Data Driven Decisions

Data-driven decisions refers to the practice of using data analysis to determine the current values of specific Key Performance Indicators (KPI) and then using those values to drive your decisions.

Dashboards are usually used to display several related KPIs all at once. These interactive displays of your data and analysis are critical to the process of data-driven decision making.

The process of data-driven decision making (DDDM) can be broken down into the following steps:

1. Define your goals. Your goals will determine what Key Performance Indicators (KPIs) you will use on your dashboard. Your goals should follow the SMART (Specific, Measurable, Achievable, Relevant and Time-based) framework. Consider what types of data analysis is appropriate for your goals and how you will implement them.

2. Specify your data sources. Your data sources should be up to date and available to users of your dashboards. You may need to create a *database view* (snapshot) to enable this. Using high quality data sources will yield the best results.

3. If necessary, prep your data via cleaning or queries. The results should be filtered into the view your dashboard uses. If your bandwidth is sufficient and your data changes by the second, then a live feed of the data may be justified. A vast majority of your project time will be spent during this stage!

4. Perform any additional data analysis that your automated reports and queries are not doing. For example, your reports and queries may produce data that you would like to run correlation or regression analysis on. (If these are not one-offs, they should be added to your data prep stage.)

   There are many types of data analysis (refer to the module on types of data analysis for more information). What kind of analysis you are doing should be determined in the first stage, where you define your goals. This stage is where that analysis is performed!

5. Add your interpretations/curating to the analyzed data. This is where the human element comes in. Help your audience understand what is being shown on your dashboard by adding illuminating text descriptions, titles, and other notes. If your displays are complex, be sure to include instructions for how to manipulate them. Refer to the “Data Storytelling” module for more information on this stage.

   Your conclusions should be obvious to the viewer! Use colors, white/negative space, etc. to emphasize your results. For example, a failed KPI should be in red or other color that represents danger. A passed KPI should be in green or other color that represents success. (Many people use a blue/orange scheme to avoid issues with colorblindness.)

6. Explore the "why". Now that your data is telling you its story, find out the "why" behind it and use that to improve your business or workflows. Teachers may find a correlation between grades and attendance (an expected result) but also things like hobbies, after school activities, or even who wears "spirit" wear. Finding out why those correlations exist is capitalizing on your data analysis.

   Another example is examining a set and identifying outliers. For example, say you have a marketing campaign or classroom project that does well at some times, but not others. Finding out the "why" behind those results enables you to act on the information to improve your marketing or classroom projects. Let's say you have a classroom project that does well in the fall semester, but not the spring semester. What other correlations may apply? Weather? Jobs? Seasonal changes?

   Take the scenario where a business owner found that one marketing campaign was highly successful during most years, but not always. Adding data that they thought wasn't relevant in the search for answers yielded the answer: in the years where the marketing campaign underperformed there were an above-average number of major storms. The marketing campaign was for outdoor leisure items, which you would not expect to sell well during extended periods of bad weather. The owner now employees an alternative marketing program during "storm season" that focuses on indoor items. Do not be afraid to expand your data collection to include items that may not appear to be related. You can always use your data analysis tools to remove the variables that do not influence the outcome.

Data-driven Decisions in Industry

Utica University uses three examples of data-driven decisions to showcase their influence in industry, citing Google, Amazon, and Southwest Airlines.[7] Google used feedback data from its manager's awards to determine criteria for the best managers, then rolled that into their management training program. Amazon, not surprisingly, found that using product suggestions (driven by customer shopping habits) at every point in the customer experience increased sales. Southwest uses browsing habits to suggest new features and benefits to their customers.
In another example, Kroger found that people who buy diapers in-store after 6PM also purchased beer at above-average rates. They determined that it was men coming in to buy diapers at that time who also bought beer, so they started placing endcap displays to capitalize on this trend. If you ever wondered why you see seemingly oddly placed endcap displays, now you know why they are there!

Similarly, your experiences should be similar. Listen to what your data is telling you. Diapers and beer might seem like an odd combination, but if your data tells you there is a strong correlation in sales, find out why!

High Quality Data

Using high-quality, or data from reputable sources, is essential in the data-driven decision making process. There's an old adage that goes "garbage in, garbage out", which means that you cannot expect good results from bad inputs. There are a number of reliable, reputable sources of data available on the Internet.

If you are collecting your own data, be sure to use a vetted process that ensures repeatability and accountability. Every time you collect data you should be using the same workflow to ensure that you are comparing apples to apples. When getting data from a third party, design a cleaning and verification process as part of your data curation plan. See the related module on Data Collection for more information.

Resources

1. Guide to Data-Driven Decision Making (social services, US Department of Health and Human Services, PDF). https://www.acf.hhs.gov/sites/default/files/documents/cb/guide_to_dddm.pdf
2. Data-driven instruction in the classroom (links to PD courses). https://blog.advancementcourses.com/articles/data-driven-instruction/
3. Using Data to Improve Schools (PDF). http://www.aasa.org/uploadedFiles/Policy_and_Advocacy/files/UsingDataToImproveSchools.pdf
4. How to Make Data-Driven Instructional Decisions Which Benefit All Students. https://www.studentachievementsolutions.com/how-to-make-data-driven-instructional-decisions/
5. Principles of Data-Driven Instruction (University of Toledo, PDF). https://www.utoledo.edu/aapr/assessment/pdfs/15-April-1_PrinciplesofDataDrivenAssessment.pdf
6. Data-Driven Decision Making in Education: 11 Tips for Teachers & Administration (American University). https://soeonline.american.edu/blog/data-driven-decision-making-in-education
7. Data-driven Decision Making: A Primer for Beginners (Northeastern University). https://www.northeastern.edu/graduate/blog/data-driven-decision-making/
8. RTI (Response to Intervention) Data-Based Decision Making (IRIS Center, Vanderbilt University case study, PDF). http://www.iris.peabody.vanderbilt.edu/wp-content/uploads/pdf_case_studies/ics_rtidm.pdf
9. 12 Examples of Data-Driven Approaches. https://simplicable.com/new/data-driven
10. Using Student Achievement Data to Support Instructional Decision Making (US Department of Education, PDF). https://ies.ed.gov/ncee/wwc/Docs/PracticeGuide/dddm_pg_092909.pdf
11. How to Approach Data-Driven Decisions in Education (Mathematica, links to full PDF report). https://mathematica.org/blogs/data-driven-decisions-in-education

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