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Abstract
The purpose of this report is to outline the design rationale and steps taken to produce a pattern library focusing on data table elements. Using the pattern library, a case study of a mobile phone contract comparison table employing the knowledge gained from researching the library was produced. Research was undertaken initially to find different patterns. An initial prototype was made from this research in Axure RP, which was further refined for the final prototype. The pattern library was built and is currently online, and features a fully interactive, embedded mobile phone contract comparison table prototype. The prototype did was not tested in a usability study, and is based on research only.
Introduction

Data tables are ubiquitous in the field of ICT. The growth of personal computing and the internet has made them familiar to most people. Data tables can often be perceived as plain, boring and difficult to read. A challenge exists in making data tables appear fresh, interesting and intuitive to use. Data tables should at the very least present data in a way that is clear and understandable. Producing a table that is engaging to use is especially important for data tables using comparisons between products for sale, as may have a direct impact on sales.

This report outlines the steps taken to research the patterns, paradigms and elements common to data tables, present that research in an engaging way and a case study that draws on the research.

The research is presented in the form of a pattern library that allows designers to browse possible patterns to be used in the construction of a data table. The case study is a prototype drawing on these patterns and applying them to a mobile phone comparison website.
Scope of Work
Research was carried out into different elements that comprise a data table, and from this a web based pattern library was built. The pattern library was put together using HTML, CSS and JavaScript web technologies. An early prototype made in Axure RP was produced so feedback to be gained from a classroom presentation. The final case study prototype comprises a fully interactive, web embedded data table focusing on mobile phone contracts.

Deliverables
- Web based pattern library
- Axure Prototype
- Mobile Phone Contact comparison table
- Report

Aims
Pattern Library
The pattern library was conceived as a professional looking resource aimed at User Experience Designers, developers and UI designers. The focus was on producing a website that could showcase the different elements found in a clear and concise way with interactive elements where possible.

The overall tone of the site was modelled after pattern libraries such as Endeca’s pattern library. A sleek, functional and professional website was designed.

The educational aims of the site concerned looking at the theory behind different patterns and why should they be used, what problems is the designer trying to overcome? The library also aimed to address aesthetic elements as well, such as use of colour.

Case Study
The case study focused on applying the knowledge gained during research and applying it to a mobile phone contract comparison table.

What are the design concerns of the prototype?
- Allow users to sort on price, number of text per month, number of free minutes of calls per month and data allowance
- Filter on network, manufacturer, contract length, number of text per month, number of free minutes of calls per month, data allowance, plus monthly and upfront costs
- Table must be optimised for mobile display
- Produce a design that clearly displays data and is aesthetically pleasing
- Overall, the final table will be simple, intuitive and engaging to use
Design Rationale

Pattern Library
The pattern library drew on existing pattern based sites such as Endeca’s Pattern Library and DarkPatterns.org.

Information Architecture
The data contained within the pattern library was organised in two ways. Each element that had been researched had a dedicated page outlining the pattern. In addition to this, some of these patterns were further grouped by issue, where they were presented as solutions to issues a designer may be facing. This is a standard way of organising data in a library.

Navigation
Each page was listed on the left hand side of the page. This menu bar is present on every page of the website, giving easy navigation to any other part of the site. The number of items in the menu isn’t too long that it becomes overwhelming for the user, but there are too many items in the list to use a horizontal bar at the top of the screen.

Another way may have been to use a drop down list on horizontal bar across the top, but this adds in another mouse click, as users have to go to the drop down and open it. As screen real estate was not an issue, hiding the navigation away was not necessary.

The vertical stack also allows users to quickly glance at the range of topics, aiding a decision as to whether or not the site is likely to contain the information they require.

![Library](image)

**Figure 1. Vertical Stack Navigation**

There are two pages that are the exception to this, the ‘About’ page and the ‘Case Study’ page. These pages are not dedicated to patterns, and so are kept separate. To make sure they appear on each page, they are located in the header of the website.
Responsive Design
A common, emerging trend amongst websites is responsive design, whereby the layout and design of the webpage changes based on screen size. This is important where the screen size is small, such as a mobile phone. There is an increasing trend to use a mobile device as a primary screen. However, building a data table is highly unlikely to occur on any device with a small screen. Any research into patterns would be conducted using a work station. Therefore, the assumed context of use of the website means the final design is not responsive.

Colour Scheme
The primary focus of the website is to display patterns. Anything that detracts from that aim limits the website’s purpose. Therefore, it was decided that the overall look and feel of the website should be sleek, minimalist and clean. This puts the content on display, not the website. The colour scheme chosen featured white heavily, to not detract from the content. Grey is used as a shading colour to help differentiate elements when needed.

![Colour Scheme](image)

The highlight colour chosen was red. Used sparingly, the red helps to punctuate the white, striking a balance between minimalist and passionate, clean and sleek but not boring or plain. The bold red colour suggests passion, the opposite of corporate and neutral blue.

Font
Two fonts are used in the design of the site, subscribing to the idea of using contrasting fonts. The main body of text on each page is written in Open Sans, a sans-serif font that makes for easy reading. To contrast against this, Bitter, a slab serif font is used for headings to improve the aesthetics of the site.

Pattern Page Structure
Each pattern is given its own page, and follows a structured format, with the exception of the Colour page. Each pattern is introduced with a one or two lines giving a brief overview of what it is. This is followed by an example.

The examples, the possible are interactive. From research it was noted that pattern libraries generally only feature static images of different elements. Therefore to make the site more engaging, visitors can play around with the elements to see if it’s appropriate for their needs. For example, the page on drop down menus features a drop down menu the user can interact with.

This is followed by ‘why use it?’ - which gives a justification for including the element in the table design, and ‘when to use it’ which explains the situation it is most suited to.

Some elements also have an ‘Issues’ section – this is where potential negatives to using the pattern are discussed.

Finally, each page is finished off with a ‘References’ section, giving the user links to further, in-depth information about the pattern.
Each page is structured and written to give a designer an overview of a pattern using concise, precise language, helping them come to a conclusion about whether or not the pattern is suitable. The references at the bottom of the page give a designer the option to find out more information if they need to.

**Case Study**

The final prototype is embedded within the website, and is launched from the Case Study page. The data table prototype opens in a new window. The justification for this is that the prototype can be viewed and interacted outside the context of the website. The colour scheme can be completely different and not clash, the menu and navigation of the site does not interfere with the experience of the table. Using the prototype should feel like using a real mobile phone comparison website.

The first prototype designed was constructed in Axure RP, as it was quick and easy to design. Some anecdotal feedback on the prototype was gained from an interim presentation on the topic. This feedback plus additional research lead to changes in the final prototype which was implemented in HTML, CSS and JavaScript to allow a seamless integration into the website.

![Figure 3. First Prototype](image-url)
Filtering
The brief called for the ability for the table to filter on cost, minutes, data and texts per month, plus
manufacturer and cost. A number of ways of filtering were looked into.

Manufacturer
The number of phone manufacturers used in the data set was 4, although from research it was
found that the average number of mobile phone manufacturers featured on websites comparing
phone contracts was 12. With a list of 12 items, a drop down menu was selected. A list of radio
buttons would be too long, but as there wasn’t more than 15 items a drop down menu was ideal to
list items without taking up too much space.

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Deal Parameters
The deal parameters were the monthly cost, minutes, data and texts. In the first prototype, range
sliders were used. Users could slide between two points to filter out any deals that did not fall within
the range.

When further research into the data sets common to mobile phone deals, it was discovered that
most minutes and texts come in bundles, in intervals of 300, 600, 900 and unlimited per month. A
slider over such a small range was not the best element to use. Data, which is generally in intervals
of 500MB, 1GB, 2GB, 3GB and 5GB, was slightly better suited, but again, possibly not the best
solution. Therefore, it was decided that a drop down menu may provide a better solution, with ‘up
to’ the amount listed being used.

Price
Price was a better candidate for filtering on a range slider. Mobile phone deal months cost can be
over quite a wide range, and range sliders are particularly useful in data tables for filtering
information in this way. They are best used when the values are continuous, and incremental or
quantitative, as is the case with price.

Despite this, it was decided that having one range slider and three drop down menus in the ‘Create
Your Deal’ would look odd, and not fit the theme. A compromised between form and function was
therefore made, and a drop down menu was also used for price.

On all drop down menus, a default of ‘all’ was used, in case the user has no preference.

Choose a network
Network choice is a filter in which a preferred network is selected. As the user may have more than
one preference, the selection is not mutually exclusive. The best option for non-mutually exclusive
options are radio Buttons, when users need to select one option from many.

Rather than use radio buttons with a text label, as is normally the case, it was decided to make non-
mutually exclusive buttons that work like radio buttons, but instead of showing a check selection, an
image comprising of the logo of the network would be used instead.

Images can sometimes better convey information than text. Mobile phone network operators have
logos that are recognisable to many.
**Contract Length**
In the original prototype, this option did not exist, but after feedback from a presentation, it was suggested that this should be added. Again, a drop down menu was used, as it is a short list but too long for radio buttons. Defaults to ‘up to 24 months’, which is the longest possible contract.

**Go! Button**
The Go! button is a form submit button. Whilst the prototype only has a few table rows for the purpose of demonstration, the finished product would have thousands of phone deals. Filtering each time one of the filtering elements was changed would cause a huge strain on the back end, and would lead the interface to feel sluggish. Therefore, the Go! button only filters once all parameters have been entered. ‘Go!’ was chosen over submit to make the interface feel less formal.

![Go! Button](image)

**Data Table**
Each row in the table has a large height. This is to make each row clear. The background of the table is white, showing a clean interface with the phones on display. The table does not use any kind of row differentiation. It was felt that each row is wide enough that it is possible to read across easily.

The ‘See Deal’ button is coloured orange. The main colours used elsewhere on the prototype are shades of blue. The orange is the direct opposite of the main blue colour used. This difference, called contrasting colours, makes the button stand out. As the main purpose of a mobile phone deal website is to sell deals, highlighting the button in this way to draw the user in is vital.

![See Deal Button](image)

**Phone images** - Images of the phones for sale are shown in the table. Using images is important here as there are certain unquantifiable qualities that a user may wish to make a decision on, that cannot be accurately conveyed via text, such as how attractive something is. The image gets this point across.

The user cannot filter on colour, because it the colour of a phone is unlikely to be a deciding factor in a mobile phone deal. However, many phones are available in a range of colours, so it is therefore important to allow the user to see these options.

This has be achieved by placing small buttons under the image of the phone the user can click on. Functionally, they are analogous to radio buttons – mutually exclusive buttons that allow the user to set a parameter to a certain state – but instead of the usual unselected/selected visual states found, the colour options each button represents are shown.
Figure 7. Phone Image with Colour Option Buttons

All text is in a clear large font, black in colour to contrast the background. This makes the data easy to read.

For network, an image has been used as the logos of network operators are instantly recognisable, and stand out more than plain text. Text is still used to anchor the image for users that are unfamiliar with the logos.

Colour Scheme
The colour scheme used uses blue and white. Blue is a trustworthy, neutral and diplomatic colour, which is appropriate for a website trying to sell mobile phone contracts. White is used for the background of the table, to make the data easy to read. All text is in a clear large font, black in colour to contrast the background.

Figure 8. Final Prototype Colour Scheme
Discussion

The main criteria for the project was met. A pattern library was produced, that does contain a useful information for designers. It features interactive content, which is somewhat novel for a pattern library. It has a professional look and feel.

Things that could have improved the website would be more images, such as on the highlighting page, to give visitors to the website more information and to break up the text.

RSS feeds about patterns and trends in data tables could have been added to the site, to keep content fresh and updated.

Most of the research into producing a mobile phone comparison website was focused around the use of a data table, however, other options were looked into. A spatial representation of deals that match the user’s needs was considered.

The user would enter details about the phone deal they were after, and would show multiple deals on a spider diagram, with each deal closer to the different parameters based on how close a match it is. This would very quickly show the deals best suited to the user. Users could then select the deal for further information.
Conclusions

The pattern library stands as a useful resource that was successfully used in order to create a prototype. Many of the elements researched for the pattern library were successfully applied in the final prototype.

The prototype itself showed how different patterns can be integrated together to solve issues, in this case, a mobile phone comparison table. Some interesting combinations of elements, such as check boxes with images of logos for the network selection were applied to create novel solutions to problems.

Further work might move away from using data tables to represent phone contracts and use spatial representations of data. More work could be done on persuasion, what patterns could be applied to increase people to choose one phone deal over another.
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