contains:

- Real-time monitoring and analysis of the impacts that the COVID-19 pandemic is having on the Canadian economy
- Directional tracking on the pace of the recovery as it relates to the health, financial, and economic wellbeing of Canada.

This dashboard is supported by our computational expertise and ability to integrate different statistical models and data sources to present a comprehensive picture on the state of the economy. Analysis is available at the national level and for each province. Major Canadian cities are also captured – enabling the Dashboard to provide a regional lens to analysis.

Relevance/applicability to Shorefast:

The Economic Recovery Dashboard can be used as an aspirational example for Shorefast in terms of the required capabilities and process followed to develop the tool. Despite this being a complex tool requiring a large team and resources to develop, the considerations from the development process can be applied to guide future data assets for Shorefast.

Canada’s Economic Recovery Dashboard (continued)

Shorefast can apply key learnings from this dashboard to the development of future assets

The dashboard provided a consolidated view of health, community/social activity, financial and economic indicators that provided updates on how the economy was reacting to various stages of the COVID-19 pandemic organized in the following groups:

Health

As a health crisis, the most important metric was the number of new cases of COVID-19 being reported, mortality rate and daily percentage increase. Monitoring individual country statistics was particularly useful for international organizations or those that depended on export markets.

Sourced: Johns Hopkins University

AI monitor

Monitoring a series of alternative Canadian/US signals of economic recovery - such as sentiment analysis across social media platforms, foot and car traffic in metropolitan areas, as well as point of sales data (dollars and transactions) – was used as leading indicators that were tracked, forecasted, and interpreted in conjunction with traditional financial and economic indicators.

Sourced: Geotab, TomTom, Talkwalker, SafeGraph, Flightradar24, PiinPoint, Google

Economy

Economic indicators assess the wellbeing of an economy. There are indicators that lead changes in the economic cycle, such as hours worked and purchasing manager indexes. Given the unique nature of this economic cycle, the inclusion of metrics on hard-hit sectors were appropriate even if they were not leading, like retail sales to understand the state of affairs during the pandemic.

Sourced: Haver

Finance

Financial indicators can be leading indicators of where the economy is headed. Equity prices embody the expectations of millions of investors with respect to future earnings growth. Rising long-term bond yields relative to short-term bond yields or cash rates signal expectations to higher growth and rising prices. Declining financial market volatility can signal less perceived risk by investors.

Sourced: Haver

The dashboard can be viewed here. Note: the dashboard is no longer updated regularly.

Canada's Economic Recovery Dashboard (continued)

Shorefast can apply key learnings from this dashboard to the development of future assets

Key capabilities/value to users:

Deloitte's COVID-19 Economic Recovery Dashboard allowed for policy and business leaders to access a real time tracker of COVID-19 recovery, from a health, financial, economic and community perspective, powered by a range of global and national data and artificial intelligence mechanisms. Real time tracking of COVID-19 recovery from a health perspective provided perspective on the potential timing of when economies and sectors would shift towards recovery.

Key considerations for Shorefast:

- **Resources Required:** a team of 15 resources working a combination of part-time and full-time hours over 4 weeks were required to design, develop, and publish the dashboard
- **Developing data assets requires a combination of skillsets**
  - The Economic Recovery Dashboard brought together skills in data engineering, data visualization, information design, web development, and economics. Multiple tools were used such as Tableau, Figma, Structured Query Language (SQL) databases, and Python.
  - For Shorefast and the communities, developing or acquiring these skills is necessary to build data assets and support them in the future.
- **Creating a data asset should follow a process to ensure user needs are appropriately and accurately met**
  - The Economic Recovery Dashboard was developed through the following process over a two-week period:
    1. Data sourcing + wireframe development
    2. Data cleansing, manipulation, and loading
    3. Dashboard development
    4. Quality Assurance testing and Subject Matter Expert review
    5. Publish to Tableau Public/Server and embed in website
  - An end-to-end process simplifies the development of a data asset by breaking it down into stages. Tasks are carried out in each stage that contribute to the development of the data asset and ensure it conforms to user requirements.
- **Data centralization enhances the efficiency of a data asset and reduces complexity**
  - The Economic Recovery Dashboard incorporated data from multiple sources which are listed below. All datasets were ingested into a SQL database that was used for the final visualization.
    - John Hopkins University
    - GeoTab
    - FlightRadar24
    - SafeGraph
    - Haver
    - Google
  - Centralizing these sources into one database simplified development as one database was required instead of multiple separate files or sources. Access to the data for profiling and measuring data quality was made easier by using a single source. In addition, the database could be reused for future assets requiring the same data. For Shorefast and communities, having a centralized location/repository for data simplifies access, consumption, and reusability of datasets. It also allows for better governance and controls to be placed on data.

Shipping & Supply Chain Dashboard| Transportation

Centralizing data sources reduces inefficiencies and establishes a single source of truth for data

A major Canadian transportation agency wanted to gain a **consolidated view into supply and demand of bulk commodities transported** by railcar within their network. The disparate sources of data resulted in consistent mismatches between the required labour force and the one deployed, resulting in inefficiencies. **A system for gathering the data from the different sources was implemented, allowing each stakeholder to view the data of interest to them**. The final product was a central source of truth for all data from the different stakeholders that allowed the port to track all shipping data, displayed on a dashboard.

Key Capabilities/Value to Users

- *Creating a central repository for all shipping data*
- *Being able to understand the rail network at a glance*
- *Being able to staff accordingly due to accurate data*

Tools Used

- *Data Prep – File Transfer Protocol (SFTP), Structured Query Language (SQL), SQL Server Integration Services*
- *Data Visualization - Tableau and Tableau Server*

Data Sources

- *Excel files extracted from client systems*

Considerations for Shorefast:

- *The client experienced inefficiencies since data was spread across different sources.*
- *The dashboard centralized data from multiple sources to give the user a complete view of all data across systems.*
- *This demonstrates the value of centralizing data to have a single source of truth.*

Appendix A

Additional Guidance on Leading Practices in Visual Analytics

Leading Practices in Visual Analytics

In the following section we outline data visualization best practices

In the following section we outline best practices for data visualization including when to use different chart types and design considerations to make charts easy to understand. The following common chart types are included:

- Bar charts
- Pie charts
- Doughnut charts
- Line charts
- Scatterplot
- Maps

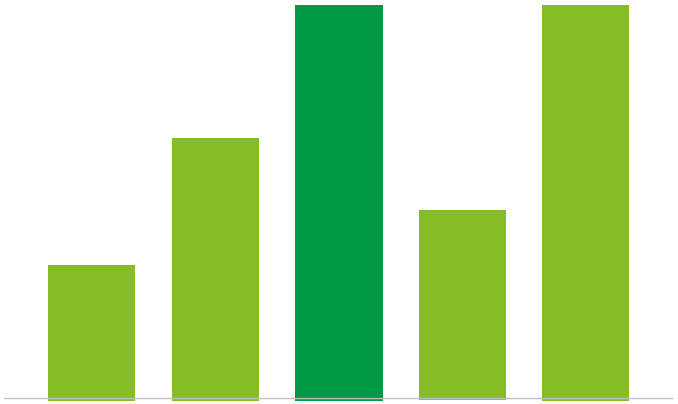
The information in this appendix can assist Shorefast when developing dashboards to ensure that chart selection makes sense for the desired analysis and meets user needs.

Leading Practices in Visual Analytics

Data Visualization Best Practices – Bar Charts

Bar charts are the most versatile of all chart types. They are best used to show change over time, compare different categories, or compare parts of a whole.

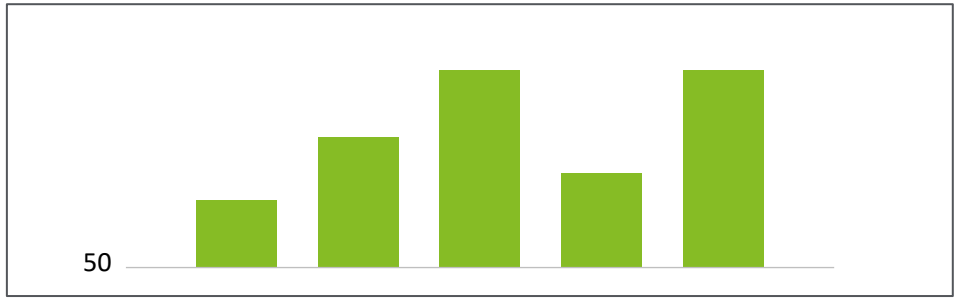
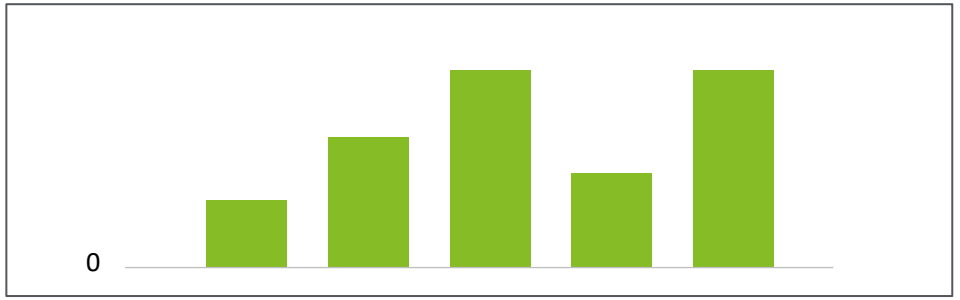
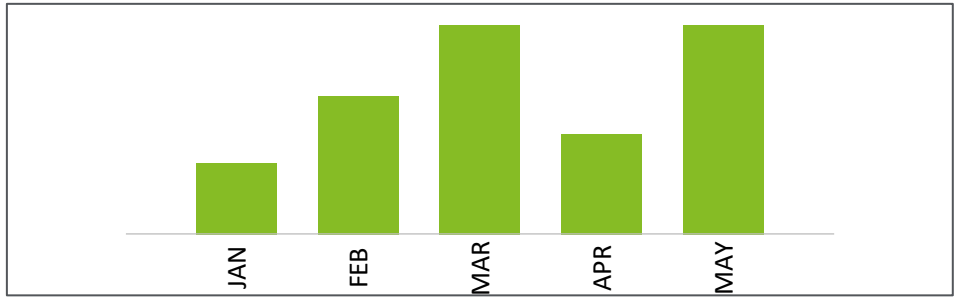
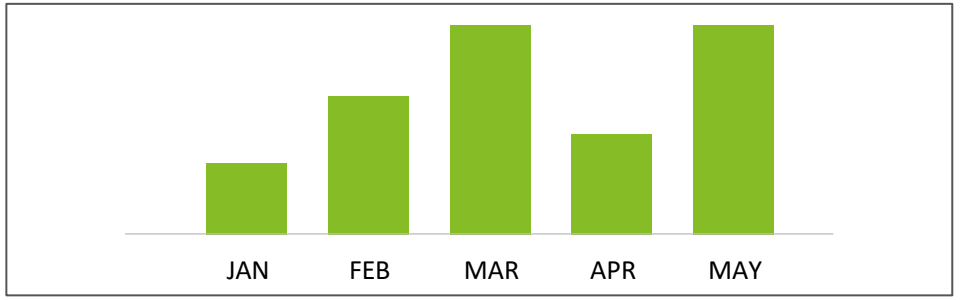
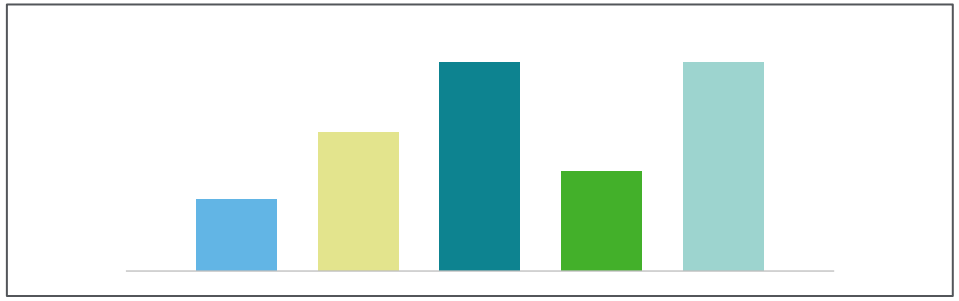
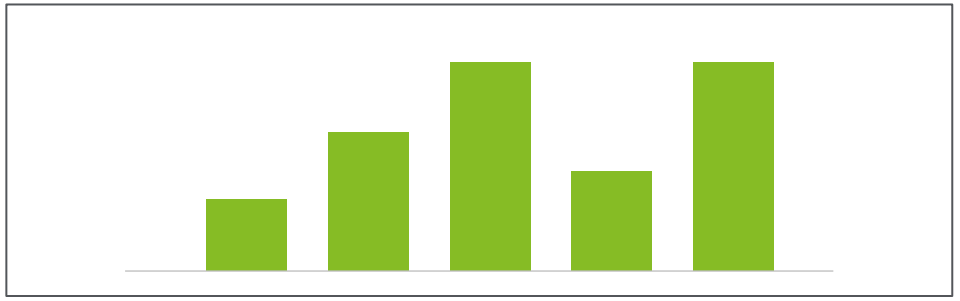
Vertical bar charts are also known as column charts. They are best used for chronological or grouped data and are also useful when visualizing negative values below the x-axis.



Stacked graphs are best used when there is a need to compare multiple part-to-whole relationships. These can use discrete or continuous data, oriented either vertically or horizontally.

Leading Practices in Visual Analytics

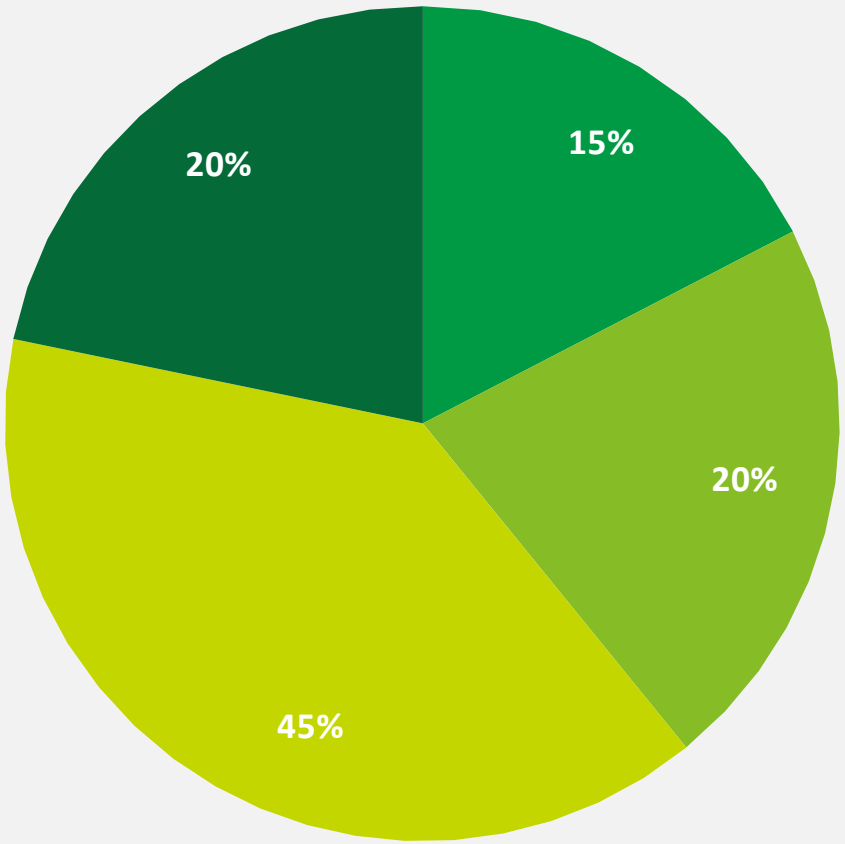
Data Visualization Best Practices – Bar Charts

	NO	YES
Start the y-axis value at **zero**.		
Use **horizontal** labels.		
Use **consistent** colour, unless multiple colours have **specific meanings**.		

Leading Practices in Visual Analytics

Data Visualization Best Practices – Pie Charts

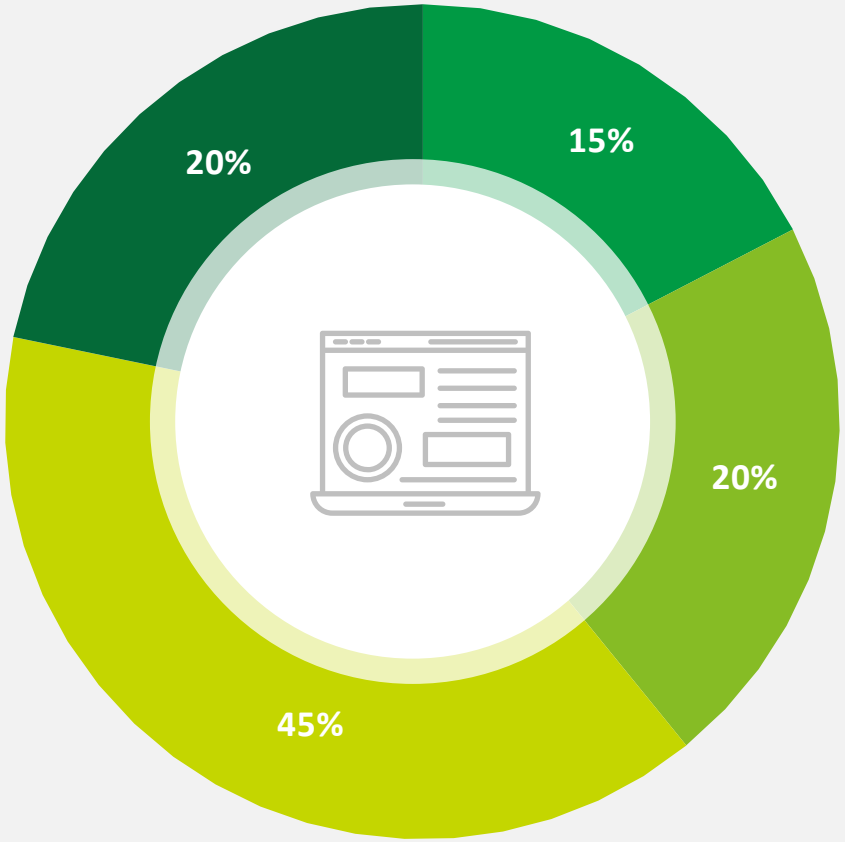
- Pie charts are best used for making part- to-whole comparisons with discrete or continuous data.
- They are most impactful with a small data set.
- All segments must add up to 100%.



Leading Practices in Visual Analytics

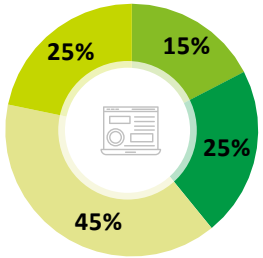
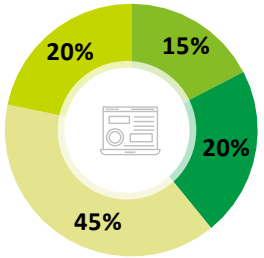
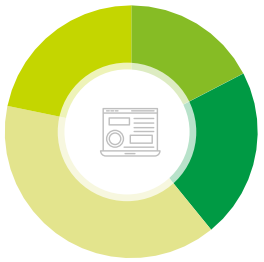
Data Visualization Best Practices – Doughnut Charts

- Variation of pie chart; often preferred because it is visually more accurate.
- Reduces distortion of segments at centre.
- This type also enables the inclusion of a total value or design element in the centre.



Leading Practices in Visual Analytics

Data Visualization Best Practices – Doughnut Charts

	NO	YES
Make sure all data adds up to **100%.**		
Visualize no more than **five categories** per chart.		
Do not use **multiple pie** charts for comparison.		

Leading Practices in Visual Analytics

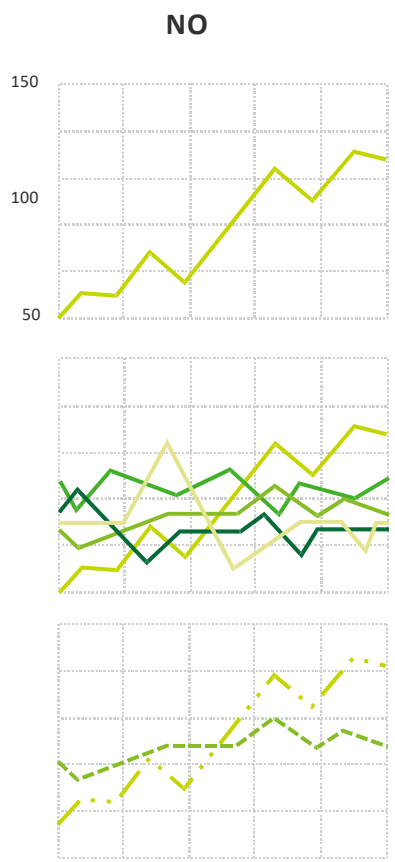
Data Visualization Best Practices – Line Charts

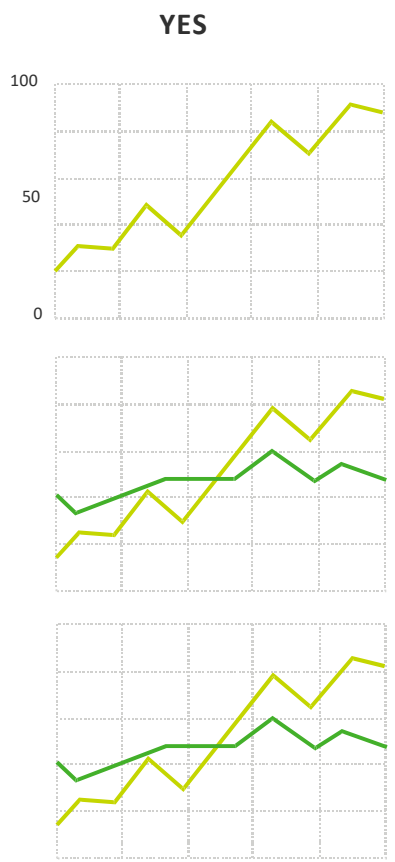
Line charts are used to show time-series relationships with continuous data. They help show trend, acceleration, deceleration, and volatility.

Start the y-axis value at **zero** if possible.

Don't plot more than **four** lines.

Use only **solid** lines.





Leading Practices in Visual Analytics

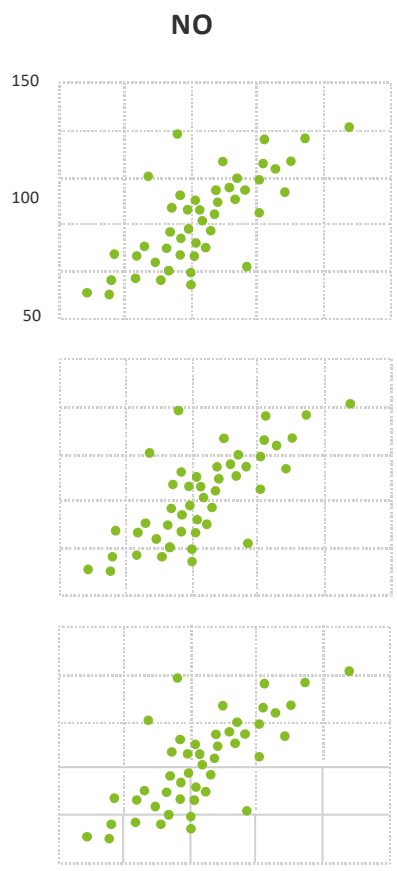
Data Visualization Best Practices – Scatterplots

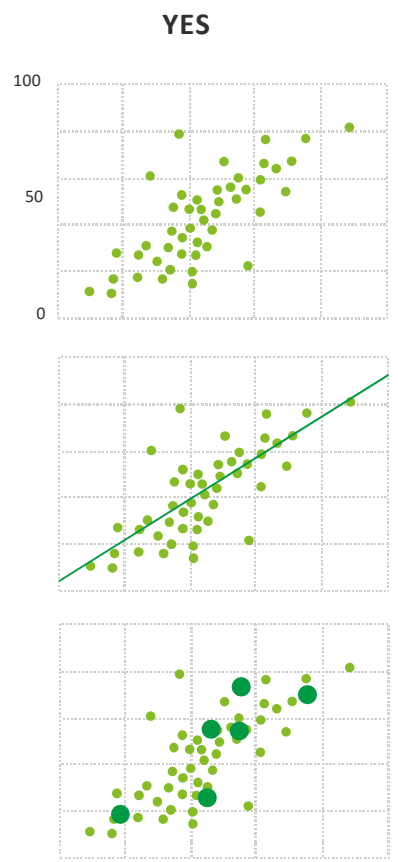
Scatter plots show the relationship between items based on two sets of variables, plotted as x and y coordinates.

Always start the y- axis value at **zero**.

Use **trend lines** to show overall trends in data.

Additional data levels can be visualized through **dot size** and **colour**.





Leading Practices in Visual Analytics

Data Visualization Best Practices – Maps

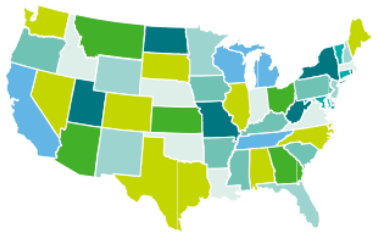
Heat maps display categorical data, using intensity of colour to represent values of geographic areas or data tables.

Use **simple**, non-distracting outlines.

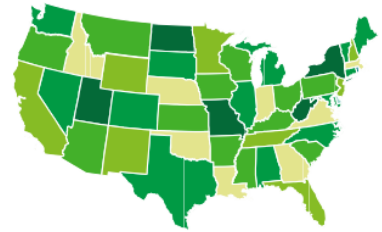
Avoid **excessive** colours. Use a **monochromatic** colour palette where possible.

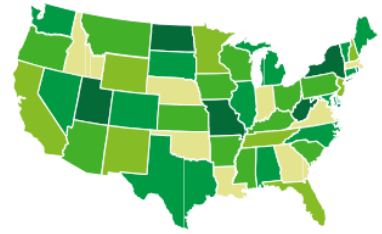
Use **data ranges** that reflect the specific data.

NO

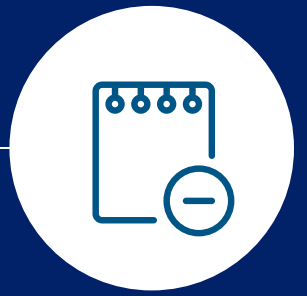


YES





Appendix B: Sources



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3. Open Humans. Available at: Home - Open Humans
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5. Blog: Using data collected by citizens for stakeholder participation and decision-making. Available at: Blog: Using data collected by citizens for stakeholder participation and decision-making - Ground Truth 2.0 (gt20.eu)
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