Using Actionable Visual Analytics with Targeted Insights for Healthcare Dashboard Development

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Outline

- Introduction
- Analytics (Pyramid, Category)
- Dashboard Type
- Dashboard Design (Goal, Element)
- Visualization Productivity
- Summary

Introduction

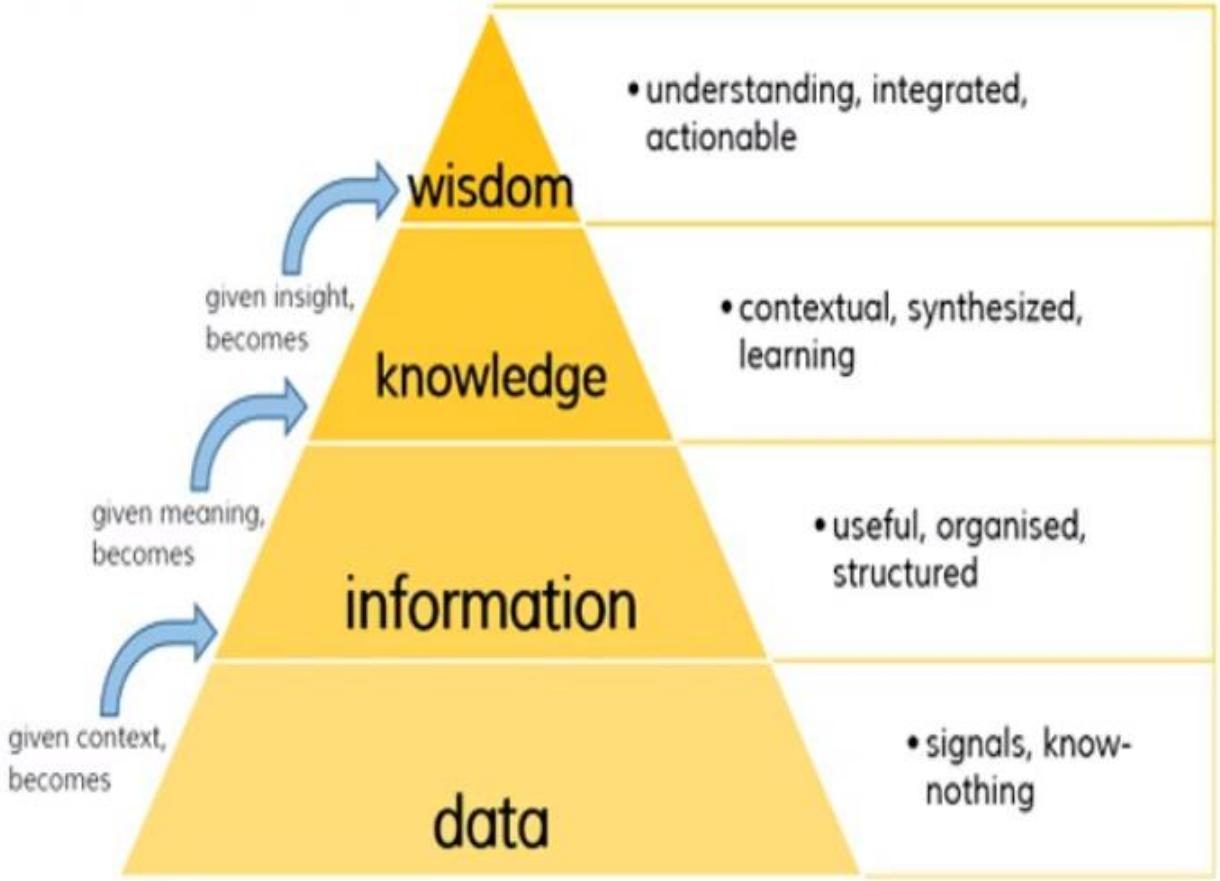
- ‘Information is the oil of the 21st century, and analytics is the combustion engine’ – Peter Sondergaard, Chairman of the Board, 2021.AI
- Healthcare data (i.e., clinical, financial, and operational) have the potential reduce costs, enhance quality, and improve the patient experience
- “The biggest problem is not ‘How do we get more data?’ It is how do you take the data that you have and simplify it to a point at which someone that’s non-technical can easily understand where they’re at, where we want them to get to, and then move in a common direction” – David Delafield, CFO, Swedish Medical Group

Introduction

- Why visualize? A picture is worth a thousand words
- Data visualization is visual representation of data that has a main goal to communicate quantitative information clearly and effectively through graphical means
- Decision makers can grasp difficult concepts or identify new patterns with dynamic change

Analytics: *Pyramid*

1. Identify problem and stakeholders
2. Identify data sources
3. Retrieval data, ETL
4. Analyze and interpret data
5. Visualize data
6. Disseminate new knowledge
7. Implement knowledge into the organization



(Fig. in [1])

Analytics: *Category*

- Challenge is how to get from information to insight to action. BI tools empower everyone to find the right path forward
  a. Descriptive Analytics: sum, count, average, typical table, pie, bar chart
  b. Diagnostic Analytics: drill-down, sorting, filter, data discovery, correlation

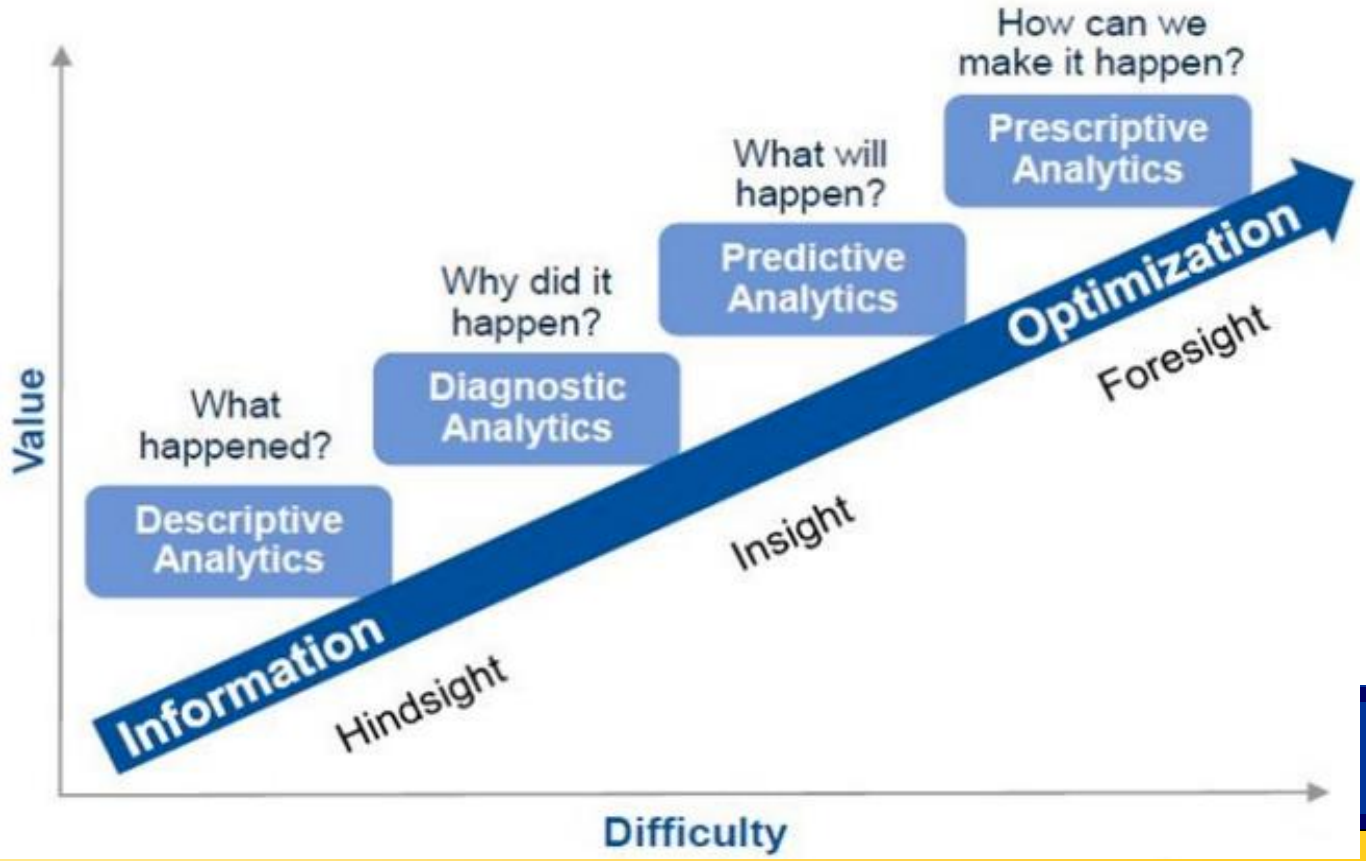
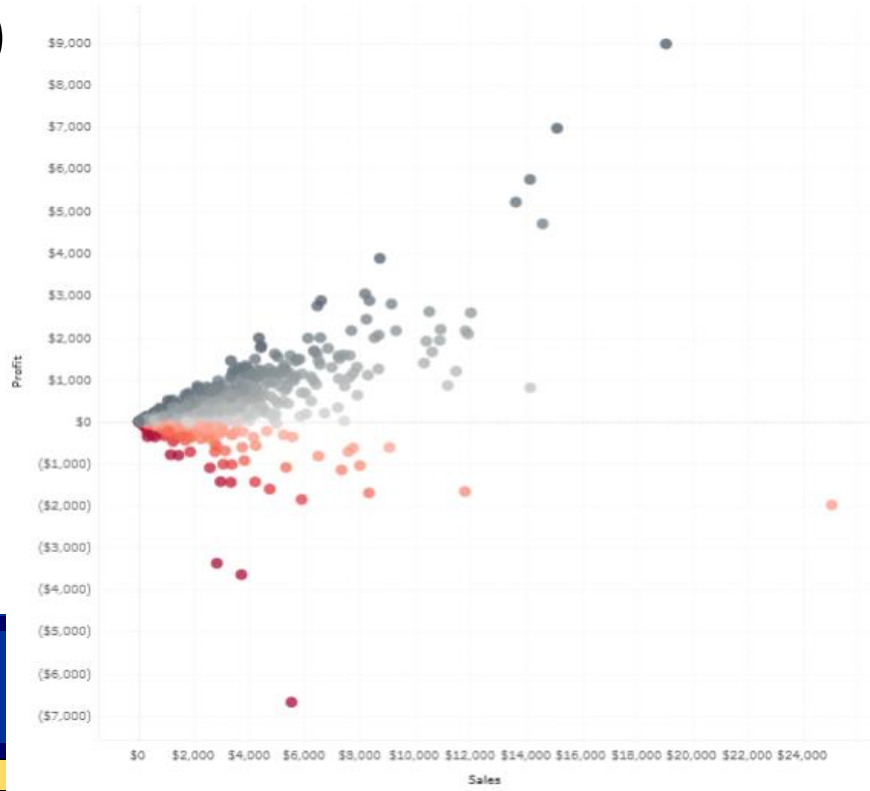


Fig. from [2]

Analytics: *Category*

c. predictive and prescriptive analytics

- ✔ Deviation analysis (categorical, comparative, thresholds)
- ✔ Time series analysis (trends, variability, rate of change)
- ✔ Multivariate analysis (heat, multiple lines)
- ✔ Correction analysis (scatter plot)
- ✔ Ranking analysis (pareto)
- ✔ Etc.



Dashboard Type

- With self-service interactive visualization, you can take the concept a step further by using technology to drill down into charts and graphs for more details, interactively changing what data you see and how it's processed.

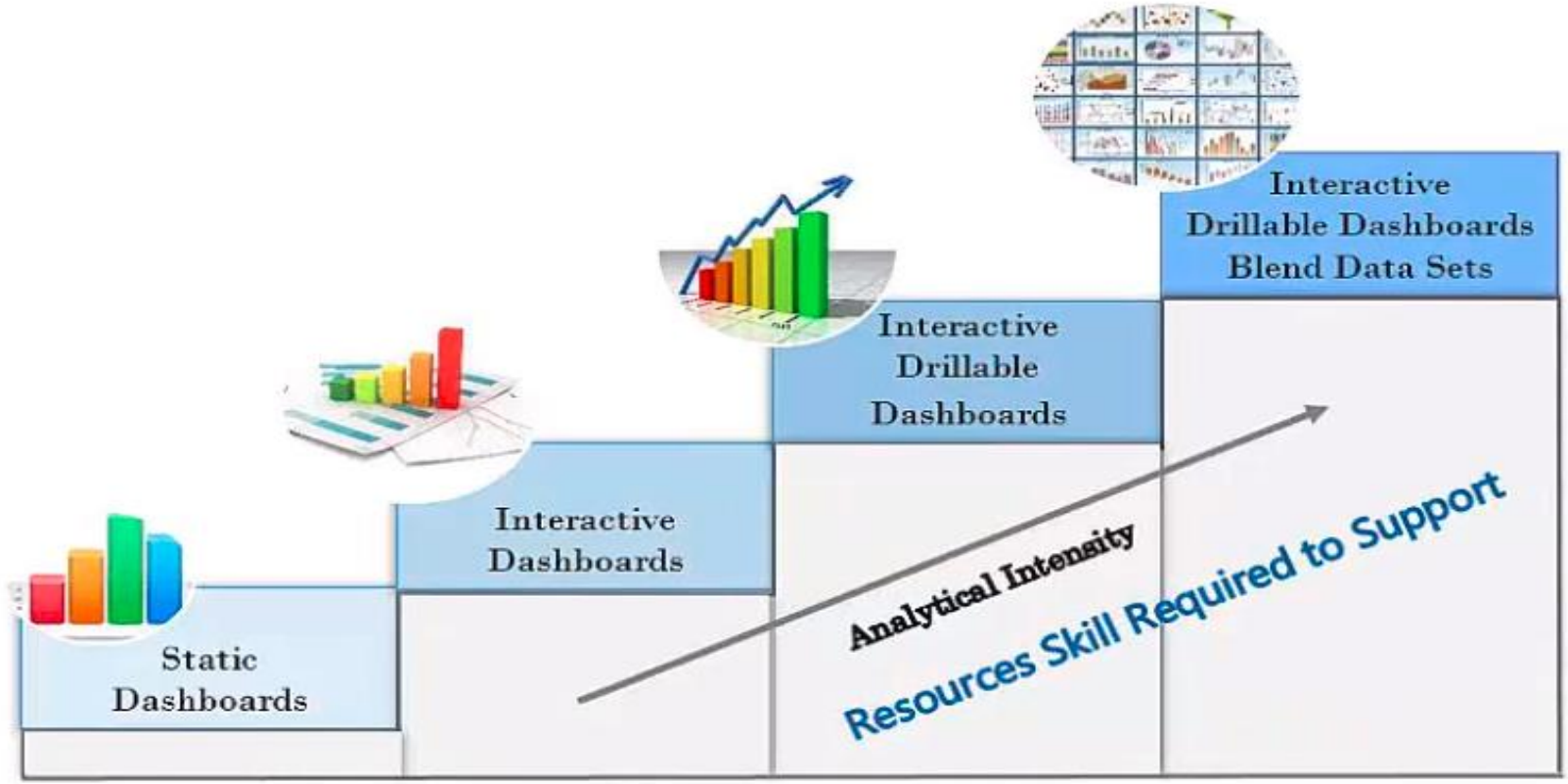


Fig. from [3]

Design: *Goal*

- Delivering meaningful, relevant, role-based, accurate, reliable, and actionable insights that align with the real-world concerns of healthcare executives, LOB leaders, physicians, clinicians or analysts is critical for timely decisions that will favorably impact patient outcomes, quality, safety, and the cost of care delivery

✔ The best dashboards just work for the intended audience
✔ Identify business goals
✔ Identify KPIs and metrics
✔ Clearly define 3-5 messages that you want to communicate

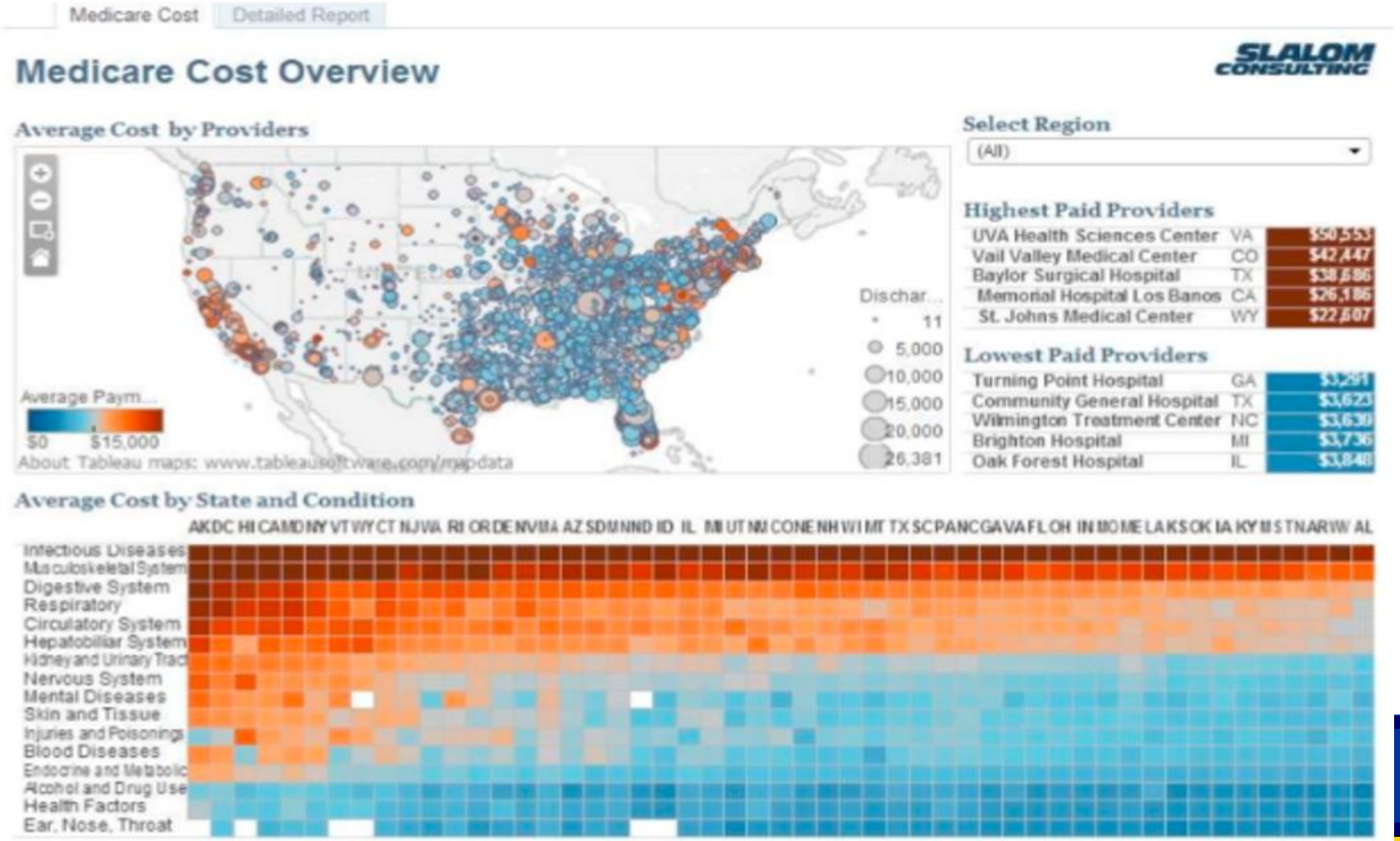
Design: *Element*

A delicate balance of three elements:

1. Content is the information that you want to communicate
2. Form is the size, shape, dimension and other distinct parameters of the object you are designing
3. Function is the intended actions associated with the object you are designing

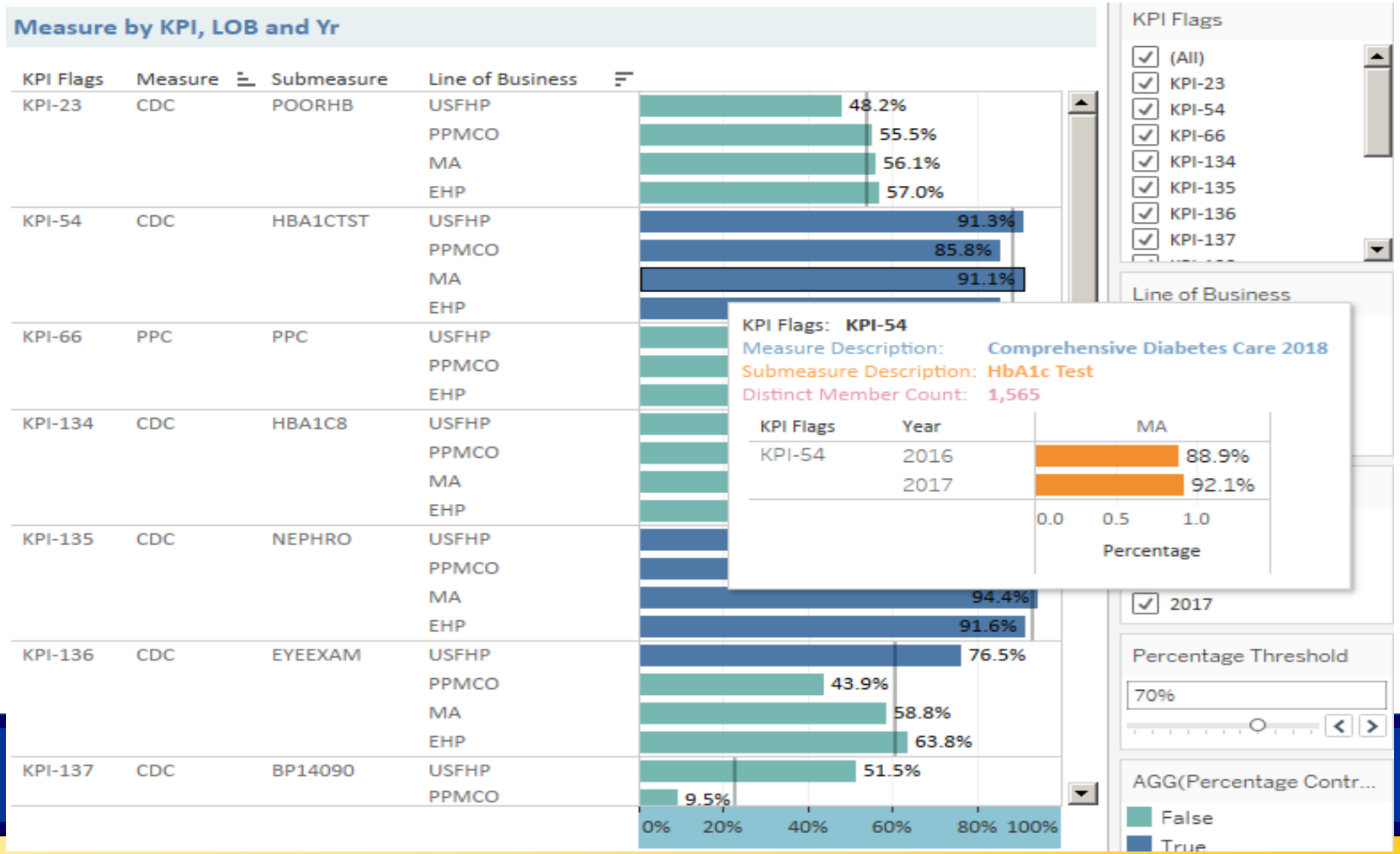
Design Content: *Layout*

- Information should flow with ease for the consumer; Adhering to simplicity and being aware of narrative flow will greatly aid in communicating (Fig. in [4])



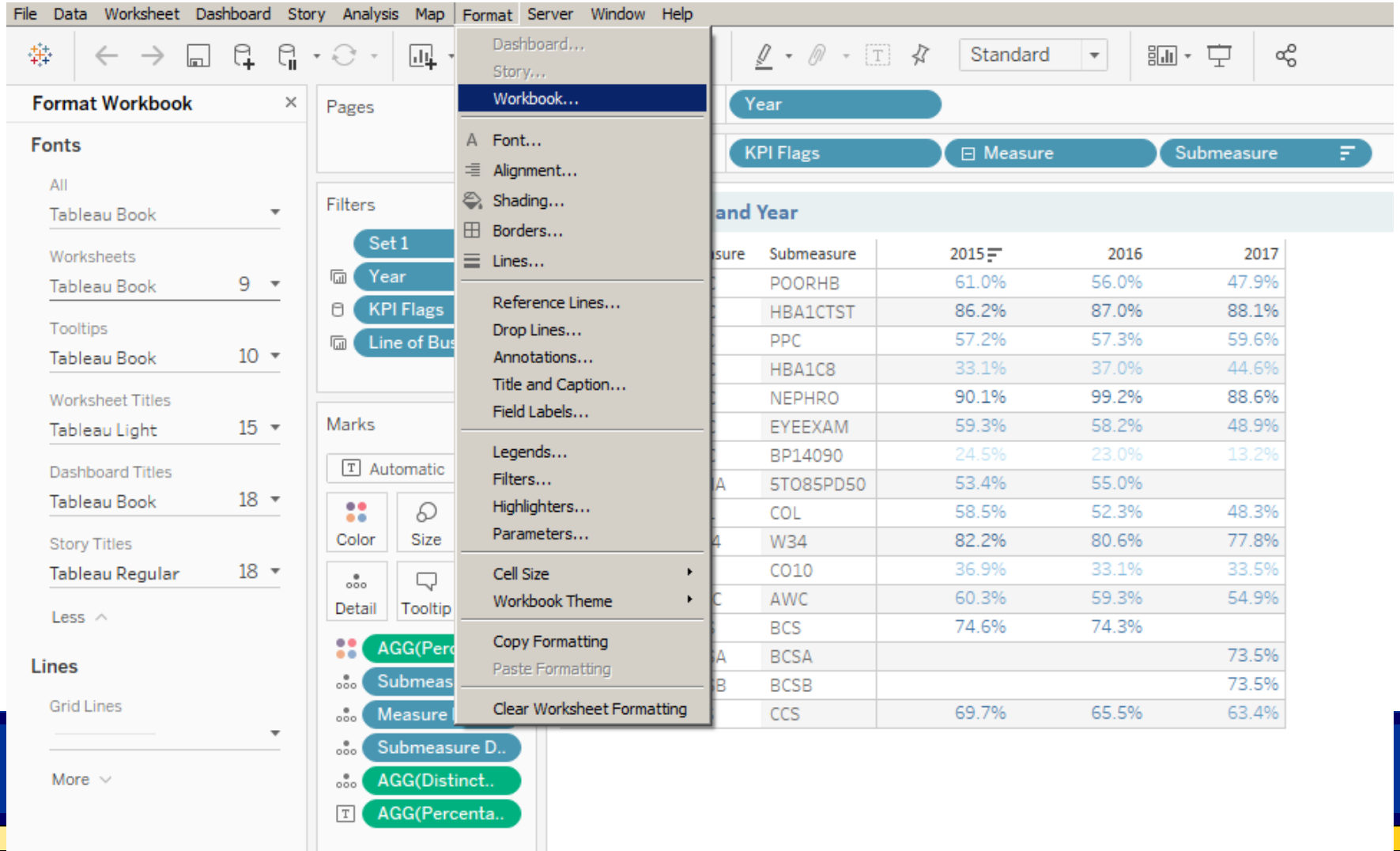
Design Content: *Data Storytelling*

- Data storytelling is the new language of business; Tell story within your story using tooltip and access to details on demand



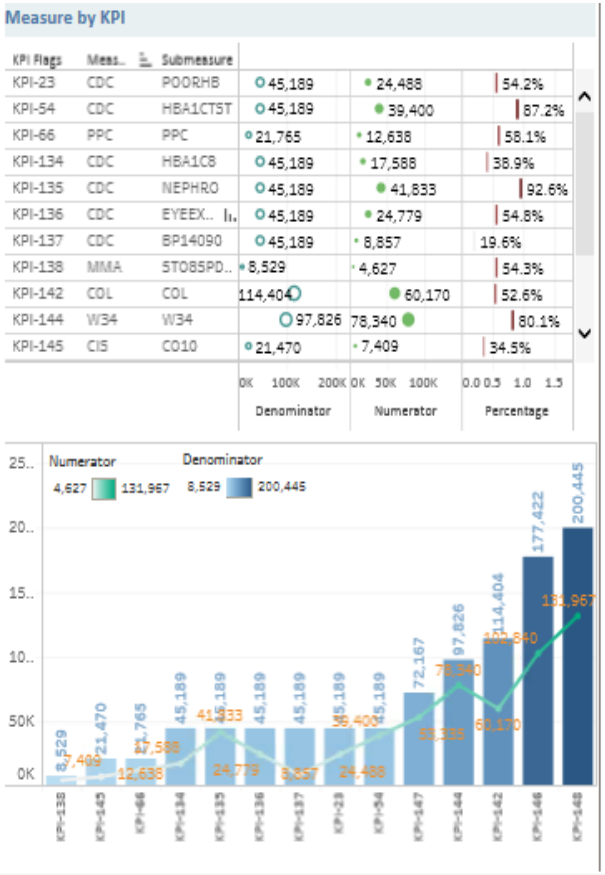
Design Form: *Format*

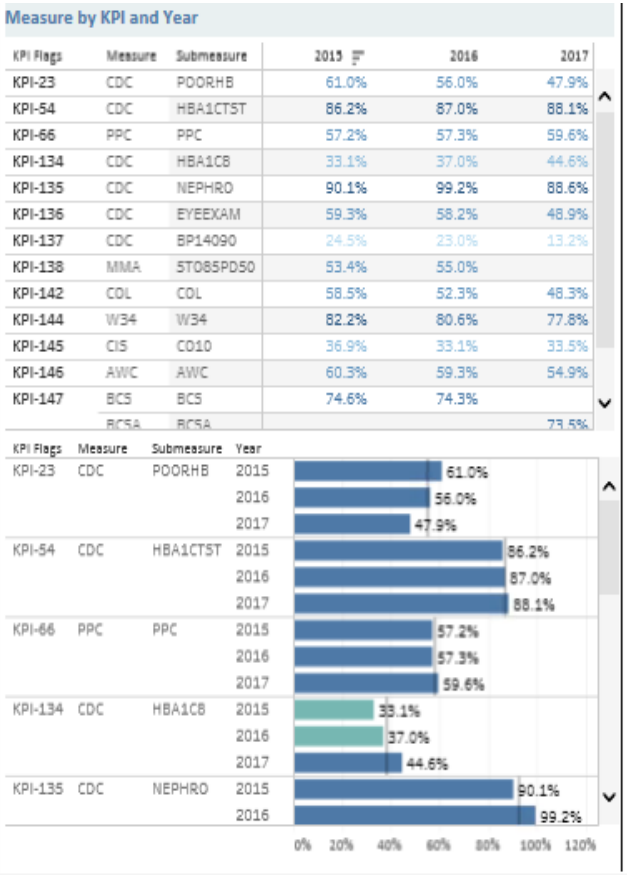
- Theme ->Workbook ->Worksheet->View parts; Not to use all caps, stylized fonts

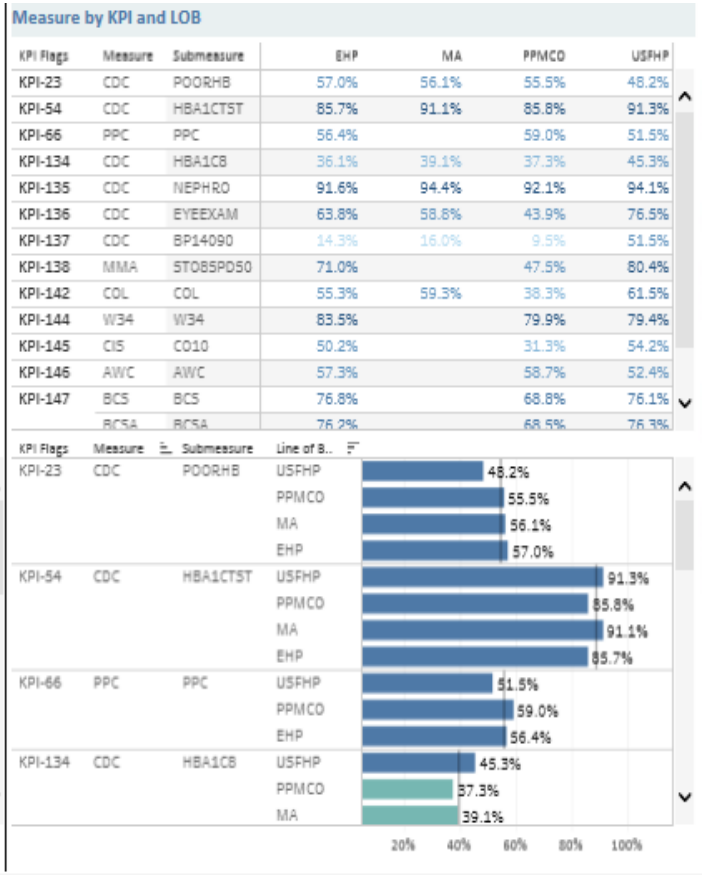


Design Form: *View*

- Stick to two or three relevant views in one dashboard







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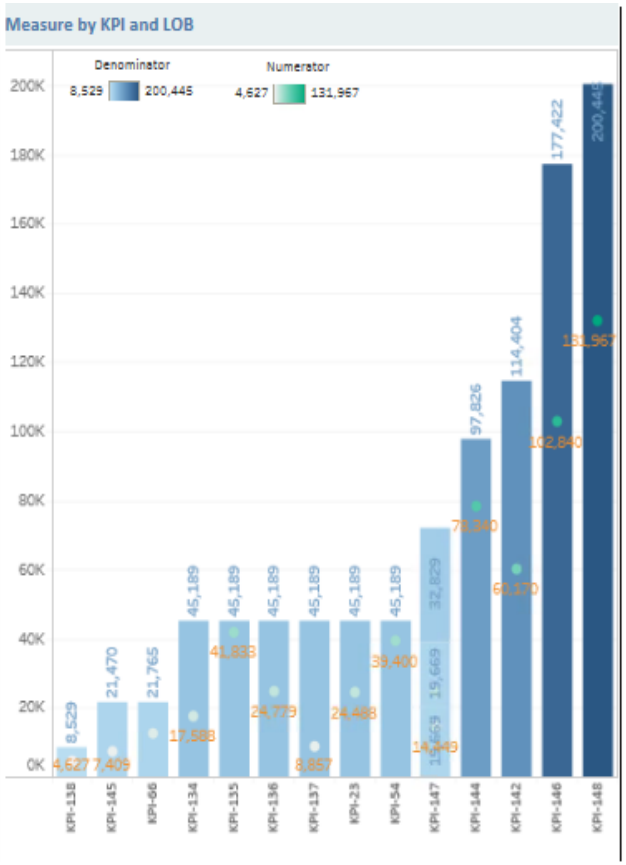
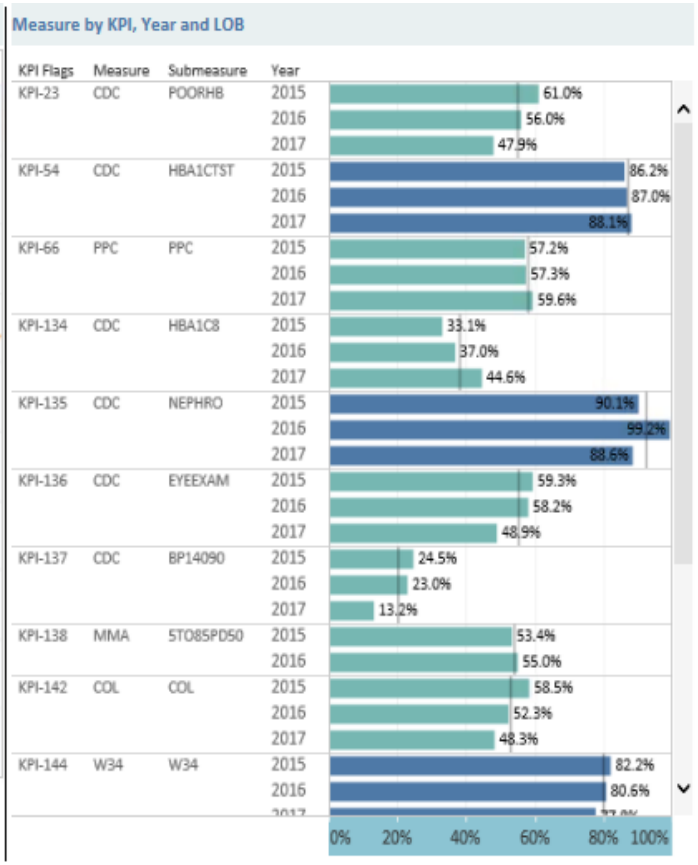
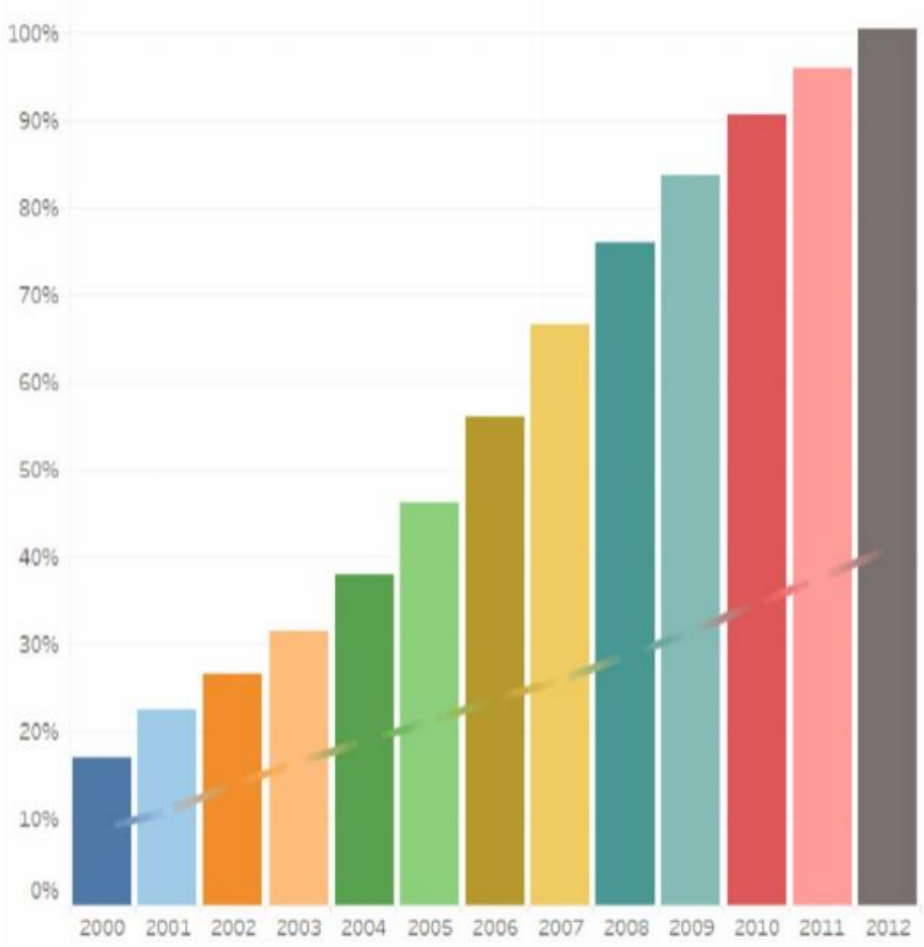
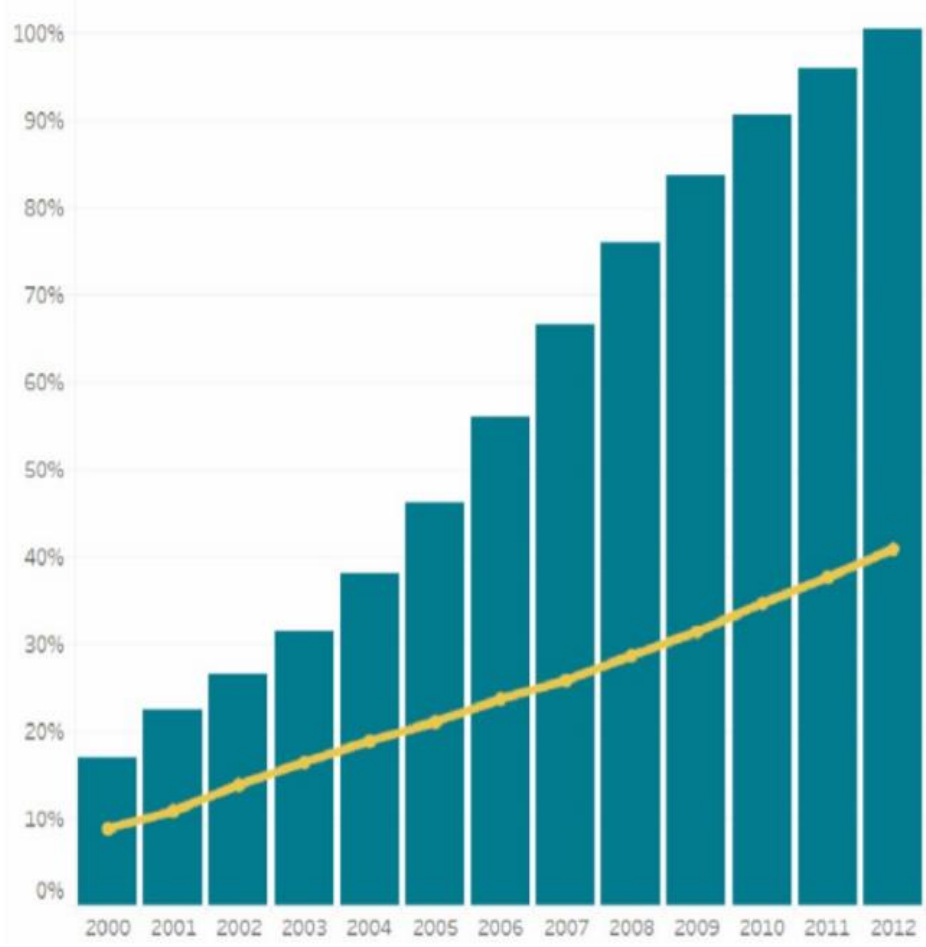




Design Form: *Color*

- Keep consistency; alter hues and intensity for distinctions or comparisons; do not use distracting colors (Figure from [5])

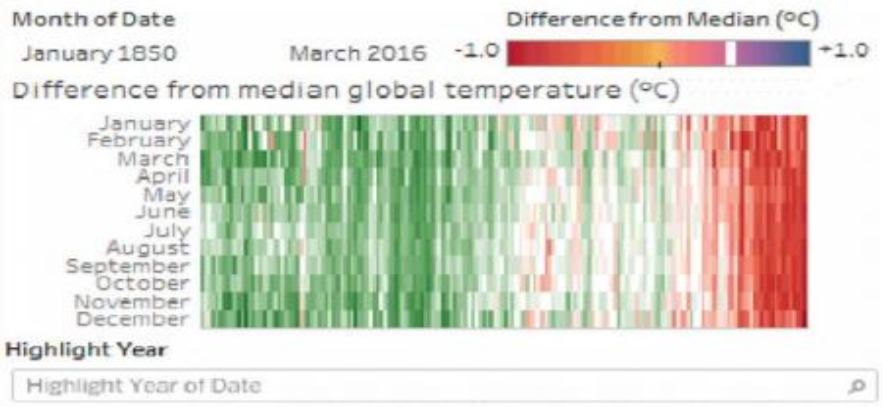


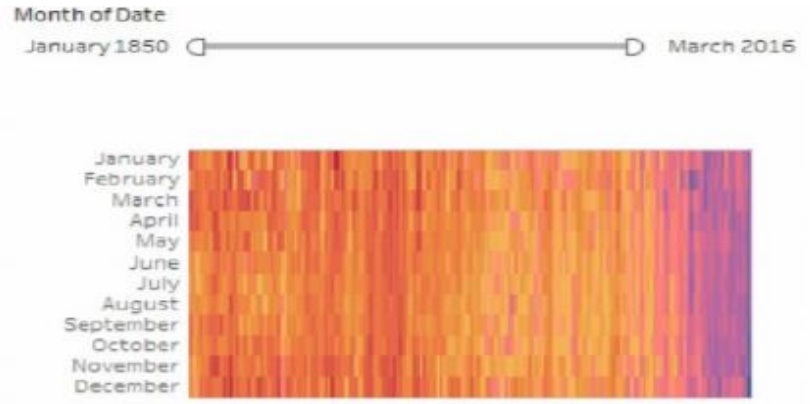


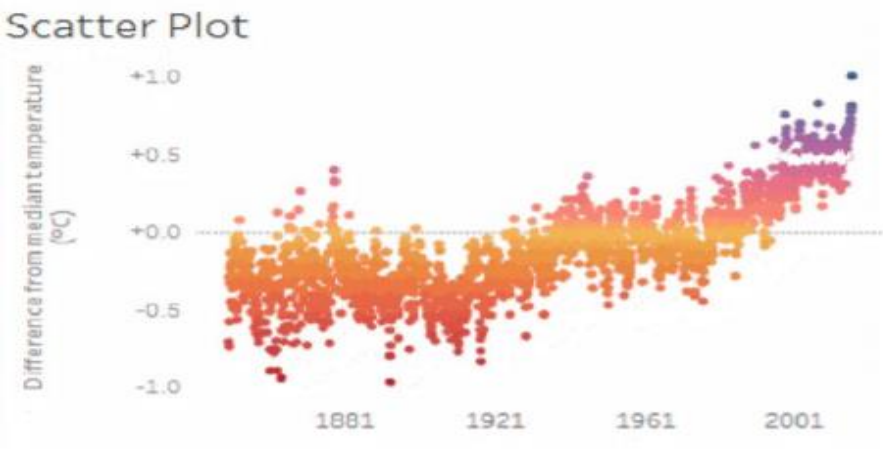
Design Form: *Color*

- Eliminate clutter, no more than two color palettes in one dashboard; avoid 3D

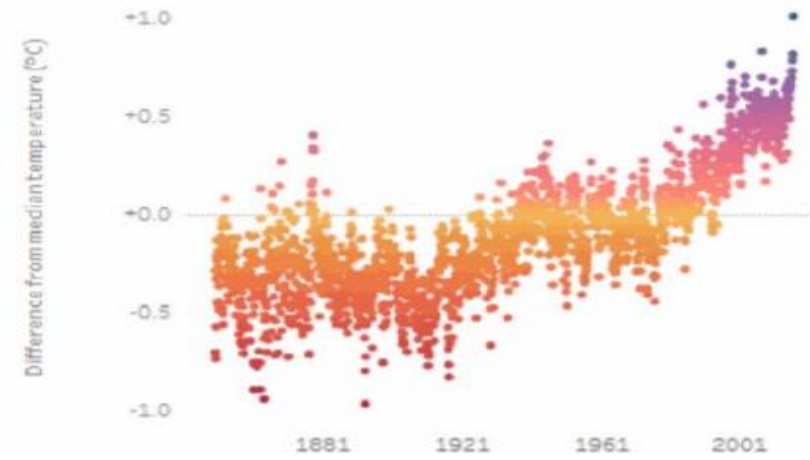
(Figure from [5])







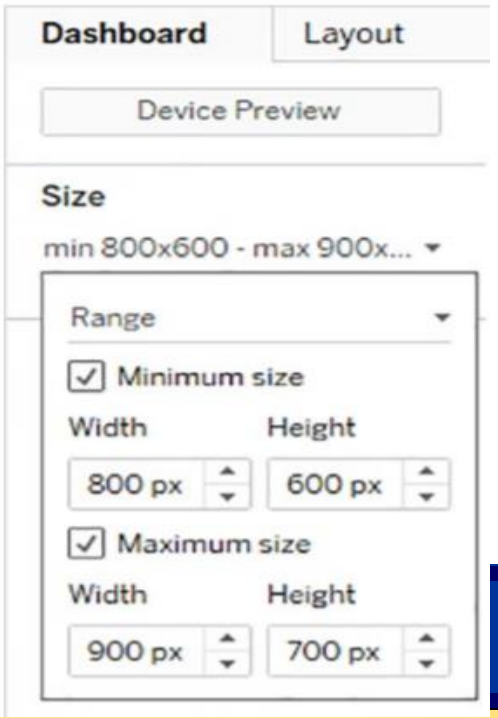
Before

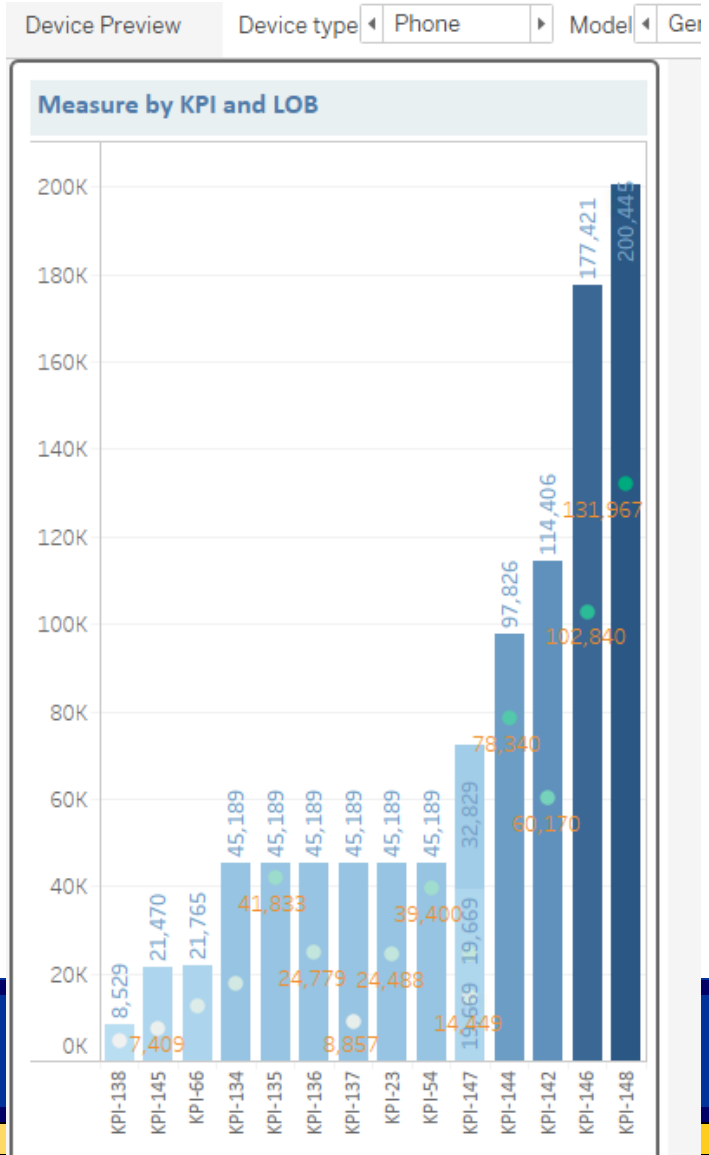


After

Design Form: *Display Size*

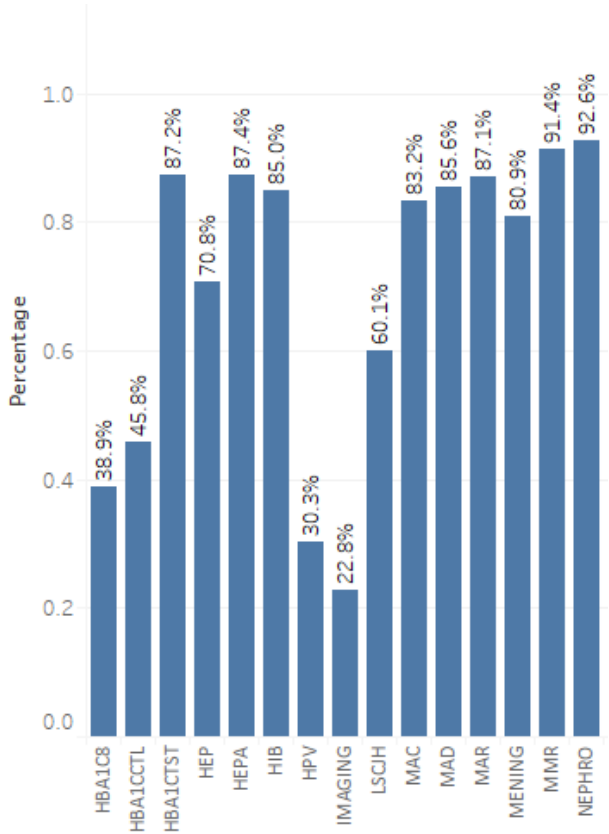
- Custom size
- Precision sizing with a range
- Automatic sizing
- Device designer

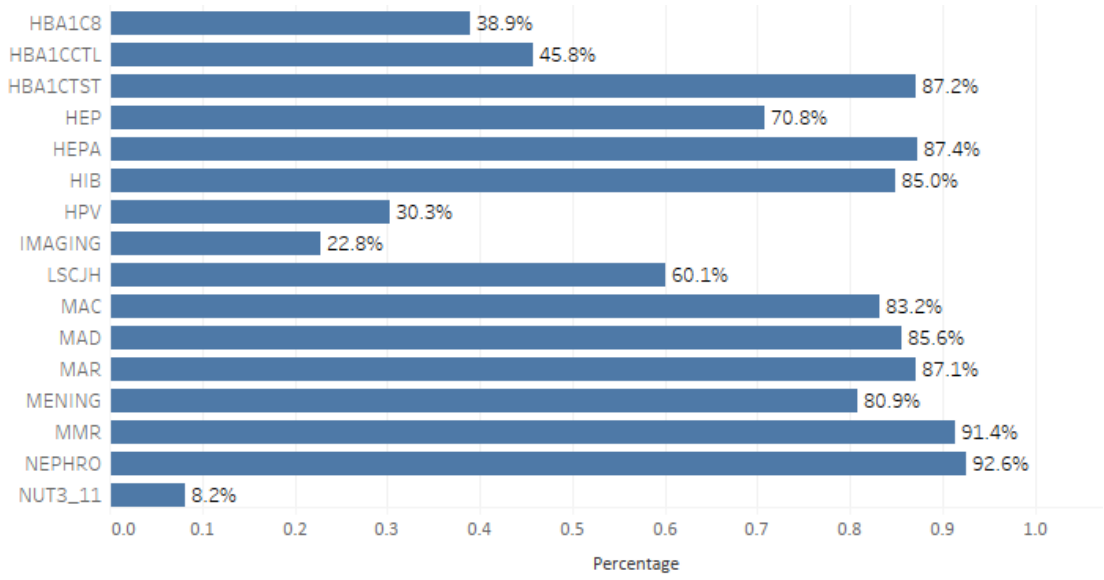




Design Form: *Display Style*

- Pilot dashboard prototypes to limited users





Design Function: *Encourage Exploration*

- Highlighting and Comparing
- Filtering

  (Tableau: extract filter, data source filter, context filter, dimension filter, measure filter, table calculation filter In [8])
- Sorting from axis, header or field label
- Re-visualization and Re-expression
- Zooming and Panning
- Bookmarking and Annotation

Design Function: *Encourage Exploration*

- E.g. color legend highlight or select marks to highlight for comparison

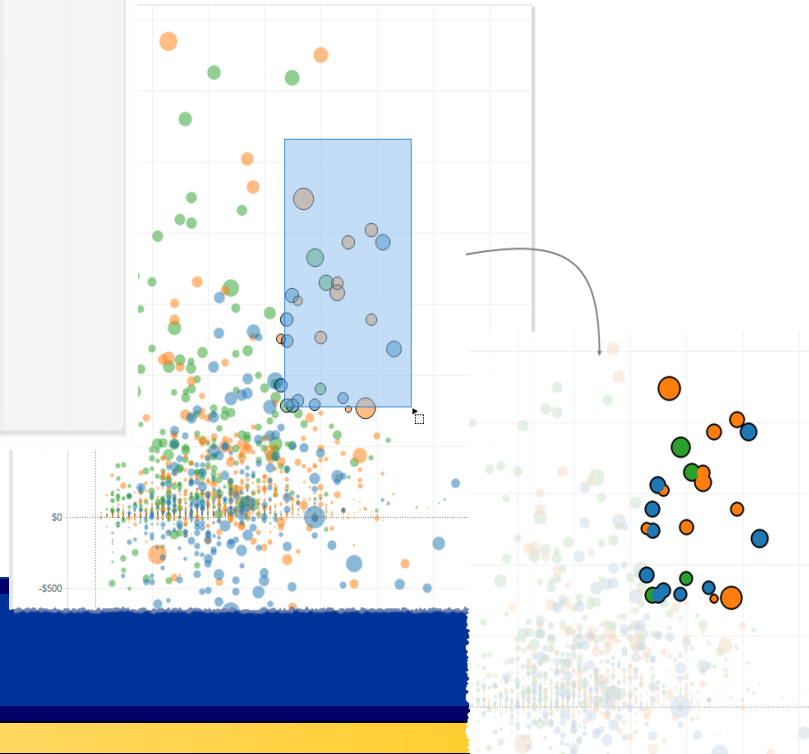
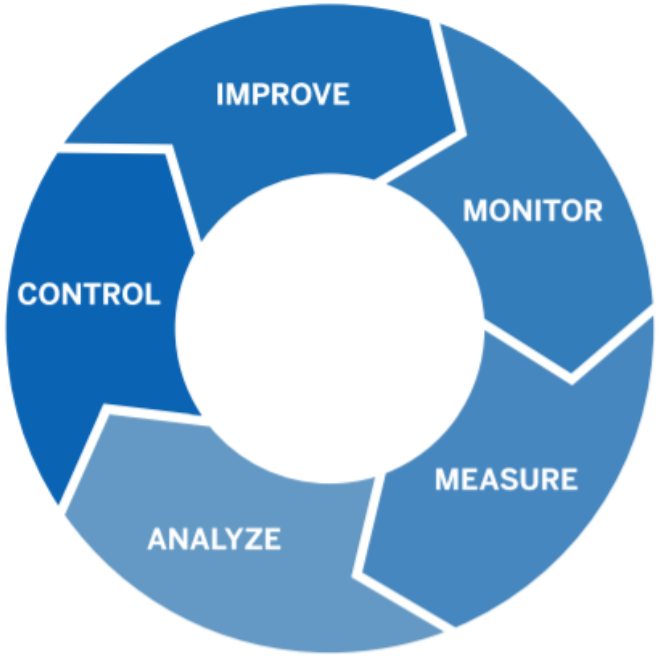


Fig. from [5]

Visualization Productivity

- You cannot fix what you cannot measure. Executives should roll out advanced analytics and embrace a five-part framework: monitor, measure, analyze, resolve, and improve.
- Instead of focusing on simple adoption metrics, leaders should focus on whether or not data and analytics are changing the way decisions are made throughout the organization



Ref. [6]

Visualization Productivity

- Use self-service in actionable visual analytics for the improvement of productivity and morale of the analytics staff

Piedmont Healthcare used to rely on some 2,400 excel spreadsheets that took nearly a month to deliver. Now a 23% improvement efficiency and savings of almost $650,000

Michigan Medicine saves over 5,000 hours on four different projects; eliminates 48 hours of work per week of 19 groups; accelerates a 4.5-hour process into a 4.5 second query; automates 85-92% of reconciliation process

Ref. [6]

Summary

- Traditional dashboards are not self-service. E.g. dashboard is created by IT, others cannot customize their needs, no personal alert, lack of user-friendly, no minimal user training; time- consuming

- A great dashboard's message and metrics are clear, color enhances meaning, and every bit of information you need is at your fingertips. It really comes down to thoughtful planning, informed design, and a critical eye for what stays and what goes

- Things to remember

– What story do you want to tell based on your data? Who is your audience or stakeholder? How will users consume this information? How will the results impact patient care or the institution? A chart is always more memorable than a table. Keep it simple, less is more. Design, do not decorate

Reference

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- [4] Tableau for Healthcare. By Wan-Jin Leu, Scientific Formosa, Inc. April 18, 2014 https://www.slideshare.net/KAMERA11901/tableau-for-healthcare-33886827
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Question?
Thank You!