SPTAC
STRATEGIC PREVENTION
TECHNICAL ASSISTANCE CENTER

DATA DASHBOARDS: MAKING DATA INTERACTIVE

Data are the foundation for preventing substance use and misuse. They provide the information that communities need to understand the problems they face, effectively select and deliver prevention programs to address these problems, and determine if these programs work.

In fact, data-driven decision-making is one of the distinctive features of SAMHSA's Strategic Prevention Framework (SPF), a five-step planning approach that helps states, tribes, jurisdictions, and communities build the infrastructure necessary to produce successful prevention outcomes. The SPF encourages practitioners to use data to assess community needs, identify risk and protective factors, and evaluate the effectiveness of interventions. By relying on accurate and comprehensive data, practitioners can better focus their prevention efforts, allocate resources efficiently, and adjust strategies, as needed, to ensure long-term, sustainable outcomes.

To increase access to the data that practitioners need to make these informed decisions, many states have developed data dashboards. Data dashboards are online tools that provide visual representations of key data points, making it easier for practitioners to track trends, monitor progress, and communicate results. When designed appropriately, data dashboards can also be effective tools for communicating data quickly and effectively. They can tell a story that stimulates action and resolution, and builds support for prevention efforts.

This resource presents eight best practices for planning, implementing, and evaluating a data dashboard.

BEST PRACTICES

Best Practice #1: Define a Clear Scope

Dashboards come in many shapes and sizes and have the potential to do many things. As a result, they can quickly become cluttered and overwhelming, resulting in a tool that just doesn't get used. To avoid this outcome, take time to clearly articulate why you even want or need a dashboard. How do you want it to make users' lives easier? How will staff and partners use it to

inform decisions and actions? What questions do you want it to answer? As Alexander Waleczek, a noted expert in data communications, says, "Dashboard design is not about making dashboards 'pretty.' It's [about] making them functional and helping the user get the information they need as efficiently as possible."[1]

Once the purpose of your dashboard is clear, develop specific and measurable objectives to guide its design and development; this will help to ensure that dashboard production remains faithful to its intended purpose.

Best Practice #2: Know Your Potential Audience

The most useful dashboards are designed with the user in mind. To help define and better understand your potential audience(s), consider the following questions:

- Who will be the dashboard's primary users (e.g., community members, policy makers, data analysts)?
- What kinds of information will they need to make decisions?
- How frequently will they need this information?
- What common tasks or data analyses will they need to perform?
- Will they want to manipulate the data? If so, how?
- Do they need data or ready-to-use visualizations for their own products?
- How data literate are?
- How will they prefer to interact with the dashboard (e.g., desktop, mobile, touchscreens)?

For substance misuse prevention, there are often two general audiences to consider when developing a dashboard: government officials (county and state-level) and community members. Each audience will need different types of information to make their decisions. To learn more about their needs, talk directly to members of these groups. These conversations will help you prioritize some of the included functionalities and help to ensure that your end product is useful.

Best Practice #3: Choose a Technology Solution that You Have the Capacity to Implement

Technology is the power of your dashboard. It determines how you will program your dashboard, how it will operate, and how it will be updated. There are many available platforms

for hosting dashboards. In considering which to use, the main considerations are cost, ease of learning, ease of use, features, security, and capacity.

Some questions to guide platform selection include the following:

- *Cost:* What will be the total cost of developing a dashboard using this technology? What will be the cost for individual users to access and use it (as some dashboards require a per-user licensing fee)? What will be the maintenance costs? Will ongoing use require a long-term subscription? If so, how much will the subscription cost?
- *Ease of Learning:* Programming a dashboard using software takes a level of expertise, and staff may need training to develop this expertise. How user-friendly is the platform software? If training is needed, who will offer it, and what will be the costs?
- *Ease of Use:* Once the dashboard is created, how intuitive is the platform for users? Will it be accessible to individuals with varying levels of technological comfort and experience?
- *Features:* What important features does the platform have? For example, what types of files (e.g., CSV, Excel) can be imported? What export capabilities does it have (e.g., PDF, Excel)? How do these features map to client needs?
- *Security:* Does the platform have encryption? Encryption ensures that data remain confidential and private. Unauthorized users cannot read encrypted data. So, are there data that will need to remain confidential and private? Do these data contain personally identifiable information or protected health information that could result in identification? Would access to these data cause harm?
- *Capacity.* In the context of data dashboards, capacity describes the resources and readiness of those who will be responsible for developing and maintaining the dashboard (internal staff), as well as those who will help you populate the dashboard (external partners). Internally, you will need staff who are comfortable manipulating technology, who can select data types, and who understand how to design a digital platform that is appropriate for different groups of users. If this internal capacity does not exist, you may need to find outside consultants who can support this work. You may also need to engage staff or consultants with graphic design and training expertise.

Externally, you will need partners who can supply you with the data you need. Think carefully about the types of data you want to include and where these data will come from. For example, if you are interested in including data on traffic fatalities, you will want to establish a strong

partnership with your state's Department of Transportation, as they are the keepers of these data.

Best Practice #4: Convene a Development Team

To get the best read on technology and capacity, it's helpful to convene a representative development team. Include people with expertise in dashboard development, substance misuse prevention decision-making, and epidemiology, as well as end users who can provide input on real-world utility. A development team that includes various perspectives will help uncover a broader range of insights, ensuring that the dashboard is not only technically robust but also practical, user-friendly, and aligned with user needs. It will also help you avoid potential blind spots, enhance the dashboard's relevance, and increase its overall effectiveness.

Best Practice #5: Select Data Sources

When deciding which data sources to include, three critical characteristics to consider are geographic reach, data type, and data quality.

- *Geographical reach:* These are the geographic locations or regions that you want the data to represent or cover. For example, data might be local (e.g., limited to a specific city or community), regional (e.g., extended to the entire state), or national. Typically, data dashboards include a combination of national, state, county, and local community data for comparisons to be made.

- *Data type:* Data type refers to the variables you want to include in the dashboard. To inform substance use prevention planning, you will want to provide users with access to data that describes the risk[*] and protective[†] factors associated with substance misuse in the community. Because prevention strategies often focus on modifying risk and protective factors, being able to monitor and track data on these factors are of particular importance. You will also want to make available data on substance misuse consumption patterns and associated consequences of substance use. This information will help users identify trends, such as which substances are most commonly used, the frequency and intensity of use, and which demographic groups are most affected. Data on consequences—such as health outcomes, criminal justice involvement, and social impacts—allow users to assess the broader effects of substance misuse on communities.

[*] Risk factor: "Characteristics at the biological, psychological, family, community or cultural level that precede and are associated with a higher likelihood of negative outcomes" (https://www.samhsa.gov/sites/default/files/20190718-samhsa-risk-protective-factors.pdf)

[†] Protective factor: "Characteristics associated with a lower likelihood of negative outcomes or that reduce a risk factor's impact." (https://www.samhsa.gov/sites/default/files/20190718-samhsa-risk-protective-factors.pdf)

- *Data quality:* This refers to the relevance, timeliness, validity (external and internal), and reliability of selected data sources. Attention to these factors ensures that the data presented is not only accurate but also appropriate, given the dashboard's purpose. Dashboards that are developed with these factors in mind are more likely to generate information that is meaningful, accurate, and actionable.
    - *Relevance* means that the data directly supports the insights needed for decision-making. So, for example, if a community is facing rising rates of opioid misuse, data on opioid prescription rates, overdose incidents, and treatment admissions would be highly relevant in shaping prevention strategies and allocating resources to address the issue effectively.
    - *Timeliness* ensures that the data included in the dashboard reflects the most current state of affairs. Substance use trends and community demographics can shift quickly, so having data that are current within the last three years is optimal.
    - *Validity,* both external and internal, confirms that the data accurately represents the real-world phenomena it is intended to measure and is consistent in relation to the specific conditions or circumstances in which it was collected or used. For example, data collected in one community may be valid for that community's context but may not apply to another community with different characteristics. External validity describes whether causal relationships observed in a study can be generalized to different measures, persons, settings, and times.[2] Internal validity describes whether results can be considered valid within the study being conducted and not due to methodological errors.[3]
    - *Reliability* means that the data can be trusted and consistently reproduced over time. The data are not influenced by unusual events or short-term fluctuations that could skew the findings.

Once data sources are selected and finalized, make sure to include on the dashboard information about sources, themselves, including who collected the data, their credentials, the original source, and the reasons for collecting the data. Also provide links to any protocol manuals or reports that detail the methodology and sampling process. This information will help to ensure that users accurately interpret their data findings.

Note: Data dashboards typically include only quantitative data. Users should thus be encouraged to pair the data provided through the dashboard with qualitative data collected from community members. Qualitative data can often provide important context for the rates and trends included in quantitative data—that is, they can help to explain the why.

Best Practice #6: Incorporate User-friendly Design Principles

Data dashboards typically include a variety of interactive features that allow users to explore the data in various ways, including manipulating the data to facilitate in-depth analysis. For instance, users may want to disaggregate data by factors such as gender, socioeconomic status, and racial/ethnic categories to identify disparities. From this information, they then can tailor interventions and address the unique needs of different community segments. This level of detail enhances the precision and effectiveness of decision-making, promoting more equitable and specified outcomes.

In addition to interactive features, developers should think carefully about how the dashboard will display the data it contains. Visual displays can communicate complex data relationships and help users understand the "story" the data is telling. They also allow users to interpret and compare data trends across time and geography.

Data visualization is the representation of data using graphics, such as charts and line graphs. The purpose of data visualization is to improve understanding and make apparent the relationships between variables (e.g., gender and alcohol-related death rate per 100,000). Data dashboards can include different types of data visualization. For example, data can be displayed:

- *Geographically and spatially.* This means presenting the data on a map to illustrate where trends occur and how they are distributed across different areas of interest. For example, Montana's Department of Public Health & Human Services hosts a dashboard that provides a county-level spatial analysis of alcohol outlet density.[4]
- *By magnitude.* This means visually representing differences in size or amount. For example, the Massachusetts Bureau of Community Health and Prevention includes in its Positive and Adverse Childhood Experiences data dashboard the percentages of residents who feel safe with family and caregivers, who feel that they belong at school, and who participate in organized activities by grade level and population group (e.g., gender, sexual orientation and gender identify, race/ethnicity).[5]
- *By change, over time.* Changes in data over time are often communicated through line graphs that include several time points. For example, the Nevada Department of Health and Human Services' Office of Analytics uses a dashboard to report on behavioral health indicators, such as the rates of drug related dependence through time in total hospital encounters by inpatient and emergency department visits.[6]
- *Through use of effective colors.* A dashboard's effectiveness depends on how quickly users can interpret and use the data being presented; colors can play a crucial role in

this process.[7] However, colors can also carry learned meanings that can influence the audience's interpretations. For example, colors can convey the severity of different health outcomes or reinforce stereotypes. To avoid misinterpretation, choose colors carefully (e.g., avoid stereotypical colors like pink and blue for gender or colors for racial inequities that reflect skin tones).

Thoughtful design and sensitivity are particularly important when visualizing race, ethnicity, gender, and/or other human characteristics. The Urban Institute has an excellent visualization style guide that provides direction on font type, chart part organization, color variation, and how to approach data visualizations with a racial or gender-equity lens.[7]

Best Practice #7: Ensure Easy Navigation

Dashboard navigation should be intuitive. Dedicate time and resources to understanding how users will move through your site. Which areas will be of greatest interest? Where are they likely to go first? Typically, minimizing clutter on the page will help users focus on the dashboard's essential elements. Some navigation principles to consider include the following:

- *Use a global navigation model* instead of a single menu to hold all the links. This refers to a structure where navigation links are spread out across multiple menus or sections, rather than in a single menu. This approach improves user experience by grouping related links logically, making it easier for users to find what they're looking for without overwhelming them with too many options in one place. Place items where users would expect to find them. So, for example, a list of all measures should be placed at the top or side of the dashboard so users can select and filter the results, as needed.
- *Use white space to help users digest the data.* White space is good because it can help users slow down and be methodical. However, too much white space may frustrate users who want to be able to quickly find what they need. The goal is to achieve a balance, so that users spend more time looking at the visualizations instead of excessive scrolling.[8]

Best Practice #8: Evaluate the Dashboard from the Beginning

Prior to roll out, pilot test your dashboard with 5–10 representative users. The goal of the pilot is to understand the user's experience and uncover any weaknesses in design or content. Here are some potential questions to ask pilot participants:

- Was the dashboard visually appealing?

- How easy was it to navigate?
- Did you have any challenges using the dashboard? If so, what were they?
- Was the navigation intuitive?
- Was the data provided relevant to your work?

Once launched, continue to evaluate the dashboard and monitor user experience. This will help to ensure that it remains relevant and useful. Some evaluation indicators to track over time include the following:

- How many users were documented in the first year?
- Who were the users and their characteristics (e.g., organization, location, expertise)?
- How did they use the dashboard?
- How did it help them in their work?
- What was their experience like?
- What technical issues did they encounter?
- Which features of the dashboard were used most frequently?

DASHBOARD EXAMPLES

- Kentucky Incentives for Prevention (KIP) Survey Data Tools Dashboard and Visualizer. The KIP Data Summary Dashboard offers a visual overview of essential data from Kentucky's statewide youth survey, organized by each of the state's fourteen prevention regions. It allows users to view indicators by survey year, either for all regions collectively or for a specific region selected from a drop-down menu. It also serves as a tool for prevention planning and program prioritization across Kentucky's prevention regions, enabling users to generate grade and gender breakdowns for several key indicators on both a statewide and regional level.
- Louisiana Opioid Data and Surveillance System. This dashboard provides information on risk factors, consequences, and outcomes for opioid use. Users can see data on a range of topics, including deaths, emergency department visits, hospital admissions, prescriptions, and treatment. For example, on selecting "prescription," users are provided with the prescriber location for benzodiazepines, opioid analgesics, and stimulants. Additional queries can provide information about time, population by age,

race, gender, and data by parish or region. This information allows partners to quantify the supply and demand for opioids in the community.

- Substance Use in Minnesota (SUMN) tool. The SUMN is an online tool that contains data on alcohol, tobacco, and other drug use patterns, related consequences, and contributing factors in Minnesota. It allows users to access data by topic, location, and demographic category; create custom charts, maps, and data tables; and download data fact sheets, reports, and infographics.

CONCLUSION

Starting the journey of building a dashboard should be intentional and productive. Remember that achieving quality takes time. Thus, it may be helpful to start small and then build once feedback from end users can be incorporated. Continue to educate yourself about dashboard best practice. Dolph (2023) provides a great series on building stunning dashboards with intention.[9] In addition, think of the data stories that the dashboard can tell, and how and when it will be used rather than just a collection of individual data points. And finally, make sure to continually monitor the dashboard's usefulness. As the substance use landscape evolves, so too should the data your dashboard includes.

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