

Introduction to dashboards

DASHBOARD DESIGN CONCEPTS



Olga Scrivner, PhD
President, Scrivner Solutions Inc

Transforming data into actionable insights

Turning **data** into **information**, and **information** into **actionable insights**

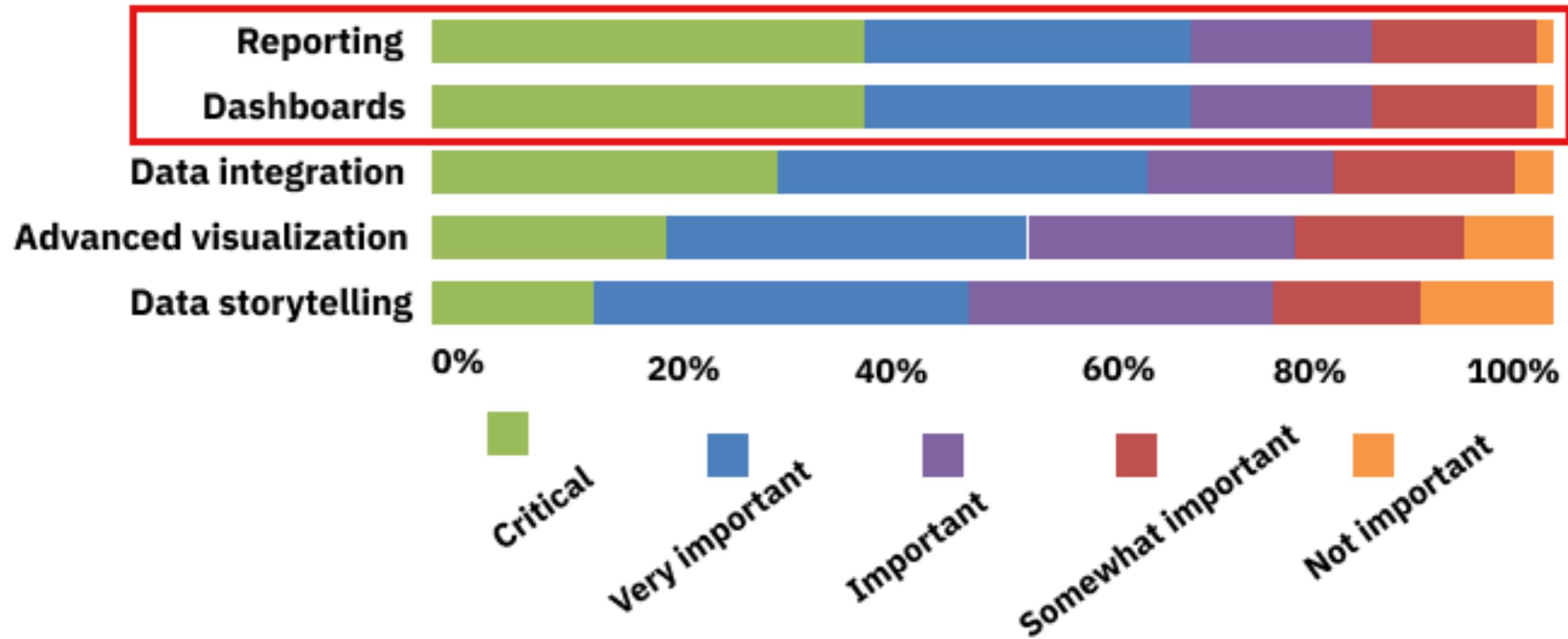
Analytics

The critical technology that brings value out of data

Visual Analytics

Values are translated into actionable insights

Visual analytics technologies

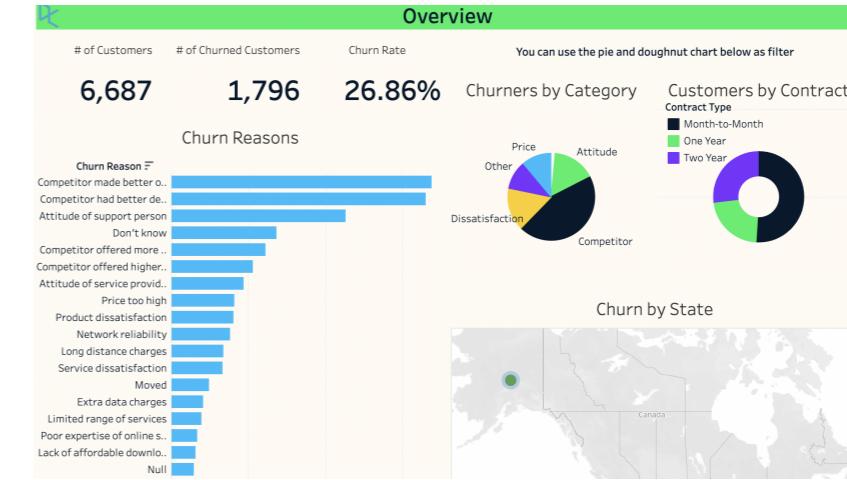


Reports versus dashboards

Report

Social Media	KPI 1	KPI 2	KPI 3
Impressions	526	829	1,231
Growth	-	58.21%	-31.31%
Accounts	112	253	422
Growth	-	125.89%	-35.35%

Dashboard



- Static snapshot in time
- Multiple pages
- Detailed historical data
- Tables and basic graphics
- Dynamic views
- Single page
- Actionable information
- Interactive graphics

Check the dashboard!

A visual display of the most important information needed to achieve one or more objectives, arranged on a single screen so the information can be monitored at a glance.¹



What's happening? What's happened? What's going to happen? Check the dashboard!²

¹ Few, S. 2004. Dashboard confusion. ²Marcus, A. 2006. Dashboards in your future.

What is an actionable dashboard?

Actionable dashboard informs business decisions



Including the right KPIs



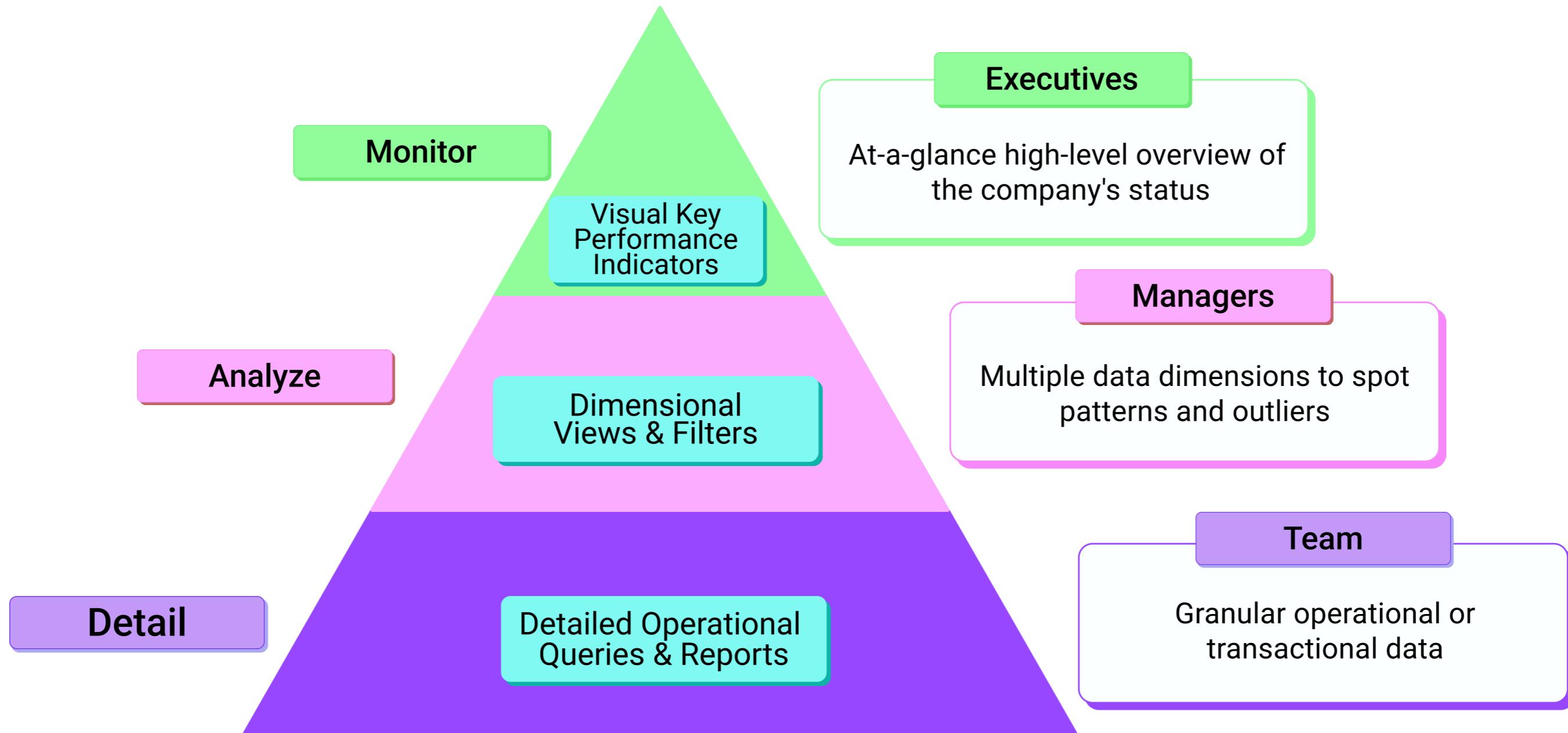
Providing accurate information



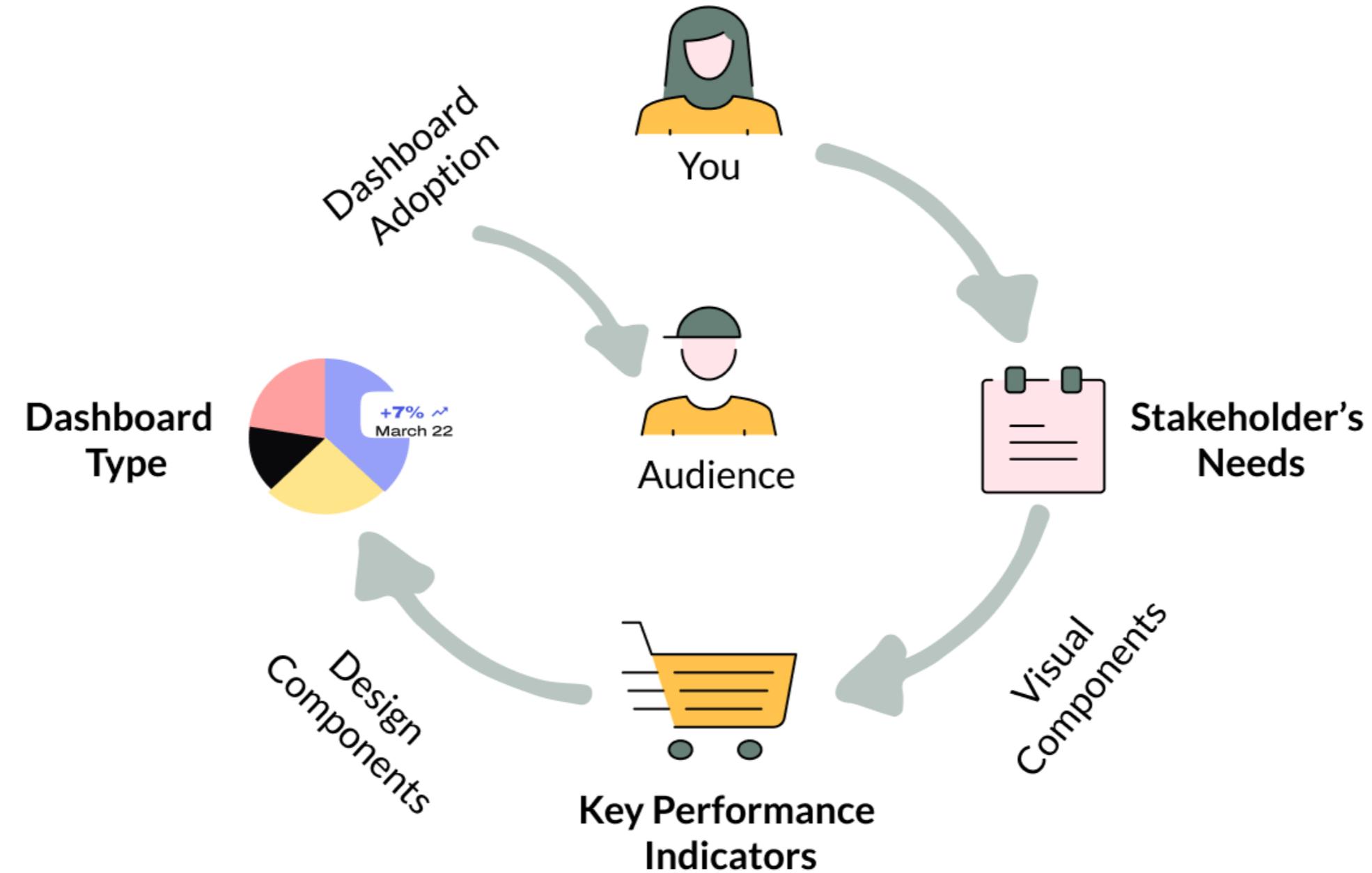
Defining the right audience

¹ Mellisa King. (2022). How to Create Actionable Dashboards: 5 Best Practices.

The MAD framework: monitor-analyze-detail



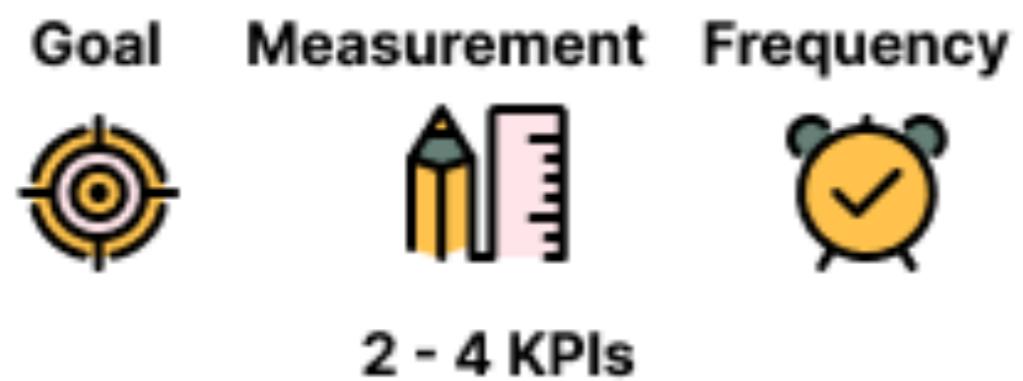
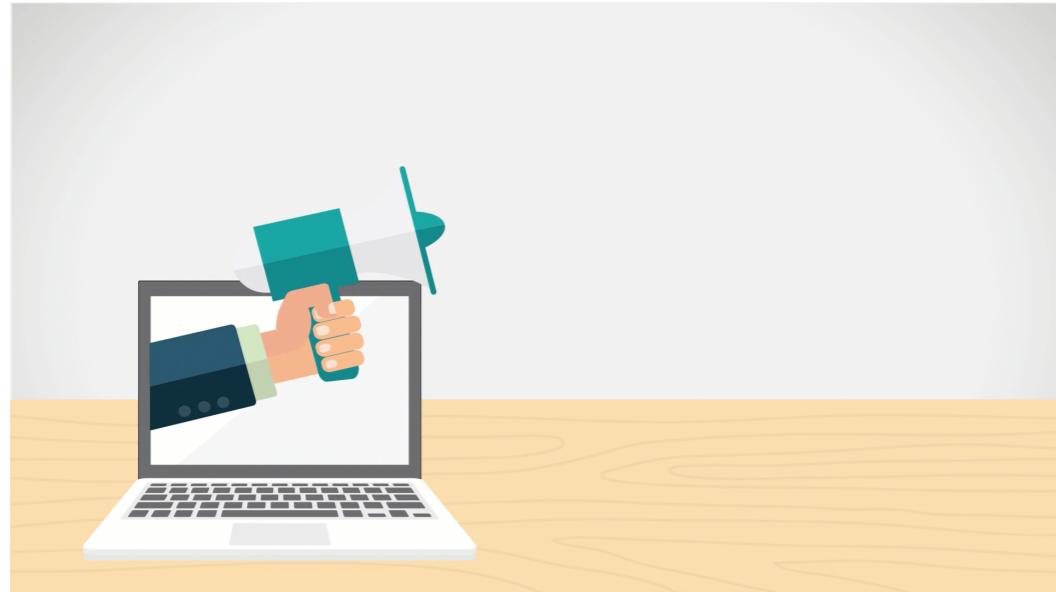
Course overview



What are key performance indicators?

"If you can't measure it, you can't manage it"

Key performance indicators

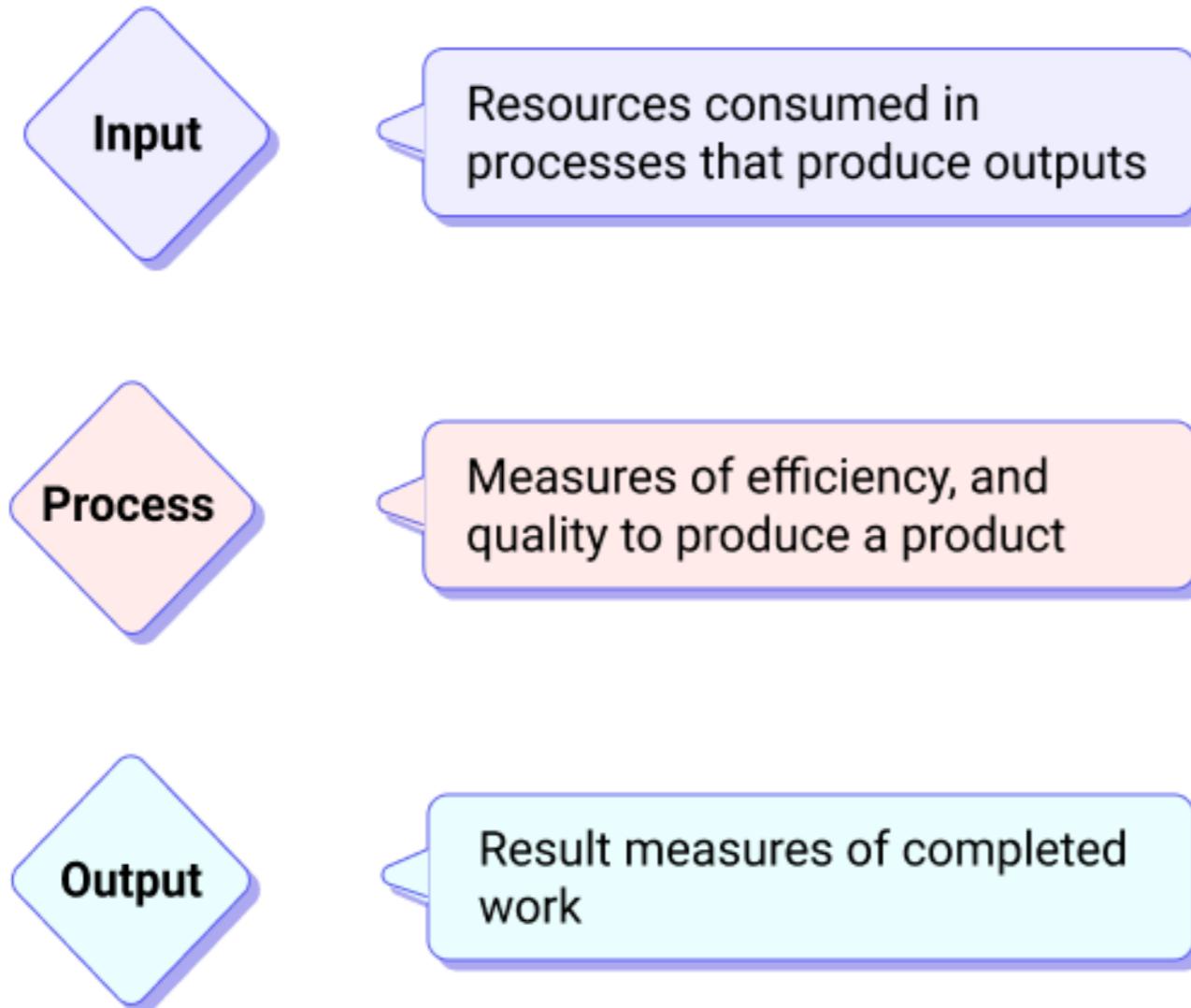


- Monitor the company's health
- Track progress against business goals
- Inform strategic and day-to-day decision making
- Highlight areas that need attention
- Provide a basis for strategic and operational improvement

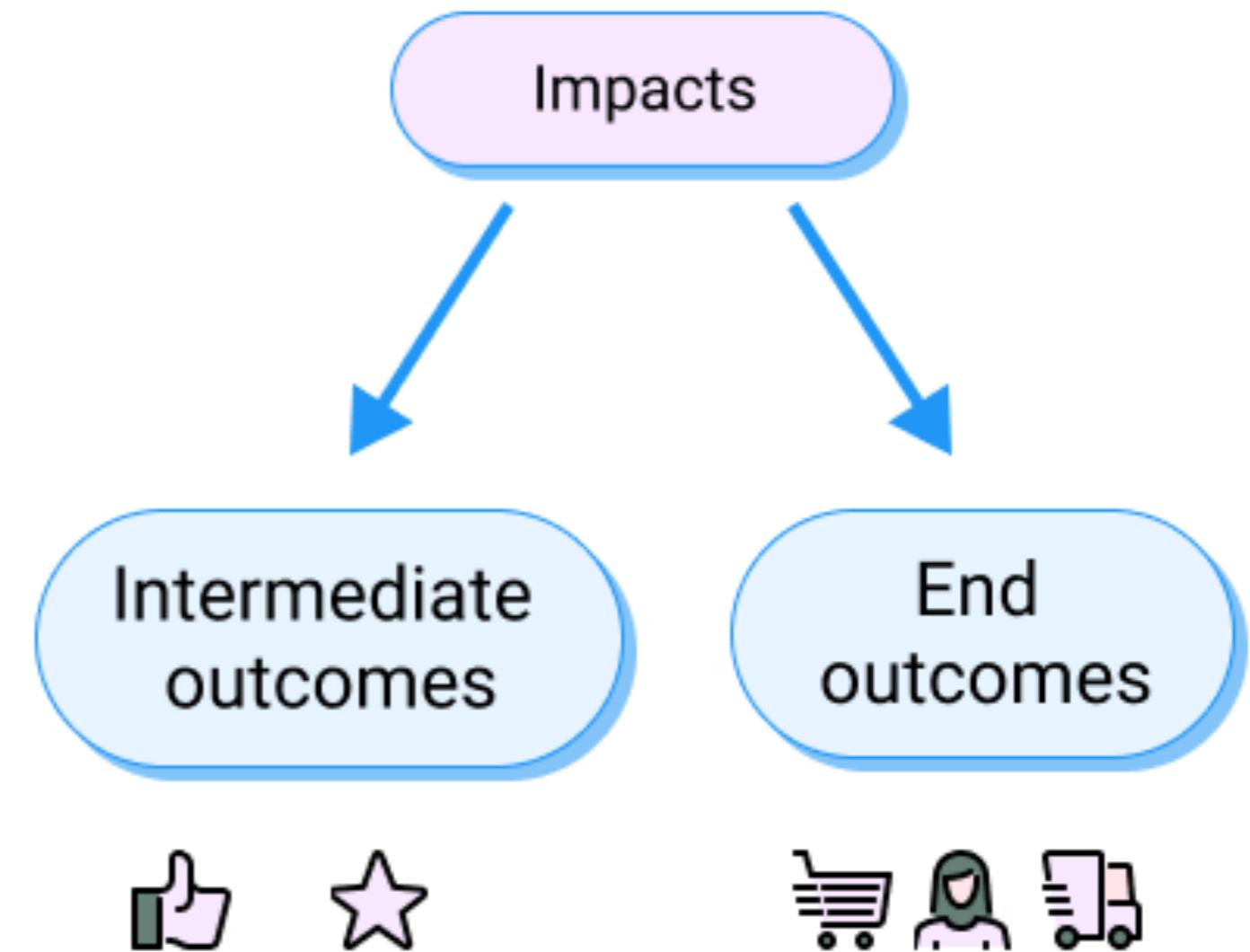
¹ Smith, Bernie. (2022). Made to measure KPIs.

KPIs measurements and types

Operational measurements



Strategic impact measurements



¹ Wilsey, David. (2017). Types of KPIs: The logic model and beyond.

Are you leading or lagging?



- ***Where your business has been***
- **Outcomes** (output metrics)
- **High-level metrics** (revenue)
- Example: sales revenue

- ***Where your business is going***
- **Progress** (input metrics)
- **Faster feedback**
- Example: number of calls per sale rep



¹ Watts, Stephen. (2019) "Leading vs. Lagging Indicators: What's the Difference?"

Objectives and key results (OKRs)

Objectives: significant/defined goal + **Key Results:** measurable success criteria to track goals



¹ Maasik, Alexander. 2021. Step-by-step guide to OKRs. Weekdone.

Goals: be S.M.A.R.T. or even S.M.A.R.T.E.R.

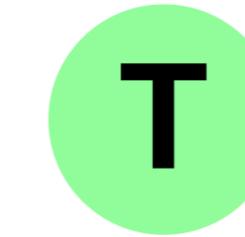
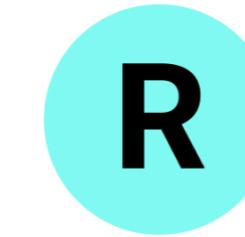
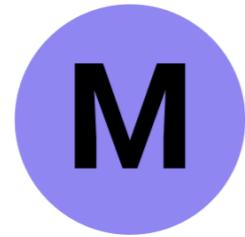
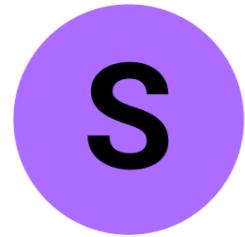
There's a S.M.A.R.T way to write management's' goals and objectives¹



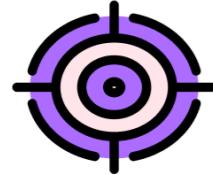
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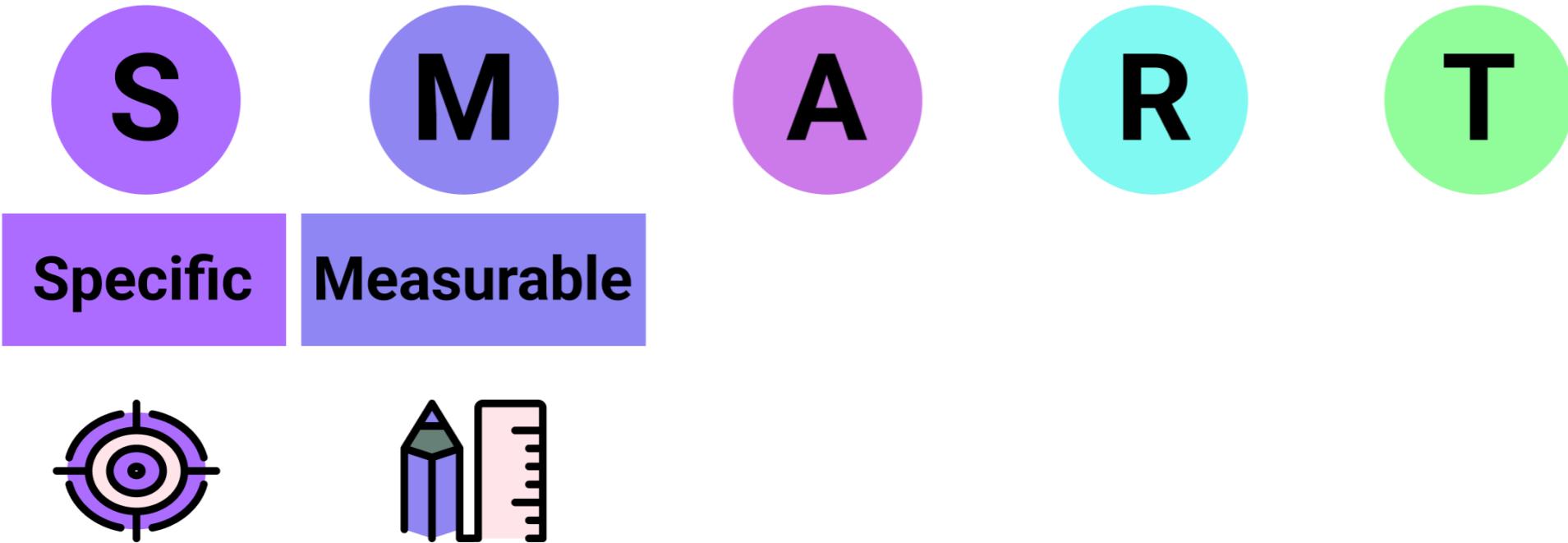
Specific



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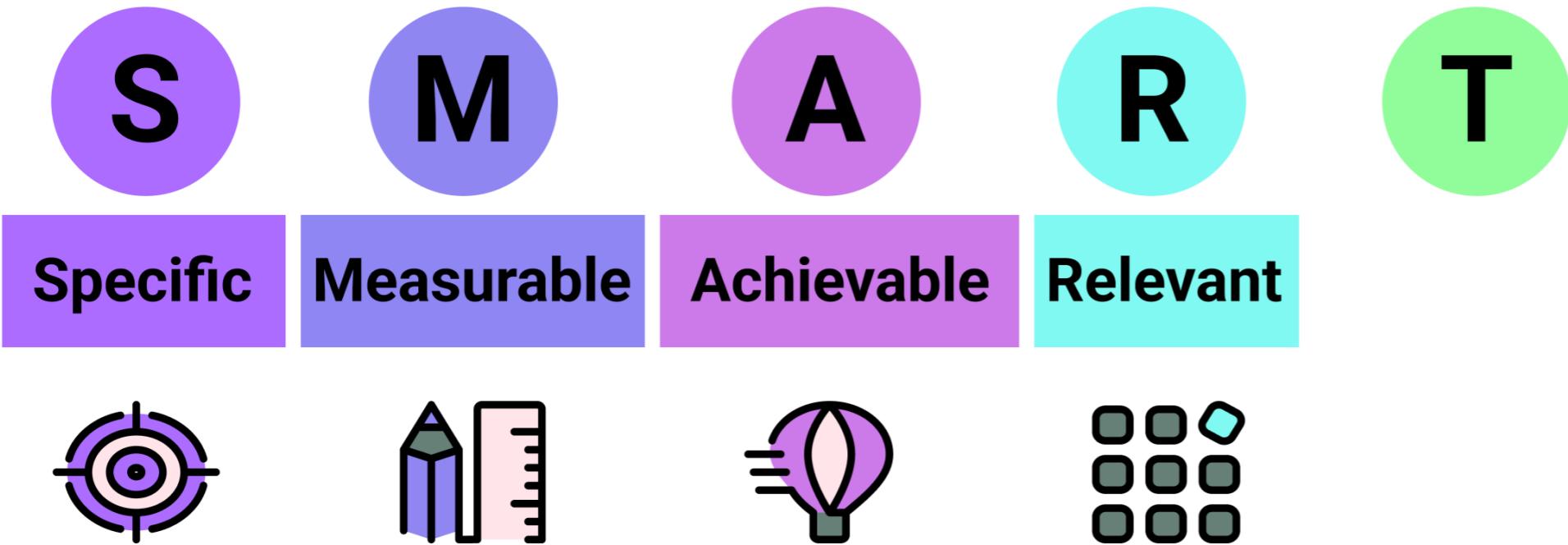
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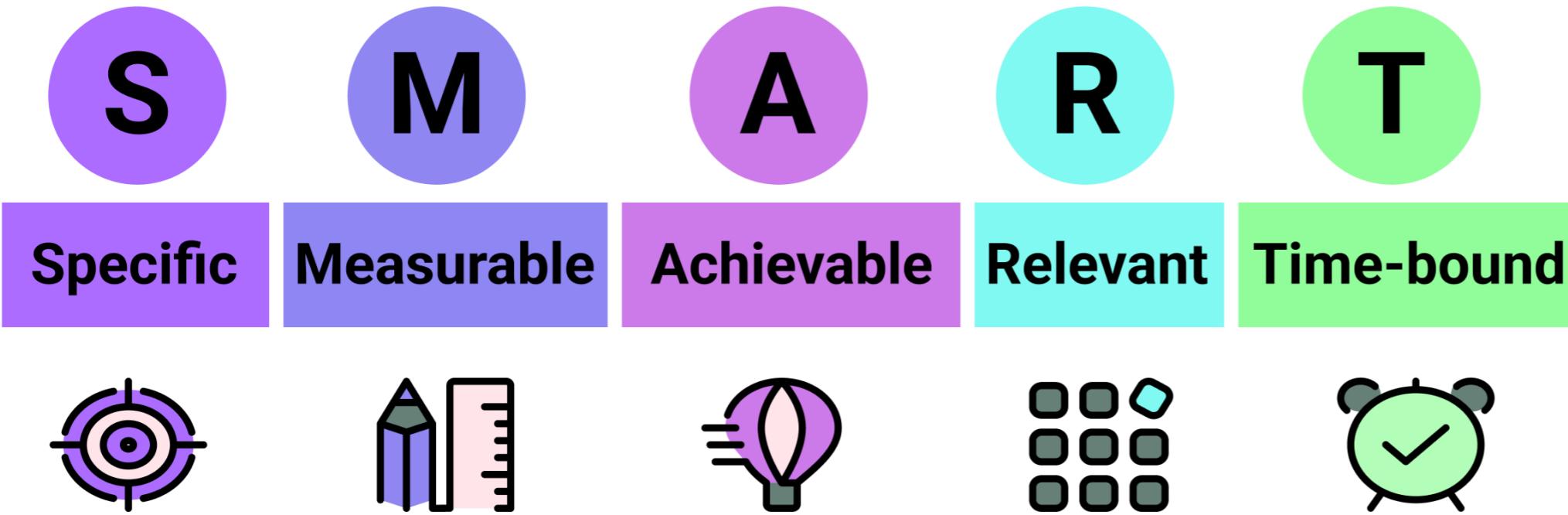
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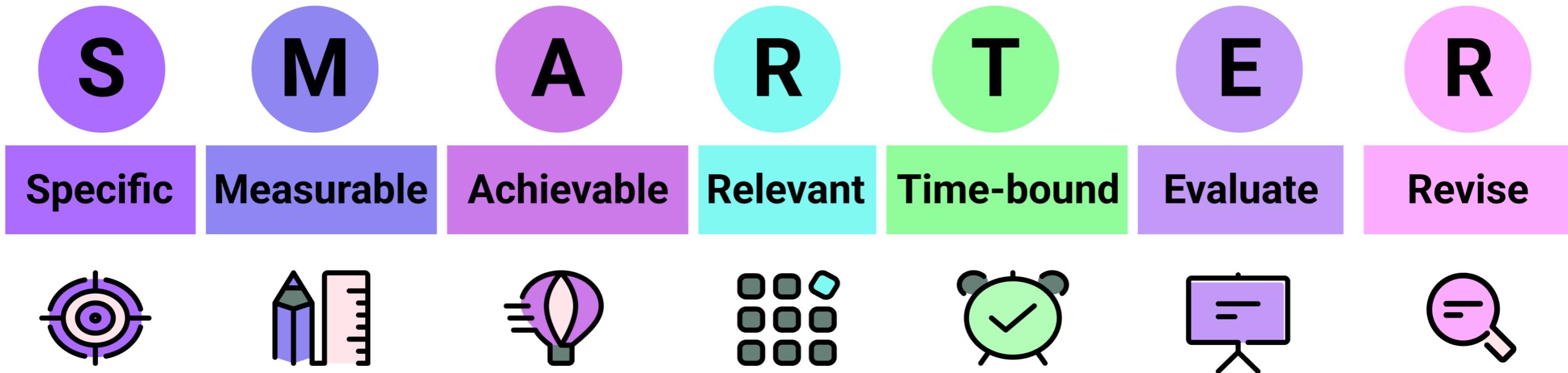
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Dashboard design stages

Define

Who the dashboard is for and what metrics are critical

¹ Davis, Matt. (2021). Identifying Key Roles.

Dashboard design stages

Define

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Prototype

How to display critical metrics

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Dashboard design stages

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How to display critical metrics

Build

Adding real data to the dashboard

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Dashboard design stages

Define

Who the dashboard is for and what metrics are critical

Prototype

How to display critical metrics

Build

Adding real data to the dashboard

Deploy

Sharing the dashboard with audience

¹ Davis, Matt. (2021). Identifying Key Roles.

Conducting an interview with stakeholders

Question 1

Why do you need a dashboard?
What do you hope to achieve?

¹ Kalaivanan, Prague. How Understanding Stakeholders Increases Dashboard Effectiveness.

Conducting an interview with stakeholders

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Why do you need a dashboard?
What do you hope to achieve?

Question 2

What are the essential KPIs needed
to make the dashboard effective?

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Conducting an interview with stakeholders

Question 1

Why do you need a dashboard?
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Question 2

What are the essential KPIs needed
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Question 3

Where and how will
the dashboard be used?

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Conducting an interview with stakeholders

Question 1

Why do you need a dashboard?
What do you hope to achieve?

Question 2

What are the essential KPIs needed
to make the dashboard effective?

Question 3

Where and how will
the dashboard be used?

Question 4

What are the company's strategic
objectives?

¹ Kalaivanan, Prague. How Understanding Stakeholders Increases Dashboard Effectiveness.

Design components

Audience

- Who will be using this dashboard?
- What are their needs?
- What format is suitable for the audience?
- How often will it be accessed?



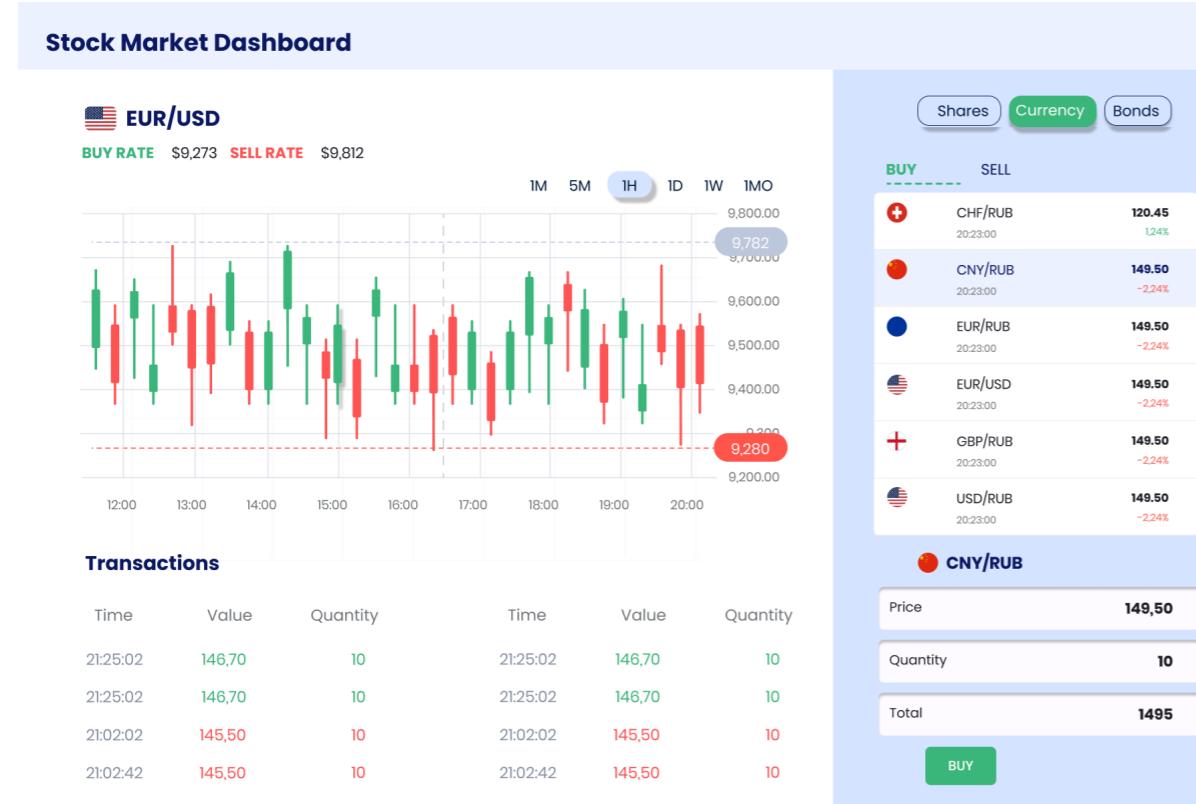
Components

- **Purpose:** exploratory versus explanatory
- **Format:** horizontal versus vertical
- **Layout:** grid versus flex
- **Visuals:** values, dimensions, shapes



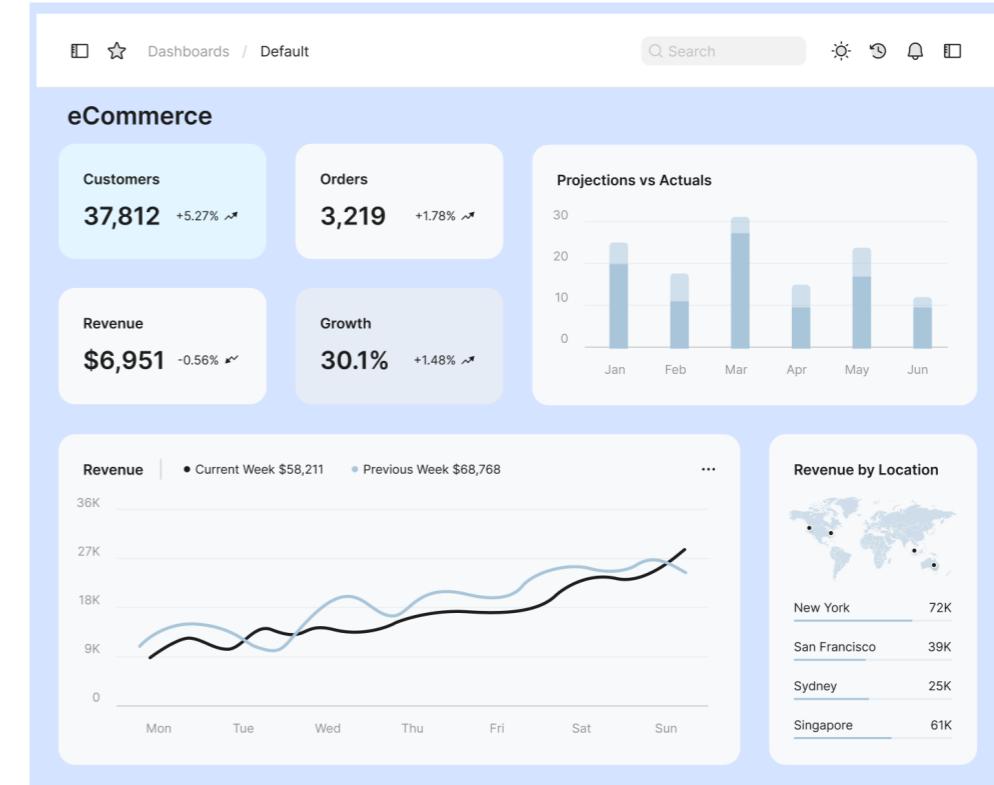
Dashboard purpose

Exploratory dashboard



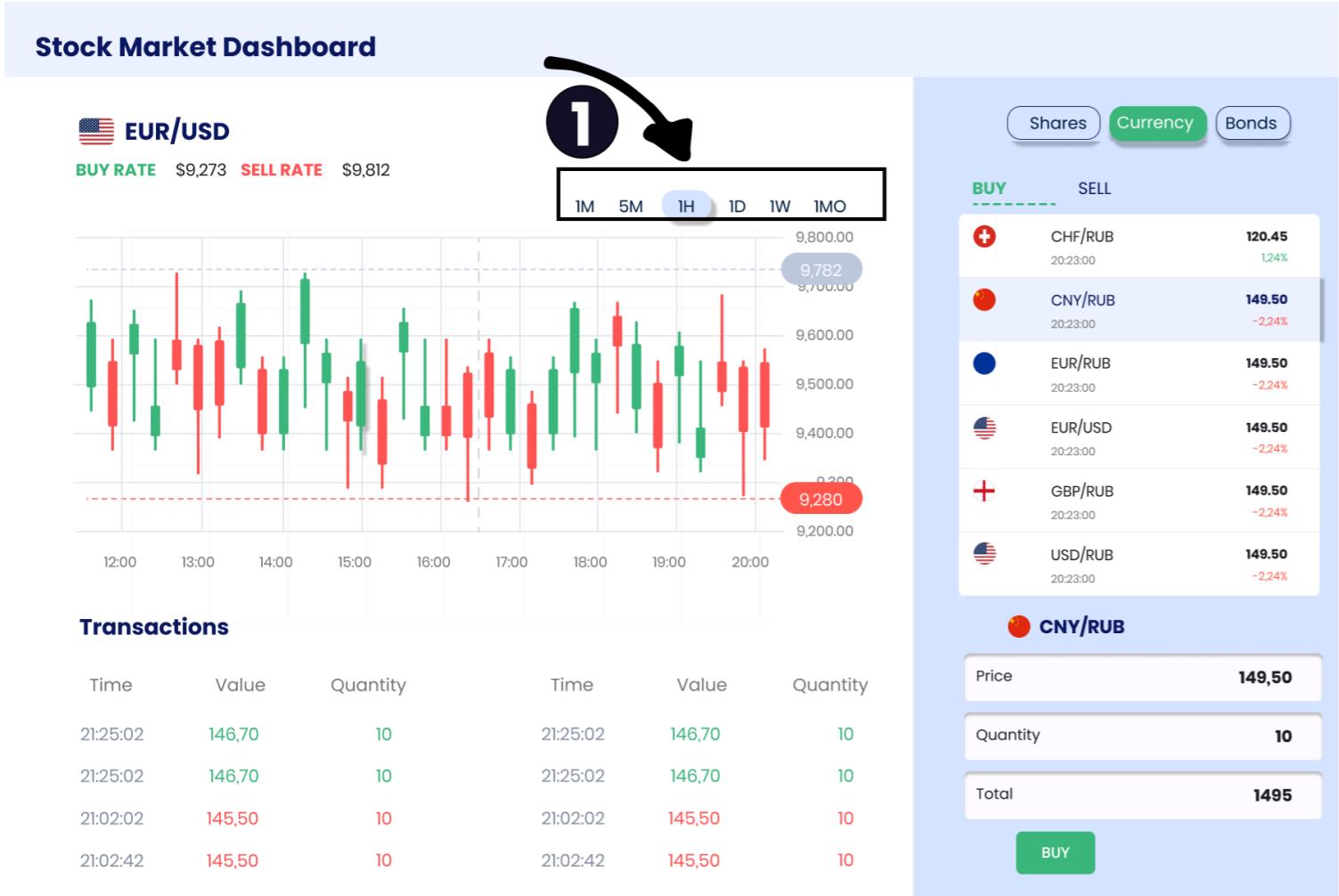
An exploratory dashboard allows users to explore data.

Explanatory dashboard



An explanatory dashboard provides users with predefined insights.

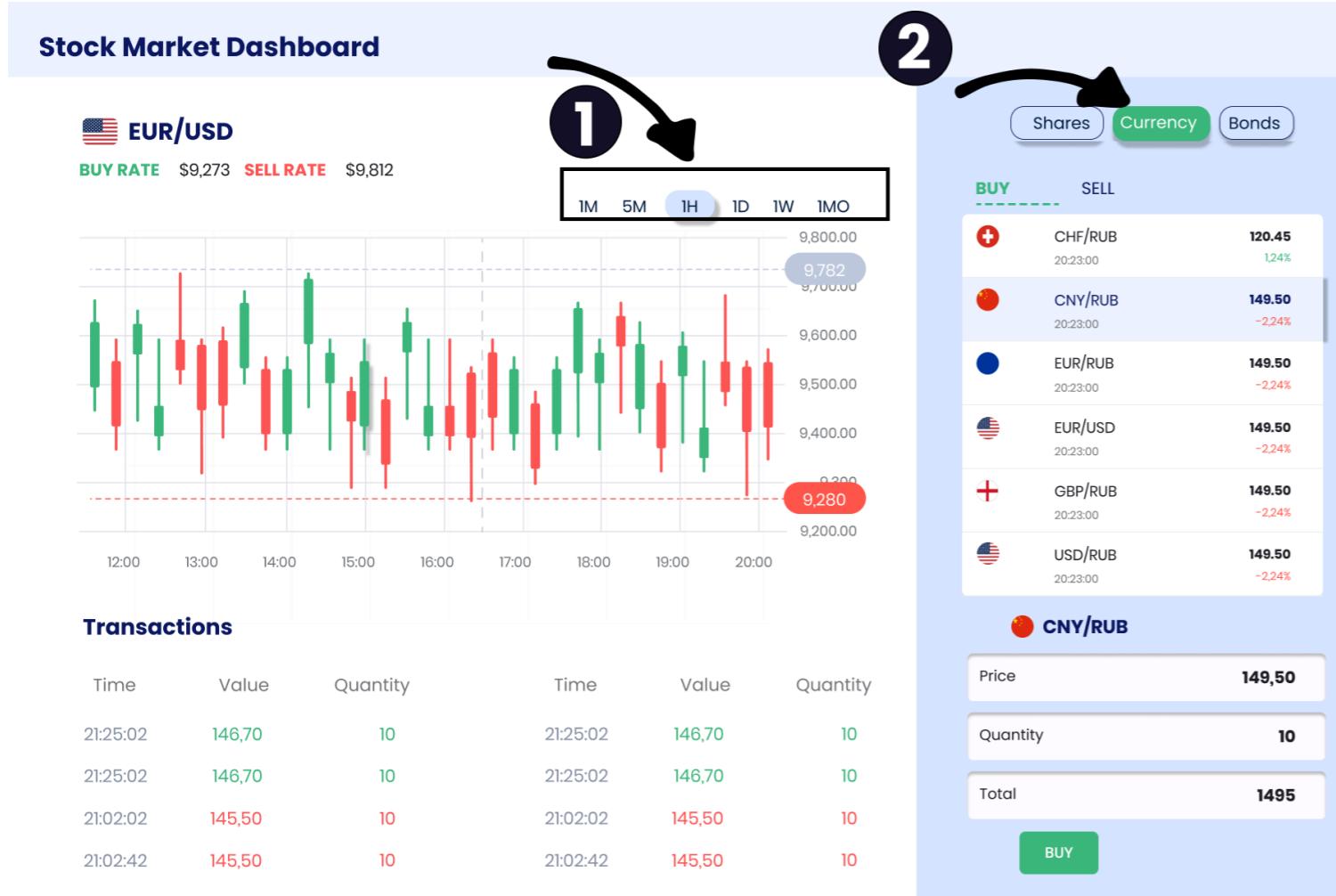
Exploratory dashboard



- Filters for custom data segmentation

¹ Baucke, Spencer. (2022). Dashboard design essentials.

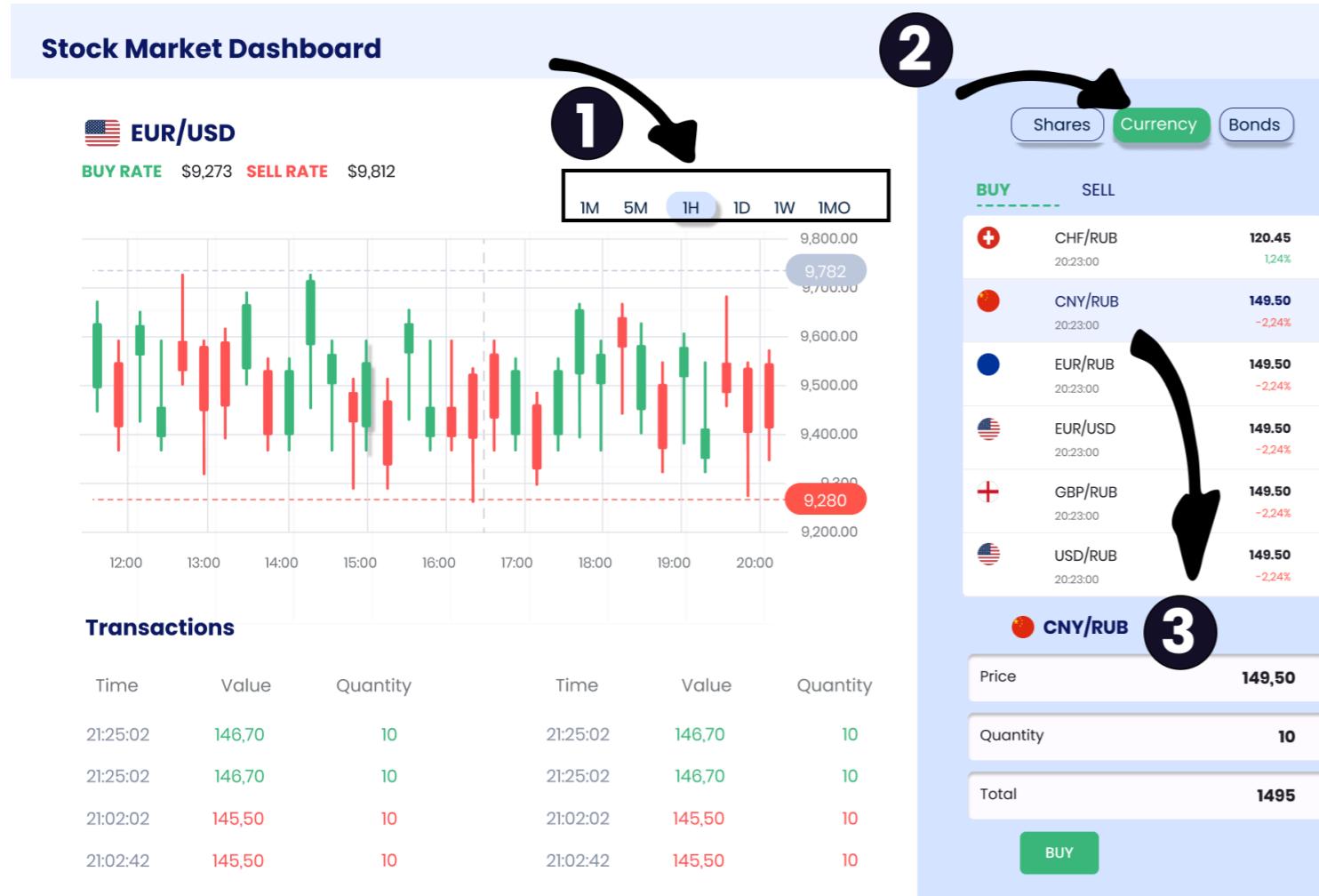
Exploratory dashboard



- Filters for custom data segmentation
- Customizable navigation panels

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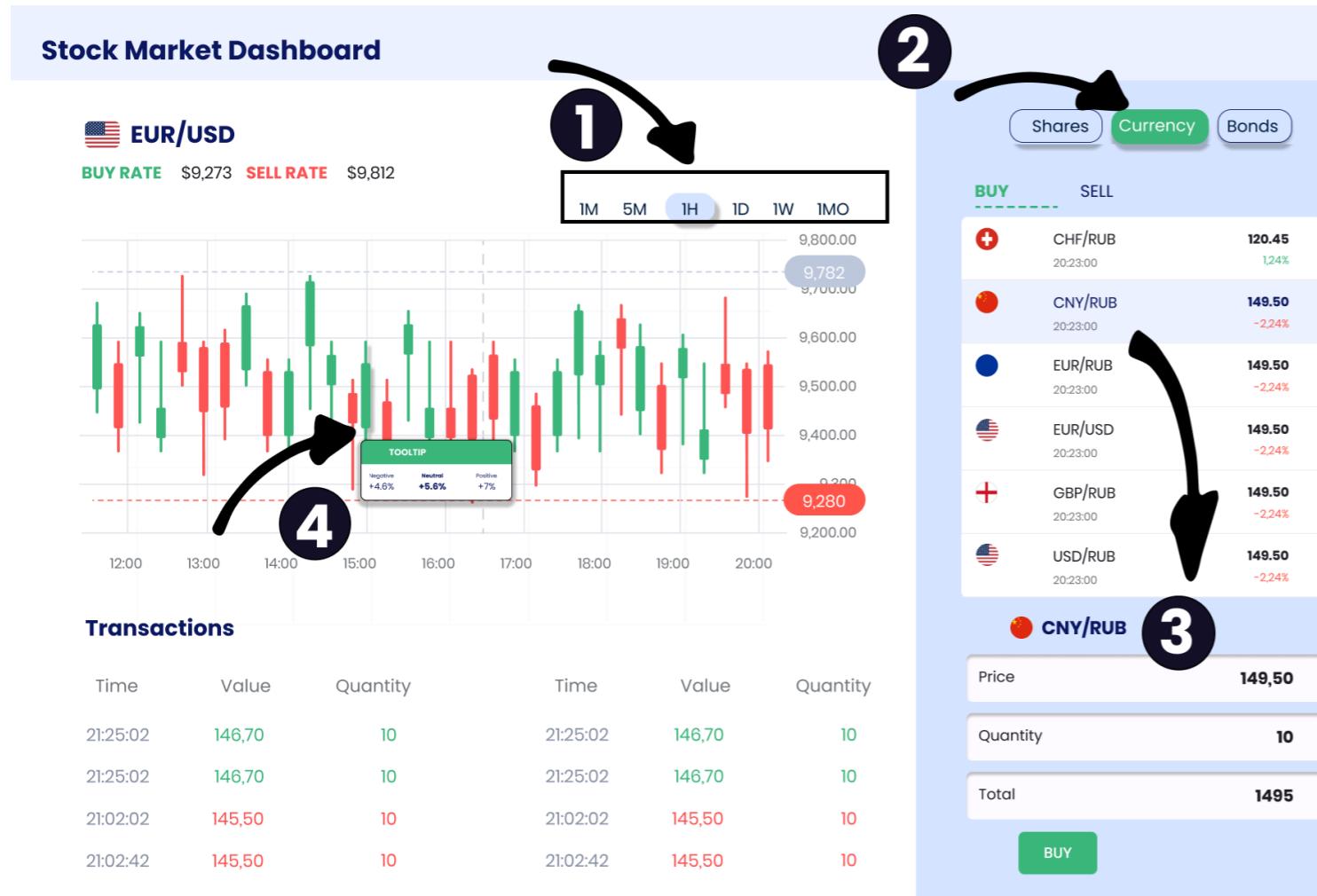
Exploratory dashboard



- Filters for custom data segmentation
- Customizable navigation panels
- Drill-down for more granular view

¹ Baucke, Spencer. (2022). Dashboard design essentials.

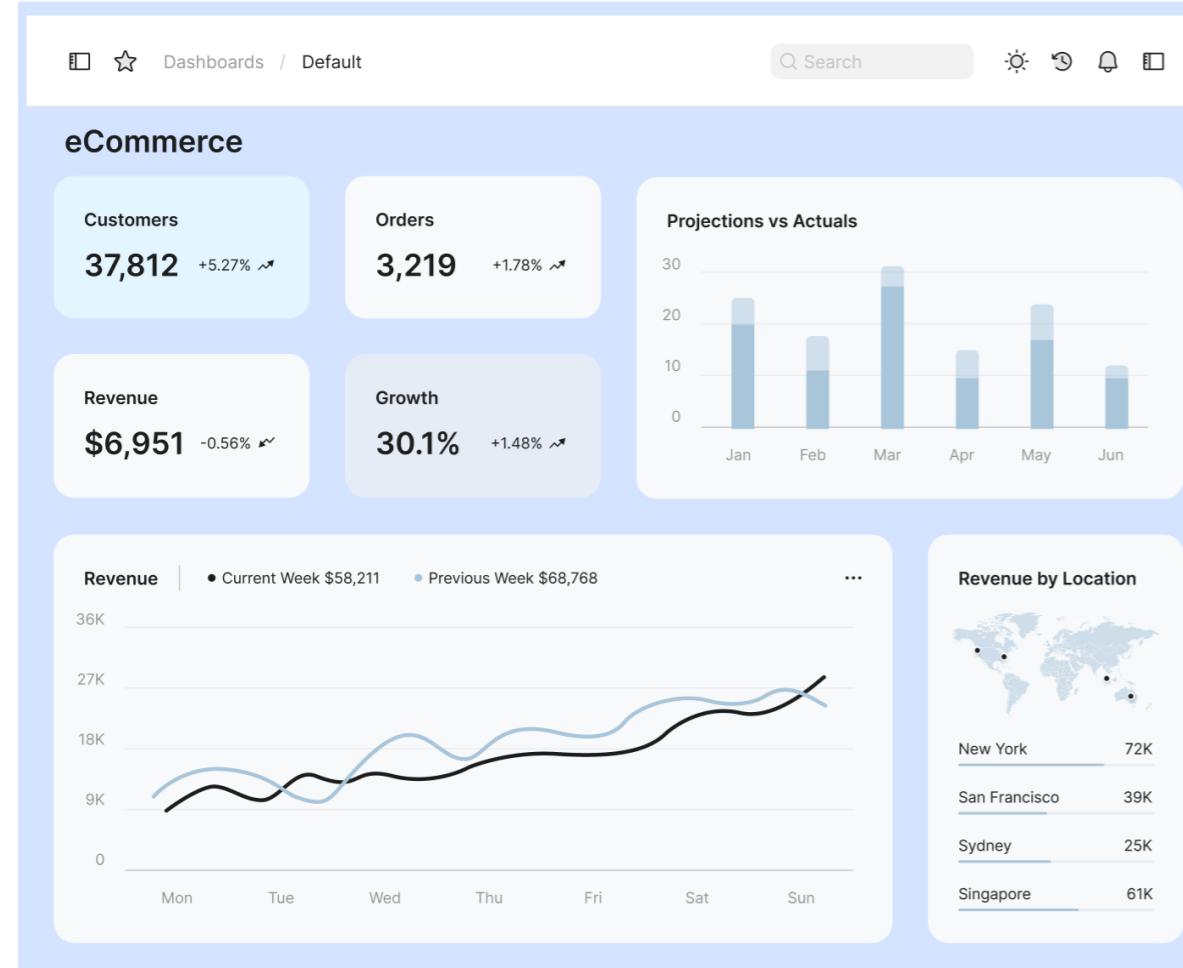
Exploratory dashboard



- Filters for custom data segmentation
- Customizable navigation panels
- Drill-down for more granular view
- Interactive visuals (hover-over, tooltips)

¹ Baucke, Spencer. (2022). Dashboard design essentials.

Explanatory dashboard



- Data is often already filtered
- Predefined storyline
- Presentation to executives
- A call for action

¹ Baucke, Spencer. (2022). Dashboard design essentials.

Dashboard size

Physical space

- Monitor size - a diagonal screen distance

Desktop, laptop, tablet, mobile devices



Dashboard size

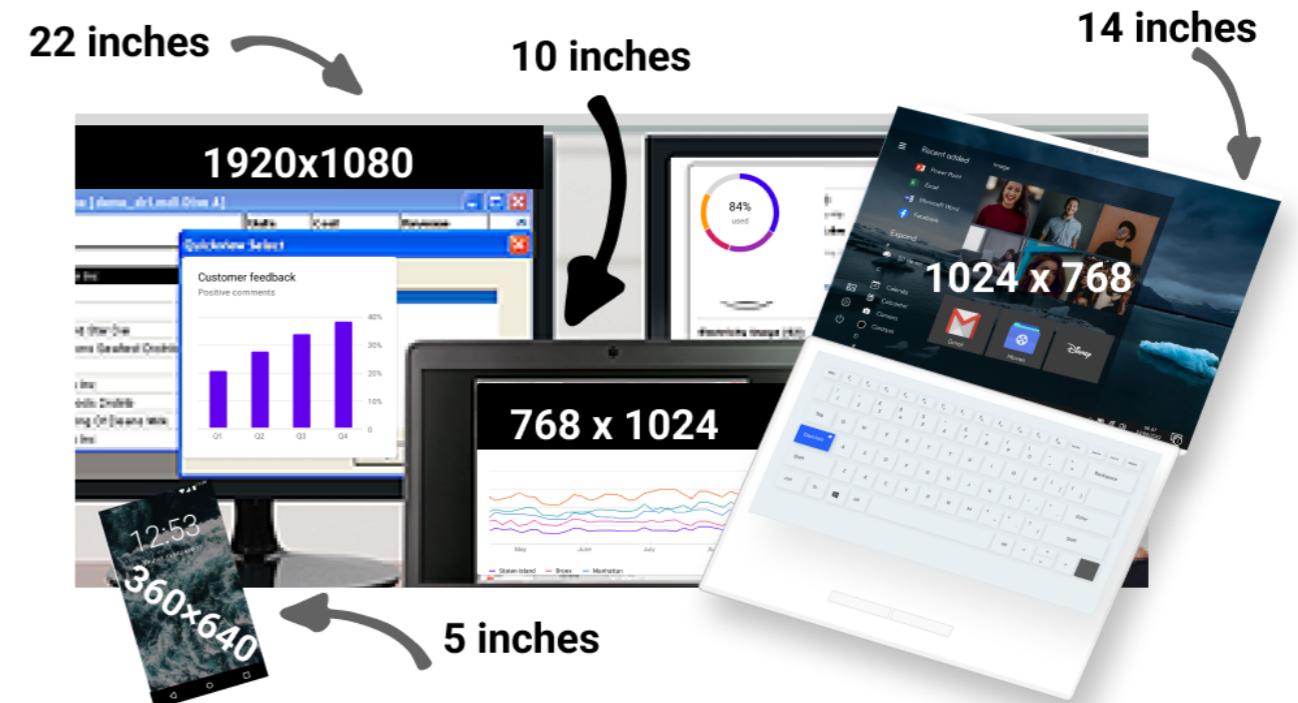
Physical space

- **Monitor size** - a diagonal screen distance
- **Screen resolution** - the number of pixels and their density (width x height)

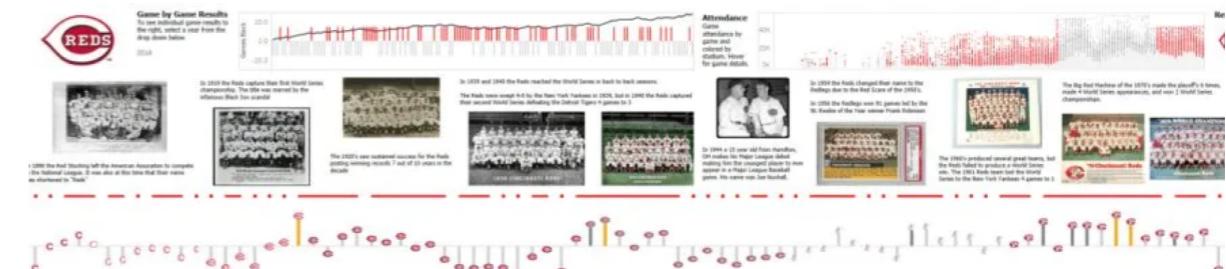
Format

- Standard format - a rectangular dashboard
 - Ratio - 16:9 ratio
 - All components visible on a screen
 - No scrolling
- Long format - horizontal or vertical

Desktop, laptop, tablet, mobile devices



Horizontal (timeline style)



Dashboard size

Physical space

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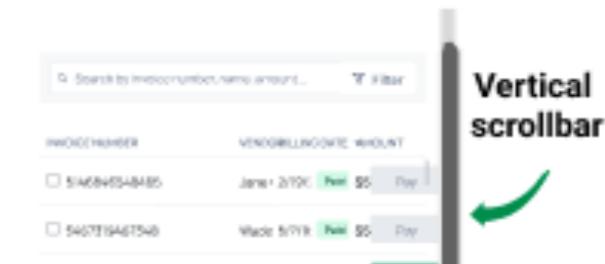
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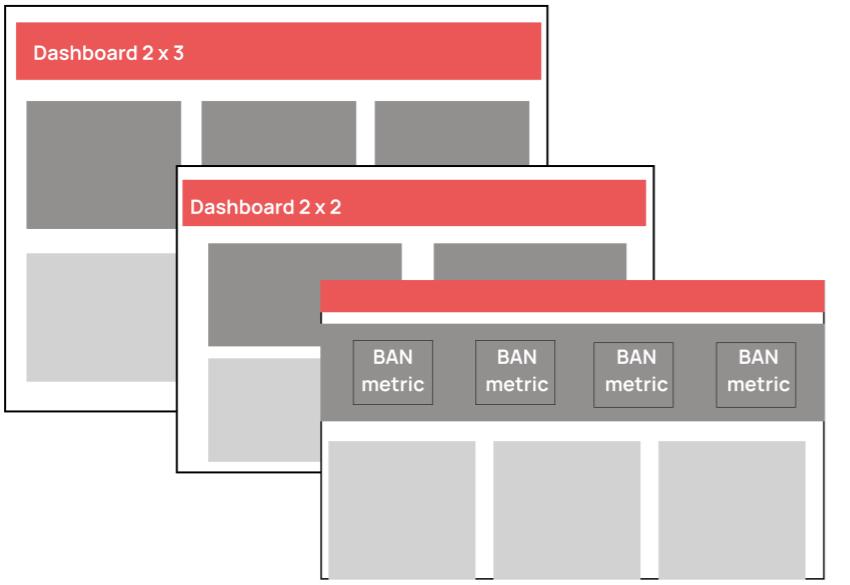


Vertical (newspaper column style)



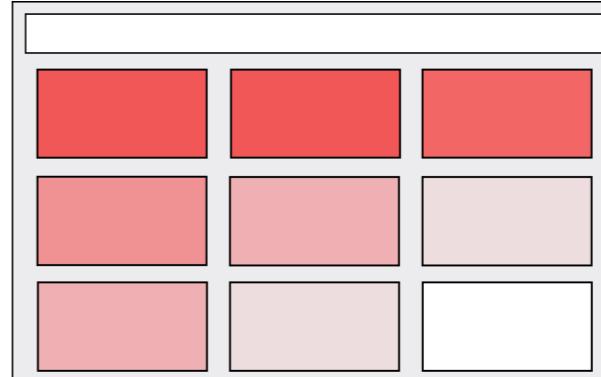
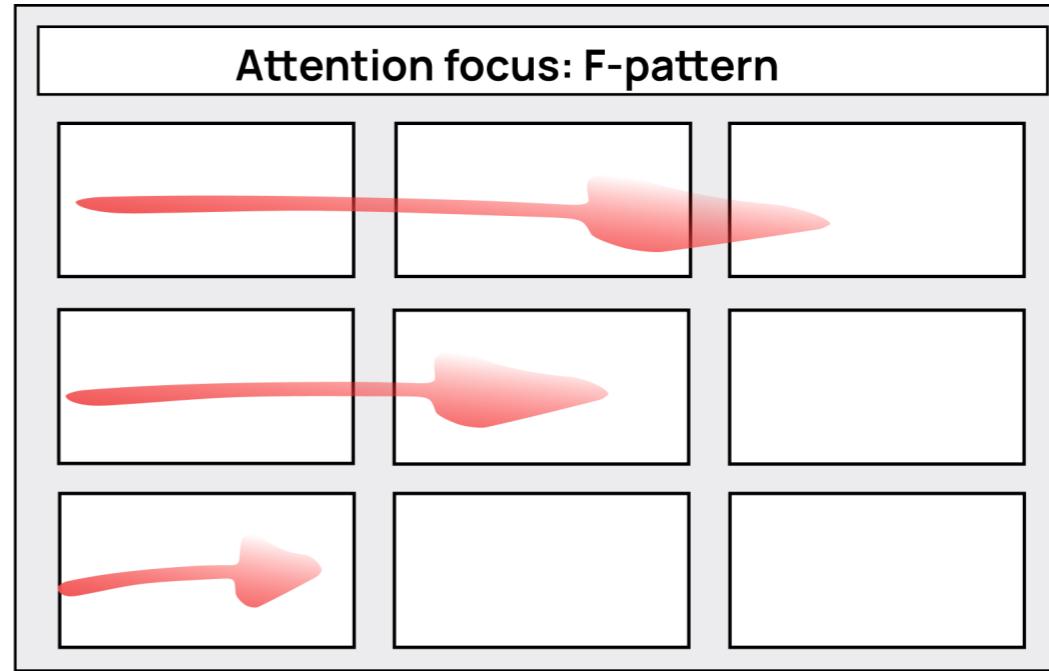
Dashboard layout

Grid system



- Two-dimensional matrix
- Balanced and symmetrical
- Simple navigation
- Big Aggregate Numbers (BAN) - top row

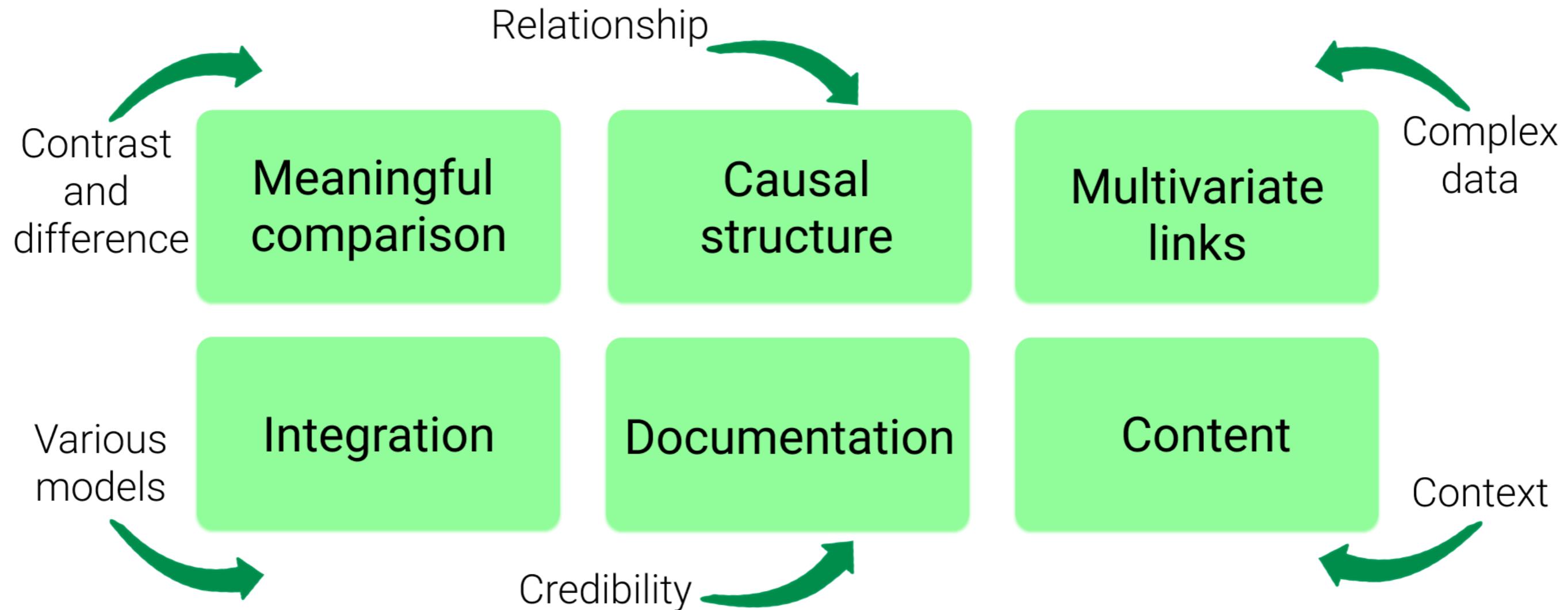
Focus



¹ Baucke, Spencer. (2022). Dashboard design essentials.

Fundamental principles of visual analytics

Principles of visual analytics are universal (Edward Tufte 2006)

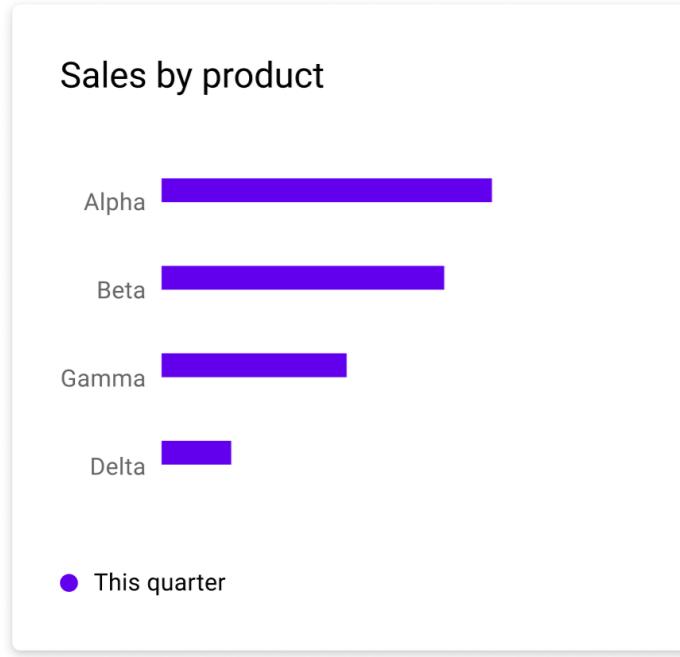


¹ Thomas, James & Cook, Kristin. (2006). A visual analytics agenda.

Comparison and contrast

Show comparisons, contrasts, differences

"Compared to what?"



Time comparison

Comparison of **different components**

Comparison between **different groups**

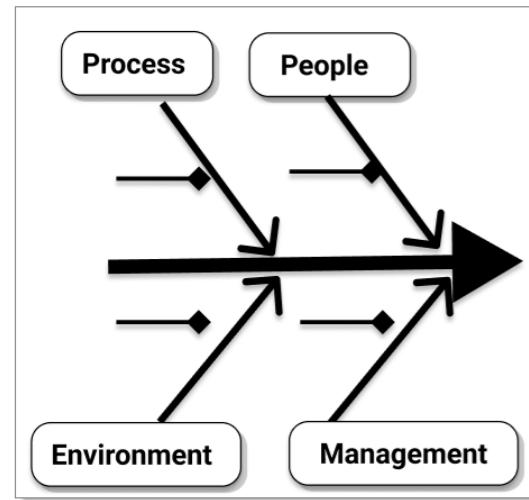
Not every comparison is meaningful

¹ Edward Tufte (2006). Beautiful Evidence.

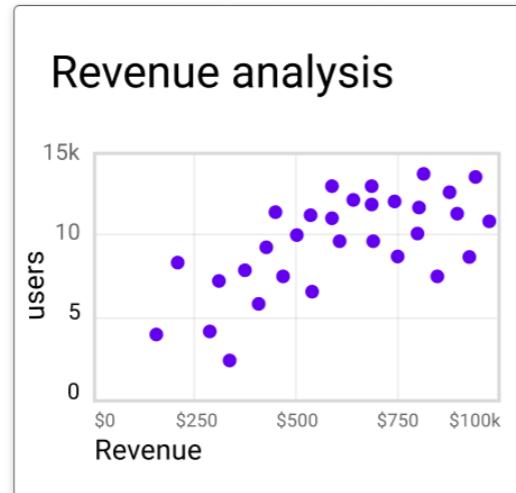
Causality and relationship

Show causality, mechanism, explanation, systematic structure

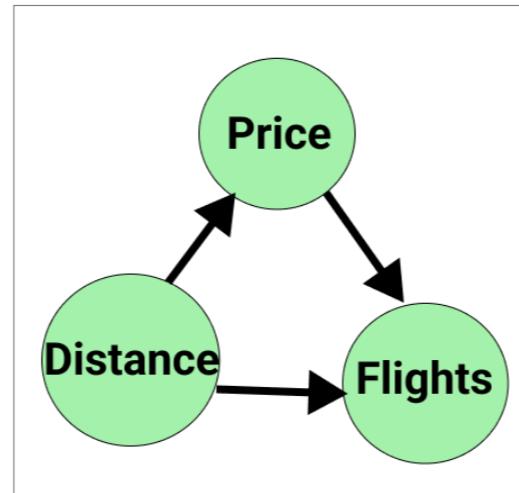
Diagram



Scatterplot



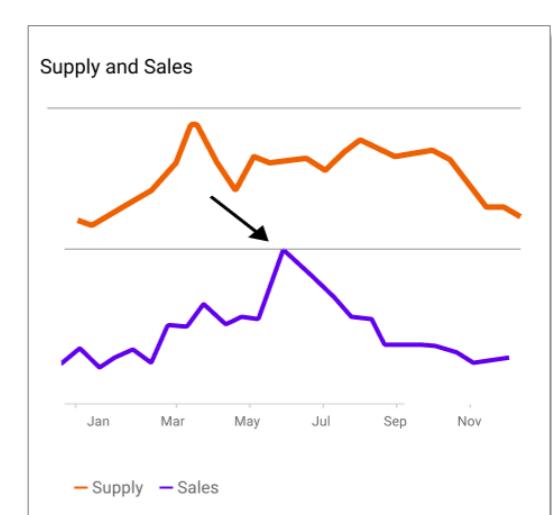
Causal graph



Flowchart



Granger-causality



Sorting ideas

Simple relationships

Causal assumptions

Events or conditions

Probabilistic causality

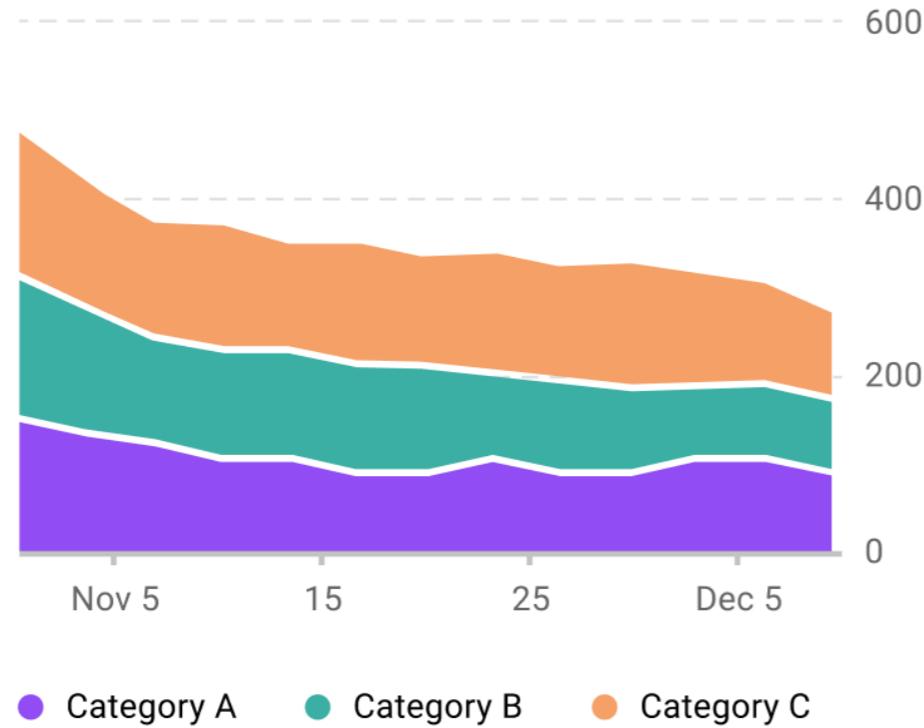
¹ Edward Tufte (2006). Beautiful Evidence.

Multiple variables

Show multiple variables (more than 2 variables and dimensions)

Grouping (single graph)

Users in the last 30 days



Faceting (multiple graphs)

Monthly totals

Region A



Region B



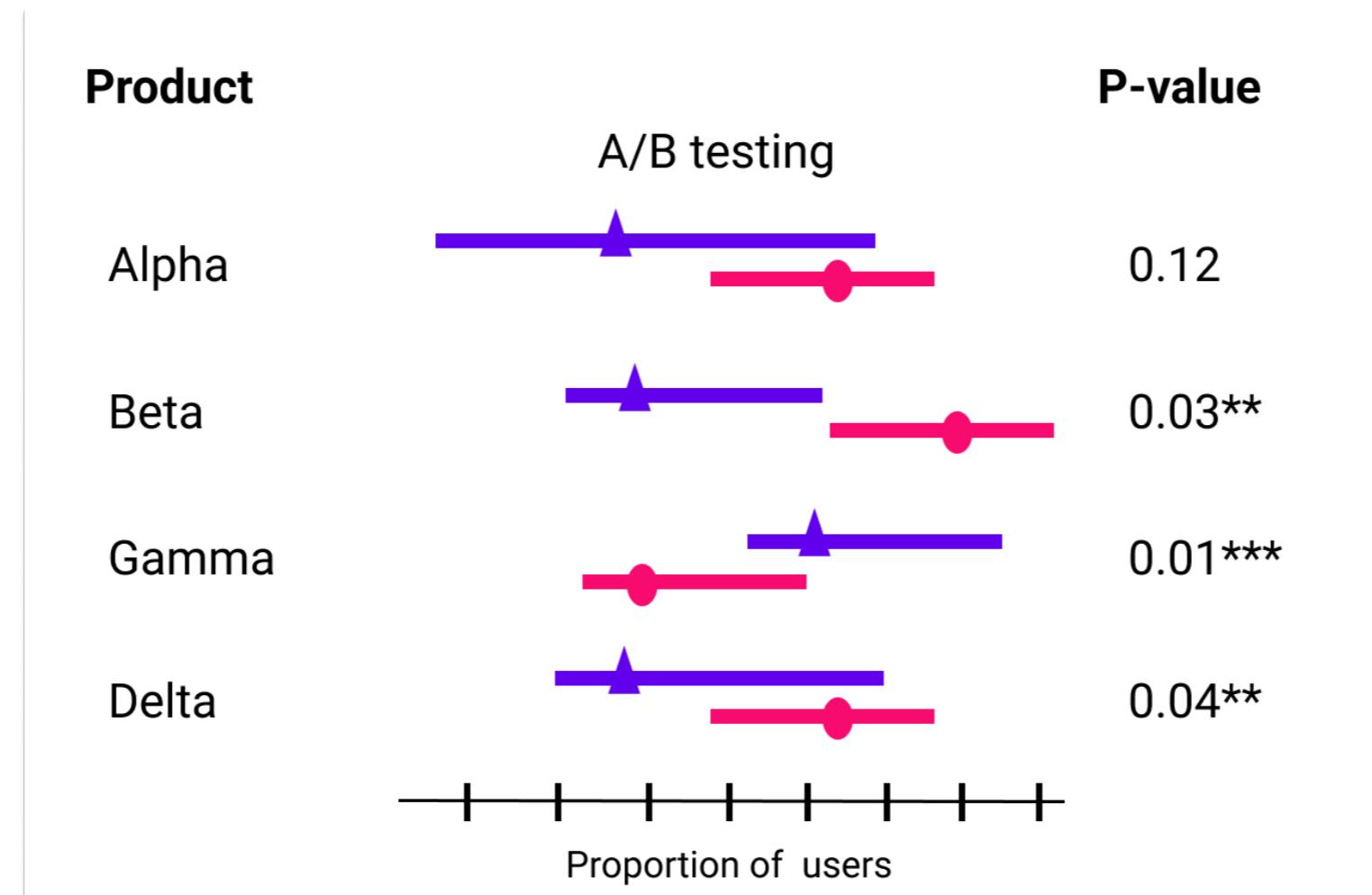
Region C



Integration of evidence

Integrate evidence onto a graphic (text, numbers, images)

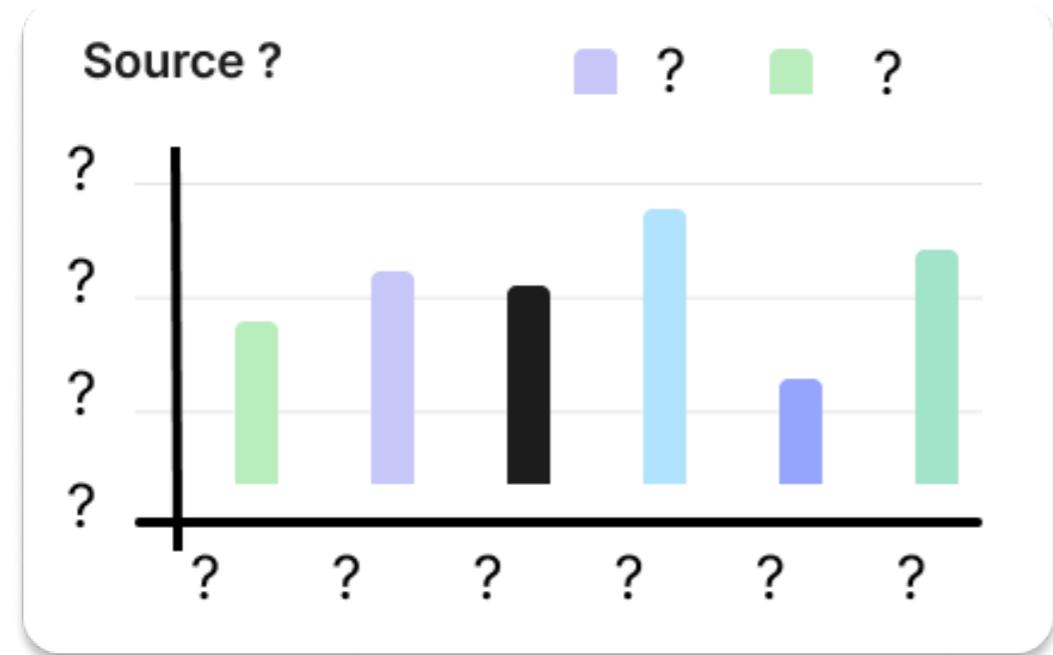
"...what matters entirely is the evidence, not particular modes of evidence"



Documentation and content

Documentation: data, process, description

Content: quality, relevance, and integrity



- What is the data origin?
 - How data is processed and cleaned?
 - Does the graph have legend and labels?

- Start with a good question



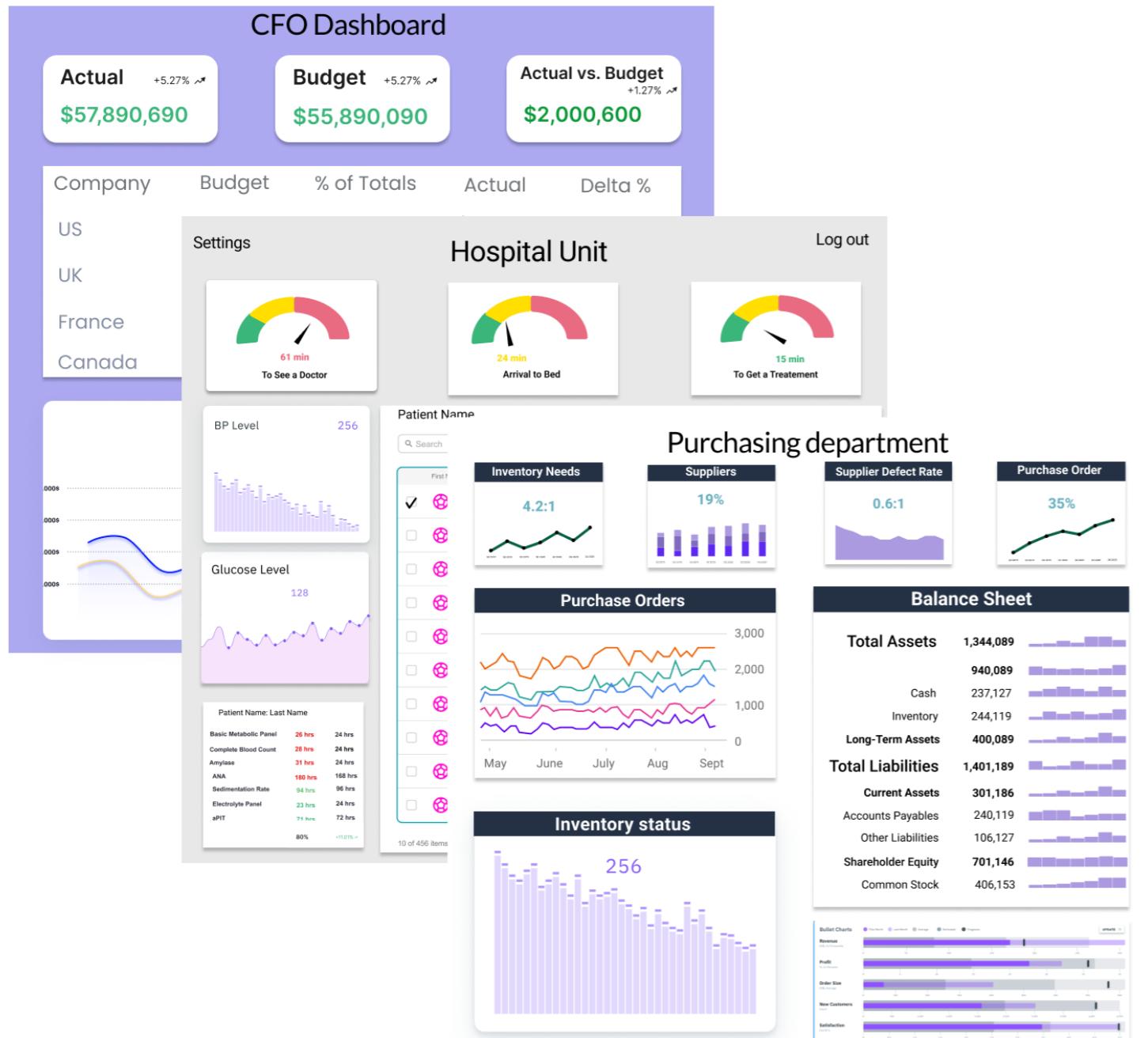
- Develop a sound approach



- Present all the necessary information



Know your dashboard type



Strategic: displays high-level metrics and a small number of plots

Tactical: displays many metrics over a large amount of data related to a single area of business

Analytical: displays many metrics related to enterprise-wide historical data for in-depth analysis

Operational: displays granular details related to a particular business task

Know your audience

Internal stakeholder

Use company's terms, acronyms,
less context is needed

External stakeholder

Use less acronyms, add more context

Familiar with
functionalities

Use more interactivity

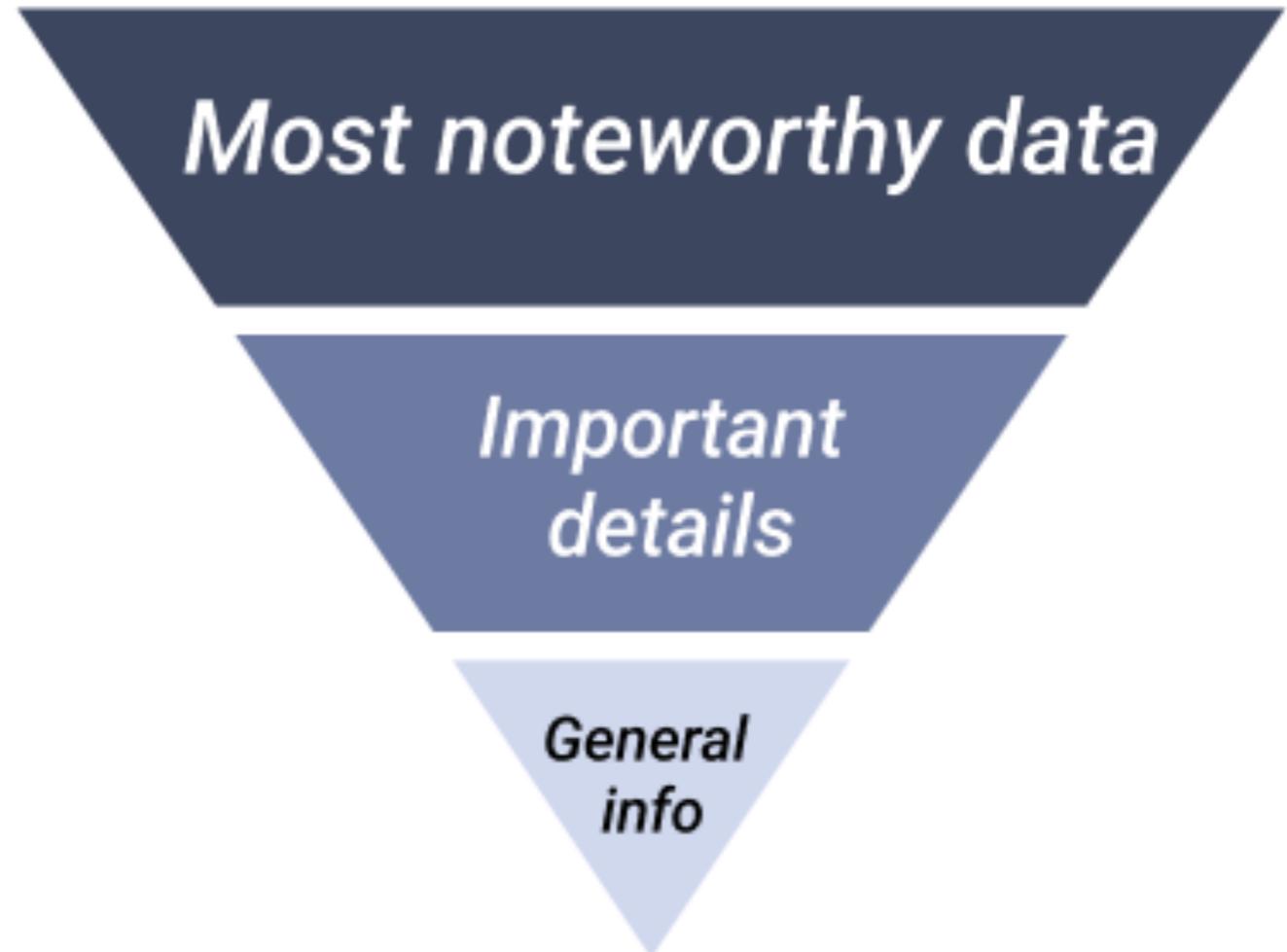
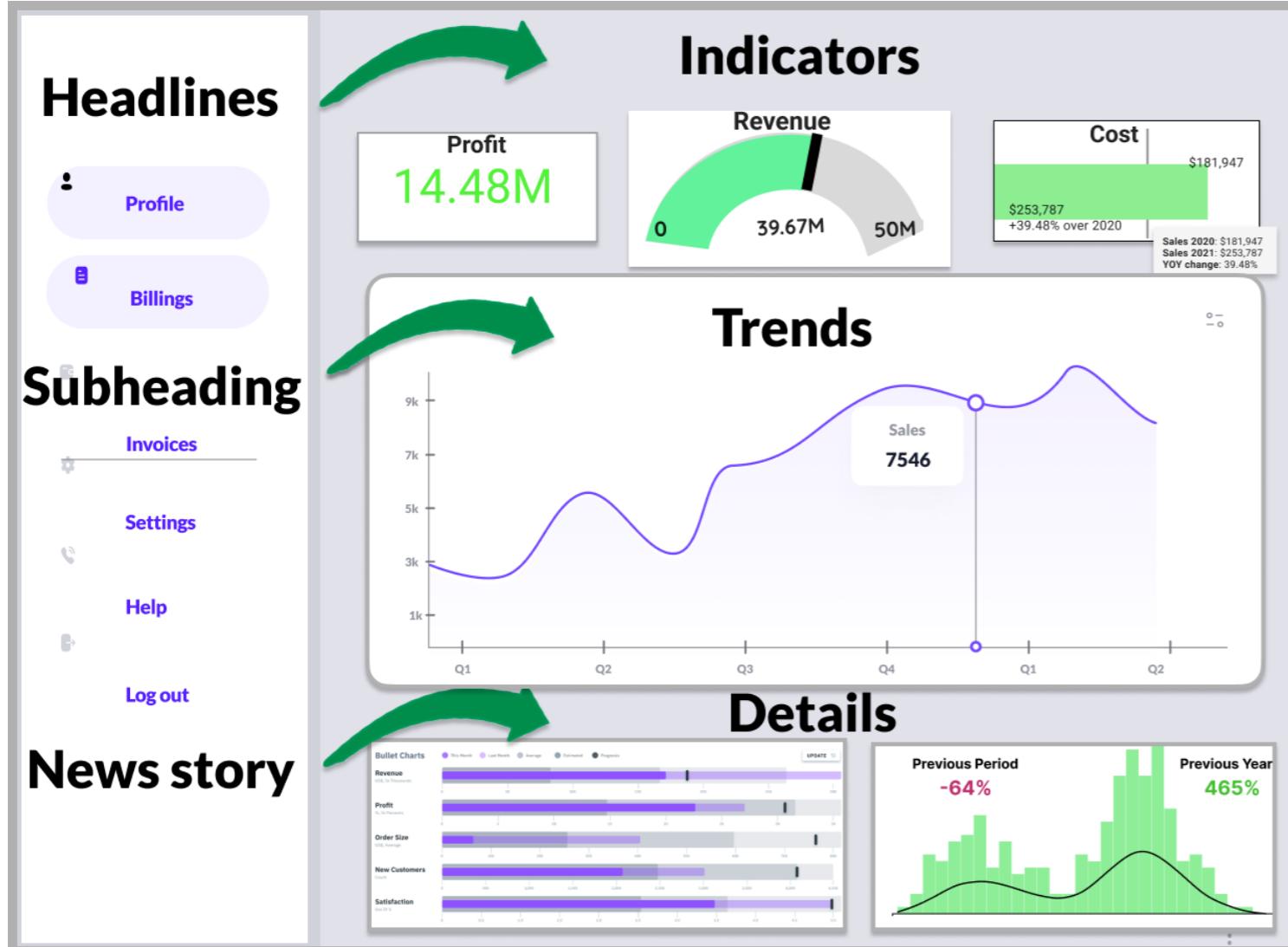
Quick-glancing

Highlight insights, use fewer charts

Long-lingered

Use more charts and drill-down data

Design your dashboard with a narrative in mind



¹ Geckoboard. (2023). Effective dashboard design

Reduce cognitive load

5

Use the 5-second rule: present the most important data in only 5 seconds



Be accessible: choose easy to read fonts, color-blind palette



Be consistent: repeat colors, font, and design elements



Be clear: provide visual clue, context, icons

Dashboard design assessment checklist



Practical test
Does it serve its purpose?



Data relevance test
Does it display relevant information?



Visual correctness test
Is the information displayed correctly?



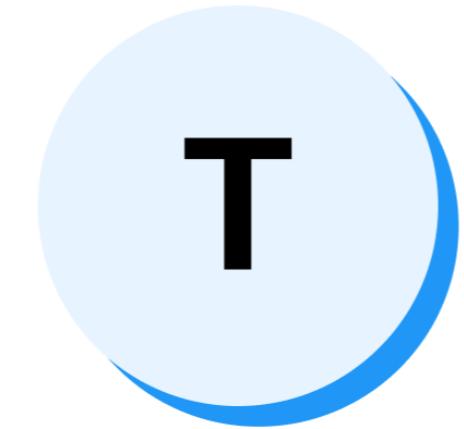
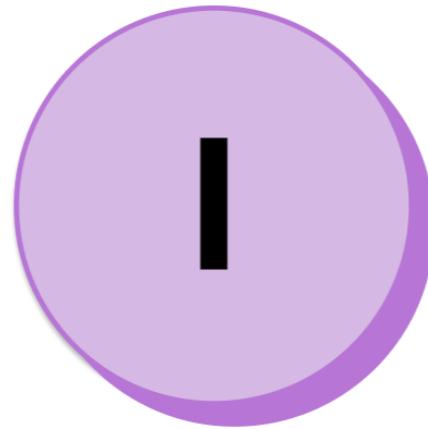
Intuitiveness test
Is it intuitive for use?



Adoption test
Is it adopted by the users?

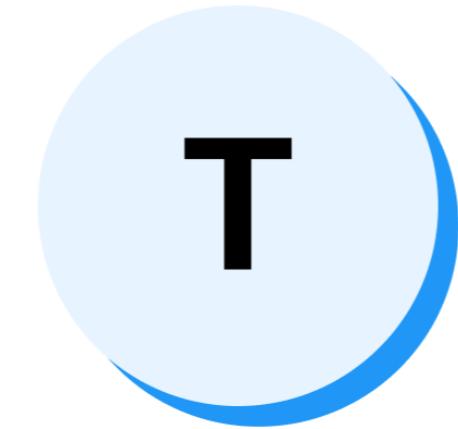
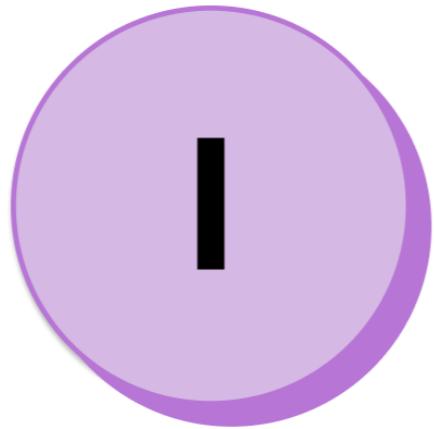
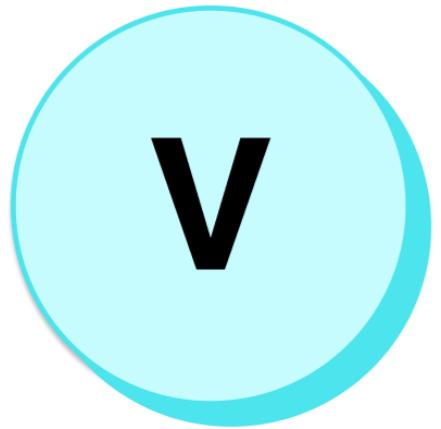
¹ Sisense. (2022). Assessing the Quality of Your Dashboard.

Dashboard VITAL success



¹ Hoenig, Nels. (2020). 5 Key Elements for Designing a Successful Dashboard.

Dashboard VITAL success

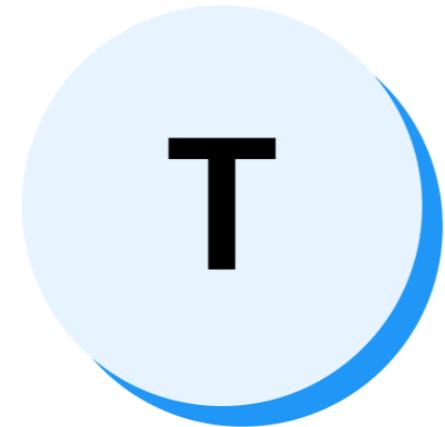
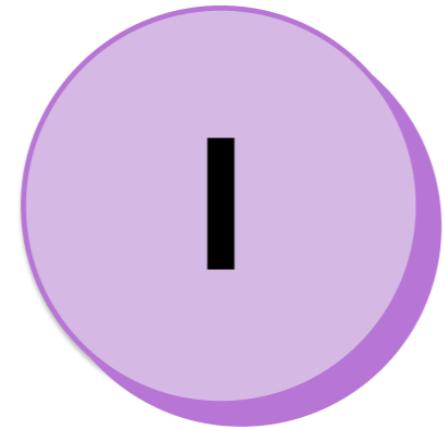


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Dashboard VITAL success



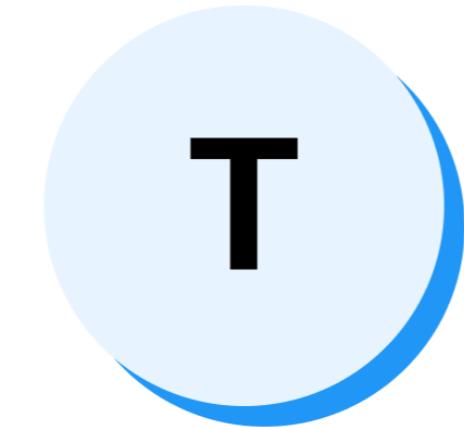
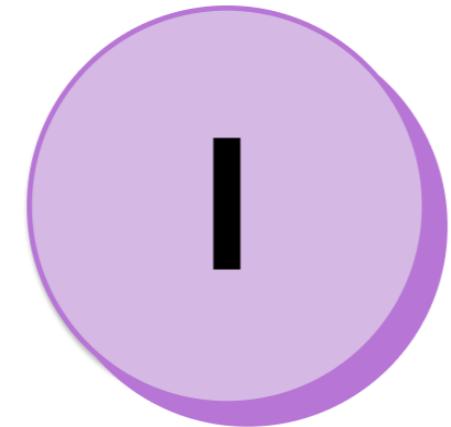
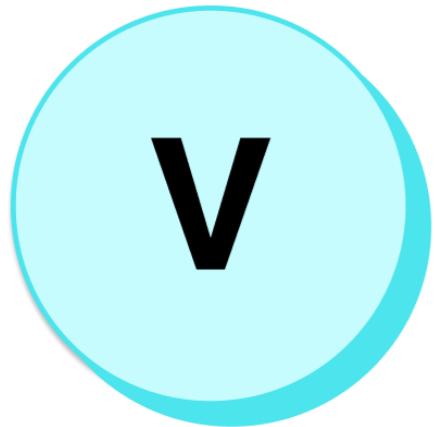
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Informative



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Dashboard VITAL success



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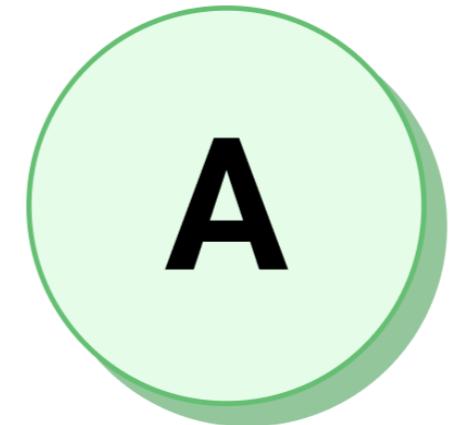
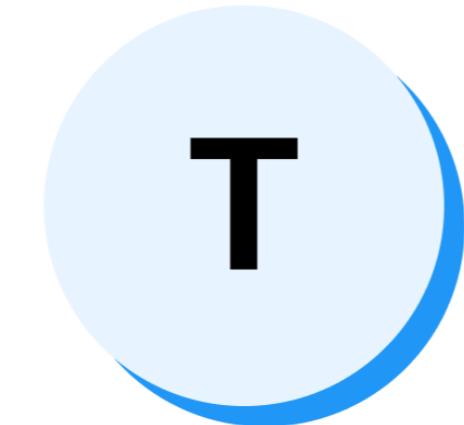
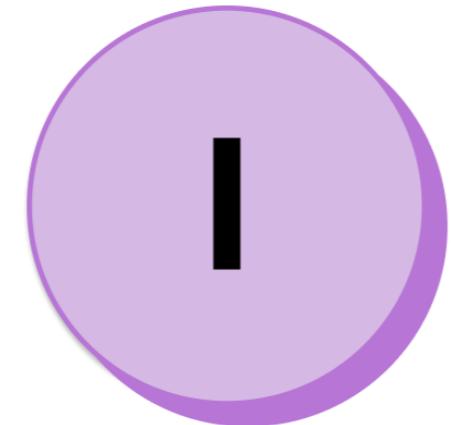
Informative

Timely



¹ Hoenig, Nels. (2020). 5 Key Elements for Designing a Successful Dashboard.

Dashboard VITAL success

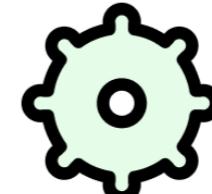


Valid

Informative

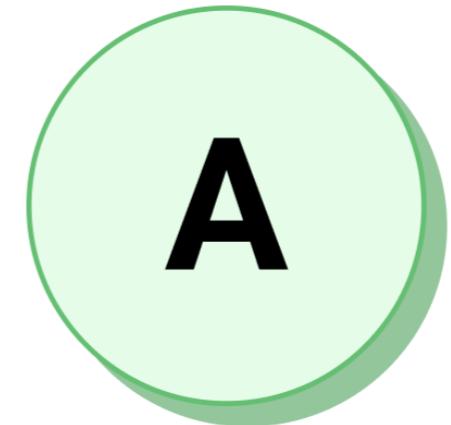
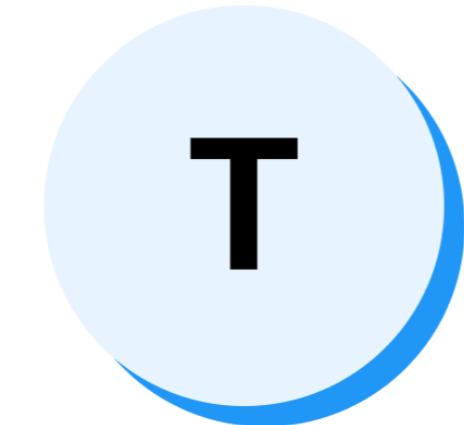
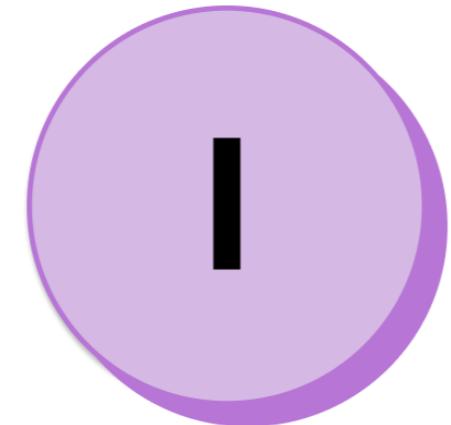
Timely

Actionable



¹ Hoenig, Nels. (2020). 5 Key Elements for Designing a Successful Dashboard.

Dashboard VITAL success



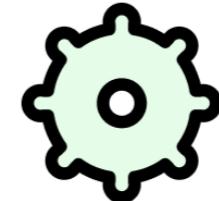
Valid

Informative

Timely

Actionable

Lovely



A dashboard is only useful if people are using it

¹ Hoenig, Nels. (2020). 5 Key Elements for Designing a Successful Dashboard

How to choose a dashboard software?

Dashboard software is an **information management tool** for tracking and displaying data

Traditional dashboards

BI/IT team performs the data analysis work for business users

Self-service dashboards

Users create dashboards without the need for technical support

Access management

Cloud-based applications, on-premises desktop software

Licensing model

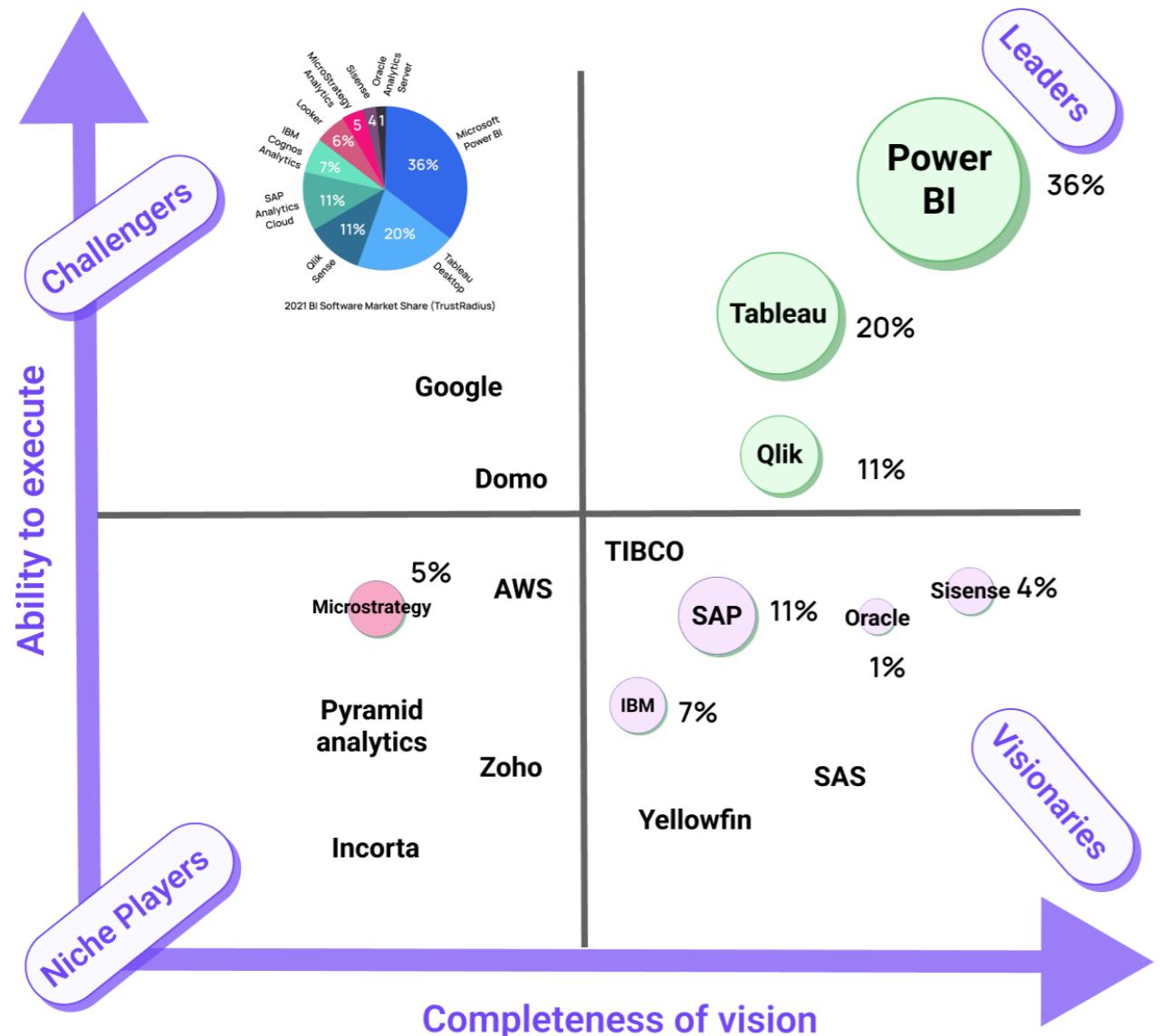
Open source, free proprietary (limited), proprietary licensed

Software architecture

Drag-and-drop applications, dashboard web frameworks

Top dashboard software: market share and interest

Marketshare proportion (TrustRadius, 2021)



Microsoft Power BI: desktop (windows), cloud service (Azure), integration with Microsoft products

Tableau: Tableau Server, Tableau Desktop, easy sharing on Tableau Public gallery

Qlik Sense: desktop, cloud-based, integration with cloud services (Azure, AWS, Google)

SAP Analytics Cloud: a cloud software for business intelligence, planning, integration with other cloud services

¹ Gartner Magic Quadrant. (2022). BI and Analytics