EPRI | ELECTRIC POWER
RESEARCH INSTITUTE

EPRI Web and Mobile Guide v4.1

November 2017 | Brad Thomas

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Overview

*Note, please contact **Bing Xie (bxie@epri.com)** with the Web and Mobile Solutions group to schedule your consultation prior to planning or beginning your app or website project.*

Consistency is important. It's how you differentiate official from unofficial, give a sense of familiarity, and build a repeatable process.

For design and development, it is important to reduce design and development time, as well as build a brand that people know and trust.

At EPRI, it is important to build applications and websites using a consistent look and feel. We want our members and the general public to know how to use our products instantly, reduce confusion and increase adoption. For example, users should be able to use any of our apps or websites and know how to search and use the search refiners.

Rather than give you a template and send you on your way, we are changing the way we approach these projects by changing the process a bit. One size does not fit all, and we can't just give you a set of files and expect you and your team to produce magic out of it.

Instead, the Web and Mobile team will meet with you during the discovery and design phases of your project. We will provide a recommendation on how you should construct your application or website, and help answer any of the questions you may have before you start. We feel that this method would be most beneficial to you and your team.

 This guide will help in you understand the various components that are available and help you to provide an outstanding user experience in less time than you spent in previous projects. Additionally, it will give an overview of our user experience and user interface patterns that are typically used in our EPRI applications and websites. The use of these guidelines and standards will help maintain EPRI's brand identity and provide a unified customer experience for internal and external customers.

For Web Applications and Web Sites, we have adopted the Google Material spec. Please view EPRI.com and the EPRI Tech Portal as examples of using the material specification. If you are using Angular in your application, you may want to use Angular Material components to expedite the development process.

For Mobile Applications, we have adopted the Ionic Framework, which will help you design and build your mobile application for iOS and Android.

The EPRI Web and Mobile Solutions team can help determine which patterns and components you will need to build your application or website. **Contact Bing Xie of the Web and Mobile Solutions group to schedule your consultation before you begin planning your project.**

Every application developed for, or deployed on the behalf of, EPRI must adhere to the required standards within this document. Requested deviations will be reviewed on an as-needed basis by the Web & Mobile and SQA leadership team. Non-compliant sites and applications will not be released to a production environment until compliance with these guidelines are met or exception(s) are made to approve the variations.

Technologies Used

In an effort to provide guidelines for modern browsers, as well as a consistent experience for web and mobile users, EPRI has adopted **Google's Material Design** specification as our visual and user experience standards.

Material is a great resource for user experience guidelines, but we at EPRI have more needs that aren't addressed by Google. Therefore, we have supplemented the Material guidelines with **Angular Material** for developers using AngularJS.

Angular Material is both a UI Component framework and a reference implementation of Google's Material Design Specification. Angular Material provides a set of reusable, well-tested, and accessible UI components based on Material Design.

Read more about Google Material at: *https://material.google.com*

Download the Material Lite framework: *https://getmdl.io/index.html*

Read more about Angular Material at: *https://material.angular.io/guide/getting-started*

The Web and Mobile Solutions group reviews all web applications for standards compliance as part of the BETA and pre-production process. However, the earlier in the development process you involve us, the earlier we can provide feedback and help avoid any last-minute delays once the code is complete.

As the work becomes completed send screenshots, wireframes, or a link to a build of the application on the development server. This will allow us to give feedback early in the process and save rework.

From the review, the Web & Mobile group will provide feedback based on the following categories:

> **1. Required Changes:** Must be met in order for the web application to enter production

> **2. Recommended Changes:** Usability/User Experience Enhancements

3. Notes/Observations: Unusual or unexpected behavior of the web application

The Web & Mobile group may attach sample mockups to the feedback, if applicable. When your web application has been approved by the Web & Mobile group, a notification will be sent to the Software Quality Assurance (SQA) group referenced in your project documentation.

When you are ready to involve the Web & Mobile team, please contact:

Bing Xie
Web and Mobile Solutions Manager
(704) 595-2508
bxie@epri.com

All web applications must adhere to their specific requirements (re-launch vs. new) listed in this section as of July 1, 2018.

Browser Compatibility

Browser compatibility standards are non-negotiable, regardless of the standards definition that is applied to your application. Both Re-Launched Web Applications and New Web Applications must meet the following minimum browser requirements.

All EPRI web applications must be fully compatible with:
- Internet Explorer 11
- Microsoft Edge (current release)
- Safari (current release)
- Firefox (current version)
- Chrome (current version)

Please note, applications for Mobile must clearly document the supported operating systems (iOS 4.x/5.x Android 2.x/3.x/4.x etc.) and platforms – phone/tablet. Mobile applications should also clearly specify the optimal display dimensions, orientation(s), and/or form factor.

Screen Resolution

 EPRI's philosophy is that all applications and websites should be built using a mobile first strategy. To achieve this, websites and applications should be built responsively, with breakpoints for mobile, tablet and desktop. Responsive or Adaptive scalable layouts should conform to the web browser's viewport size.

Google has a great tool to be able to visualize this, located at https://material.io/resizer/.

The content region of such layouts does not need to consume the entire viewport area. Web pages may scroll horizontally on monitors with a screen resolution of 1024 x 768 or less. In these cases, the site should remain usable and navigable. Resolutions at or above 1280 x 800 should not require a horizontal scrollbar at any time. This includes during load, during transition between pages, or due to animation within a page. Appropriate CSS overflow control should be used to negate any potential problems in this area.

For more about responsive breakpoints using Google Material, visit:
https://material.io/guidelines/layout/responsive-ui.html - responsive-ui-surface-behaviors

Browser Window/Tab Management

The use of pop-up and modal windows is highly discouraged and should be reserved for cases where no other solution is possible (i.e. inline help). An in-page modal should be used wherever possible. If a link opens in a new tab or pop-up window, it is not allowed on the primary navigation and must be placed within the page content area (preferably in the same location on each). Links leading out of a site or application should be designated with the approved icon and open in a new tab/window. For example, all links in an application's footer should open in a new browser tab.

Typography

Consistent use of a style sheet visually reinforces EPRI's brand by providing a consistent look and feel throughout our web applications. For future compatibility, we suggest using CSS 2 and CSS 3 for use within your application(s).

Using a limited set of typographic fonts provides branding support by consistently displaying text throughout our web sites.

All text should be displayed using the **Roboto** font face, with a fall back to Arial, and then the default Sans-Serif font on desktop applications.

For the best system integration and performance on Mobile Web devices, the device optimized version of Roboto will outperform and be more legible on small-screen devices.

For mobile web applications, the font cascade should be Roboto, Arial, Helvetica, Sans-Serif.

Roboto

Headline	Regular 24px
Title	**Bold 18px**
Subheader	Regular 16px
Body 2 / Menu	**Medium 14px**
Body 1	Regular 14px
Caption	Regular 12px
BUTTON	**MEDIUM 14PX**

Light theme default type color	Primary	#212121	
	Secondary	#000000	54%
Default light bg: Google Grey 200, #EEEEEE	Disabled	#000000	38%

You can download Roboto from Google Web Fonts for use on your own machine, and instructions on how to include the font into your page are located at: https://fonts.google.com/specimen/Roboto

You will not need any other fonts, as Roboto has a variety of weights that will accommodate all of your needs.
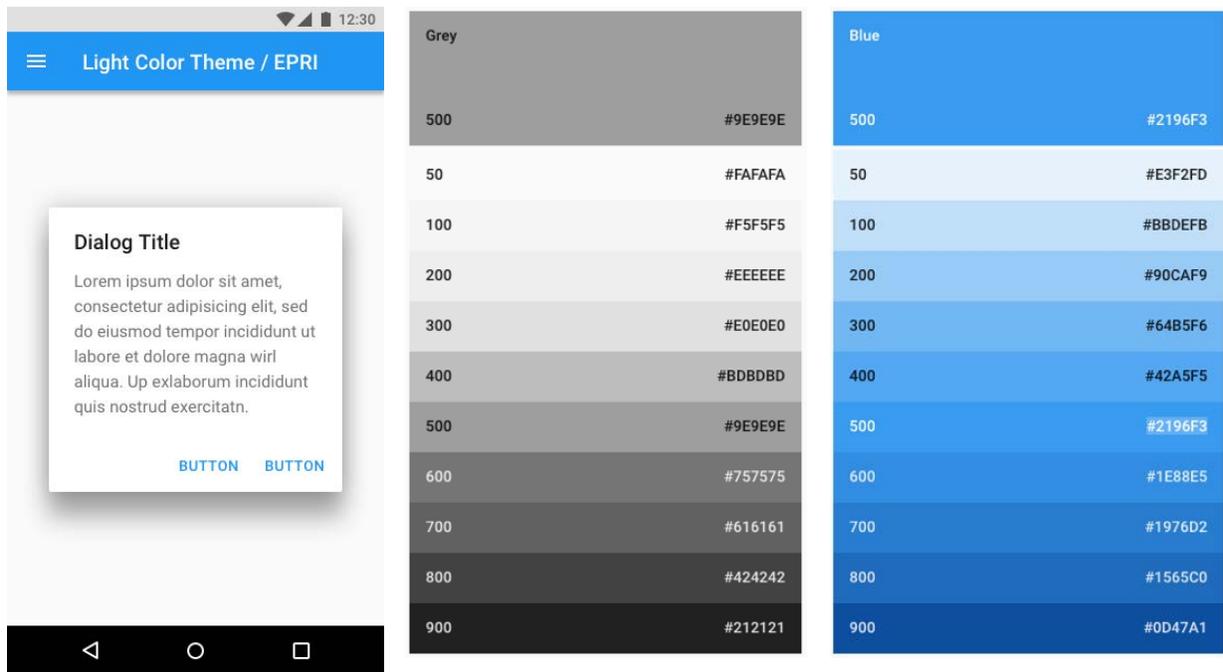
Default Theme / Color

Consistent use of the color theme reinforces EPRI's brand by providing a consistent look and feel throughout our web applications.

Our Primary Web and Mobile Color Themes come from the Material Design Specifications. Our Primary theme is "Light", and the Primary colors used are Blue (#1976D2) and Grey.

Other colors may be used for errors (#d13235), confirmation (#4fad56), and caution/alerts (#f3b32f). Please contact **Brad Thomas** for discussion on color and usage for your particular application or website.

For more regarding the Material Design Light Theme, visit:
https://material.google.com/style/color.html - color-themes

For more regarding the Material Design Color Palette, visit:
https://material.google.com/style/color.html - color-color-palette

Media and Iconography

The right type of media can enhance your website and make it more enjoyable and informative for your visitors.

Media

Video:
Preferred solution: HTML5 (<video>) + <object> + <embed>

Streaming from YouTube is permitted. Video must be uploaded to the EPRI YouTube channel. Engage the EPRI Web & Mobile team for assistance. Please see the EPRI Video Requirements document for specific information.
Note: Videos must be publicly available to be utilized in this way

Audio:
Preferred solution: HTML5 (<audio>) + <embed>

Accepted fallback formats are MP3/MP4. WAV and WMA formats should be converted to MP3, whenever possible

Images:
Image file sizes should not exceed 100K. All images should have alt tag definitions. All images should have their width and height properties set within the HTML. Images resolution should be 72 DPI, or higher for specific targeted solutions. Accepted formats are JPEG, GIF, PNG, and SVG. All images should have their embedded meta-data removed from the file prior to publishing to the website (use this article as a reference on how to remove the unwanted metadata). All images should be losslessly compressed prior to publishing to the website. A service like Kraken.io can be used to help automate the process.

For help with selecting of securing various forms of media, contact:
Mike Szwed
mszwed@EPRI.com

Iconography

Material icons use geometric shapes to visually represent core ideas, capabilities, or topics.

Product icons are the visual expression of a brand's products, services, and tools.

System icons represent a command, file, device, directory, or common actions.

Any icons from Google's Material Design library are acceptable. You can view and search them at: https://material.io/icons/.

Examples of these icons are found on EPRI.com.

Please contact **Brad Thomas** to discuss the specific iconography that you need for your website or application.

Please Note, EPRI has specific iconography for the Header Bar, which is a required item in all applications and websites.

Page Design/Layout

EPRI has a defined page design and layout structure, consisting of three main elements:

The Header, the Sidebar and the Content Container

The page layout, whenever possible, will use the existing page layout patterns to maintain a normalized structure and appearance of EPRI web properties. If you have the need for a different pattern, please contact **Brad Thomas** (bthomas@epri.com) to discuss possible solutions.

The Header

The Header is composed of (from left to right) The EPRI logo, The Site Title, the Search Component, the Contact Us Icon, the Help Icon, the Language Switch Icon and the EPRI Login Component.

The Sidebar

The sidebar contains all of your main site navigation, with subsections hidden by default until the parent item is clicked, revealing the children navigational items. The sidebar should scroll independent of the body, and only when necessary. On viewports 960px and smaller, the navigation should be rolled up under a hamburger menu to conserve screen space for content.
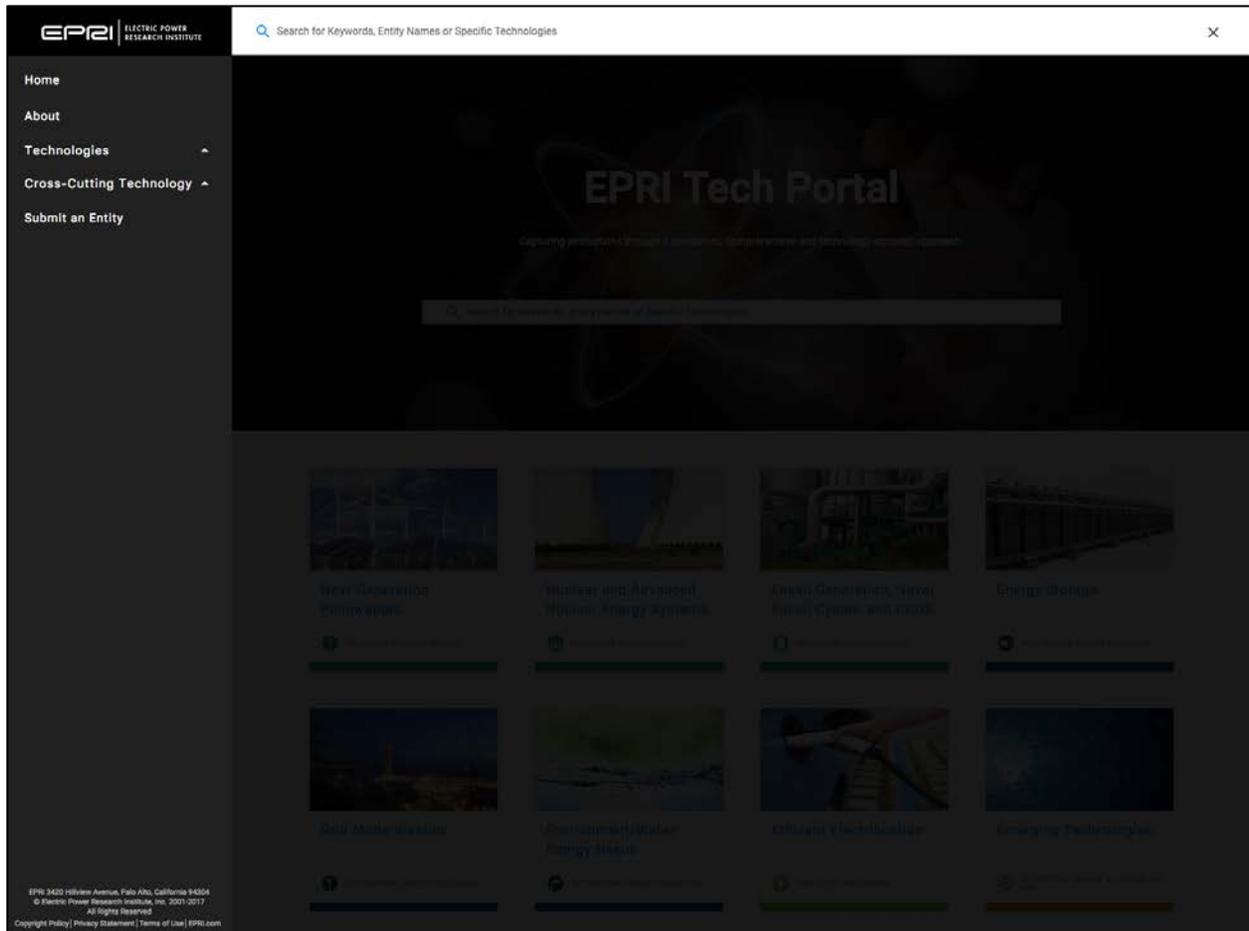
The Content Container

The content container is where all of your content should be placed. The Material Spec has specific and useful information regarding all of these elements.
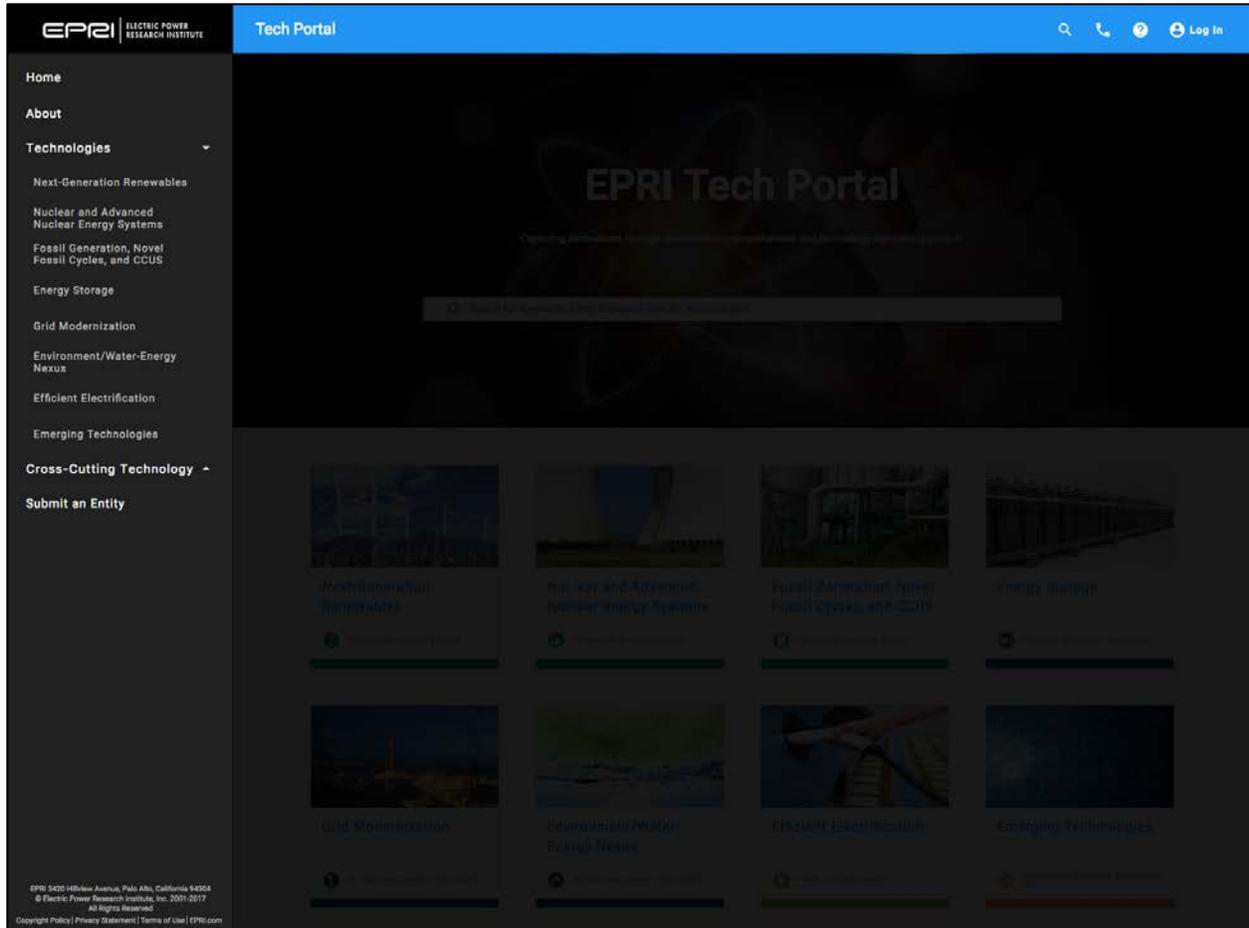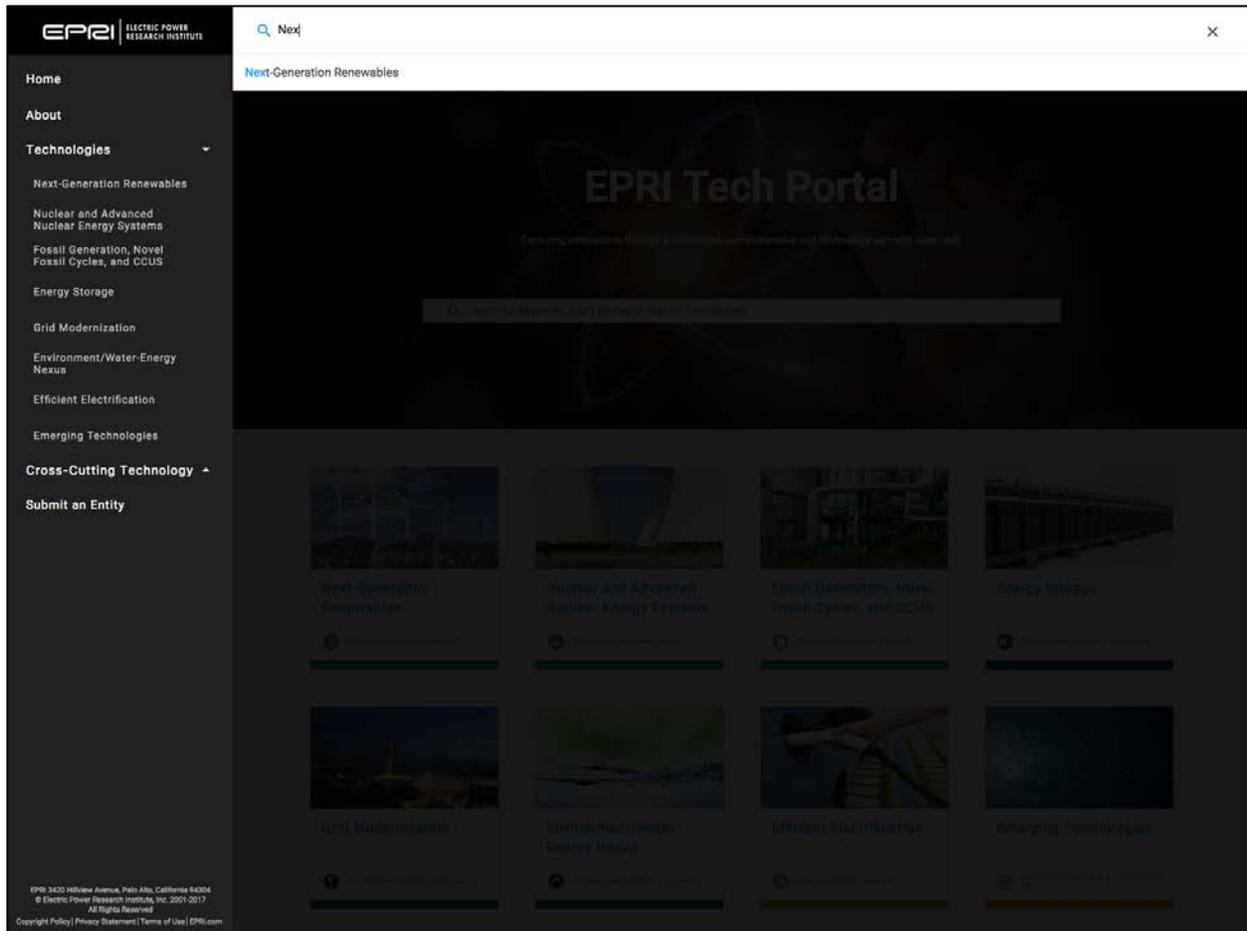
Screenshot of the Tech Portal showing the basic elements listed above.

Screenshot of the Tech Portal. User has clicked on the Spyglass icon to display the search field

Screenshot of the Tech Portal. User has entered text into the search and autosuggest is triggered

Material Components

If you aren't using Angular, you can still abide by the Material Specification independently. If you are using Angular, you'll want to use the Angular Material version of those components. We recommend using the Angular Material components. Get started using Angular Material.

Form Controls

Form elements are styled in a particular way within Material. You'll notice that it's a bit different than what you have seen in the past. The best part for developers, is that if you have your theme set up, you don't have to do much styling to them because Material handles all of that already.
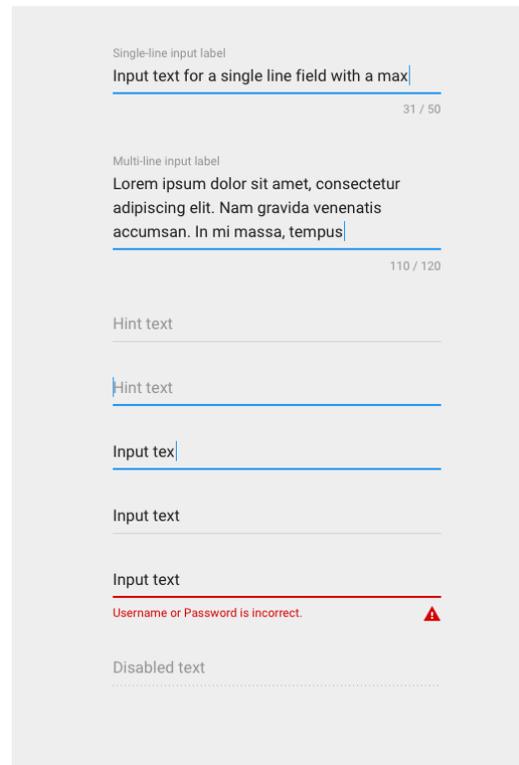
Angular Material Form Controls include:

Autocomplete

Checkbox

Datepicker

Form field

Input

Radio button

Select

Slider

Slide toggle

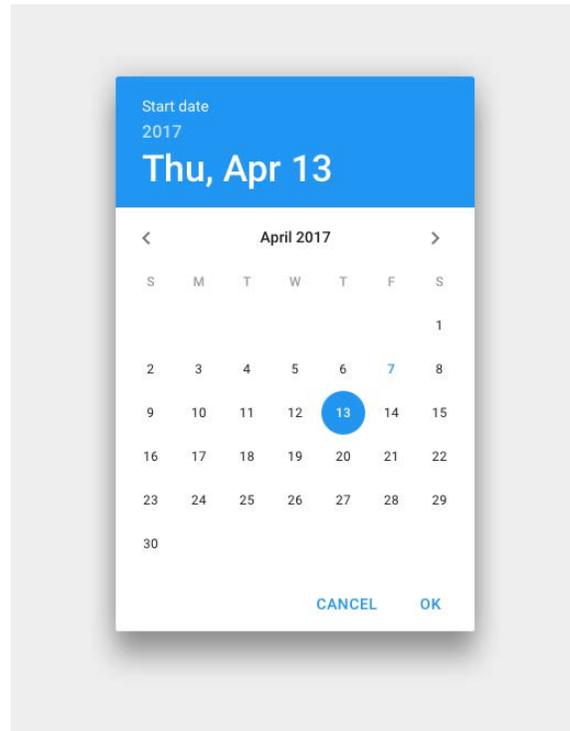**Material Design Form Controls Include:**

Checkboxes

Form Fields

Inputs and Controls

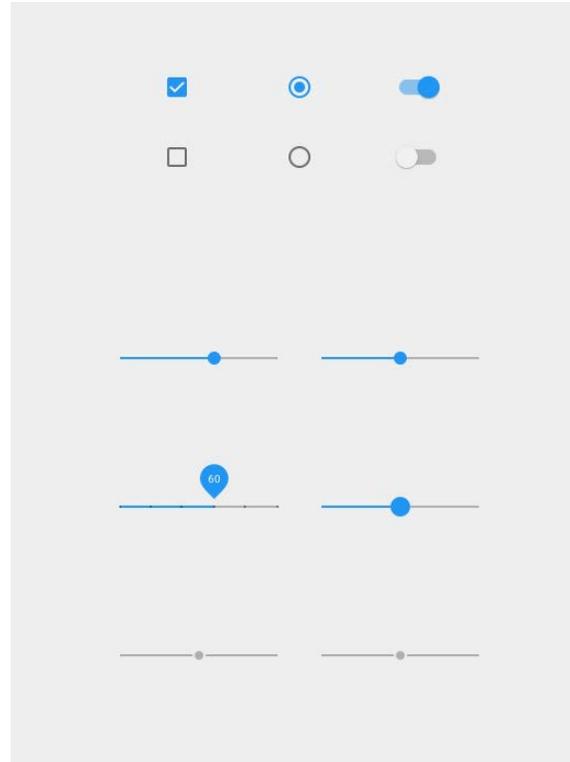Radio Buttons

Select Menus
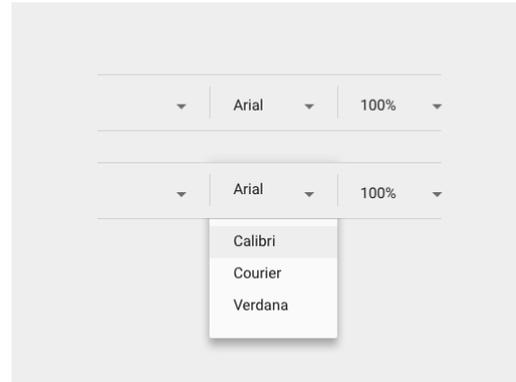
Sliders

Switches

Text Fields

Navigation

There are different forms of navigation. Be sure to consult with the Web and Mobile team regarding the type of navigation you should use for your application or website.

Angular Material Navigation items include:

Menu

Sidenav

Toolbar

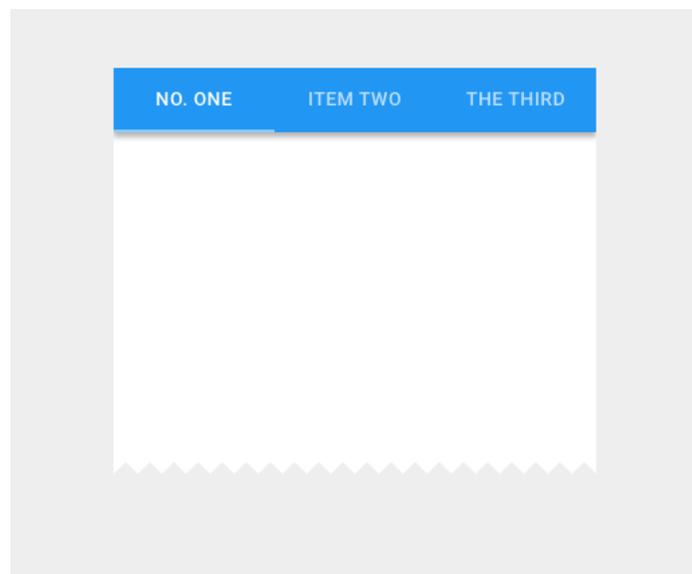**Material Design Navigation items include:**

Menus

Toolbars

Layout

The method which you display your information within components is referred to the layout. Depending on what type of information you have, there are specific types of components that you should use when constructing your website or application.

Angular Material Layout components include:

Card

Expansion Panel

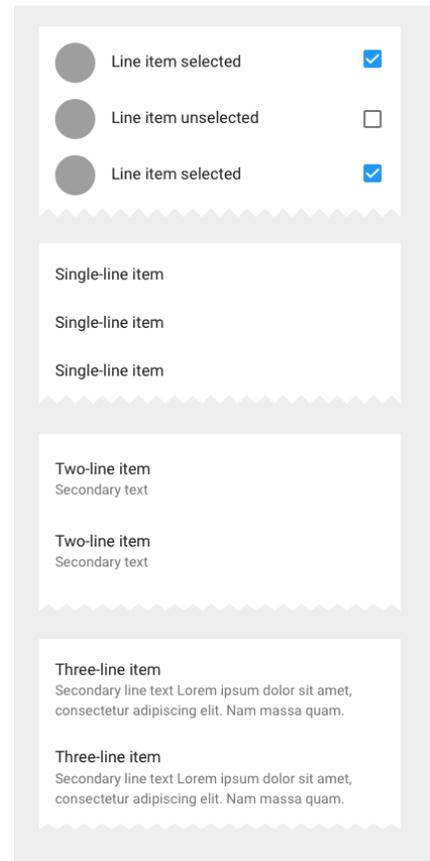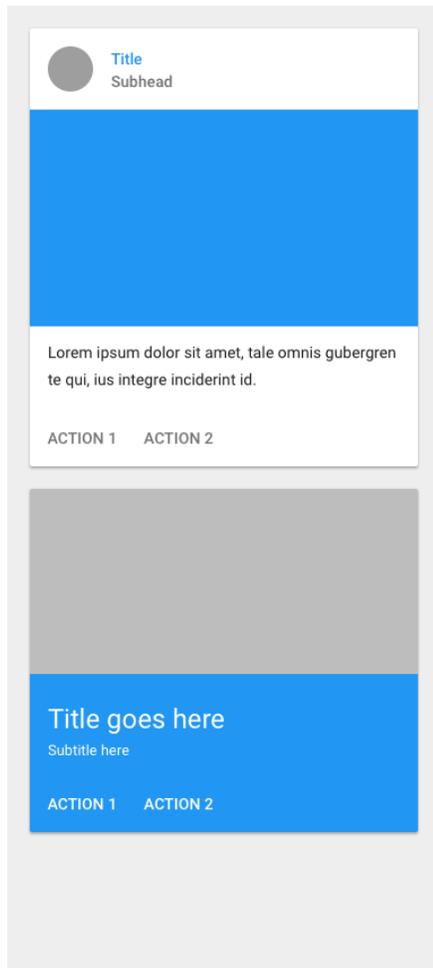Grid list

List

Stepper

Tabs

Material Design Layout components include:

Cards

Grid Lists

Lists

Layout Grids

Tabs

Buttons & Indicators

Buttons communicate the action that will occur when the user touches them. Use the correct button for the type of action the user will be taking. Progress and activity indicators are visual indications of an app loading content. A single visual indicator should be used to represent each type of operation.

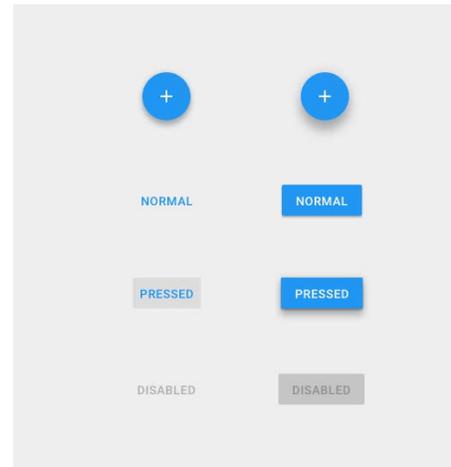**Angular Material Button & Indicator types include:**

Button

Button toggle

Chips

Icons

Progress spinner

Progress bar

Material Design Button & Indicator types include:

Buttons

Floating Action Button

Progress & Activity

Popups & Modals

Popups and Modals are generally used to either notify that something is happening, or allow the user to enter some data to run a process.

Angular Material Popups & Modal types include:

Dialog

Tooltip

Snackbar
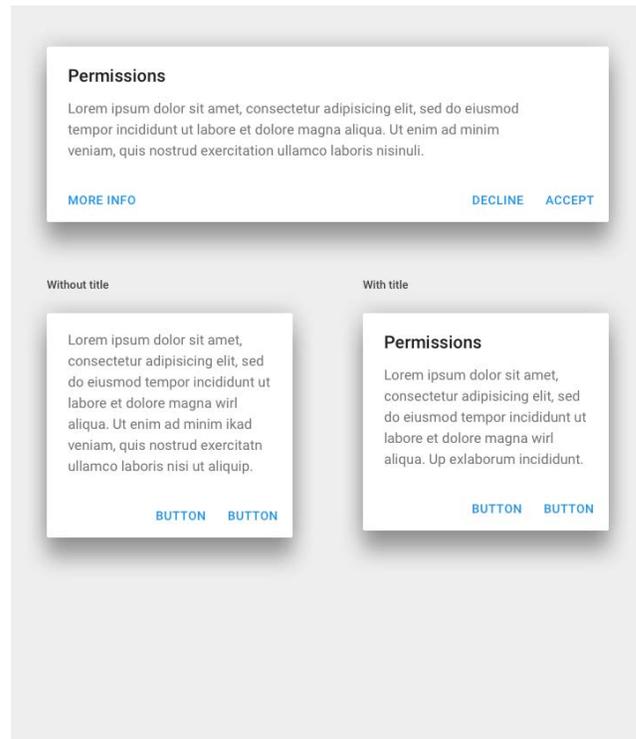
Material Design Popups and Modal types include:

Dialogs

Snackbars & Toasts

Tooltips

Data Tables

Data Tables are one of the more common elements that EPRI uses in its applications and websites. Data tables display sets of raw data. Data tables may be embedded on a surface, such as a card. They can include:

- A corresponding visualization
- The ability to query and manipulate data

Data tables on cards may display navigation and data manipulation tools at the top and bottom.

A data table contains a header row at the top that lists column names, followed by rows for data. Checkboxes should accompany each row if the user needs to select or manipulate data. Data tables may include:

- Three or more columns of data
- A corresponding visualization
- The ability for users to query and manipulate data

The previous version of this guide recommended using Kendo UI for Data Tables and grids. Google has since updated their versions of Data Tables, negating the necessity of using Kendo UI.

ID	Name	Progress	Color ↑
100	Jack A.	32%	aqua
1	Jasper C.	15%	aqua
76	Arthur A.	91%	aqua
66	Asher I.	74%	aqua
54	Cora E.	36%	aqua
49	Isabella A.	82%	aqua
32	Cora O.	44%	black
99	Oliver V.	26%	black
79	Arthur A.	95%	black

Dessert (100g) ↑	Calories	Fat (g)	Carbs (g)	Protein (g)
Cupcake	305	4	67	4
Eclair	262	16	24	6
Frozen yogurt	159	6	24	4
Gingerbread	356	16	49	4
Ice cream sandwich	237	9	37	4

Items per page: 10 ▼   1 - 10 of 100   <   >

Angular Material Data Tables include:

Table

Sort Header

Paginator

Material Design Data Tables include:

Data Tables

Common UX Patterns

Confirmation & acknowledgement

Confirming and acknowledging actions can help alleviate uncertainty about things that have happened or will happen. It also prevents users from making mistakes they might regret.

- Confirming involves asking the user to verify that they want to proceed with an action
- Acknowledging is displaying text to let the user know that the action they chose has been completed

Not all actions warrant a confirmation or an acknowledgment.

Data formats

Different types of numeric and linguistic data are represented using data formats. Date and time values may be formatted to depict ranges, time zones, abbreviations, and more, as appropriate to the context. Data redaction and truncation guidelines describe how to represent truncated numbers and disguise sensitive data.

Empty states

Empty states occur when an item's content can't be shown. A list that doesn't contain any items, or a search that doesn't display any results, are examples of empty states. Although these states aren't typical, they should be designed to prevent user confusion. For content that cannot be displayed because of a system failure, see app errors.

Errors

Errors occur when an app fails to complete an expected action. Some examples of errors include: When user input is not understood; An app failing to load; Incompatible operations are run concurrently.

Help & feedback

Help content provides answers to common user questions about your app. Users can send comments, report bugs, and ask questions that are not already answered by the help content.

Launch screens

The launch screen is a user's first experience of your application. A placeholder UI displays core structural elements such as the status and app bars until the app has loaded. Branded launch screens display your logo or other elements that improve brand recognition.

Loading images

Images, including illustrations and photographs, may load in three phases. Illustrations and photographs may load and transition in three phases by staggering opacity, exposure, and saturation levels.

Navigation

Navigation guides users through different parts of your app. Organize your app's structure according to the content and tasks you want users to see. Focus attention on important destinations by displaying them in tabs or in the side navigation, and de-emphasize inessential content by displaying it in less prominent locations.

Navigation drawer

The navigation drawer slides in from the left and contains the navigation destinations for your app. The nav drawer spans the height of the screen, with everything behind it visible but darkened by a scrim. The navigation drawer follows the keylines and metrics for lists.

Navigational transitions

Navigational transitions are movements between states in an app, such as from a high-level view to a detailed view. Most, but not all, transitions are hierarchical in nature. These moments should appropriately reflect the user's journey through each state of an app.

Permissions

Permission requests should be simple, transparent, and understandable. Apps should clarify why each permission request is needed, either through the feature name or an explanation provided. Runtime permissions are requested at the moment a user needs to perform an action in an app. Denied permissions should provide feedback and options.

Scrolling techniques

Scrolling techniques affect how content scrolls in relation to the app bar. These following patterns describe the elevations at which content should scroll, how to size flexible space, and when to anchor specific elements.

Selection

Selection enables user choices through gestures and visual cues. Checkboxes indicate completion, such as checking items off a list. Text selection is indicated by highlighting a segment of text.

Settings

App settings let users indicate preferences for how an app should behave. App settings are located under the "Settings" label in your app's navigation. Setting controls should capture user preferences. The settings shown should either affect most users or provide critical support to a minority of users.

EPRI UX / UI Best Practices

Tables

- Tables are for tabular data and should not be used for layout, spacing, or other utilitarian needs

- Provide a descriptive heading for each table

- Ensure that tables have clear, concise, and accurate row and/or column headings

- If table headings are sortable provide cues to the user (visual carrot)

- Provide users with the ability to export data into standard file types (.pdf, .csv)

- Provide filters to help users reduce the amount of possible matches

Charts and Graphs

- Include units of measurement on all charts and graphs

- Provide meaningful titles and axis labels for charts and graphs

- Use standard scaling practices for charts and graphs

- Include a key with each graph

- Do not clutter charts and graphs with useless information – Only display what is important

- Use interactive graphs with filtering and querying – Only if the data warrants it

Maps

- Use vector maps to show points, lines, and areas

- Pick appropriate symbols for points

- Use raster data for continuous images and photos

- Use appropriate scaling techniques

- Separate information using layers

- Pinpoint locations by latitude and longitude

- Provide a legend, Compass Rose (north arrow) and a scale bar

- Provide tools for zooming, panning, and centering

Feedback

Feedback promotes a user's confidence in their ability to negotiate and manage the application, and in the underlying functionality that supports their every action.

- Feedback must be provided in case of system failure

- Error messages should be clear, precise, and help the user solve the problem

- Error message should be polite, not intimidating, and should never blame the user

- Error messages should list the missing fields or pieces of data needed to successfully complete the action

Application Response Time

Application and web page response time are an important factor. Decreasing response times and load times can greatly enhance a user's experience with EPRI and can also directly impact the SEO ratings of EPRI's websites. The list below identifies the three important limits to application response time.

Page Load Times

Fast page load times are a key element to user retention on your application. The list below identifies types of pages and what their preferred load time should be.

Time: 0.1 – 0.9 seconds

The limit for having the user feel that the system is reacting instantaneously.

UI Element: None, display result

Time: 1.0 -9.9 seconds

The limit for the user's flow of thought to stay uninterrupted, even though the user will notice the delay.

UI Element: Progress Circular

Time: 10+ second

The limit for keeping the user's attention focused on the dialogue. Users will want to perform other tasks while waiting for the computer to finish, so they should be given feedback indicating when the computer expects to be done.

UI Element: Percent-done progress indicators

Data Heavy Pages

This type of page contains rich interactions, displaying data from a database, querying data from a database, or the use of multimedia

5 seconds average / may not exceed 10 seconds

Accessibility

By following accessibility guidelines content will be more accessible to a wider range of people with disabilities, including blindness and low vision, deafness and hearing loss, learning disabilities, cognitive limitations, limited movement, speech disabilities, photosensitivity and combinations of these.

Following these guidelines will also often make your Web content more usable to users in general and may have the added benefit of being more search engine friendly.

It is recommended that all EPRI web applications should conform to Level A of the W3C Web Content Accessibility Guidelines (WCAG) 2.0.

Final Remarks

Contact **Bing Xie** of the Web and Mobile solutions group to schedule your consultation before you begin planning your project.

Bing Xie	Brad Thomas	Manuel Morales	Mike Szwed
Manager, *Web & Mobile Solutions* bxie@epri.com 704-595-2508	Information Architect, *Web & Mobile Solutions* bthomas@epri.com 704-595-2487	Manager, *Software Quality Assurance* mamorale@epri.com 650-855-8743	Senior Graphic Designer, *Art & Design* mszwed@epri.com 704-595-2704