

: *What are design elements in a DSS user interface?*

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A design element is a discreet, identifiable component that appears in the user interface of computerized applications. Decision support systems have some unique design elements, but many design elements in a DSS are found in other types of applications. For example, a pivot table is a common design element in a data-driven DSS or business intelligence application. Charts and graphs are found in many types of applications and especially in model-driven and data-driven DSS. Other generic graphical elements often included in decision support applications are windows, menus, radio buttons, check boxes and icons. Are there "must have" elements when building a decision support system?

A graphical user interface is the most common software interface. For this reason, design elements commonly found on web pages and used for applications on mobile devices are emphasized in decision support design. Graphical elements create a visual language for a user to manipulate a DSS. This visual language creates a "look and feel" for the application. This term describes the overall graphical user interface. The "look and feel" includes all aspects of its design, including characteristics of design elements such as colors, shapes, layout, and typefaces (determining the "look"), as well as the behavior of the dynamic elements such as buttons, boxes, and menus (providing the "feel").

Designers need to explore the cross platform "look and feel" of a DSS across browsers, operating systems and devices. Designers should also provide users tools to alter the "look and feel" (e.g, graphical design elements) with a user interface management tool built into the application.

Since the mid-1970s, computer graphics have been used to aid in management decision making. Graphics, including charts, enable the presentation of information in a way that can show the meaning of data and help users visualize relationships. The importance of using charts and graphs in communicating numeric data has been recognized for many years. Graphics do help managers picture data, see relationships, and examine variances. Common types of computer graphs and charts include time-series charts, bar and pie charts, scatter diagrams, maps, hierarchy charts, and flow charts. Managers, business analysts, and corporate staff use computer generated graphics in reports, presentations, performance tracking, scheduling, control, planning, modeling, and design. It is important to use graphics in the DSS user interface, especially in data displays.

Color is often recommended as a means of enhancing a user-interface design and color is an important component in the feel of the interface. Appropriate use of color can enhance the

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aesthetics of an interface for most people. Color can call attention to extreme or exceptional data values, help users differentiate among items on a chart, and convey information quickly. For example, research indicates blue creates a sense of trust; green means "go" or "all clear;" red indicates danger. In general, the following guidelines related to the use of color are appropriate for building DSS:

- Do not allow color to be the only way your system conveys any specific information. Augment the use of color with other cues that can be used by people who cannot discern the color difference. Include numerical values in addition to color codes, provide cross-hatching on top of color, or make sure that the colors you choose are perceived as substantially lighter or darker than each other.
- Where your computer hardware and software permit, allow the user to customize an application's use of color. Changing colors can compensate for some people's color vision deficiencies. In some systems, colors that cover an area, such as a region on a map, can be replaced by monochrome patterns such as dots, stripes, and cross-hatching.
- Use light pastel colors in screen designs. They create fewer annoying reflections than do dark colors. This is especially true in an office environment with fluorescent lights. As a result, try to use light colors to cover large areas of the screen. Reserve darker colors for smaller "spot" usage.

Let's summarize some guidelines for graphical displays. First, communicate only one major message on each chart or screen. Second, use an action heading in appropriate sized fonts for screen and chart headings. Third, be careful to use appropriate labels and avoid adding dissimilar quantities. Fourth, bar charts are more appropriate for comparing individual data values. Fifth, pie charts help show how the whole breaks down into component parts. Sixth, line charts are most appropriate for displaying time-related information. Seventh, think through the labels you use on buttons and links. Eighth, use verbs for action (feel) design element labels.

DSS design should heavily emphasize interface design. Designers need to pay attention to every detail, including layout and empty or white space between design elements. There are no "must have" design elements included in all DSS.

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Touch and voice interfaces are becoming more common in decision support applications. A voice-user interface (VUI) is a natural language processing (NLP) application that supports spoken conversational, human interaction with software and computing devices. Speech recognition software or NLP recognizes spoken commands and questions and implements the commands and answers the questions. A rules-engine or Artificial Intelligence (AI) application provides spoken replies to questions. Virtual assistants like Siri, Google Assistant, and Alexa are examples of VUIs.

Decision support user interfaces are increasingly conversational and very easy to use. Voice user interfaces (VUIs) and hybrid interfaces with menus, forms, and touch are improving decision support user experiences.

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