Death by Dropdown? Engineer Insightful Shiny Apps with Behavioral Science

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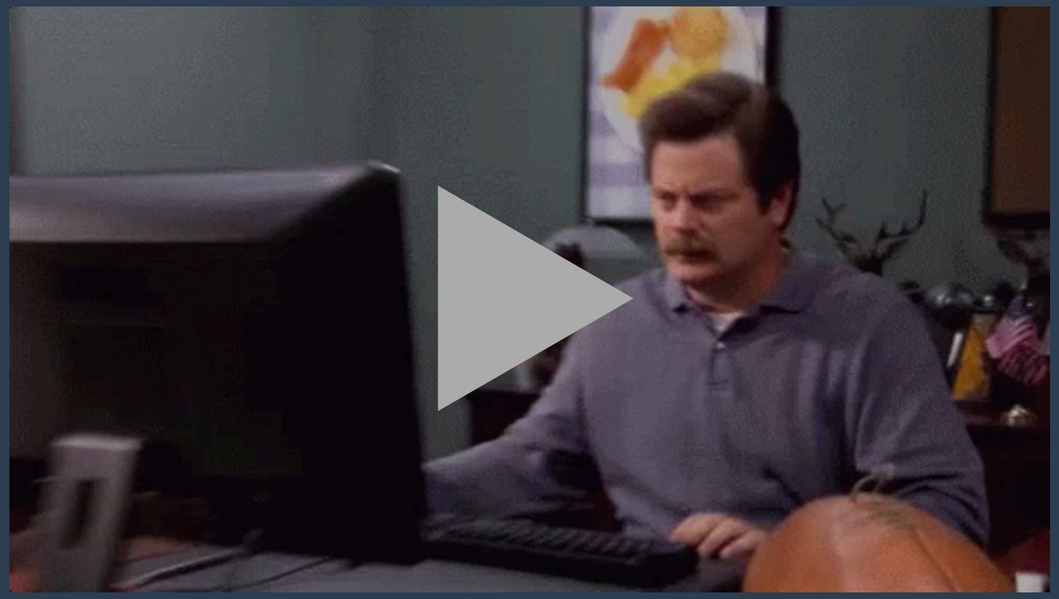
September 17, 2025

Ever open a dashboard with 18 filters across 6 tabs…
and wonder where to even begin?



Dashboard Support Group

Raise hand if you've ever:

- Designed a UI with 10+ filters?
- Had a user ask for "one more dropdown"?
- Built a Shiny app with more `selectInput()` than insights?

Welcome! You're among friends 😊

Think of our time together as a little therapy session for dropdown overload

👋 Hi, I'm Jeremy!

I'm a psychologist by training, but probably not the kind you're thinking of

The public sees therapists, but the discipline is powered by data.

My Journey

Applied Social Psychology →
Full Stack Engineer →
Led Shiny teams at scale →
Researcher / OSS Developer

Core Realization

> ***A lot of dashboard failures aren’t technical…***
>
> ***They’re psychological.***

Enterprise Analytics Dashboard

Global Filters

Year: 2024

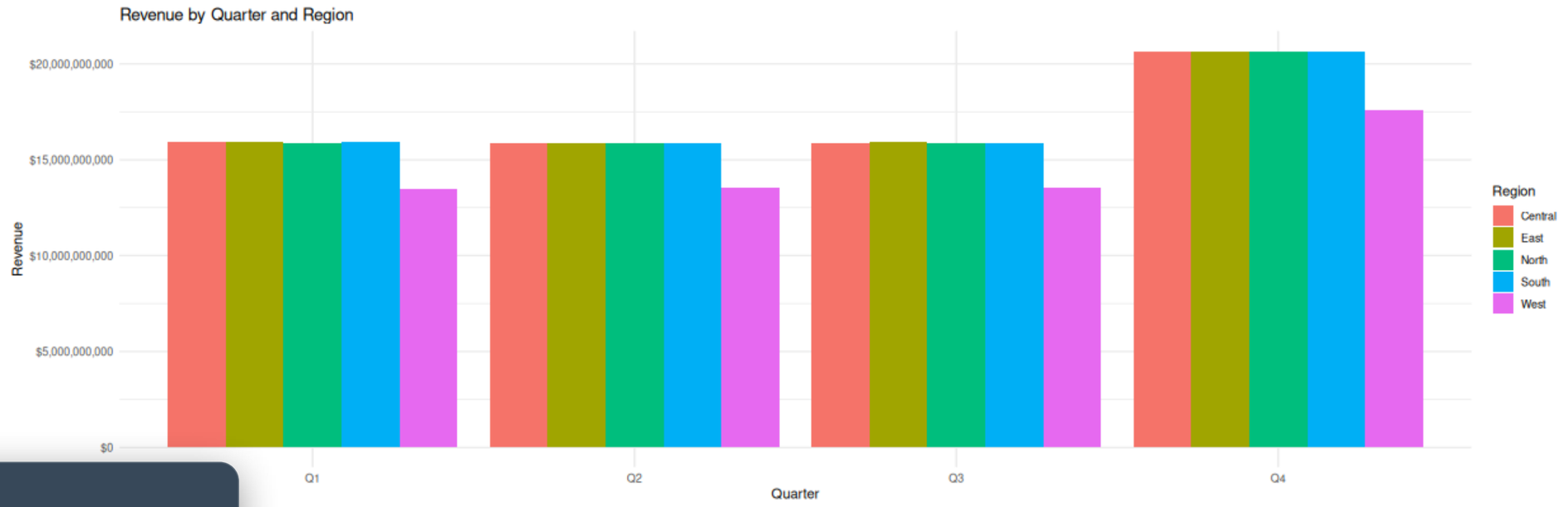
Quarter: All

Region: All

Additional filters available in each tab

Revenue Analysis | Customer Insights | Operations | Product Performance | Marketing Analytics | Executive Summary

Product: All **Category:** All **Channel:** All



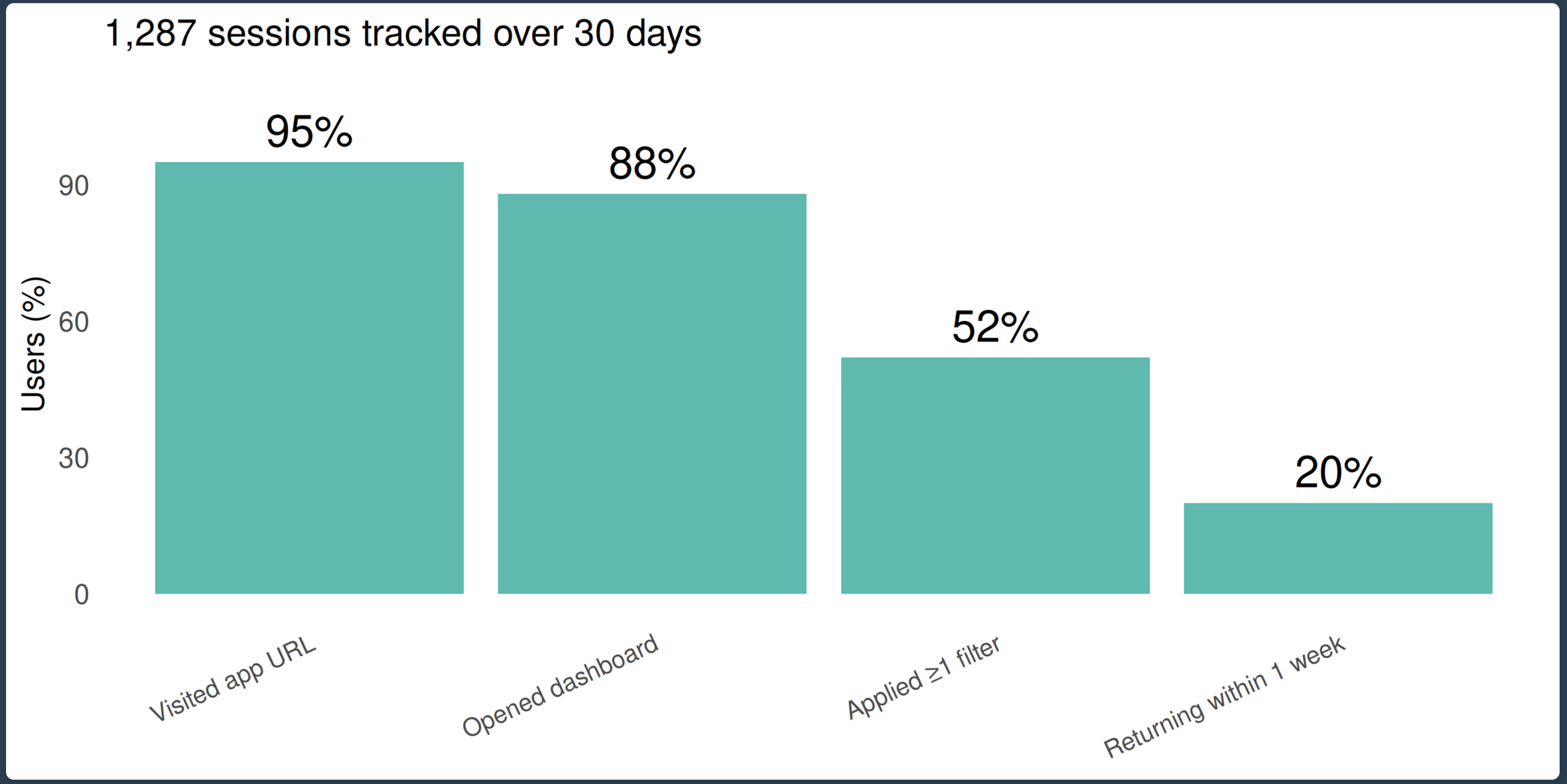
- 18 filters across 6 tabs
- Every possible data view
- Curiosity quickly vanished. So did visits.

We ran telemetry for 30 days…

Show 10 entries Search:

	Product	Region	Revenue	Units	AvgOrderValue
1	Product A	Central	17085640512	69115970	289.4709186197917
2	Product A	East	17099141519	69204575	287.3621362847222
3	Product A	North	17080869425	69112030	289.0340189525463
4	Product A	South	17082686223	69075173	287.5157690248843
5	Product A	West	14520792938	69063221	244.5412042824074

Telemetry Revealed the Journey



Enter: Behavioral Science

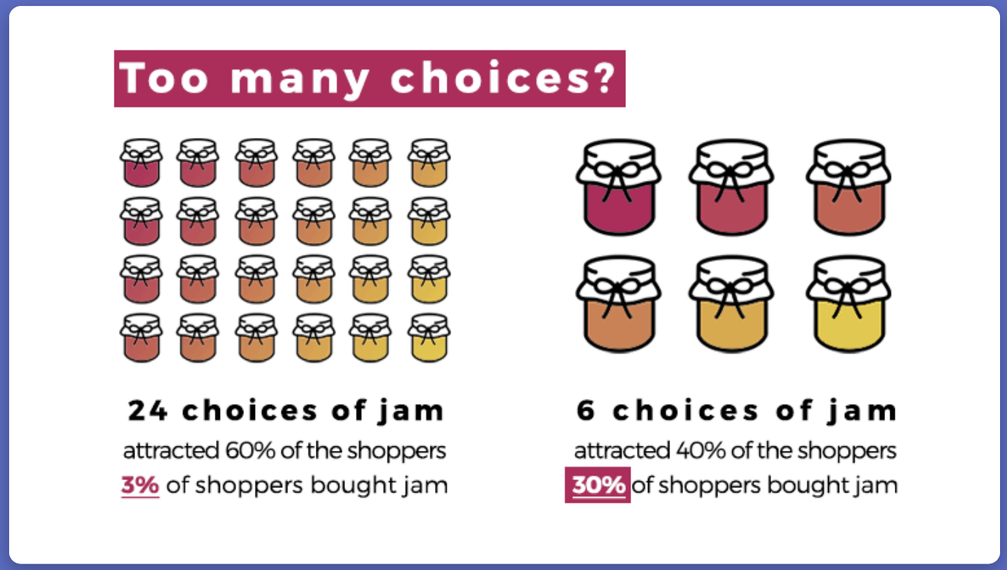
What is it? The interdisciplinary study of how people make decisions
(Spoiler: irrationally, yet predictably & consistently)

Classic Example: The Paradox of Choice

Researchers: Sheena Iyengar & Mark Lepper

Setting: Upscale grocery store sampling booth

Design: 24 jams vs. 6 jams display



10x higher conversion with fewer options

Applied to Dashboards

Core Concepts

- **Cognitive Load**
  - Too many choices overwhelm users' mental capacity
- **Progressive Disclosure**
  - Reveal complexity gradually as users need it
- **Framing Effects**
  - Same data can tell completely different stories

Dashboard Examples

- **Cognitive Load**
  - Start with 3 key filters, hide 15 advanced ones
- **Progressive Disclosure**
  - Show summary → detailed dive → comparisons
- **Framing Effects**
  - "Revenue up 15%" vs "Revenue missed by 5%"

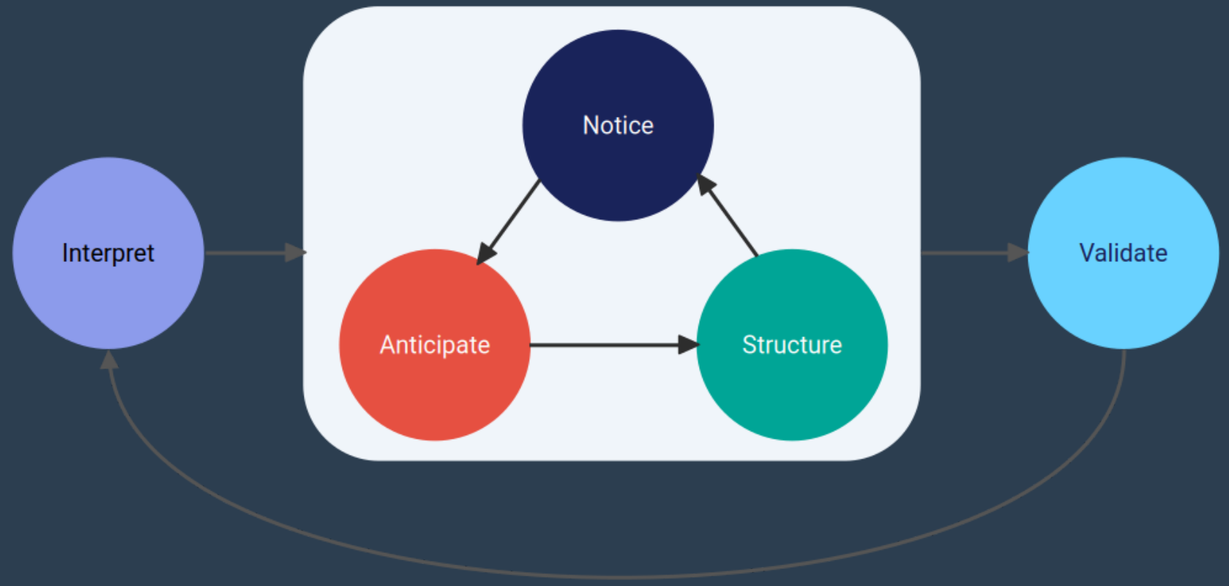
The Solution: Your Dashboard Journey

Think of it like a road trip

📍 **Interpret** where you're going
⚠️ **Notice** the warning lights
🌦️ **Anticipate** weather changes
🗺️ **Structure** the best route
✅ **Validate** safe arrival

The BID Framework

📍 **Interpret** user needs
⚠️ **Notice** friction points
🌦️ **Anticipate** cognitive biases
🗺️ **Structure** information flow
✅ **Validate** understanding



What is {bidux}?

An R package that:

- ✅ Works with ANY Shiny dashboard
- ✅ Analyzes telemetry OR works without
- ✅ Auto-suggests behavioral science improvements
- ✅ Custom parameter overrides

Your behavioral scientist in the console

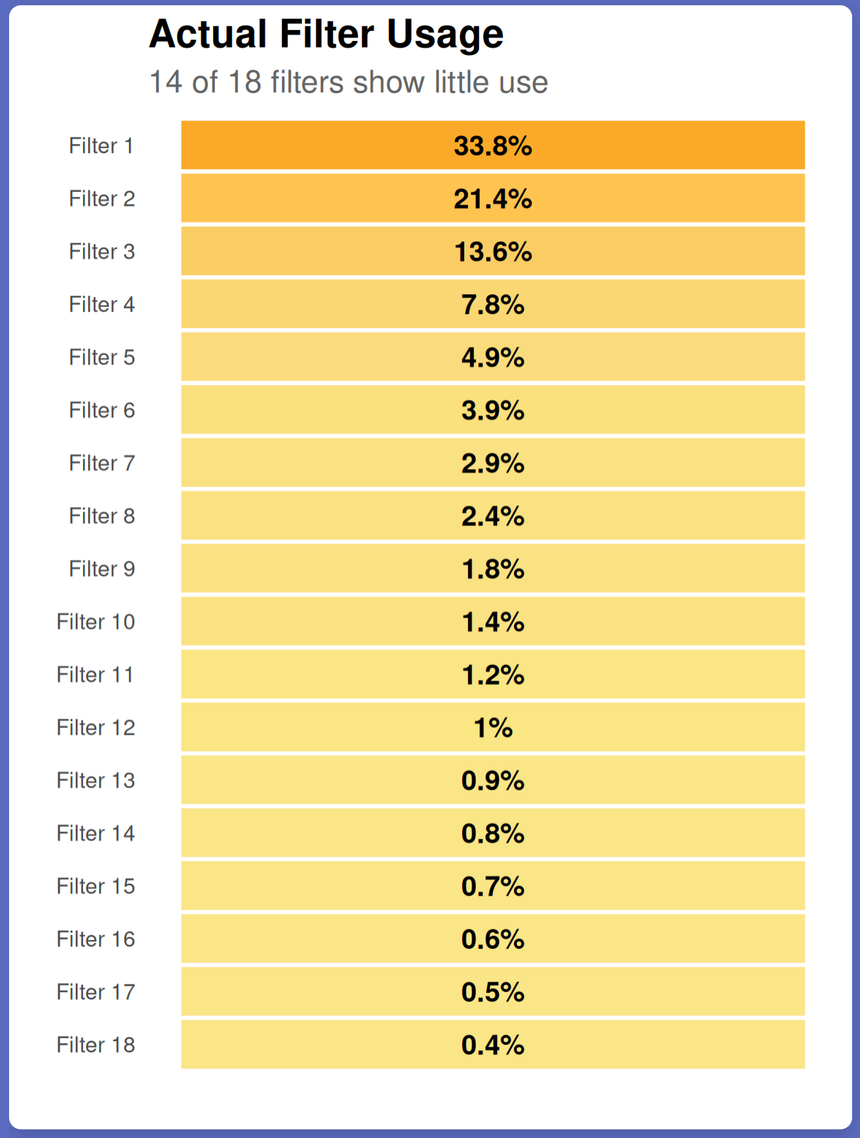
INTERPRET: Start with Why

```
library(bidux)

interpret_stage <- bid_interpret(
  central_question = "Which markets are driving performance?",
  data_story = list(
    hook = "Q4 revenue hit record high, but satisfaction dipped",
    context = "After aggressive marketing across all regions",
    tension = "West region satisfaction fell 10 points",
    resolution = "Focus retention efforts on underperforming regions"
  ),
  user_personas = list(
    list(
      name = "Product Manager",
```

```
>
Stage 1 (Interpret) completed.
  - Central question: Which markets are driving performance?
  - Your data story has all key elements. Focus on making each component compelling and relevant.
  - Your central question is appropriately scoped.
  - User personas: 1 defined
```

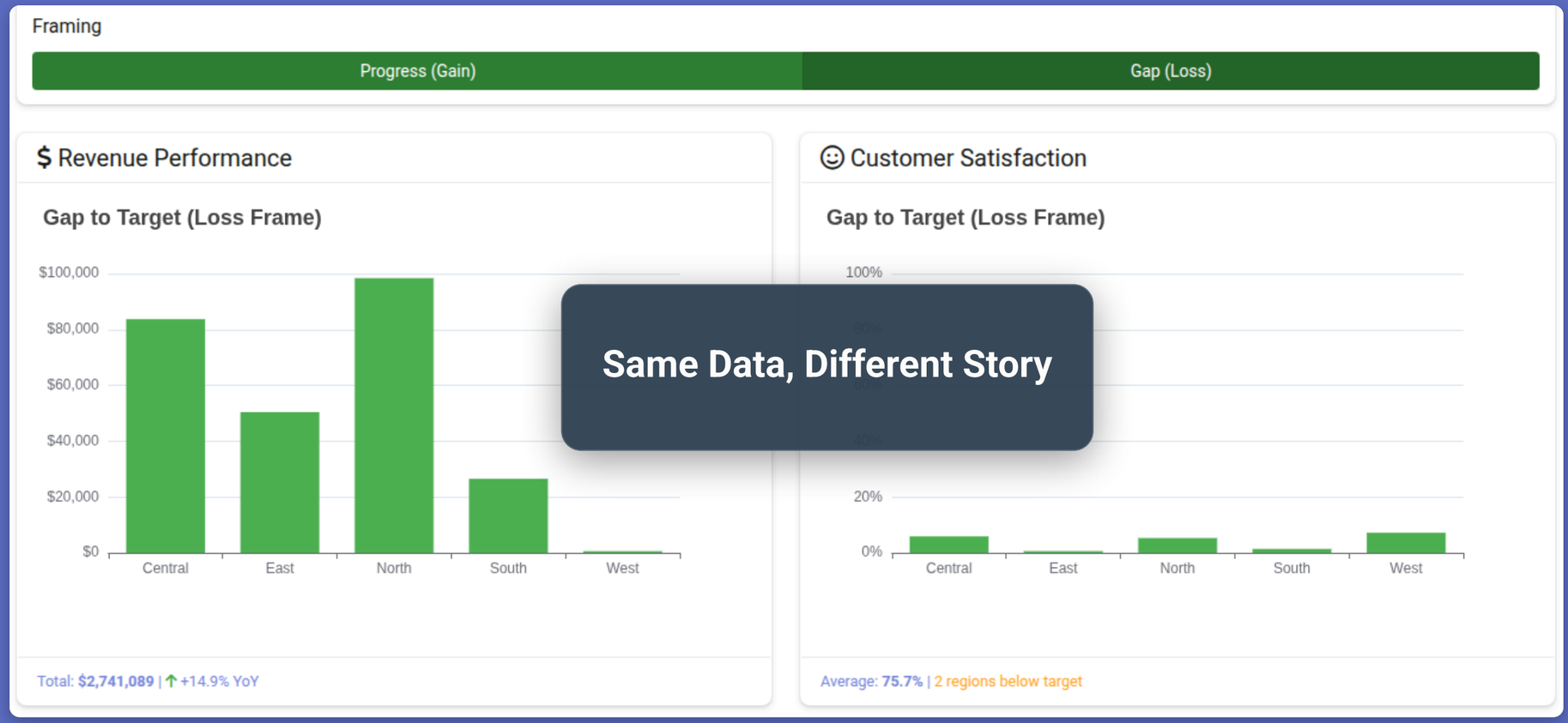
NOTICE: Find the Core Problems




```r
notice_stage <- bid_notice(
  previous_stage = interpret_stage,
  problem = "Users are struggling to find key insights",
  evidence = "Telemetry shows over 75% of filters are rarely u
)
```

```
>
Auto-suggested theory: Cognitive Load Theory (confidence: 90%)
Stage 2 (Notice) completed. (40% complete)
  - Problem: Users are struggling to find key insights
  - Theory: Cognitive Load Theory (auto-suggested)
  - Evidence: Telemetry shows over 75% of filters are rarely used
  - Theory confidence: 90%
  - Next: Use bid_anticipate() for Stage 3
```

ANTICIPATE: Guard Against Biases



STRUCTURE: Progressive Disclosure

```
1 # Provides su
2 str(structur
```

```
>
List of 2
 $ concept    :
 $ suggestions:
  ..$ :List of
  .. ..$ title
  .. ..$ detail
accordions."
  .. ..$ compon
  .. ..$ ration
  .. ..$ score
   $ :List of
```

```
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functionality."
```
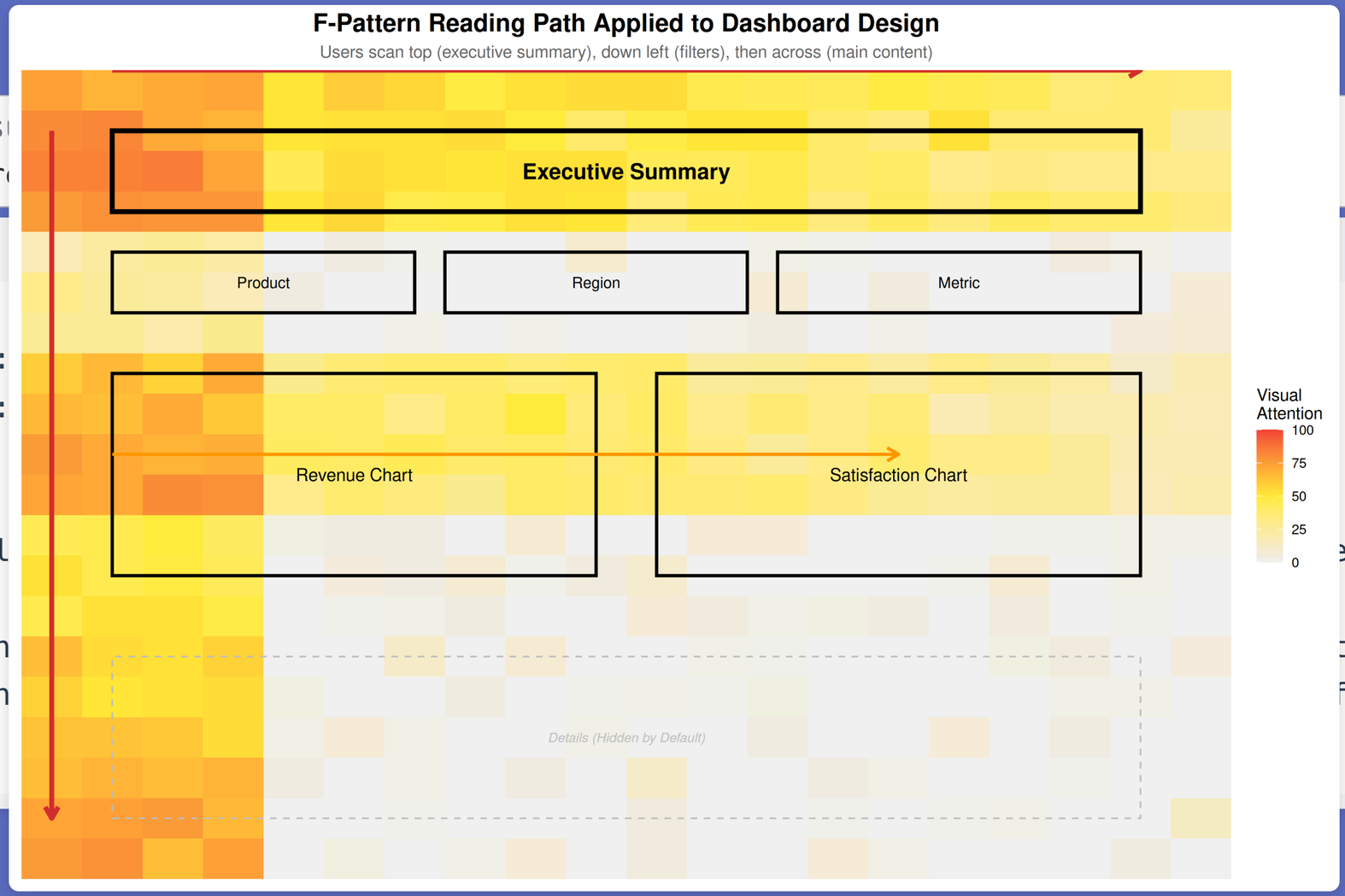
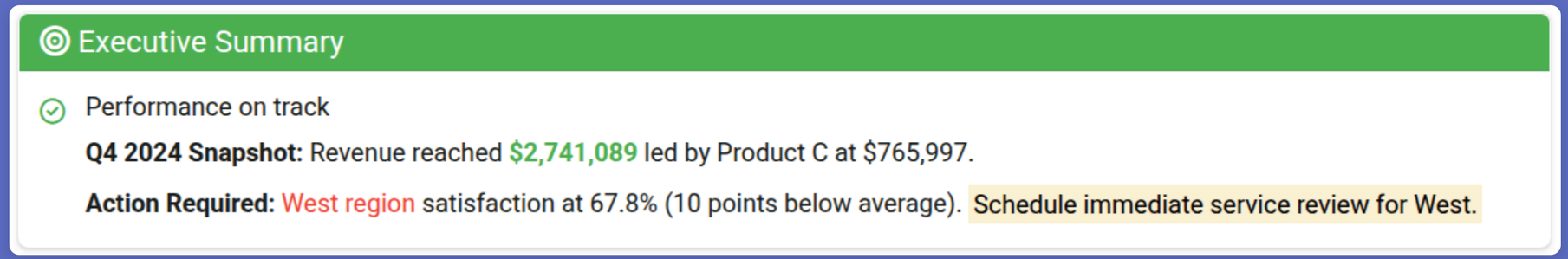



VALIDATE: Plain Language Wins



The Transformation

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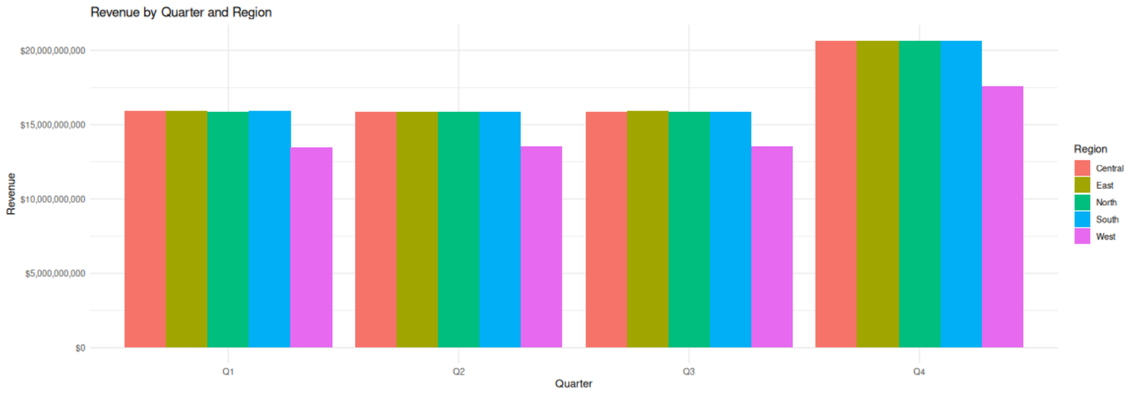

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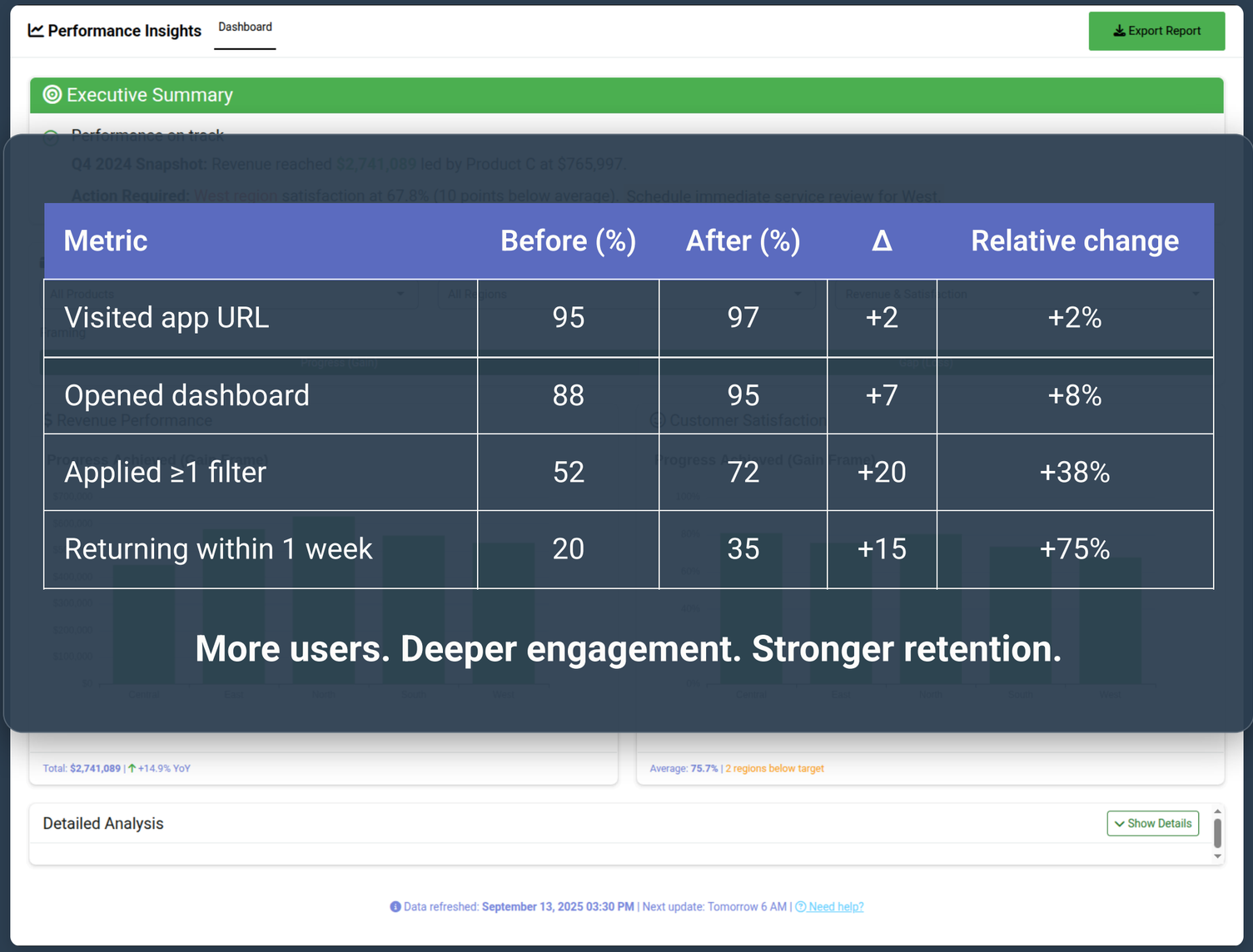
5	Product A	West	14520792938	69063221	244.5412042824074
6	Product B	Central	17094469368	69045695	290.03666015625
7	Product B	East	17104250116	69102665	289.3322356770833
8	Product B	North	17099489928	69178529	286.2292517361111
9	Product B	South	17075953983	69181024	284.8958368778935
10	Product B	West	14539372009	69130248	244.1188976417824

Showing 1 to 10 of 20 entries Previous 1 2 Next

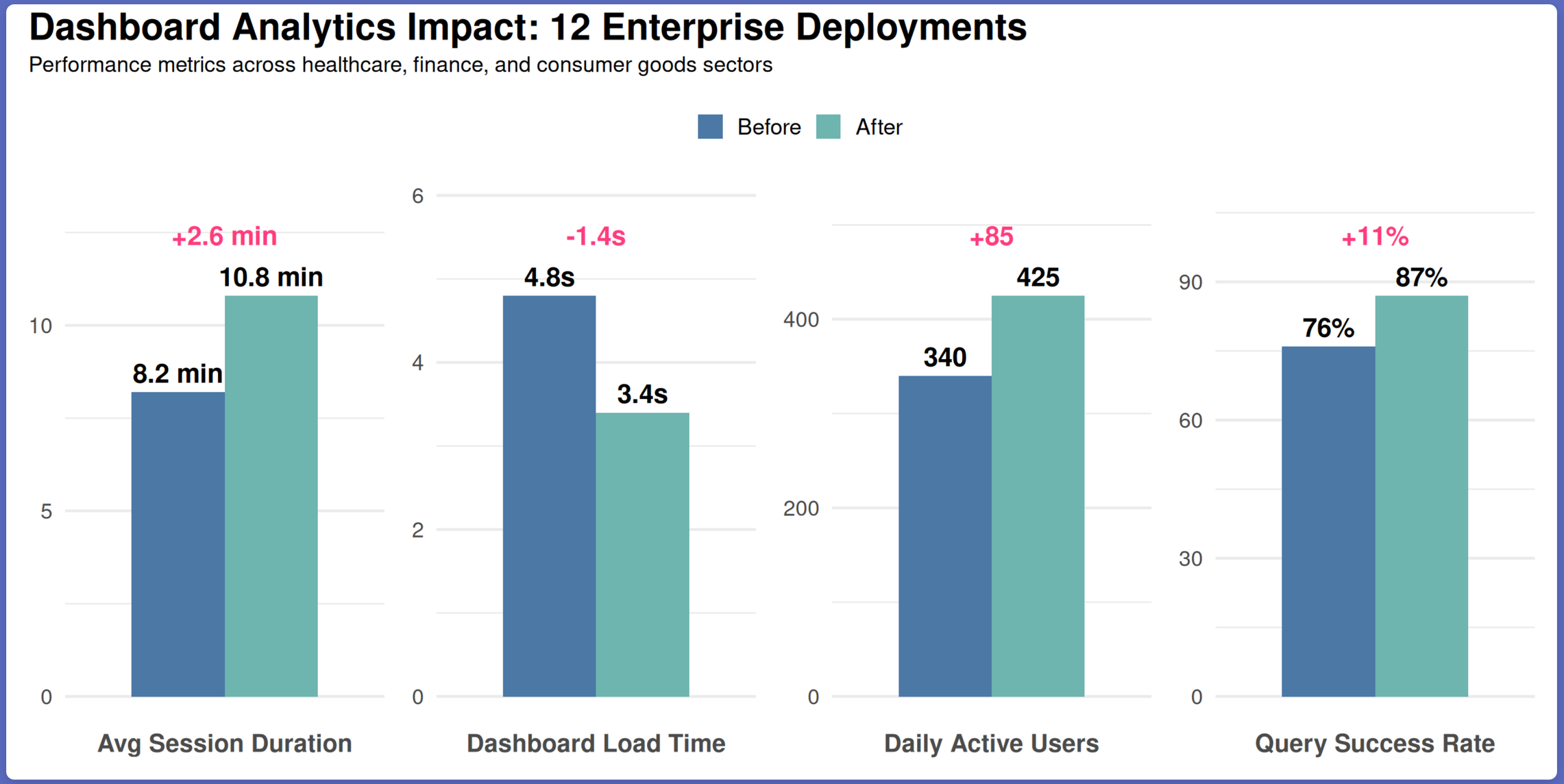
The Transformation



Metric	Before (%)	After (%)	Δ	Relative change
Visited app URL	95	97	+2	+2%
Opened dashboard	88	95	+7	+8%
Applied ≥1 filter	52	72	+20	+38%
Returning within 1 week	20	35	+15	+75%

More users. Deeper engagement. Stronger retention.

Real Impact Across Industries



Simplified UX Workflows

```r
# Using telemetry data
issues <- bid_telemetry("dashboard_telemetry.sqlite")

report <- filter(issues, severity == "critical") |>
  slice_head(n = 1) |>
  bid_interpret(central_question = "Which markets are driving performance?") |>
  bid_notice_issue(issues[1, ]) |> # bridge from telemetry to BID
  bid_anticipate() |>
  bid_structure() |>
  bid_validate() |>
  bid_report(format = "markdown", include_diagrams = TRUE)
```

Simplified UX Workflows

```
# Without telemetry data
report <- bid_interpret(
    central_question = "Which markets are driving performance?",
    data_story = list(
      hook = "Q4 revenue hit record high, but satisfaction dipped",
      context = "After aggressive marketing across all regions",
      tension = "West region satisfaction fell 10 points",
      resolution = "Focus retention efforts on underperforming regions"
    )
  ) |>
  bid_notice(
    problem = "Users are struggling to find key insights",
    evidence = "Users report not knowing where to start"
```

Your Turn: Start Today

```r
install.packages("bidux")
library(bidux)

result <- bid_interpret("What do users need?") |>
  bid_notice(
    problem = "Death by dropdown",
    evidence = "User complaints"
  ) |>
  bid_anticipate() |>
  bid_structure() |>
  bid_validate()

bid_concepts("choice overload")
```

Resources:

- 🔬 **BID Framework**: github.com/jrwinget/bid-framework
- 📚 **{bidux} Docs**: github.com/jrwinget/bidux
- 💬 **Community**: github.com/jrwinget/bidux/discussions
- 🤝 **Let's Connect!**
  - @jrwinget
  - @jrwinget
  - 🌐 jrwinget.com
  - 📧 contact@jrwinget.com

One Thing to Remember

Dashboards don’t need more features.
They need fewer obstacles.

Let’s fix that together!

Special thanks to the posit::conf organizers, Shiny community, and all of you for caring about your users