

Clear Data in Limited Space: Dashboards for Mobile Devices

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Receiving business centric reporting via mobile devices, particularly phones, is becoming more and more commonplace. However, dashboard designs have tended more towards shrinking existing dashboard functionality, rather than creating anything bespoke to cater for the display medium.

In an attempt to right this wrong, we will look at ten considerations that should be applied to all reports that will be viewed through screens with a limited size, whilst maintaining three rules of good dashboard design:

Clarity

Whatever information is being displayed, it should be easy to read and interpret.

Functionality

Provide the audience with the interactivity they need to analyze the data which usually means drill-downs and filters through one means or another.

Accuracy

The information displayed must be correct and relevant, just like every report!

This paper focuses exclusively on Clarity and Functionality and how they can be used for mobile device friendly dashboards. Of course, both of which are redundant if the information displayed is not accurate, this should not be forgotten.

Before we leap into what makes a good dashboard for mobile devices, just a quick point on terminology: I refer to the individual elements of a dashboard as 'Display Elements', rather than charts or graphs (except, of course, when referring specifically to a chart!).

Often a Display Element is a chart or graph but not always. RAG (Red Amber Green) statuses expressed as traffic lights or 'smiley faces' or dynamic text are some common examples.

In order to keep this paper as software agnostic as possible, all illustrations have been created with a graphics package rather than any existing reporting product.

Ten Considerations for Mobile Dashboard Clarity

1

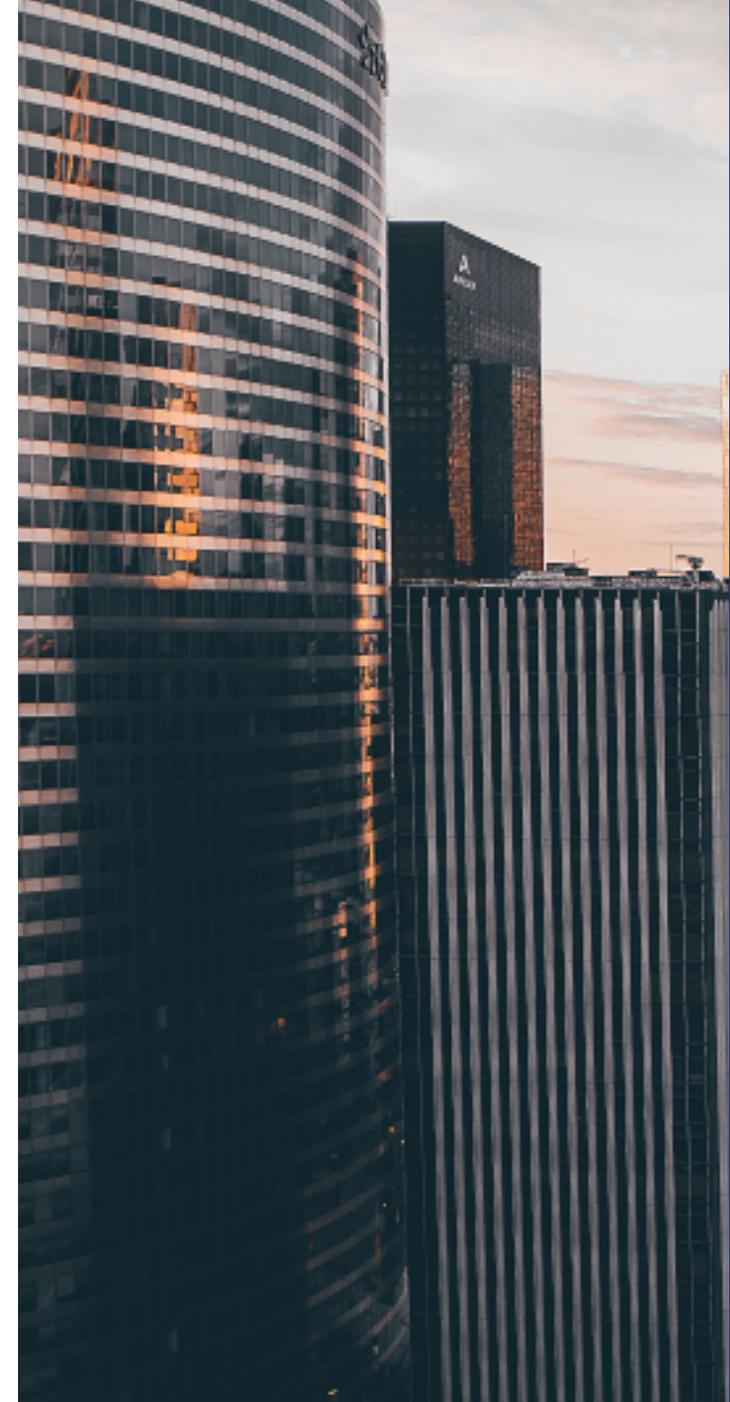
Menus Being Charts, and
Charts Being Menus

This first point should not really be news to anyone familiar with dashboards. Drilling down (the ability to click on a series in a chart to view that series at a lower level) is hardly groundbreaking.

What may be new is utilizing charts as a means to create a menu. As most reporting software tends to be a bit light on content and functionality when it comes to non-chart based display items, often the only way to create a dynamic and interactive menu is via a chart.

Fig. 1: Displaying a KPI driven RAG status provides a summary that doubles as a contents page to direct the audience to troublesome metrics.

Example





In this example, the chart has been constrained to keep uniformity to the area covered and to only allow color changes based on the success of the KPIs relevant to a specific Resolver Group.

This enables the audience to quickly identify which service is breaking the KPI and decide if they want to view the data beneath that red or amber box.

When to Use

Abusing chart functionality in this way goes hand in hand with point 4 and the necessary focus a mobile device friendly dashboard should place on the depth of data display due to lack of width.

Of course, if you are fortunate enough to be using one of the few reporting software packages that support functionality beyond basic charts and data grids, this point will be of limited use compared to other possible options. With buttons, dropdowns and menus available, bastardising charts may not be necessary but it is a handy tool to at least be aware of, especially when dealing with traditional reporting software.

2

Meaningful Titles, Dynamic and Otherwise

This consideration is not exactly new technology either, but is especially powerful for drilldown actions which need to keep context.

The more meaningful a dashboard, page or chart level title is, the more clarity can be given to each drilldown level or page. If an audience member receives a dashboard aimed at the KPIs for the Service Desk, there is no need to identify any series or chart if "Service Desk" is featured in each page title.

When to Use?

Whenever you can! The more meaningful a heading or title for a Display Element is, the less of other supporting information is needed to provide context for the Display Element itself.

I consider this something to keep in mind for all reporting and dashboard whether for a mobile display area or not.

Minimal Labels, Maximum Colors & Icons

Meaningful Display Element titles serve an important purpose and need to convey a verbal description of what message said element is displaying. Usually, dropping a main title is counterproductive

This is another "depending on software" recommendation, where possible, animation opens up a world of efficient communication on mobile devices. RAG statuses are great to highlight specific issues, but a flashing status is a lot more noticeable than just a color change, especially on the smaller mobile screen.

Animation can also aid in showing links between parent and child display elements through pulsating lines. That said, strong color coding can do the job with an equal level of clarity but this may not always be an option, depending on the display element or when two elements feed a third and it becomes unclear which parent element color should be inherited.

Example

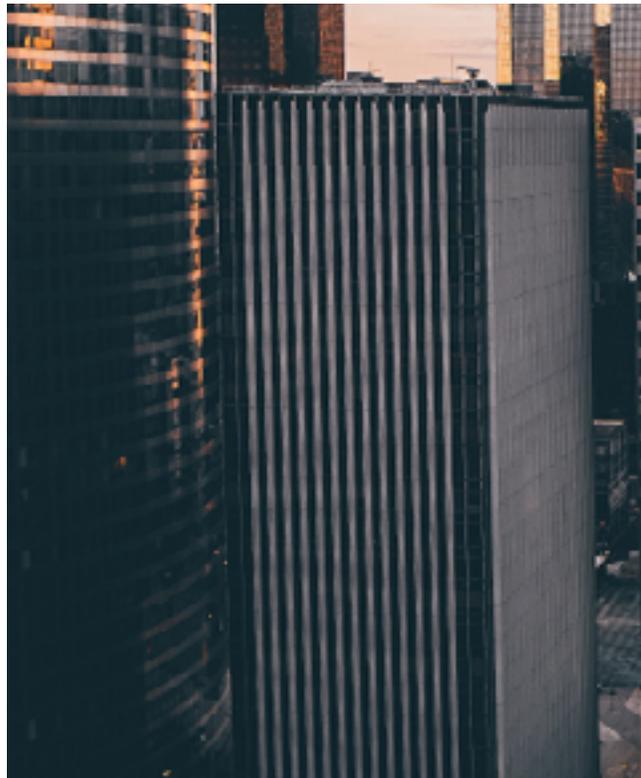


Fig. 2: Revisiting the illustration from Point 1, we can see that the KPI percentages are not displayed without any detriment to chart clarity.

When to Use?

This is one of the points in the list that can reap great rewards in clarity and overall coolness factor for a mobile device centric dashboard. However, it is also the easiest way to create an unusable and unsightly mess!

Like so much MI/BI design, it should be developed with as much audience validation as possible. In this particular case, present the audience with a minimally labelled dashboard as a starting point, then add additional labeling if required.

This consideration is very much a balancing act, and a good rule of thumb is to only display a piece of information once, e.g.: if a chart has a title announcing it as "Blah Blah Monthly Percentage Blah Blah" there is no need to label the chart axis as "%" and "Month", because we already know that from the title.

Personally I would (and have!) argue that if the x axis is grouping data monthly it is obvious enough seeing the month names, without having to label the axis too. Unfortunately the same logic cannot be applied to the "%" y axis, as a range of 0-100 is not necessarily a percentage.

Fig. 3: Drilldown functionality is paramount to get the most mobile device displays.

4

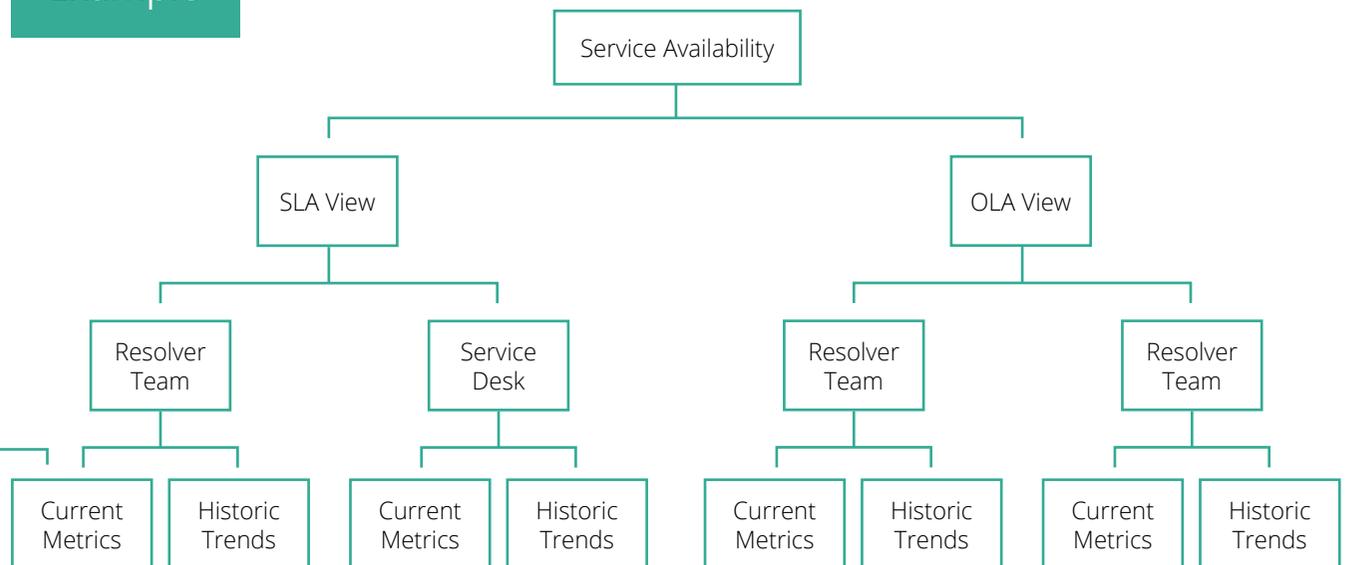
Deep Drill-Downs

"When they go wide, we go deep!"

Which summarizes this consideration beautifully! Without the vast expanse of modern desk based monitor display areas, we have to maximize the depth of the dashboard.

Drilldowns are a fantastic function in reporting and are still massively underused. However, there is one weakness which can become a concern when displayed on a device with limited screen space.

Example



Namely: context. A traditional dashboard will usually have the space to still display values associated with the parent it was called from in some way.

This is not ideal on mobile devices, but the parent of a drill down still has context value and should still be displayed in some manner.

When to Use?

When designing a dashboard for a mobile device, this point tends to happen organically... at least, it should! But whenever an existing, traditional dashboard needs to be 'folded into itself' in order to fit on a mobile phone device, considering a dashboard from this perspective of 'breadth into depth' is a great mindset to adopt.

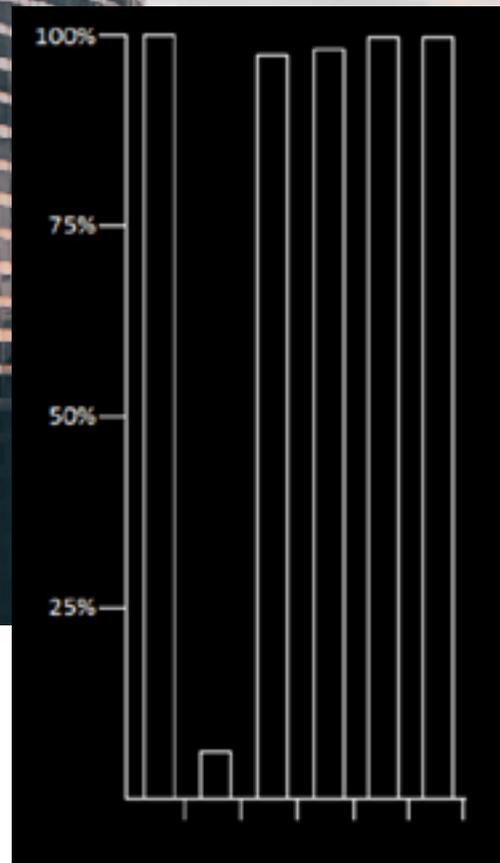
5

Split Range Charts

This consideration is almost painful to write, as it goes against what I would consider good reporting practice for 'full size' dashboards et al.

I would normally consider it beneficial for clarity to display bar charts in their entirety as this visually highlights the difference in values when one or two values are distinctly lower.

Example



The examples show how the night shift Service Desk tend to meet their phone response KPIs and score 98.5%. Except for every now and again when everyone is asleep and it plummets to 5%.

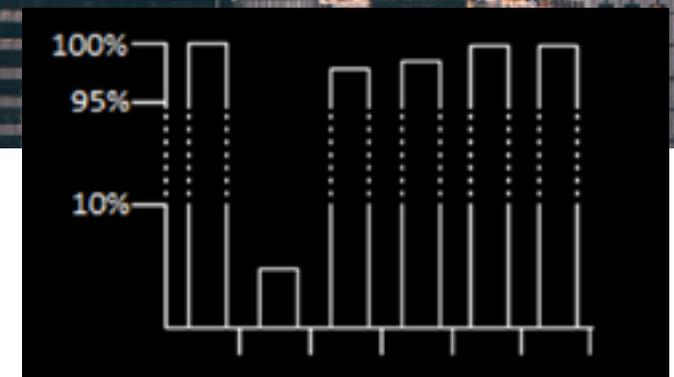
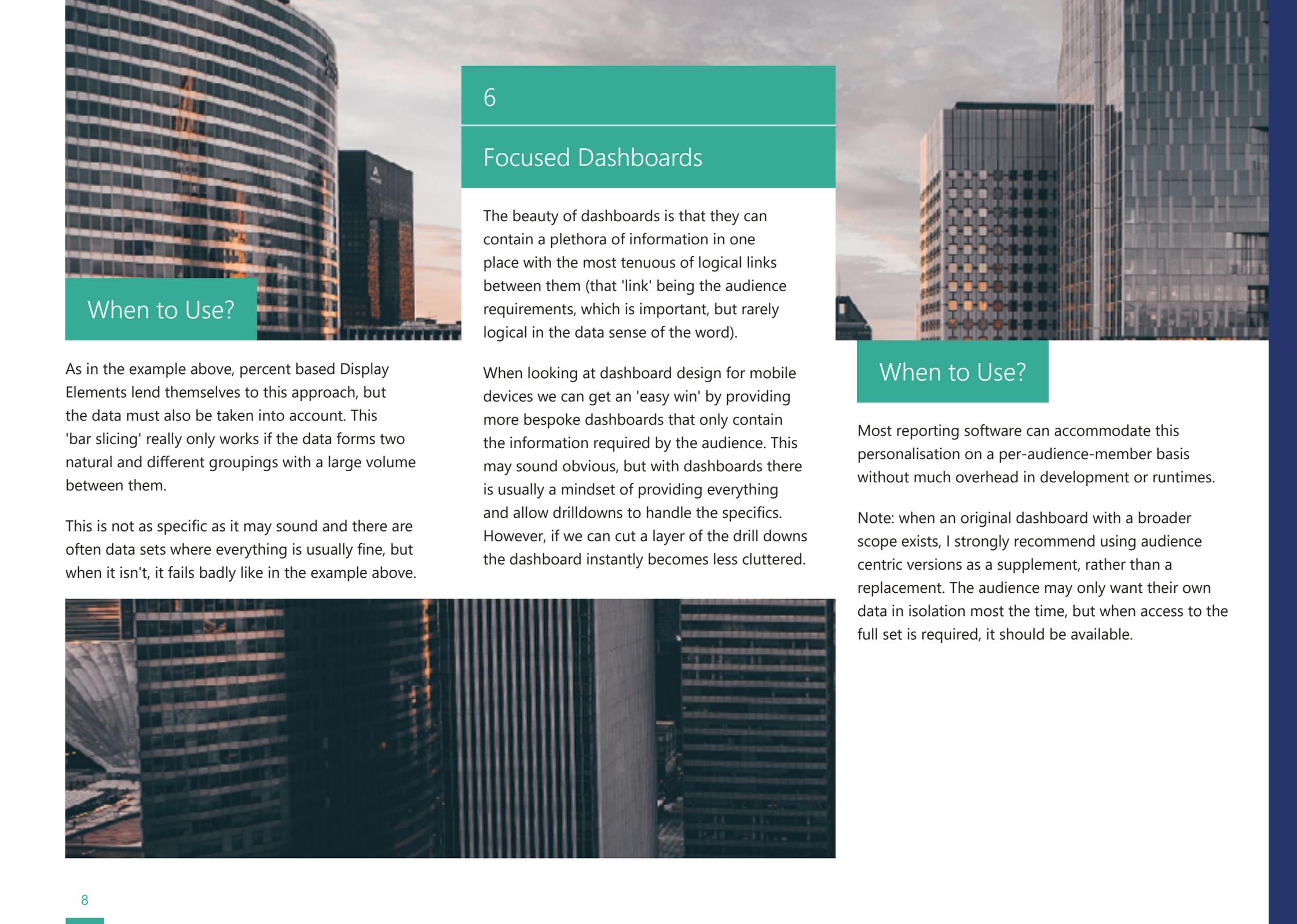


Fig. 4: Using dynamic breaks in data series with wide ranging values can save a lot of valuable display space



6

Focused Dashboards

The beauty of dashboards is that they can contain a plethora of information in one place with the most tenuous of logical links between them (that 'link' being the audience requirements, which is important, but rarely logical in the data sense of the word).

When looking at dashboard design for mobile devices we can get an 'easy win' by providing more bespoke dashboards that only contain the information required by the audience. This may sound obvious, but with dashboards there is usually a mindset of providing everything and allow drilldowns to handle the specifics. However, if we can cut a layer of the drill downs the dashboard instantly becomes less cluttered.

When to Use?

As in the example above, percent based Display Elements lend themselves to this approach, but the data must also be taken into account. This 'bar slicing' really only works if the data forms two natural and different groupings with a large volume between them.

This is not as specific as it may sound and there are often data sets where everything is usually fine, but when it isn't, it fails badly like in the example above.

When to Use?

Most reporting software can accommodate this personalisation on a per-audience-member basis without much overhead in development or runtimes.

Note: when an original dashboard with a broader scope exists, I strongly recommend using audience centric versions as a supplement, rather than a replacement. The audience may only want their own data in isolation most the time, but when access to the full set is required, it should be available.

Extending Functionality

Bar and pie charts are great methods of data display, as their prevalence suggests and of course, this prevalence means the audience expect to see these charts.

With display space at a premium we need to think how to squeeze the most out of each chart.

This can be done through three main methods:

1

Create new types of chart.

2

Use existing chart types, but for other than their intended purpose.

3

Introduce new functionality to traditional chart types.

Of course, none of the above three will even be considered if basic chart types by default.

Example

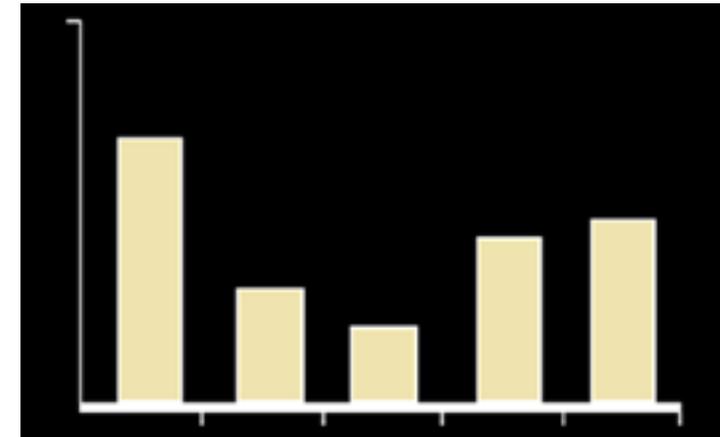
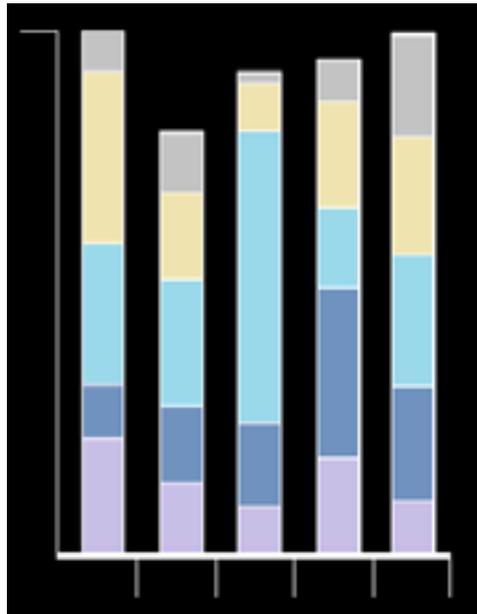


Fig. 5: Dynamic data series alignment is the only way to make traditional stacked column charts readable.

When to Use?

Traditional Business Intelligence reporting can get very dry for both the audience and the developers who have to constantly churn out the same reports/dashboards.

If nothing else, mobile reporting provides a justifiable excuse to produce something a little away from the usual. Organizational standards must be adhered to in regards to font, colors and logos, but there is still a huge amount of scope beyond these restrictions to create something a bit different.

Easy Zoom-in

Being able to view the data item clearly is paramount, and of particular concern for mobile devices. Enabling the audience to enlarge/zoom in to areas of interest is an easy win.

To this end, avoid any type of sliding scale zoom control - the controller itself takes some of our limited display space and leads to the display item staying the same size within the dashboard.



Example

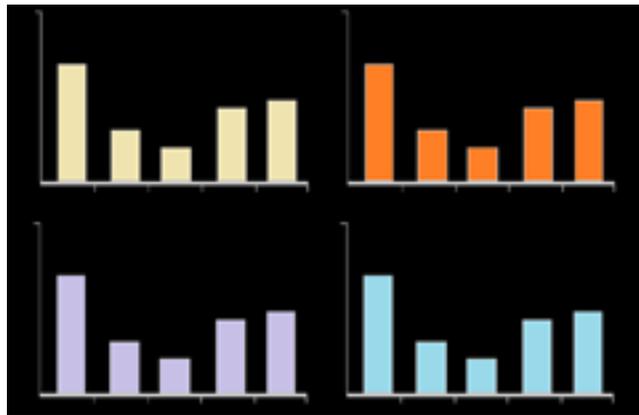
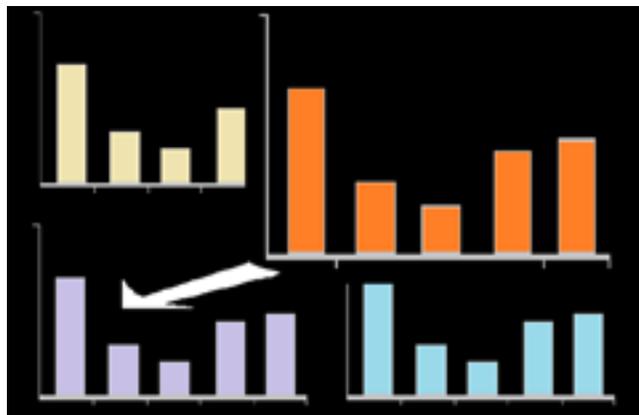
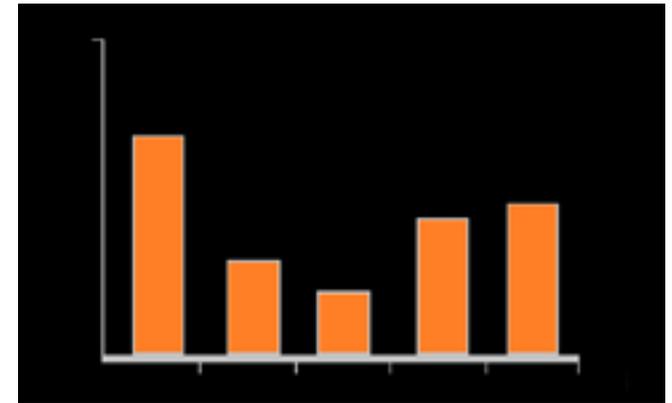


Fig. 6: Four small, but readable charts...



...the audience simply hovers over the chart of interest...



... to enlarge it to full screen size.

When to Use?

The need for manually zooming in on a well designed mobile dashboard should not be that much of a prevalent requirement. By making good design decisions elsewhere, the dashboard should present data clearly enough despite the small screen area.

However, for audience members with restricted vision, the inclusion of manual zoom-in functionality on display elements may be required to make the mobile dashboard usable.

White Space is No Longer a Friend

A big, broad margin on a dashboard being projected or display on a huge monitor looks neat and with space to spare, why not?

Once again, mobile devices are another story. There is just not the screen space to spare. And nearly everything has a margin, the dashboard, the Display Elements in the dashboard, the titles and labels in a Display Element!

Minimizing margins across the board can get a lot of dashboard display area back.



When to Use?

White space in a dashboard is wasteful when it comes to mobile devices, but that does not mean the screen should be packed solid with content.

In a lot of cases, following the other points in this list should remove any excess dashboard clutter to a degree that white space is an affordable luxury. For the instances where there is just too much to fit on a screen, forget margins on the dashboard and the individual Display Element own margins/spacing.

It is important to not forget clarity or functionality when applying this point, as it is all too easy to create something unreadable and a challenge to drill-down through (especially on touch screens).

Pick Display Elements Wisely

Clarity is always key in data presentation. When it comes to mobile devices and their limited screen sizes, clarity becomes challenged by scale changes.

Consideration 8, above, goes some way to resolving this issue by allowing the audience to zoom in on Display Element that interests them. The challenge with this is ensuring that the audience can see all metric results displayed clearly enough in order to know where to zoom in or drill down.

Example

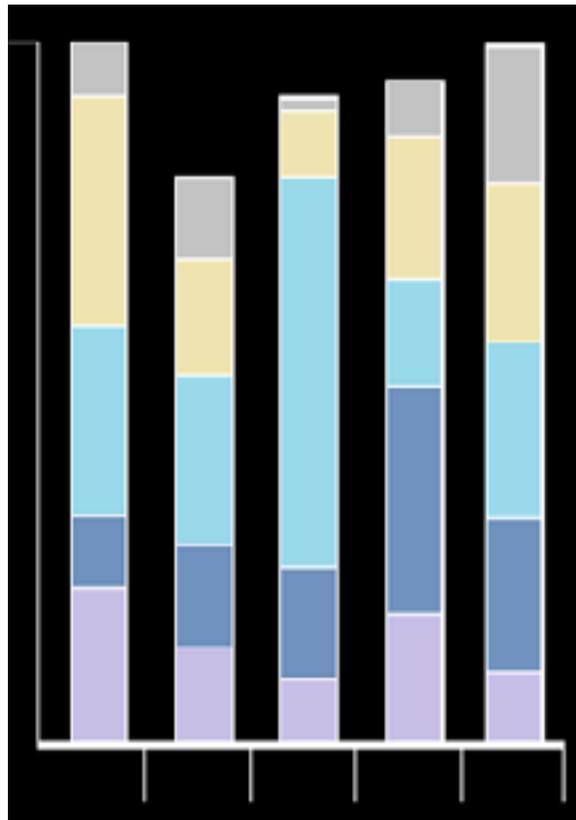


Fig. 7: This stacked column chart does the job of five pie charts, in a lot less space.

When to Use?

Everywhere!

Or, for a more targeted answer: Consider each display item (chart or otherwise) and how easy to read it is when impacted by broad ranges of data (like in point 5). For example, Pie Charts are great, until there are over ten Series being displayed or a smaller set is under two percent and becomes a sliver, rather than a slice of pie.

This sort of thing is a mild annoyance for traditional reporting, but is just part of the job. However when scaled down for mobile devices it can become misleading. I suggest looking through historic data to identify the likelihood of extremes and their impact.

Share chart keys!

A Word on Technology



Not everything presented in this paper can be achieved by all reporting software, and I imagine very few could do them all. But while some limitations may be encountered in trying to apply some of the specific rules suggested above, the majority of reporting software should be able to do most of it.

Audience Involvement



With the approaches discussed in this paper it is more important than ever to engage with the audience when creating dashboards for mobile devices. Providing the data the audience requires in a format they find meaningful is one thing for a traditional dashboard and quite another with the wide range of options to be considered to get the most from mobile device display.

This makes it doubly important that the audience are involved with all levels of functionality and are happy that the presented format meets all their needs.

Summary



All of the above suggestions will improve mobile dashboard consumption, but unfortunately each also comes with a development cost (especially when compared to just shrinking an existing dashboard).

Whether or not taking the time to improve mobile reporting offerings is worth the expense will differ depending on the audience; obviously, not all the lists points above need to be implemented - just applying one or two can make all the difference.

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