



A Flexible Self-Tracking Approach Leveraging Semi-Automated Tracking

Young-Ho Kim

Jinwook Seo



Jae Ho Jeon



Bongshin Lee



Eun Kyoung Choe



THE RISE OF SELF-TRACKING



259,000 mHealth apps listed on major app stores (2016)¹
21% of American adults use wearable devices (2015)²

¹ Research 2 Guidance 2016, mHealth App Developer Economics 2016.

² Fleming 2015, Data Digest: Announcing Our Annual Benchmark On The State Of US Consumers And Technology In 2015

LITTLE FLEXIBILITY ON DATA ENTRIES



People's tracking abilities are bounded by how the tools were initially designed.

What activity to record,
What information to record,

...

DIVERSE TRACKING NEEDS



Q. Imagine a book tracker to record your reading activities.

Book Reviews

Title text

Author text

Pages number

Review text

Book Reviews

Title text

Author text

Rating star

Reading Logs

Title text

Page From number

Page To number

Date date

• • •

Challenging to find an existing app that perfectly suits one's tracking needs

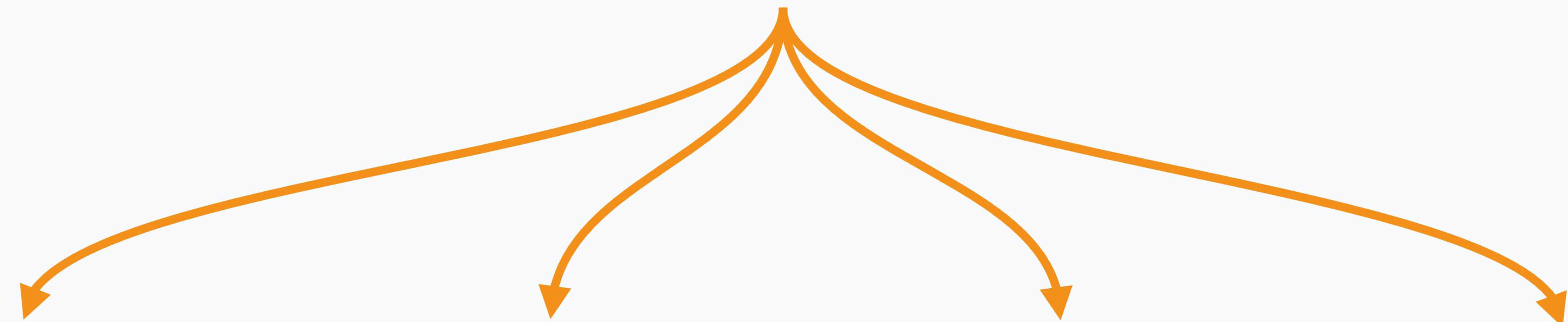
RESEARCH AIM



To support people's diverse tracking needs
through a flexible self-tracking system.



THE OMNITRACK SYSTEM



■ Daily Diary

■ Coffee Counter

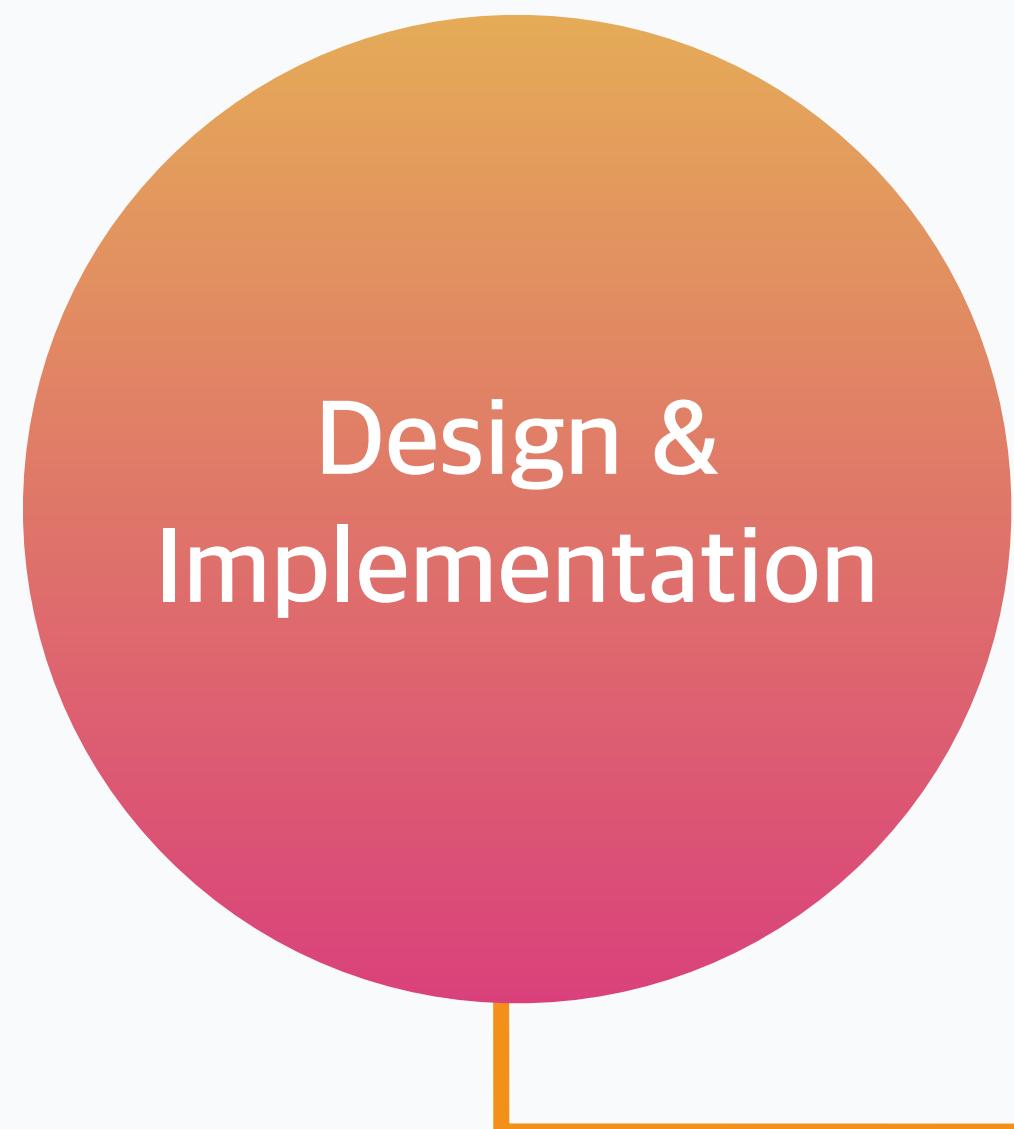
■ Physical Activity

Anything You Want

OVERVIEW



PACM IMWUT 1(3), Article 67.



Covered Today



Preliminary
Survey

Design &
Implementation

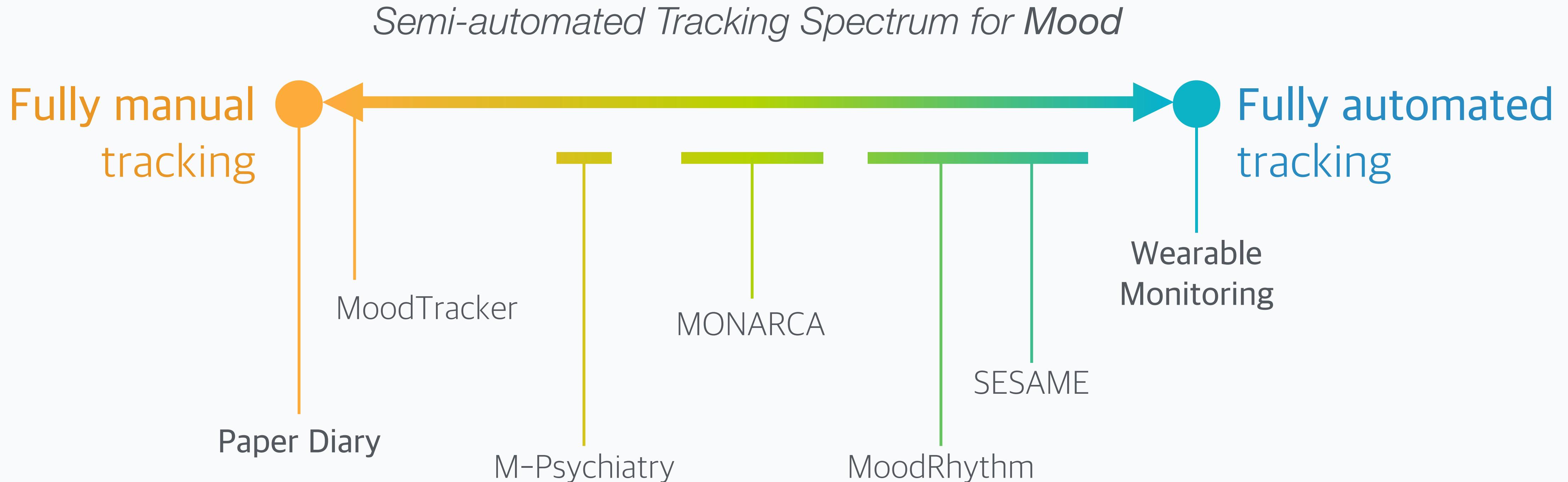
Usability
Study

Field Deployment
Study

SEMI-AUTOMATED TRACKING



Understanding self-tracking
as a combination of the **automated + manual** tracking methods



SEMI-AUTOMATED TRACKING



- + Increased self-awareness
- + Engagement with data
- + Flexibility of choosing target behaviors
- + Some data can only be tracked manually
- High capture burden
- Compromised data accuracy

- + Reduced mental load
- + Better accuracy (depending on the data)
- Cumbersome to wear (wearable sensing)
- Reduce engagement with data

BALANCING BURDEN WITH OMNITRACK

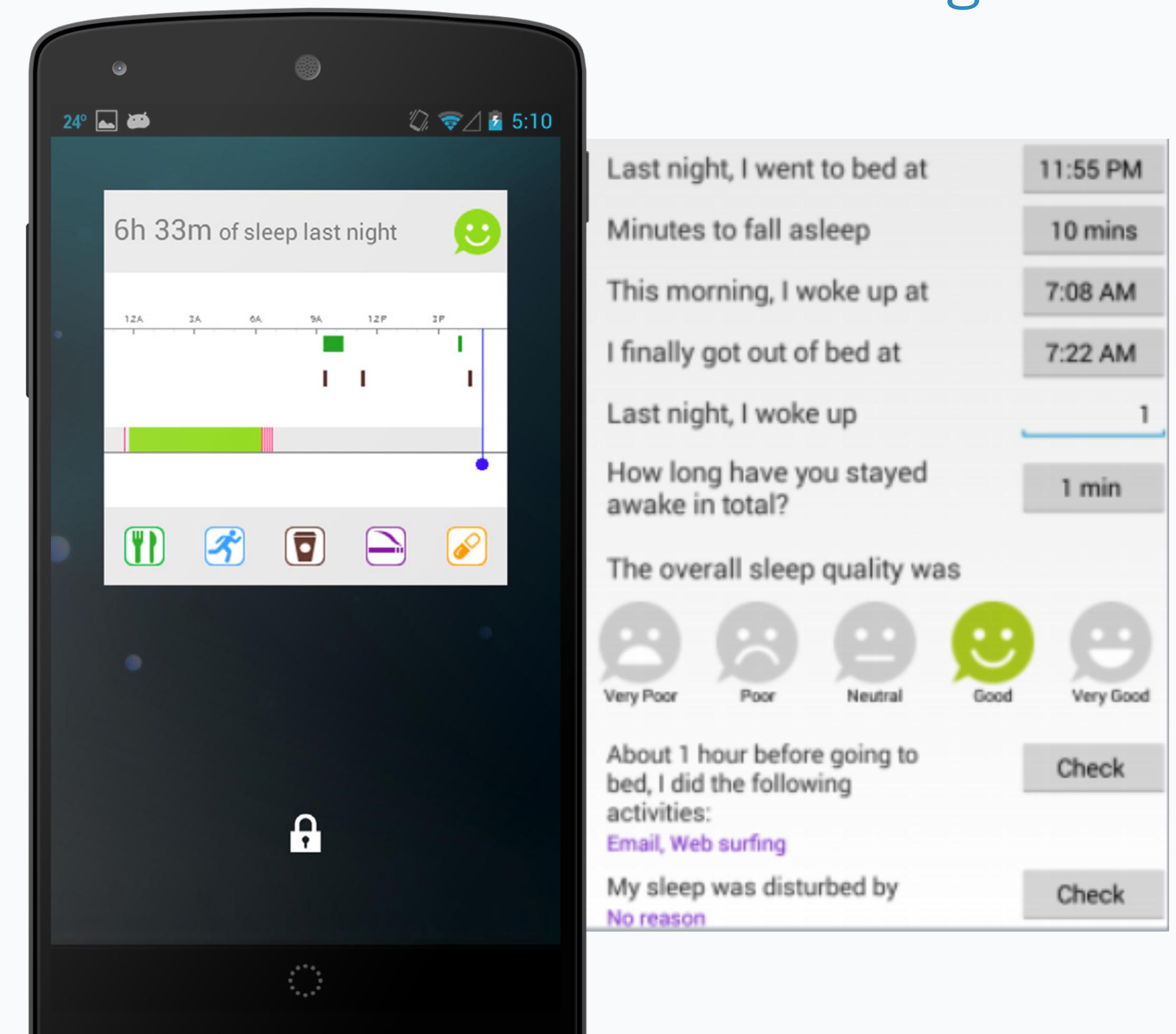


Fully manual
tracking



Fully automated
tracking

SleepTight (Choe et al. 2015)
Mostly Manual





BALANCING BURDEN WITH OMNITRACK

Fully manual tracking ← → Fully automated tracking



SleepTight++
Semi-Automated

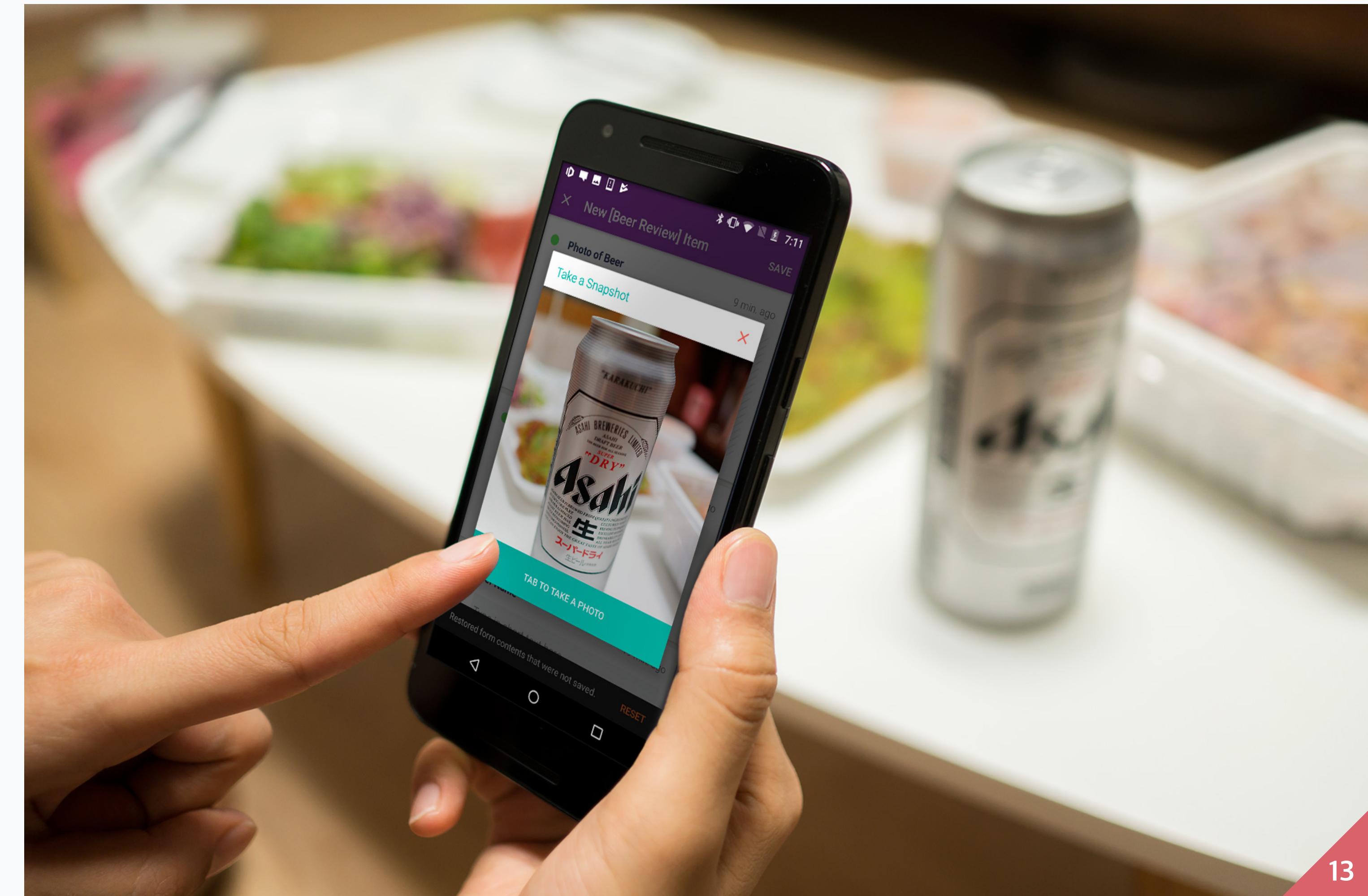
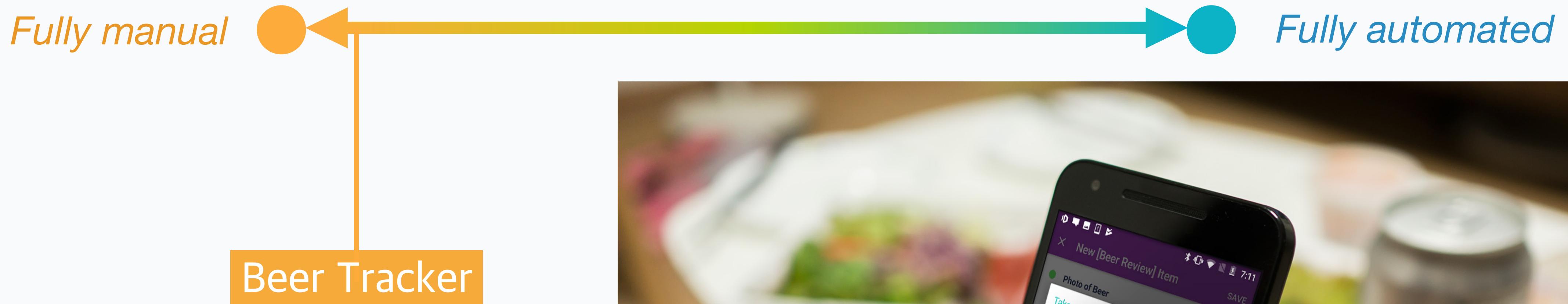


Manual Capture of
Subjective Sleep Quality

Automated Capture of
Sleep Duration

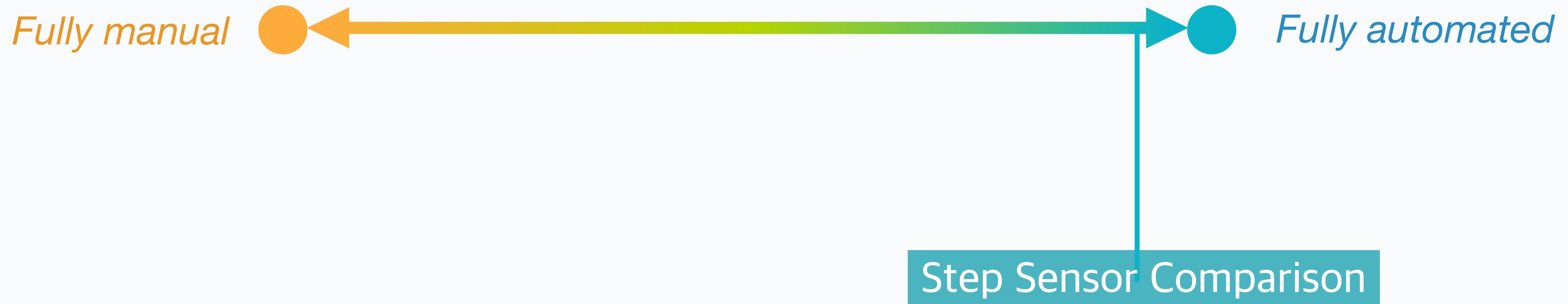


OTHER EXTREME CASES





OTHER EXTREME CASES



VS



VS





OTHER EXTREME CASES

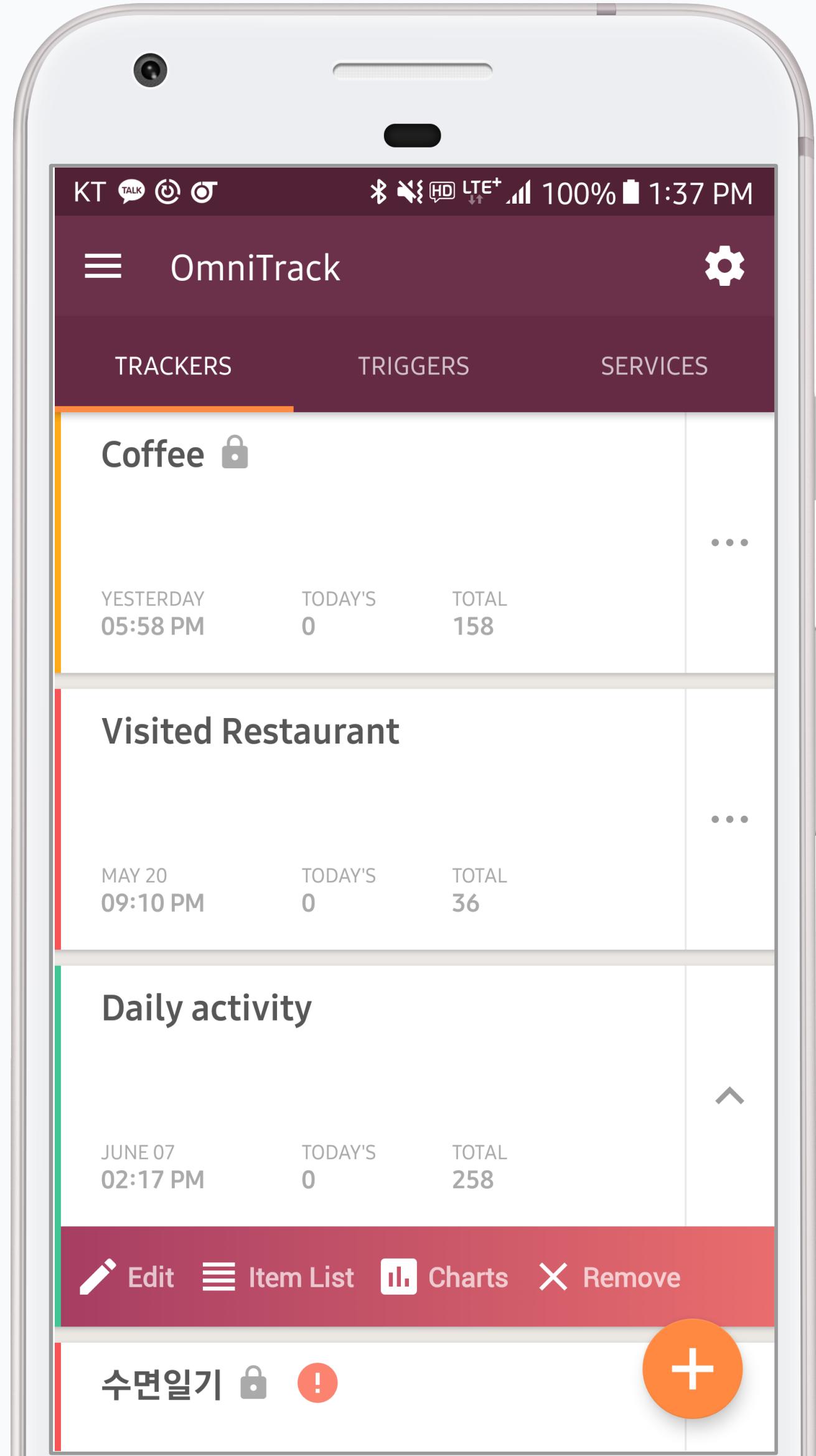




CORE COMPONENTS OF OMNITRACK



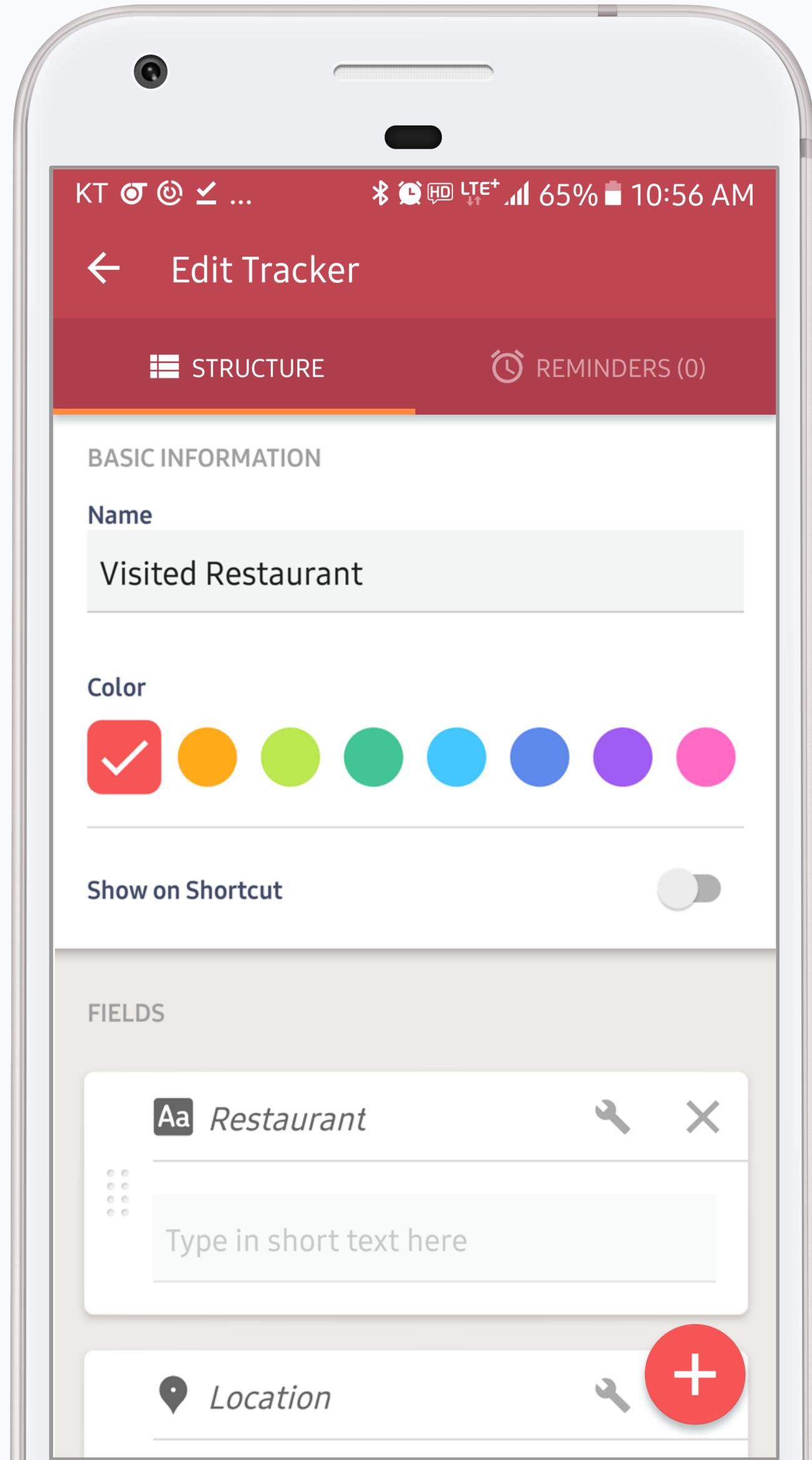
TRACKER = DATA TABLE



Trackers:

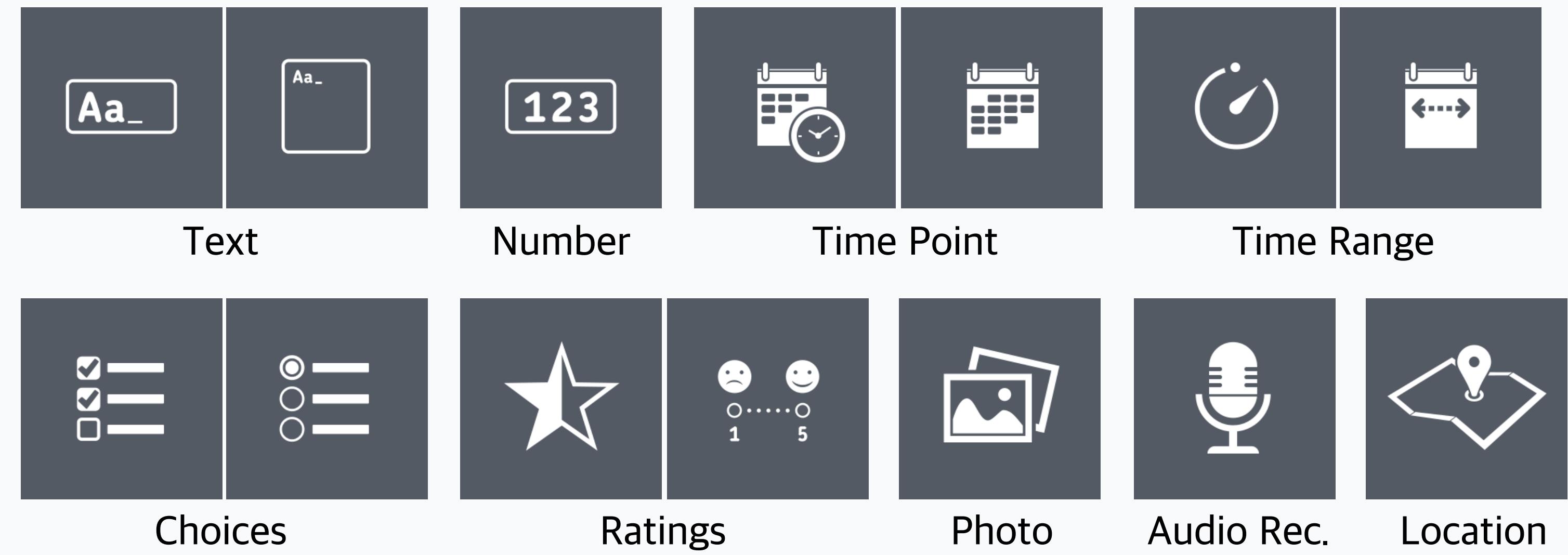
- A basic unit of self-tracking.
- Corresponds to a **single data table**

DESIGNING & REVISING DATA SCHEMA



People can configure **Fields** of the data schema.
The schema can be **revised without hurting the previous data.**

■ Supported Field Types:



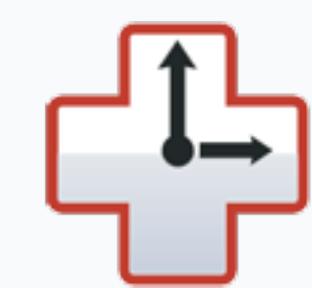
LEVERAGING THE EXISTING SERVICES



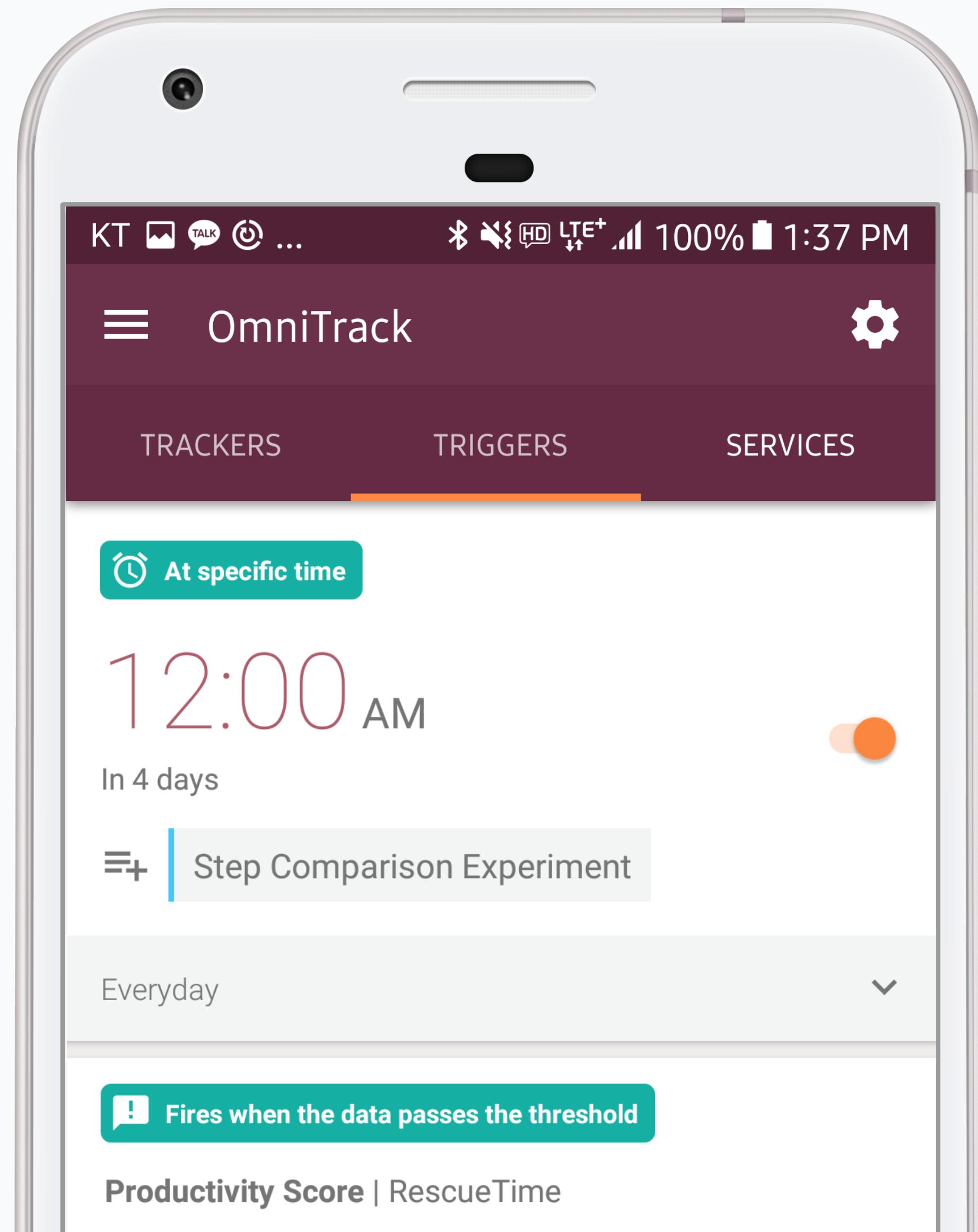
OmniTrack can read data from the existing fitness devices or tools



Google Fit



TRACKING AUTOMATION BY TRIGGERS



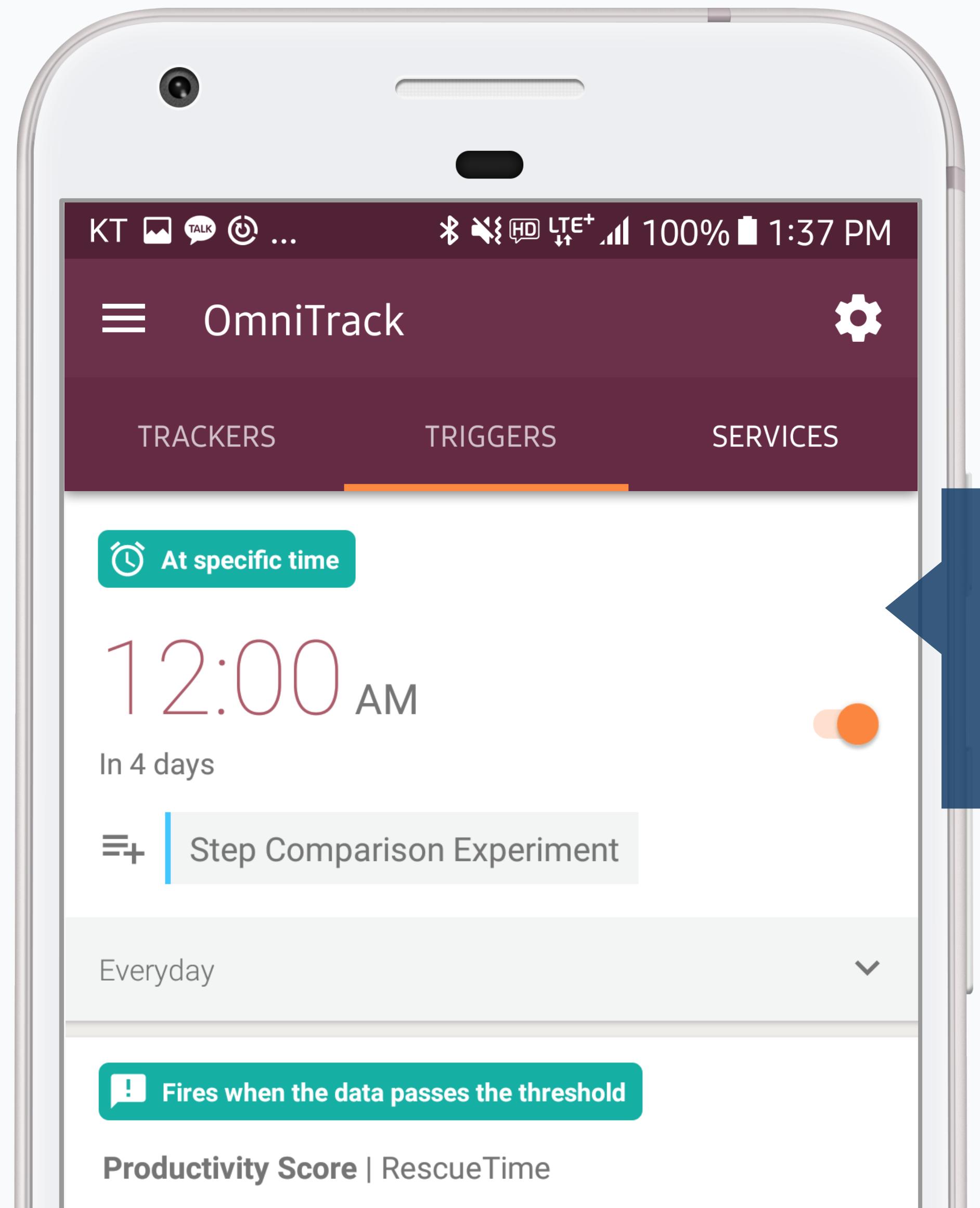
Triggers:

Automatically pushes an item entry in background
when predefined conditions are met.

Time-based trigger:

Fired either at the preset [time](#) or
at periodic [intervals](#)

TRACKING AUTOMATION BY TRIGGERS

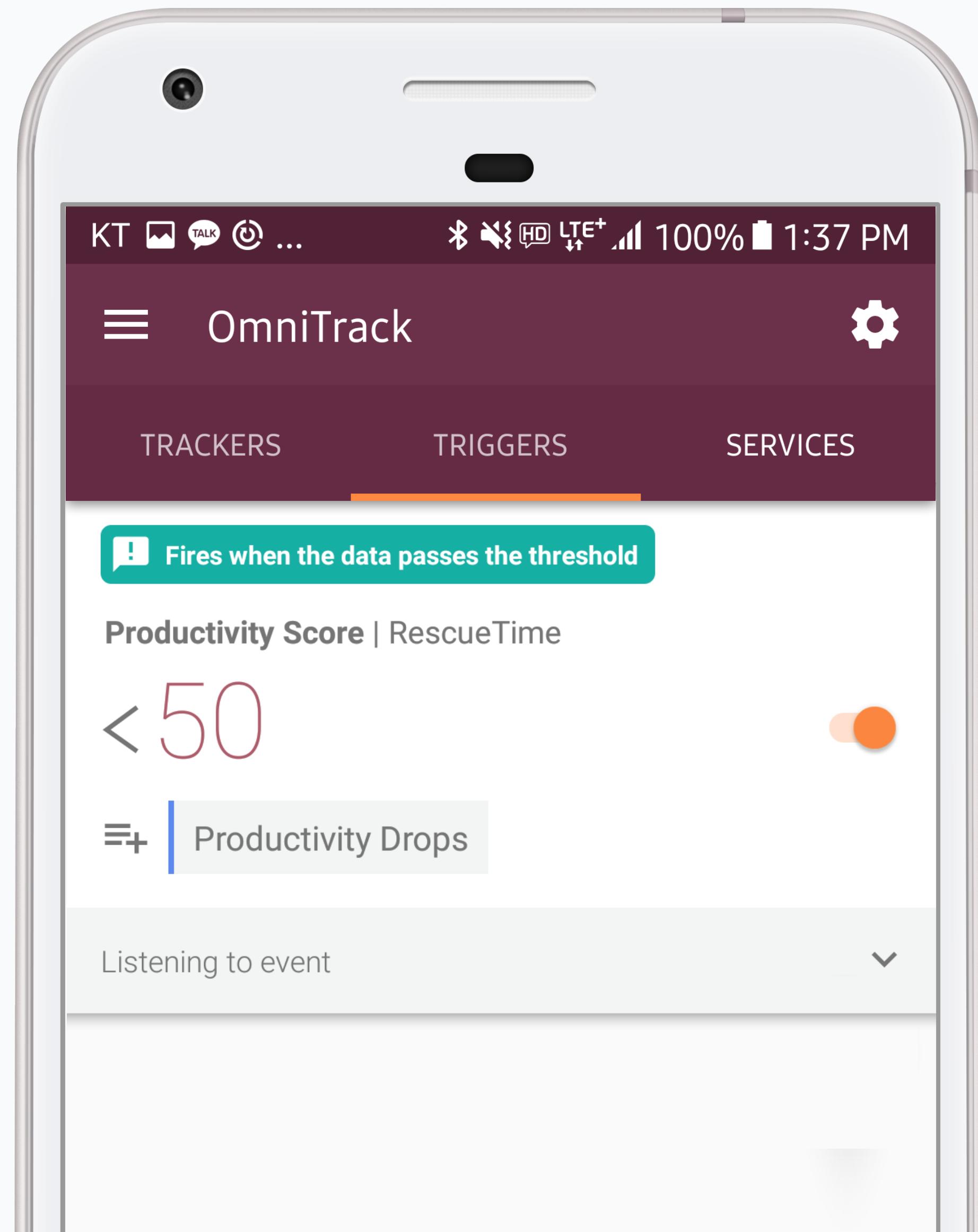


Triggers:

Automatically pushes an item entry in background
when predefined conditions are met.

Time-based trigger:
Log daily step count at every midnight
Fired either at the preset time or
at periodic intervals

TRACKING AUTOMATION BY TRIGGERS



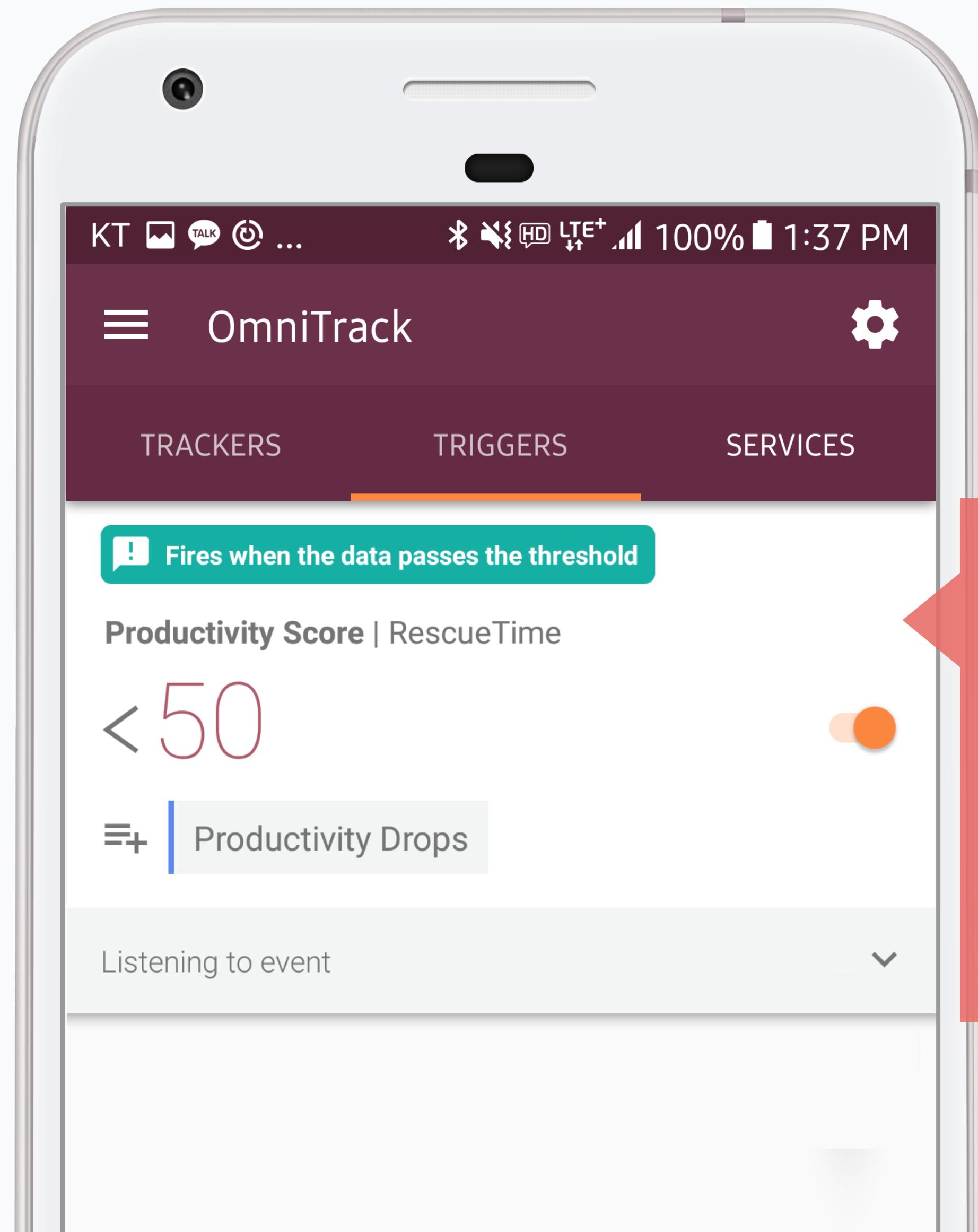
Triggers:

Automatically pushes an item entry in background
when predefined conditions are met.

Data-driven trigger:

Fired when the attached [external service](#)
measurement value passes the threshold

TRACKING AUTOMATION BY TRIGGERS



Triggers:

Automatically pushes an item entry in background
when predefined conditions are met.

Log the time when my productivity drops
Data-driven trigger:
under 50%.





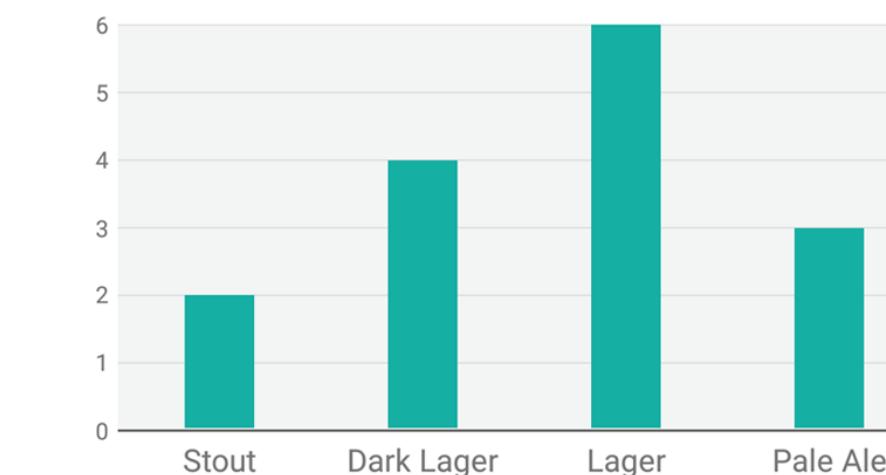
VISUALIZATION



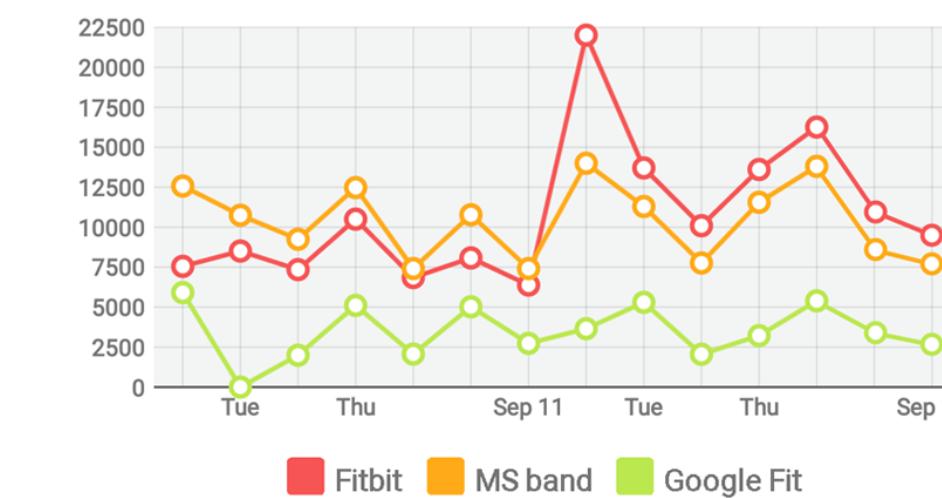
A Visualization Dashboard provides visualizations curated by **field-level heuristics**

Supported Visualizations:

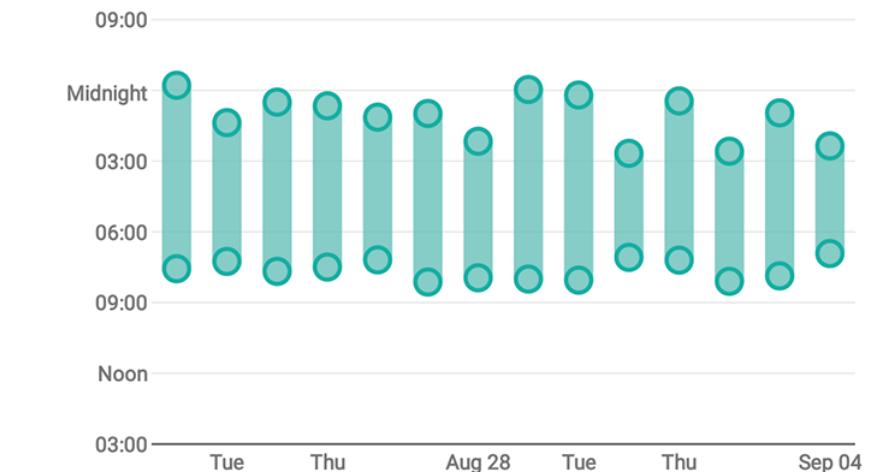
Type Distribution



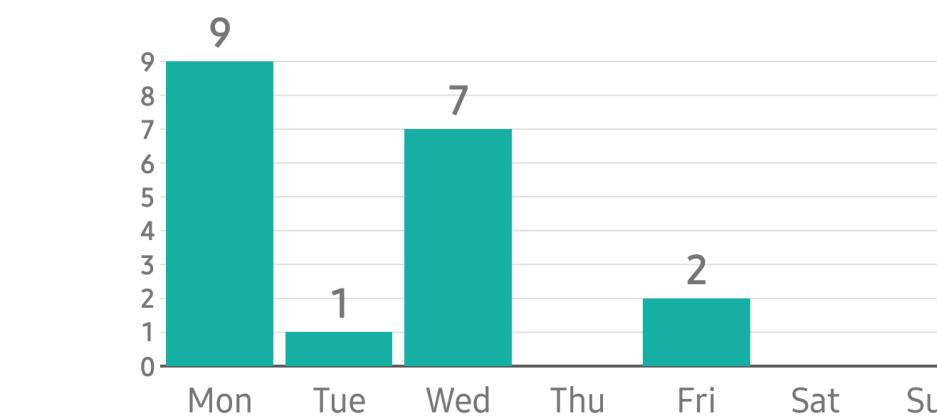
Numeric Fields on Timeline



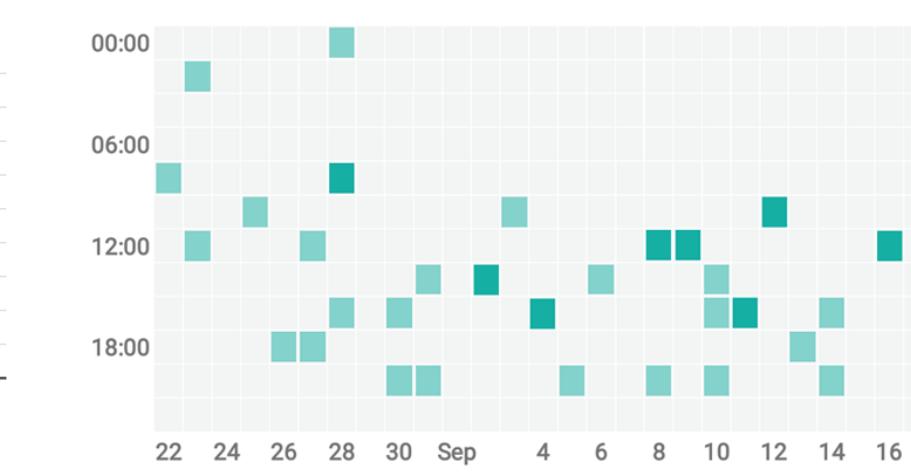
Sleep Duration

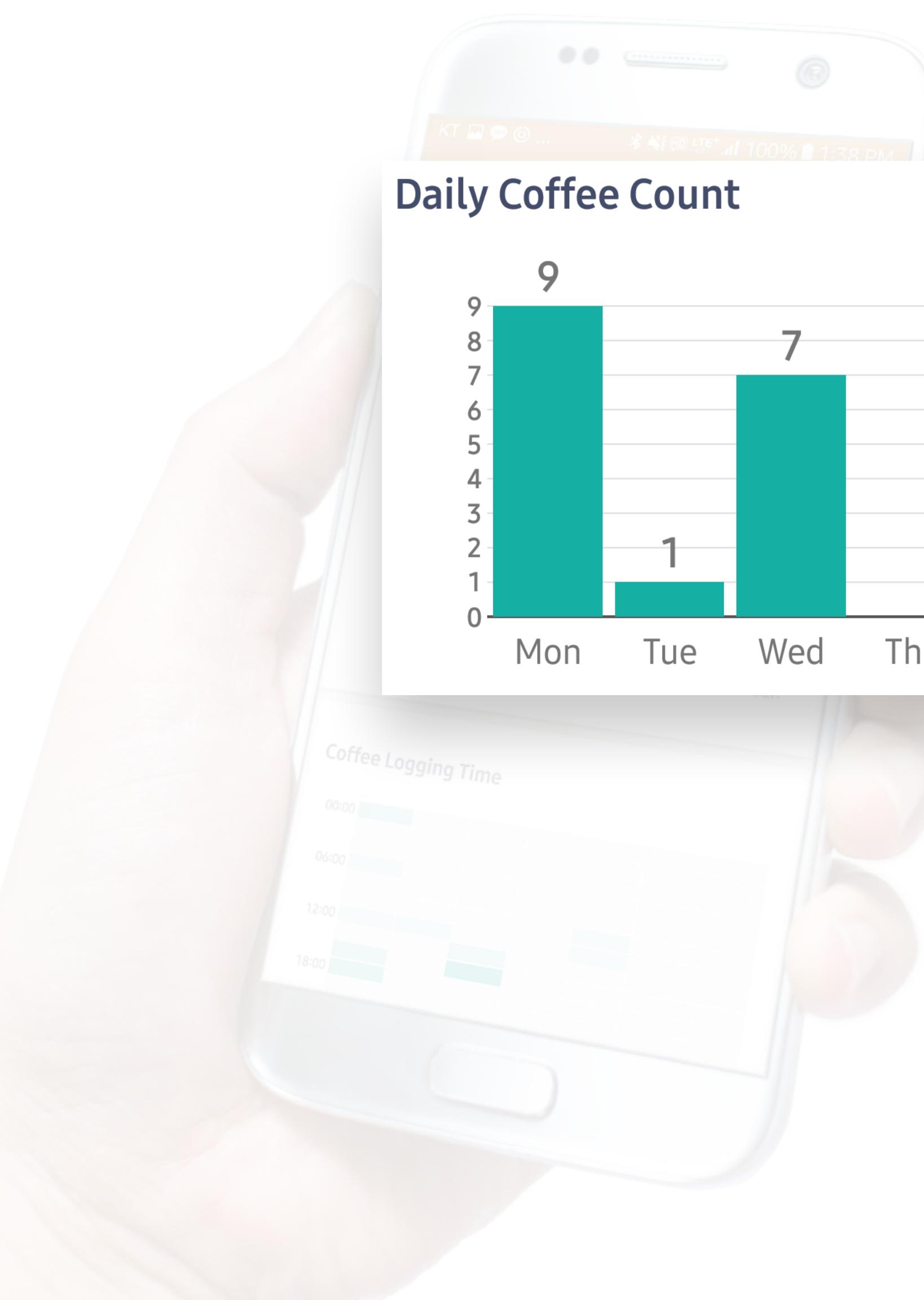


Daily Coffee Count

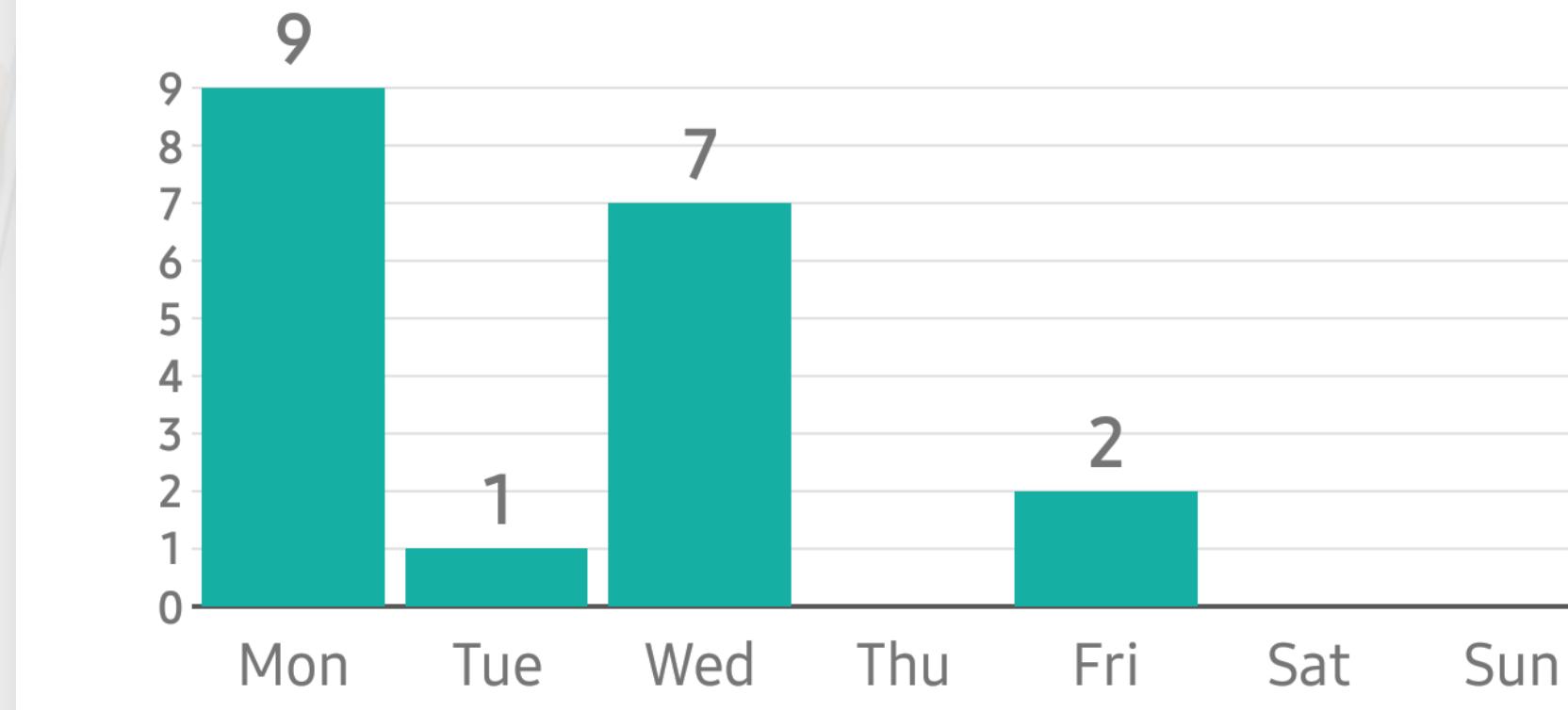


Coffee Logging Time





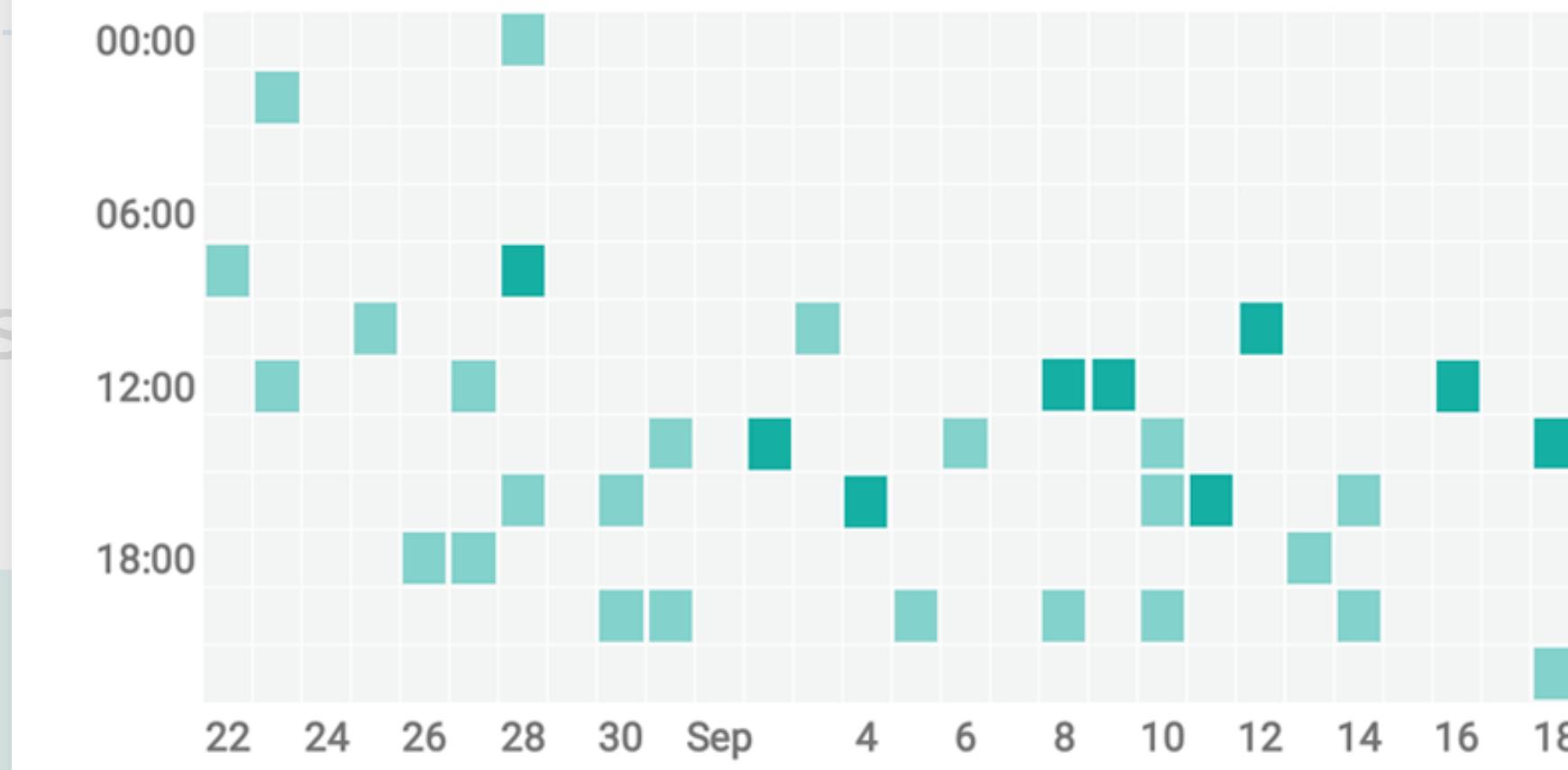
Daily Coffee Count



A Visualiza

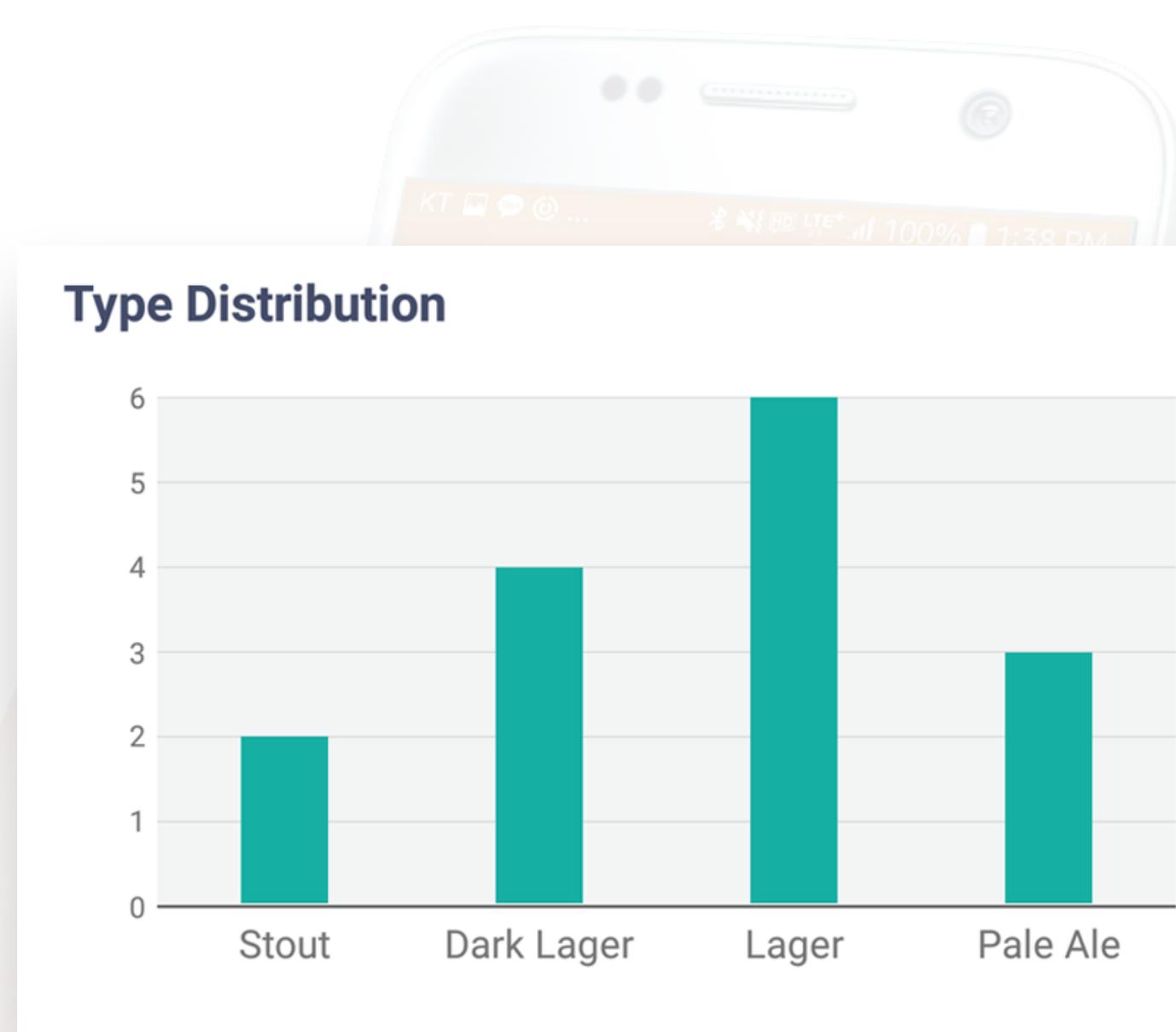
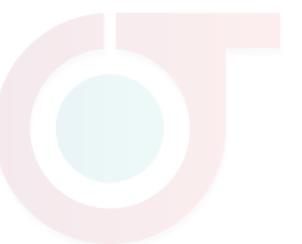
Logging Patterns

Coffee Logging Time

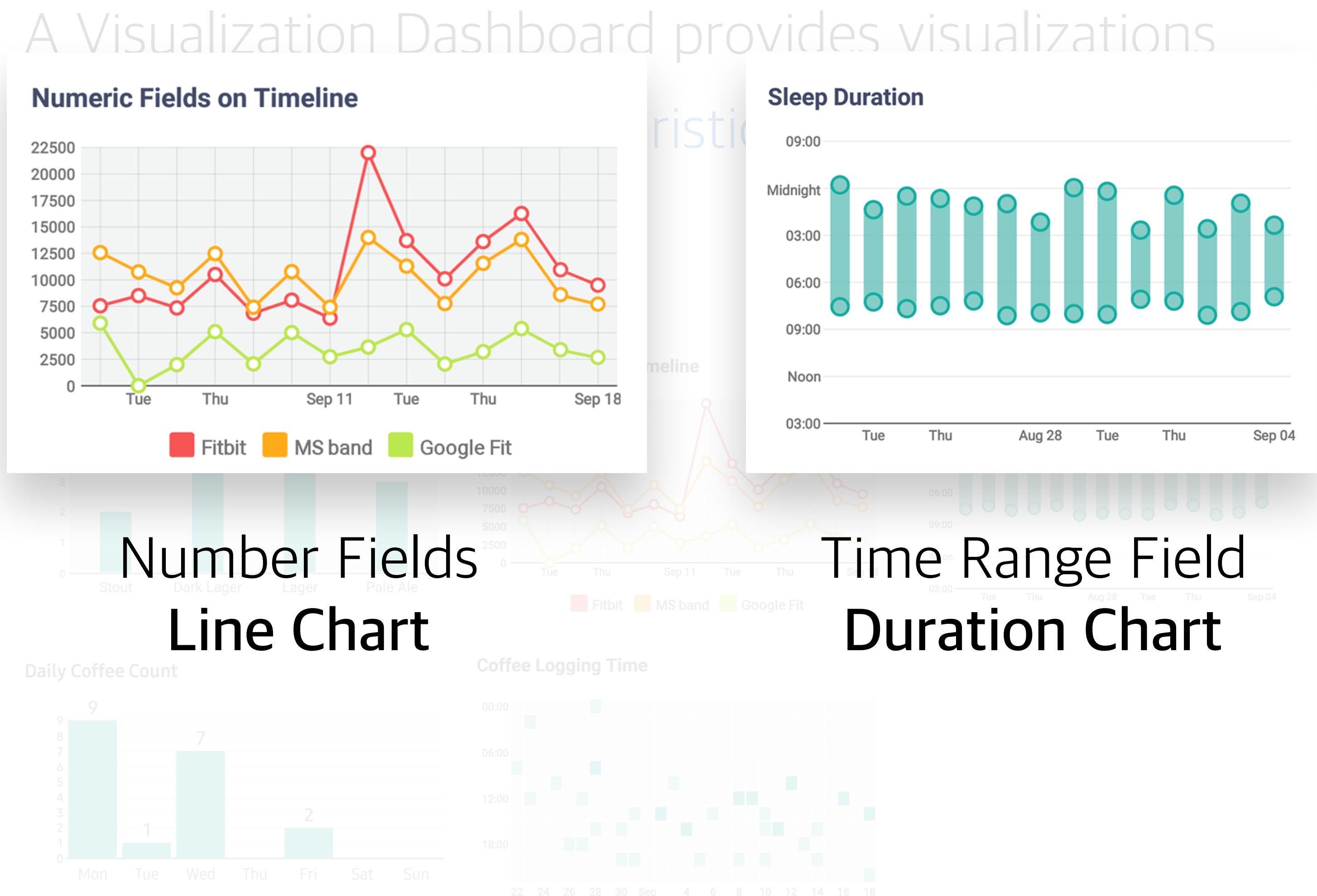


ons

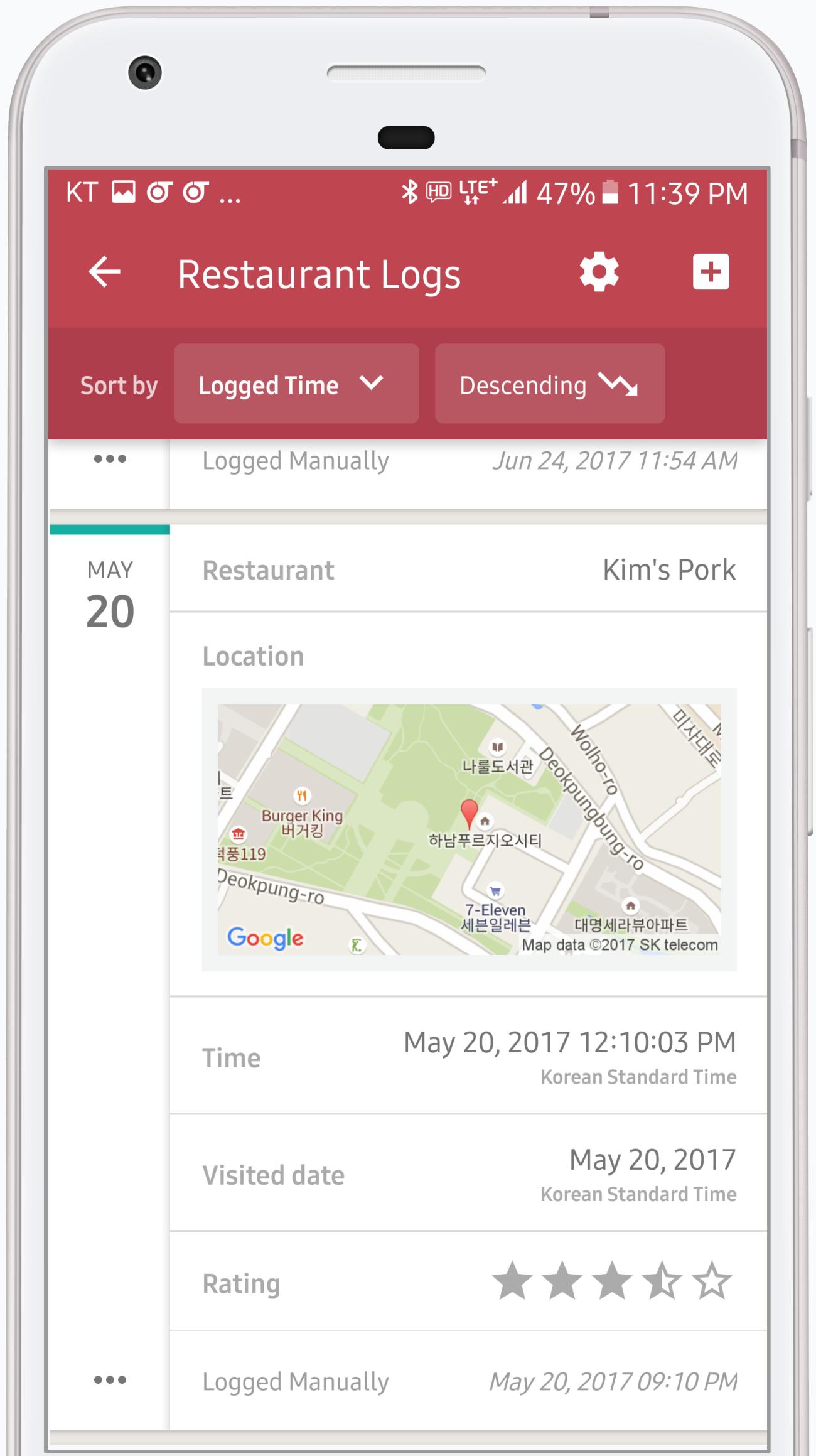
VISUALIZATION



Choice Field Histogram



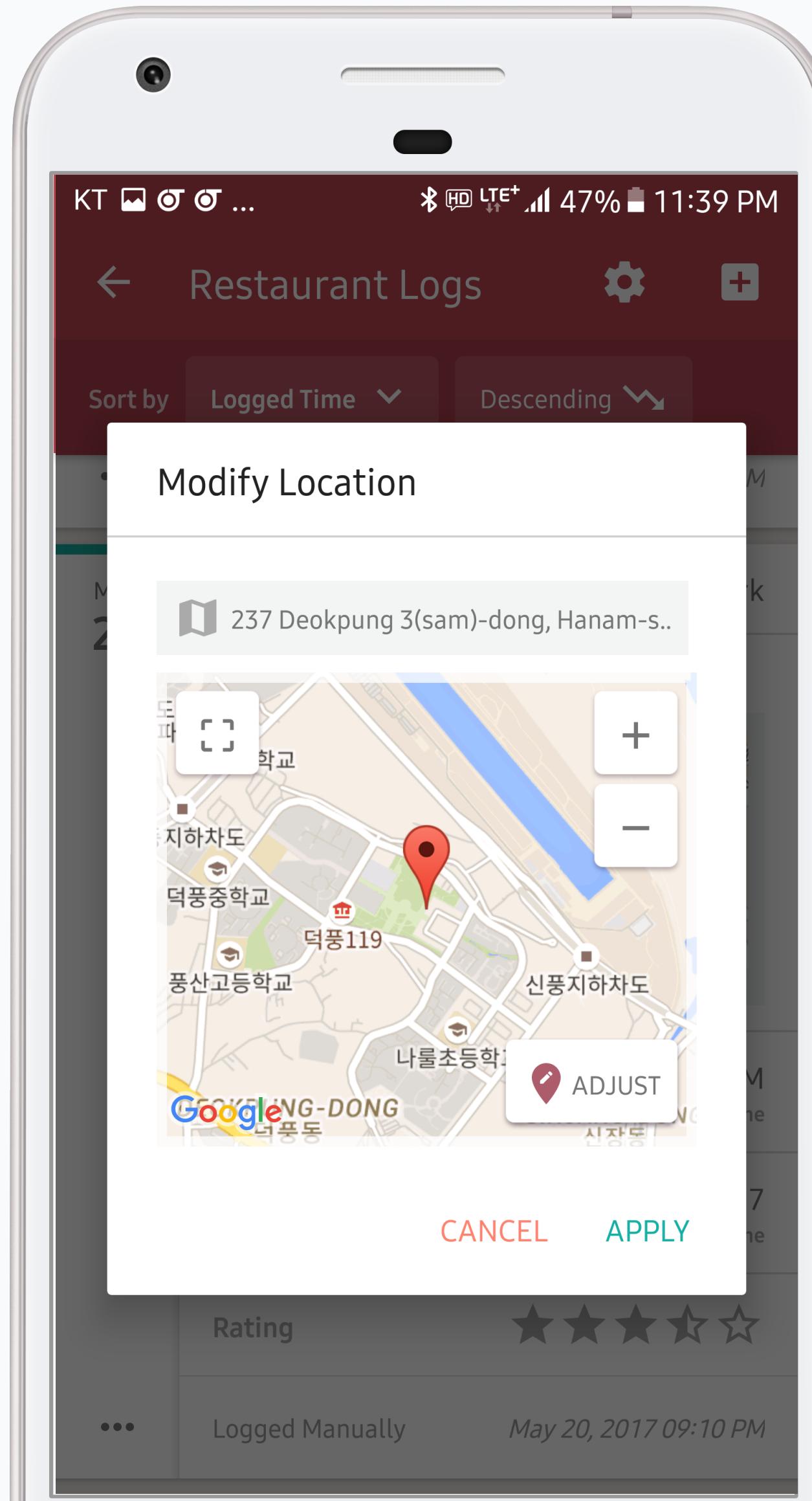
REVIEWING ITEMS AND EXPORT



Item List Page:

Logged items are listed, browsed, and modified.

REVIEWING ITEMS AND EXPORT

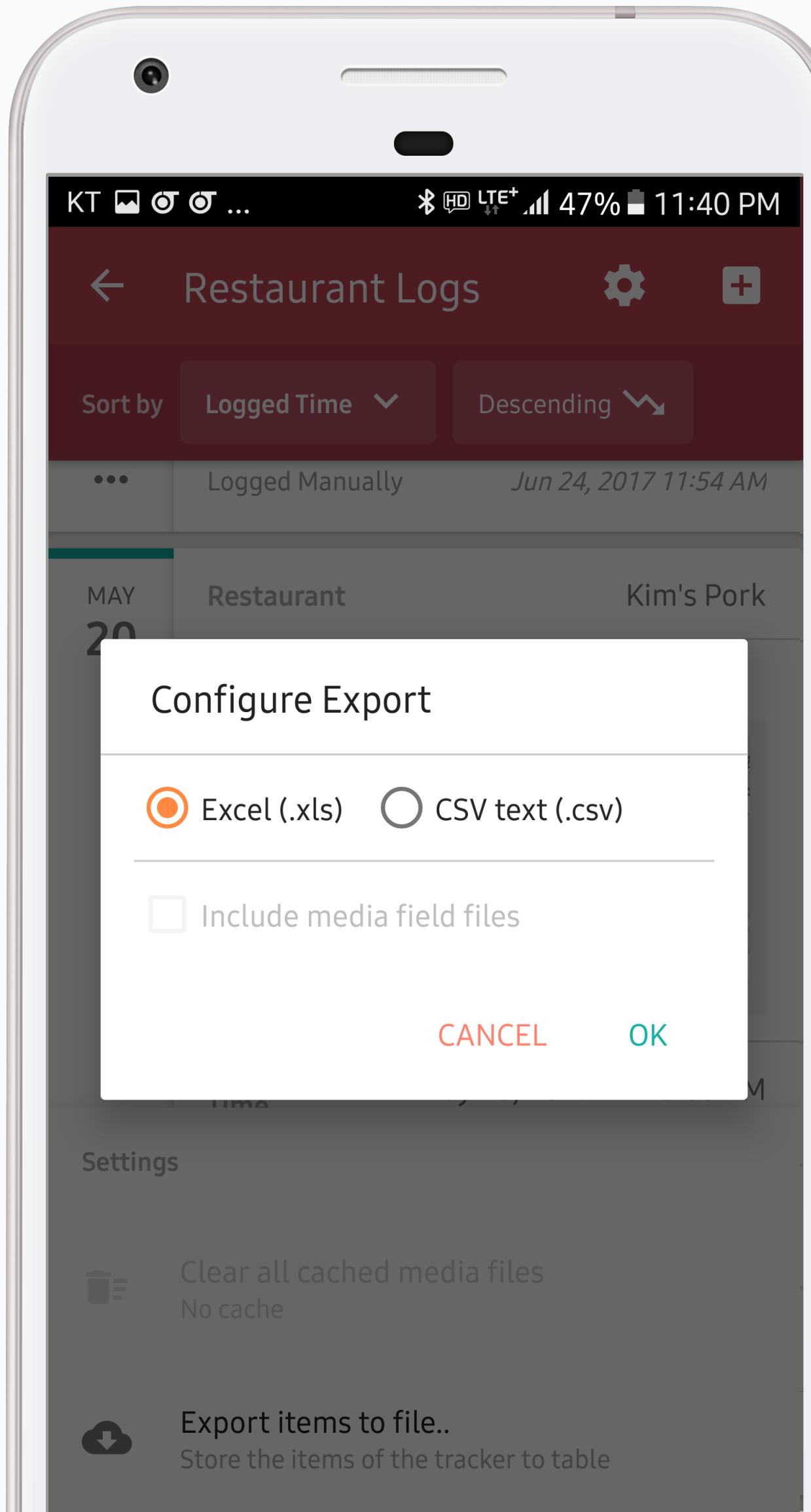


Item List Page:

Logged items are listed, browsed, and modified.

Individual field value can be edited after logging.

REVIEWING ITEMS AND EXPORT



Item List Page:

Logged items are listed, browsed, and modified.

Individual field value can be edited after logging.

Item table + media files (images, audios) can be exported and shared for further analysis.



Preliminary
Survey

Design &
Implementation

Usability
Study

Field Deployment
Study



GOALS OF THE DEPLOYMENT STUDY

1. Assess if people **can** capitalize on OmniTrack
2. Assess **how** people use the OmniTrack app
3. Assess OmniTrack's **flexibility**



PARTICIPANTS

N = 21 (11 Females)

11 Undergrads / 6 Grads / 4 Workers

Ages 22 ~ 34

■ Screener

1. Android User
2. Has a tracking experience using any methods
3. Interested in self-tracking

EXPERIMENT DESIGN



Send Play Store Link



3 weeks

Exit Interview



No Face-to-Face Tutorial, 4 Example Trackers by Default



RESULTS

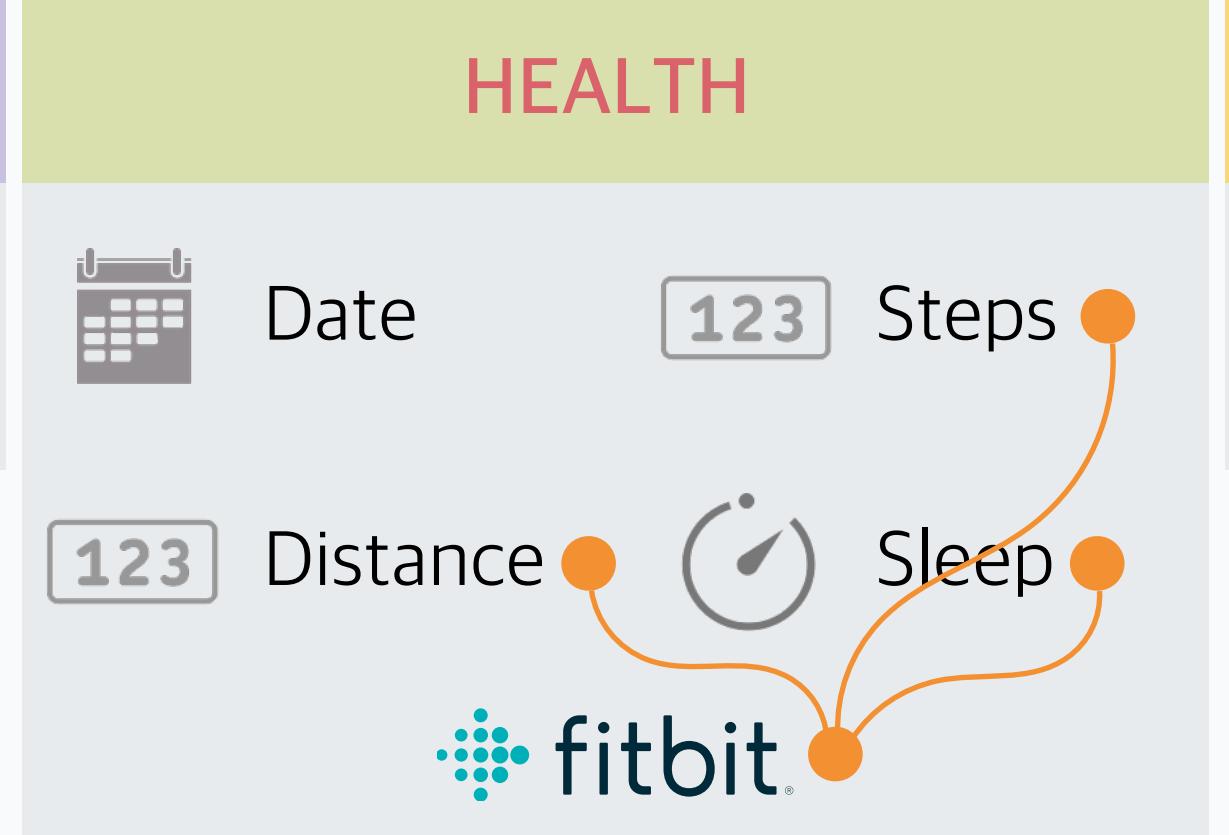


RETAINED TRACKERS





TRACKER STYLES

In-Situ Experience Tracker	Timestamper	Daily Summary	Archive
Capture experience when occurred	A single-button tracker to record timestamp	Recorded the aggregated information once a day	Archiving or journaling memories
MOOD When Mood Emotion	ALERGY PILL Taken At <i>On Shortcut Panel</i>	HEALTH Date Steps Distance Sleep  fitbit	RESTAURANT-WANNA-GO Memo <i>On Shortcut Panel</i>
<i>On Shortcut Panel</i>		<i>Trigger at 1:00 AM</i>	

TRACKER STYLES



In-Situ Experience Tracker

Capture experience
when occurred

Timestamper

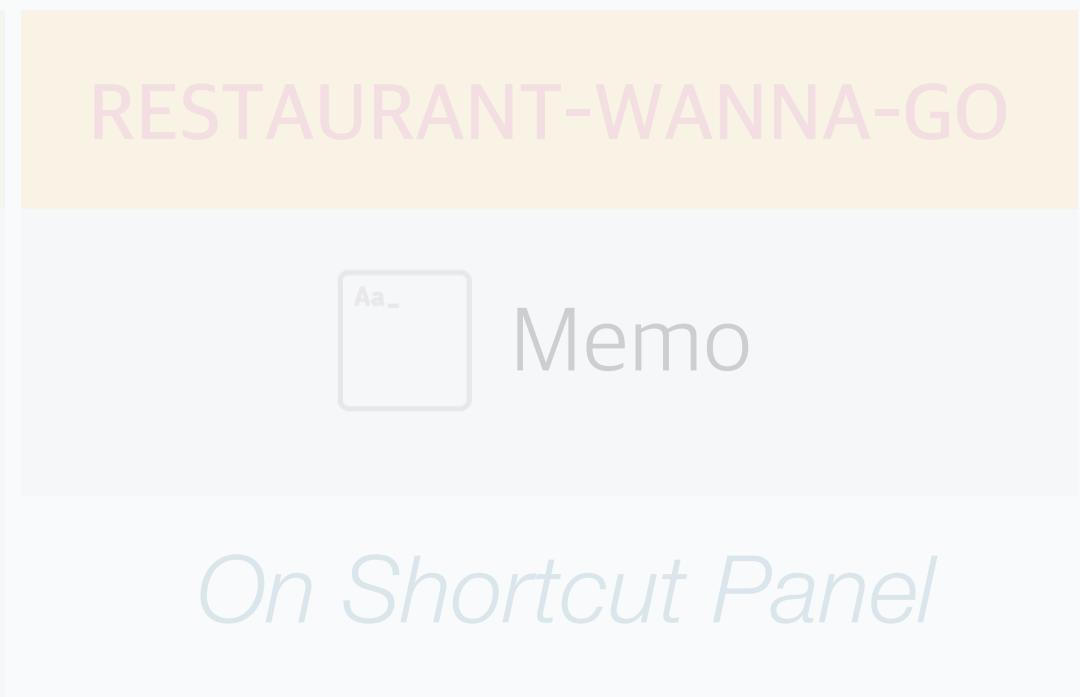
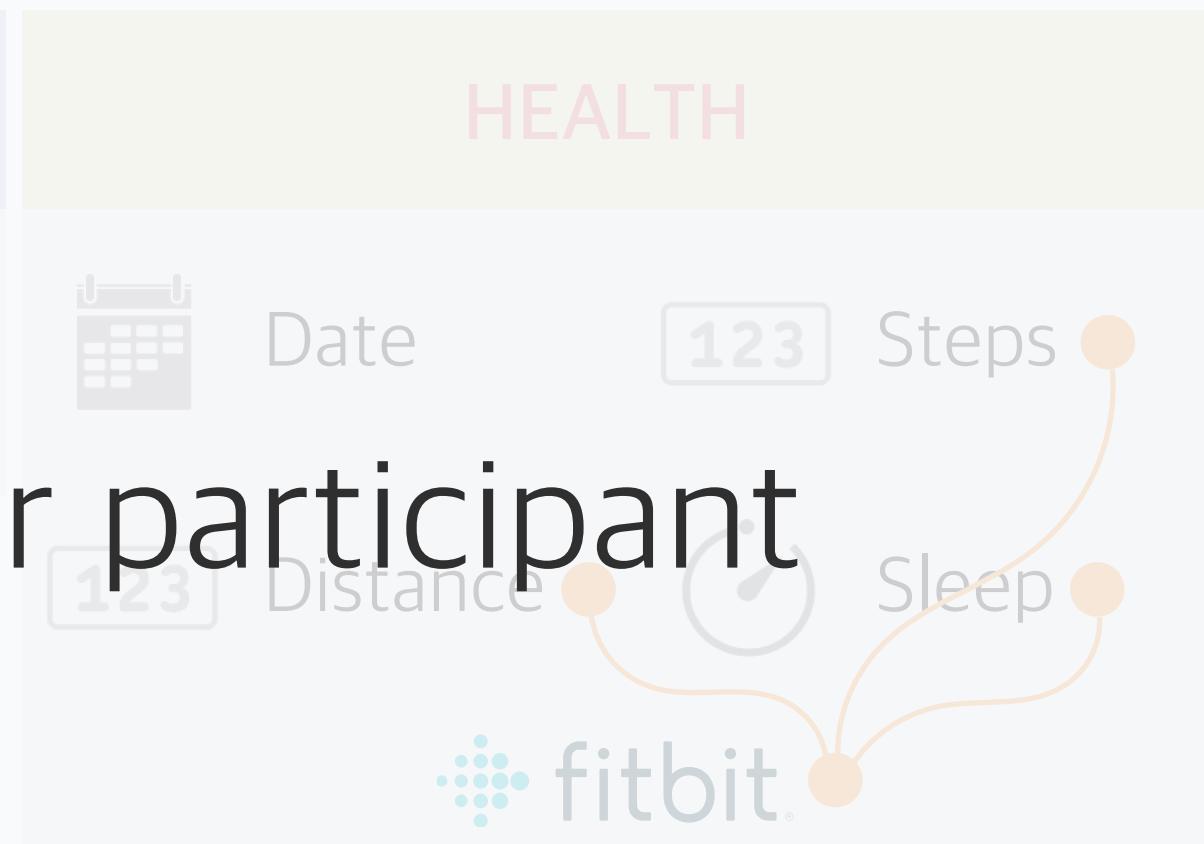
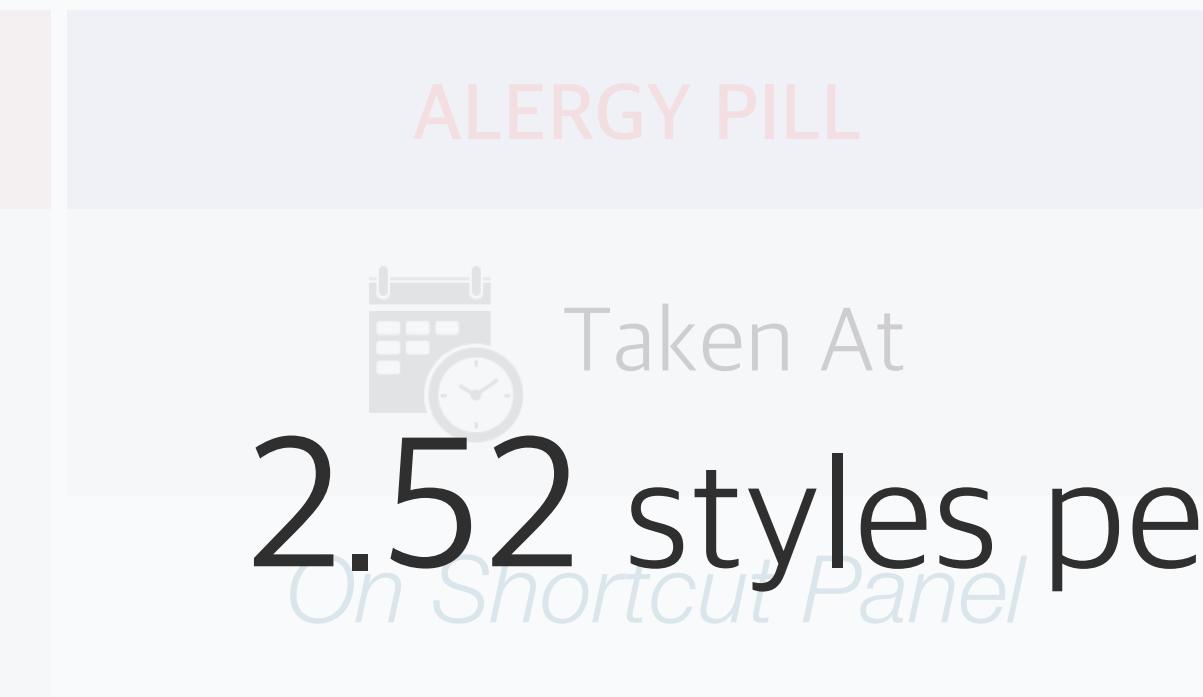
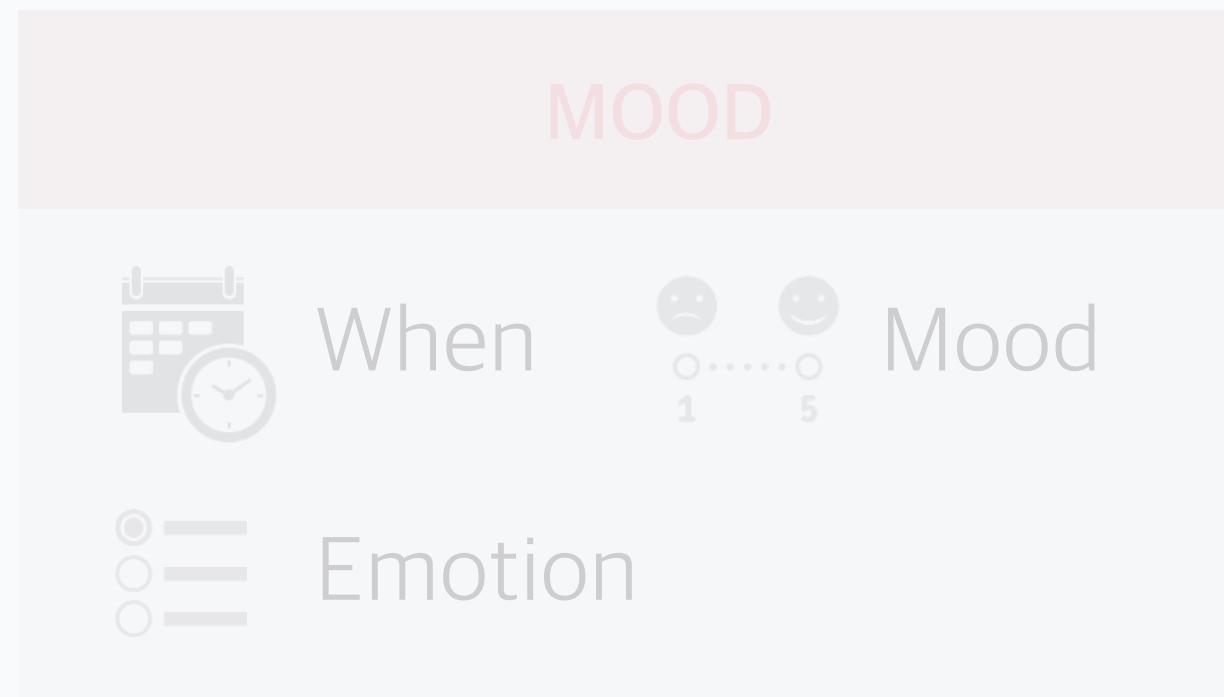
A single-button tracker
to record timestamp

Daily Summary

Recorded the aggregated
information once a day

Archive

Archiving or journaling
memories

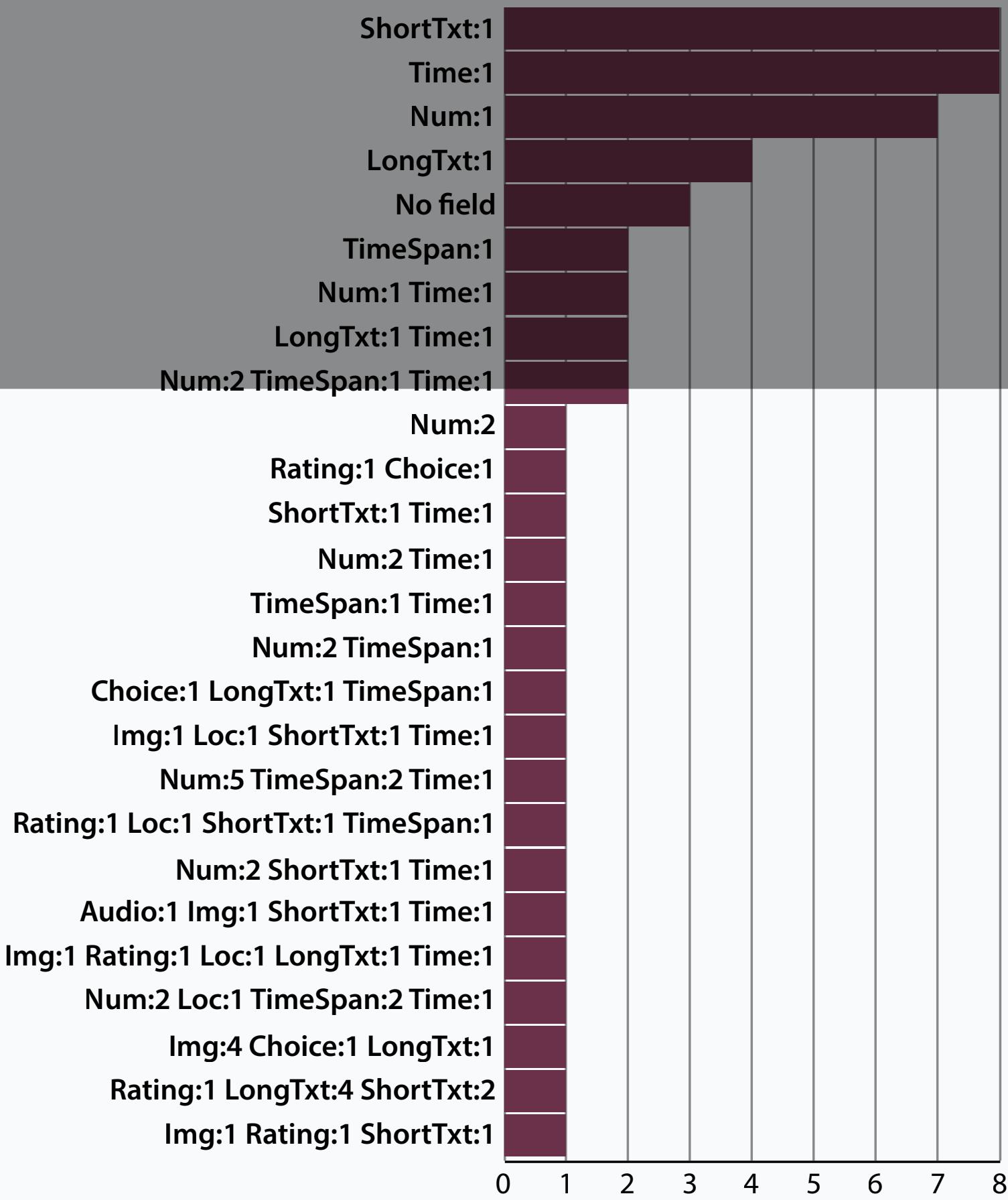


2.52 styles per participant

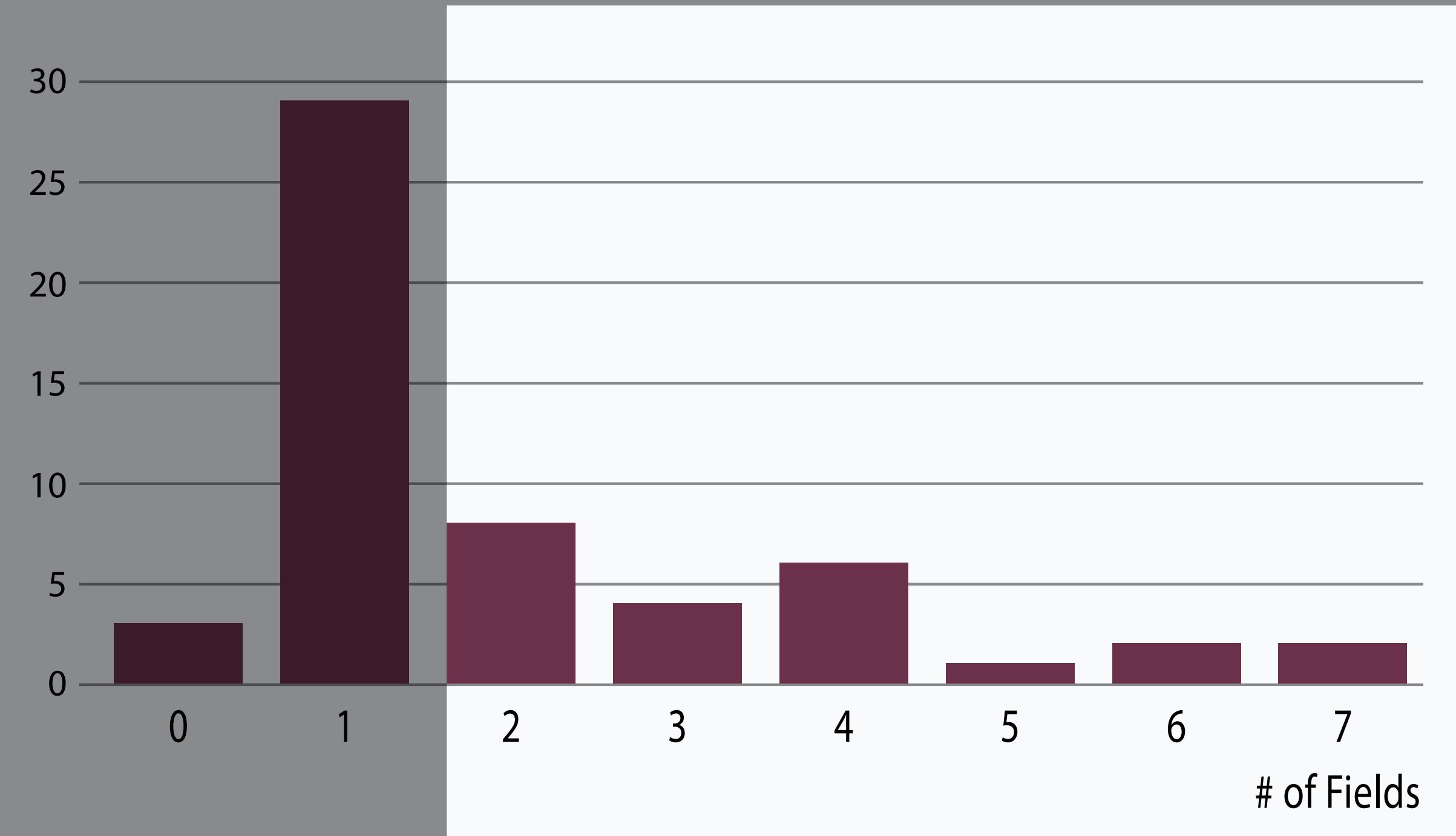
On Shortcut Panel

Trigger at 1:00 AM

TRACKER DIVERSITY



Tracker schema distribution



Field count distribution

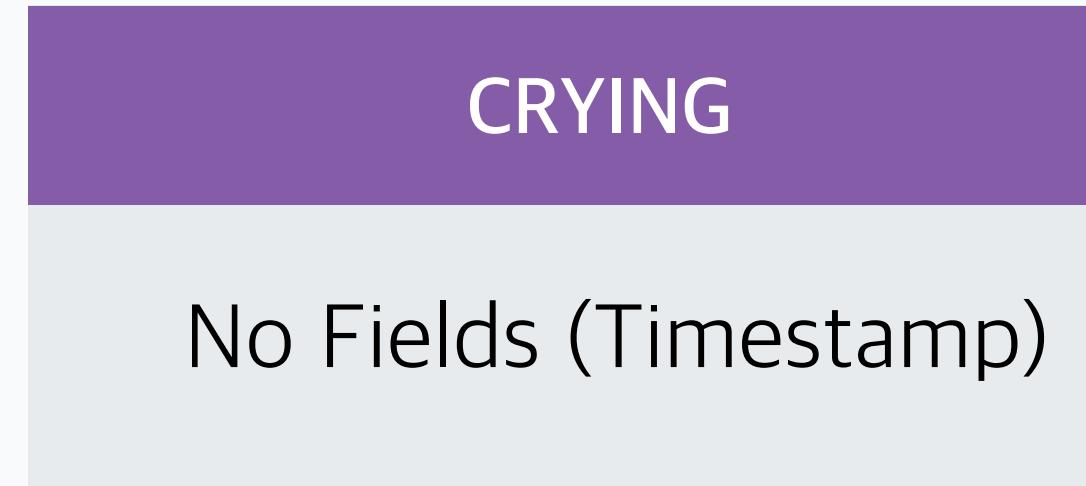
Long-tailed Distribution
Complicated and long trackers at the tail end



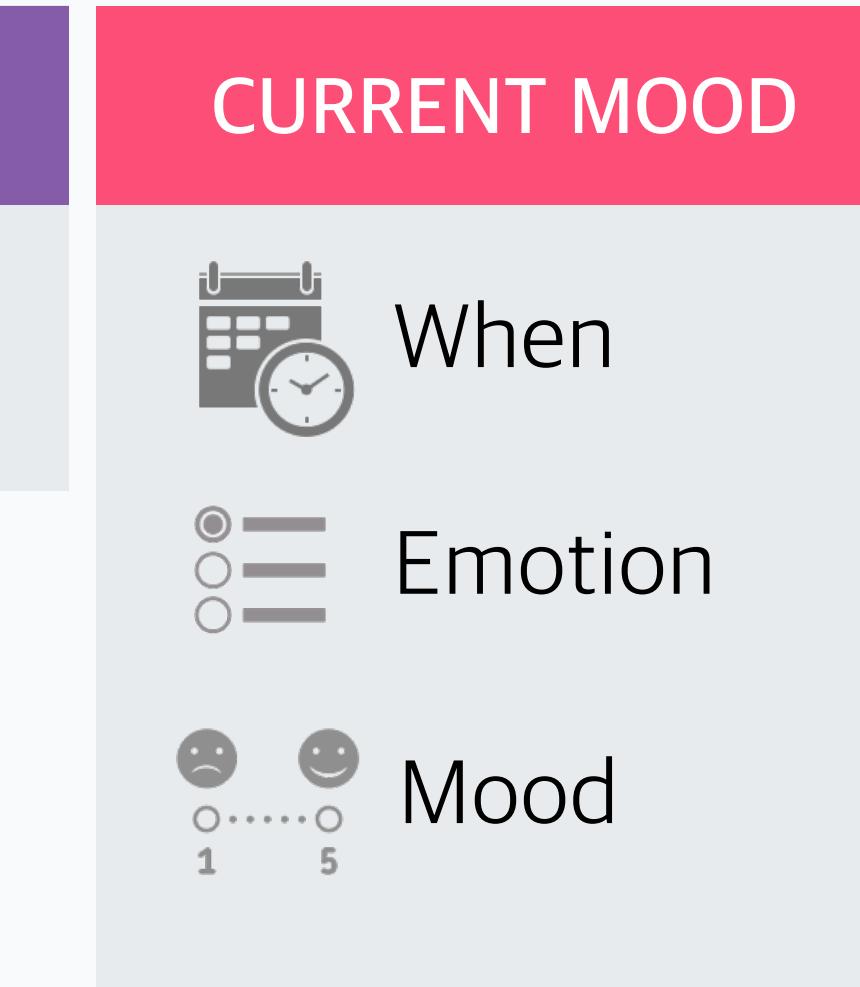
TRACKER DIVERSITY

5 heterogeneous designs for mood tracking

D19 Male, Undergrad

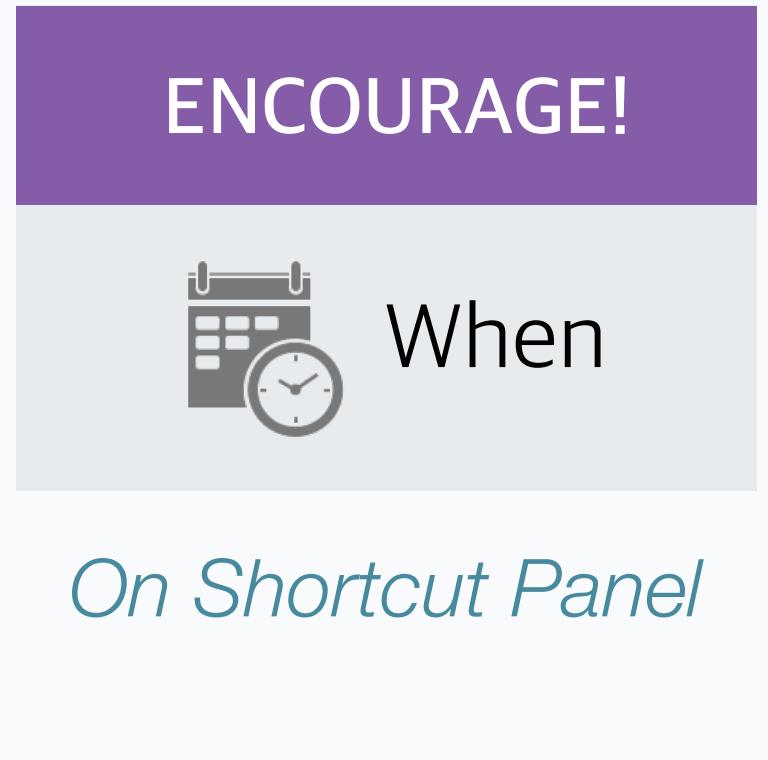
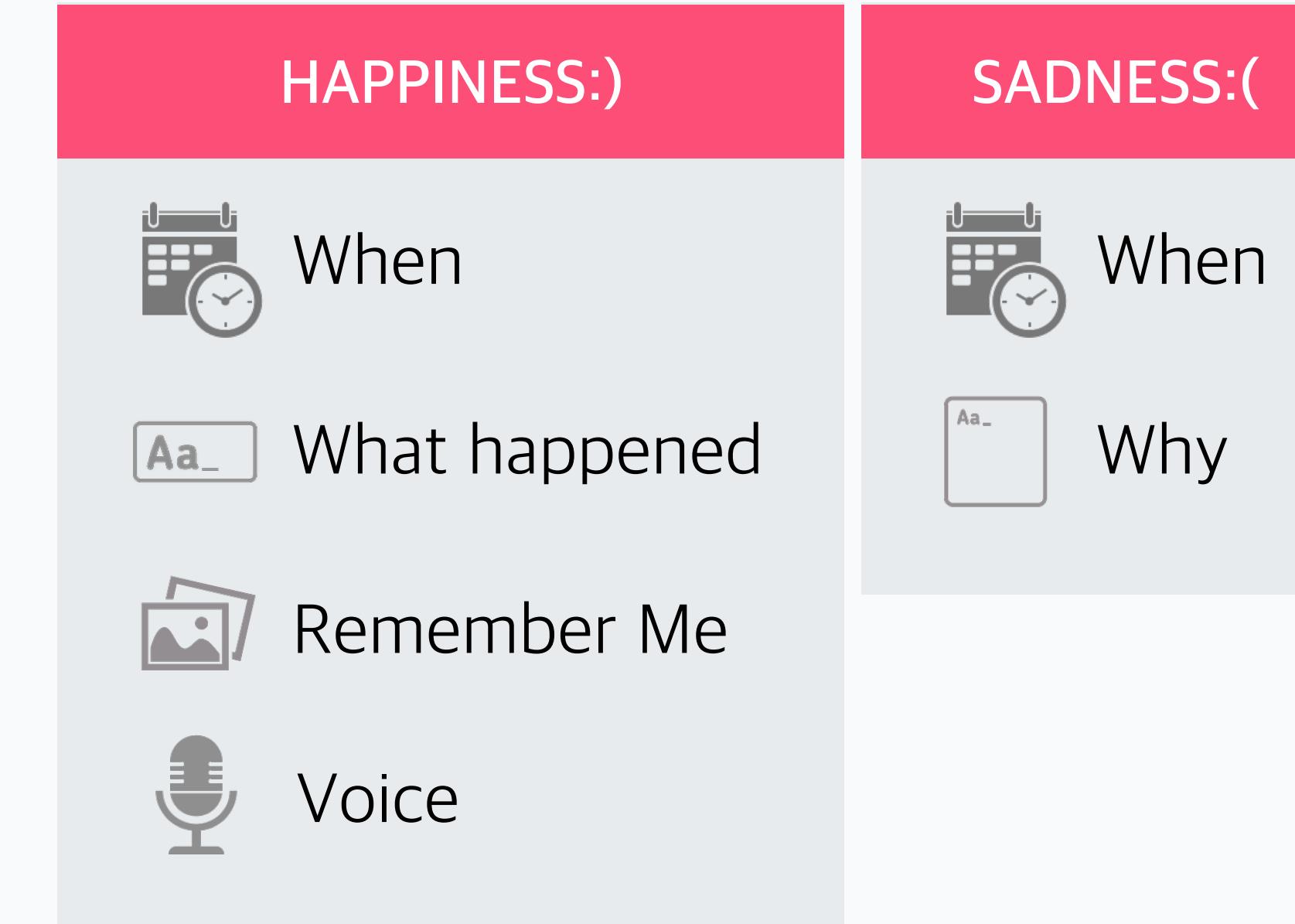


On Shortcut Panel



- In-Situ Experience Logger
- Timestamper

D8 Female, Undergrad

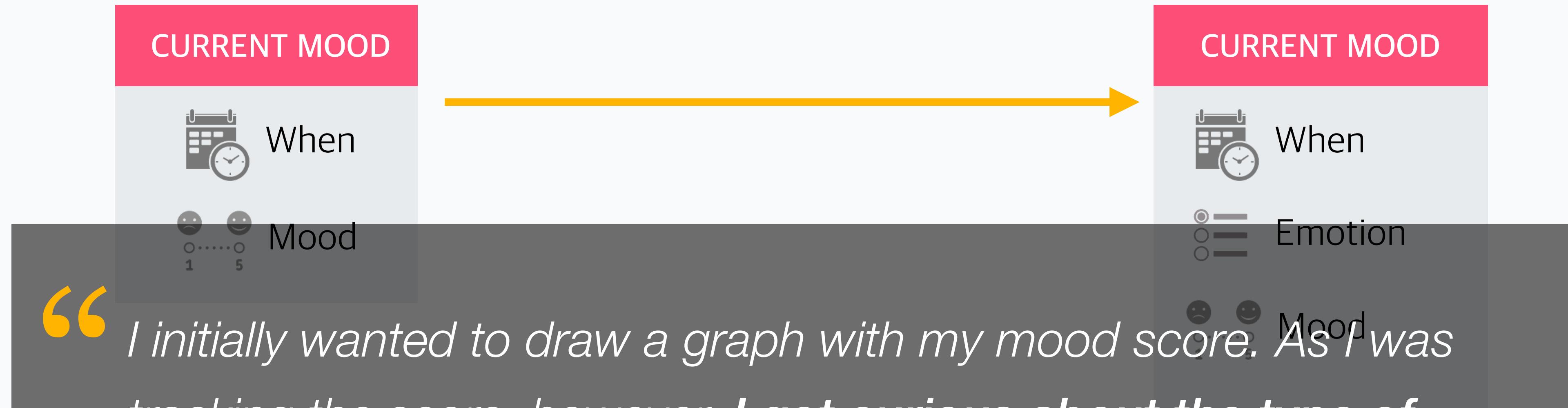


On Shortcut Panel

TRACKER REFINEMENT



33% participants modified their trackers after started logging.



“

I initially wanted to draw a graph with my mood score. As I was tracking the score, however, I got curious about the type of mood I felt. So I added a checkbox and appended new mood types every time I encountered a new one.



DISCUSSION & FUTURE WORK



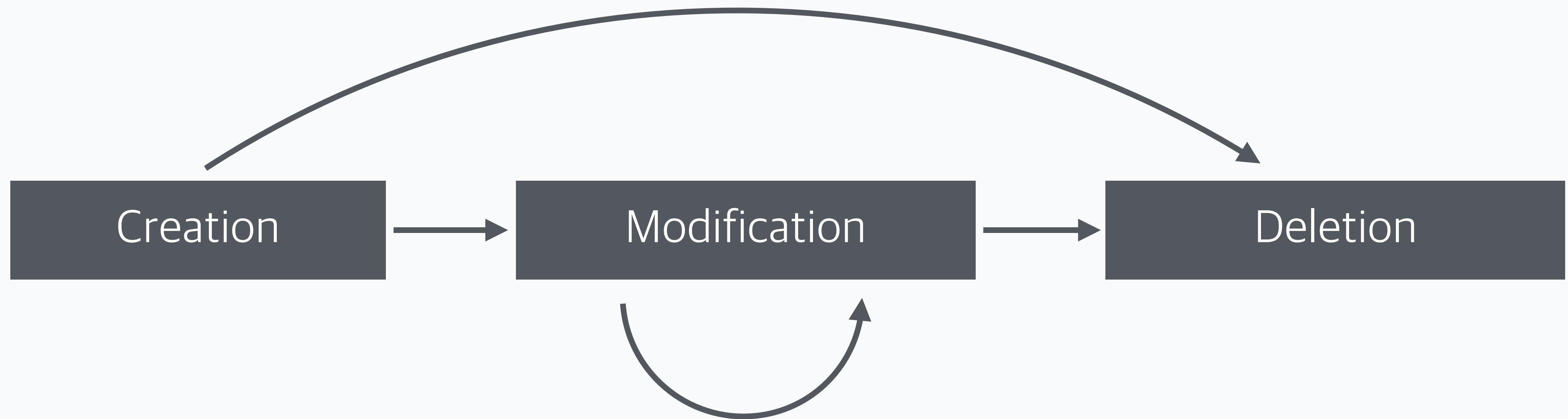
DIVERSE AND DYNAMIC NEEDS

- People's tracking needs are **diverse** and **dynamic** over time
- “*On the go*” modification feature fulfills individualized and sophisticated tracking needs



EXTENDING TRACKING DESIGN SPACE

Examining the **lifecycle of a tracker** in relation to people's corresponding stages of self-tracking





UTILIZING THE EXTERNAL CONTEXT

Integrating with the existing services and frameworks with mature ecosystem

AWARE

www.awareframework.com



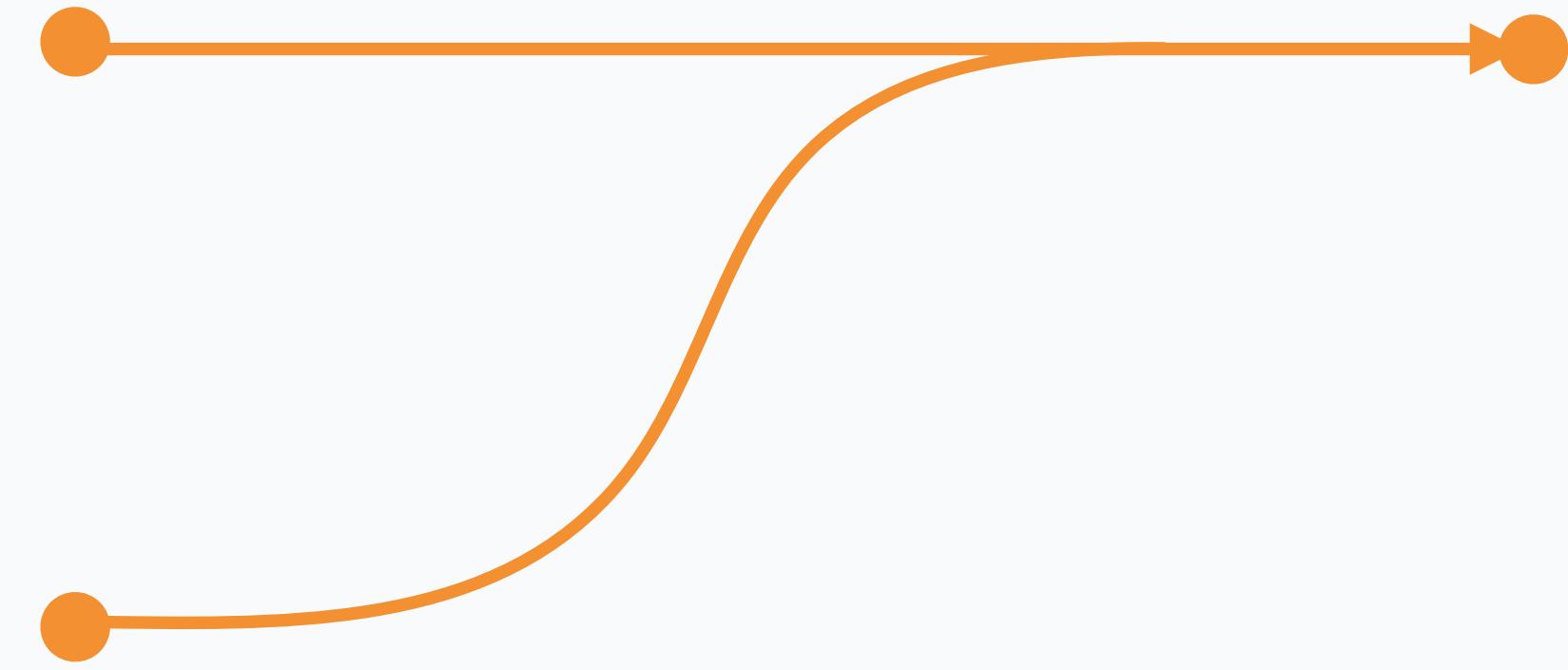
ifttt.com

Contextual sensing

Sophisticated Trigger



OmniTrack

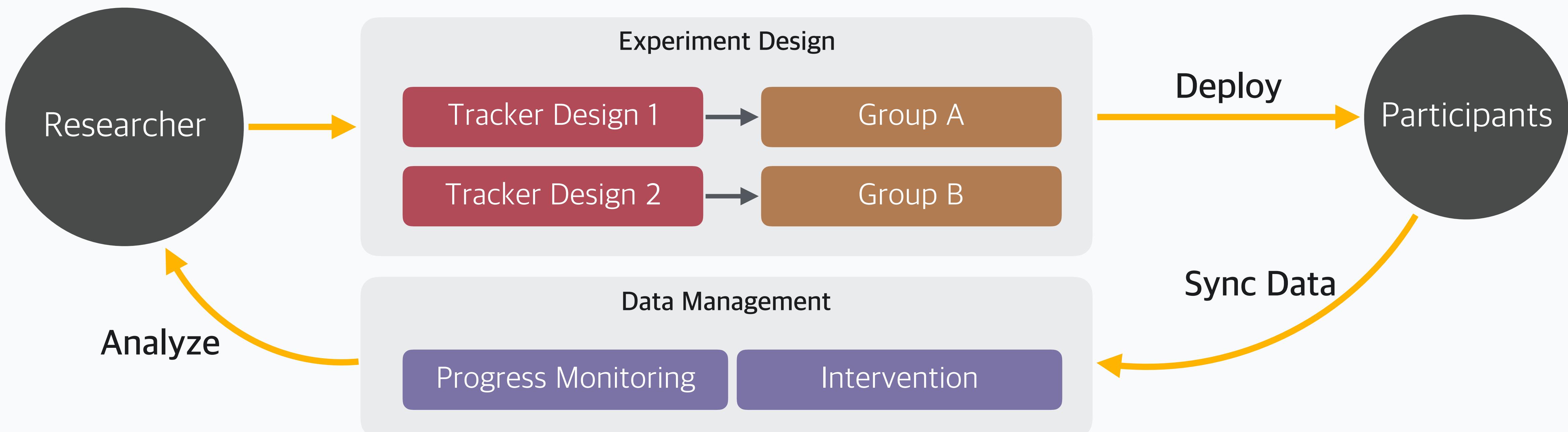


RESEARCHER SUPPORT

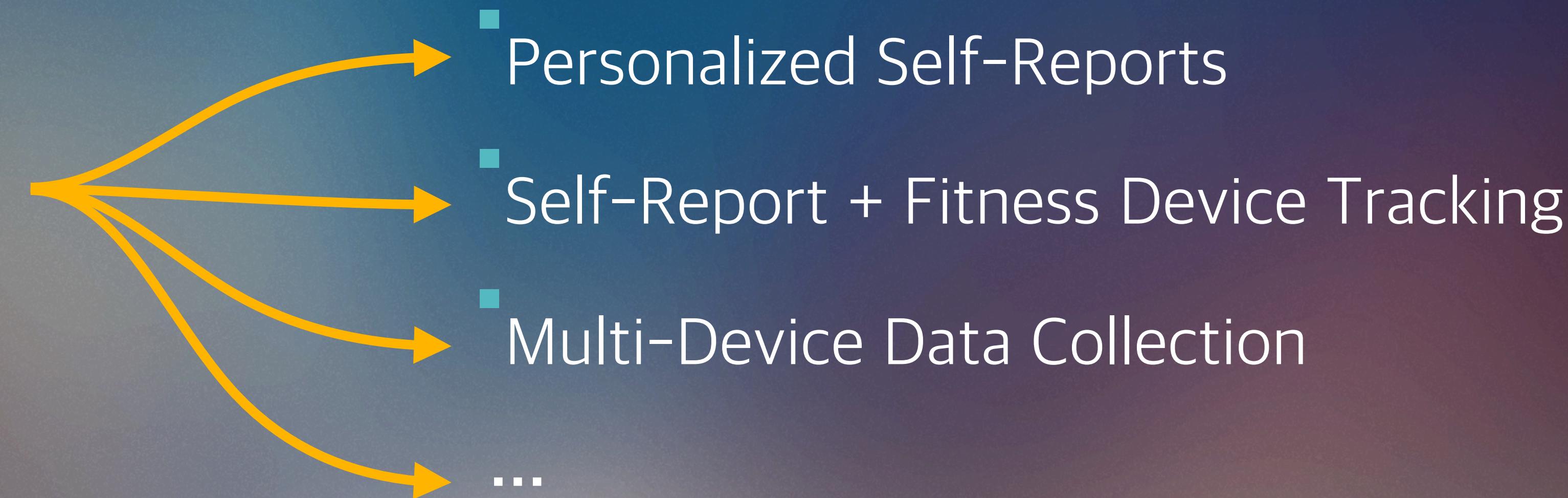


Data collection tool without programming
Maximizing data capture space by combining manual + automatic fields

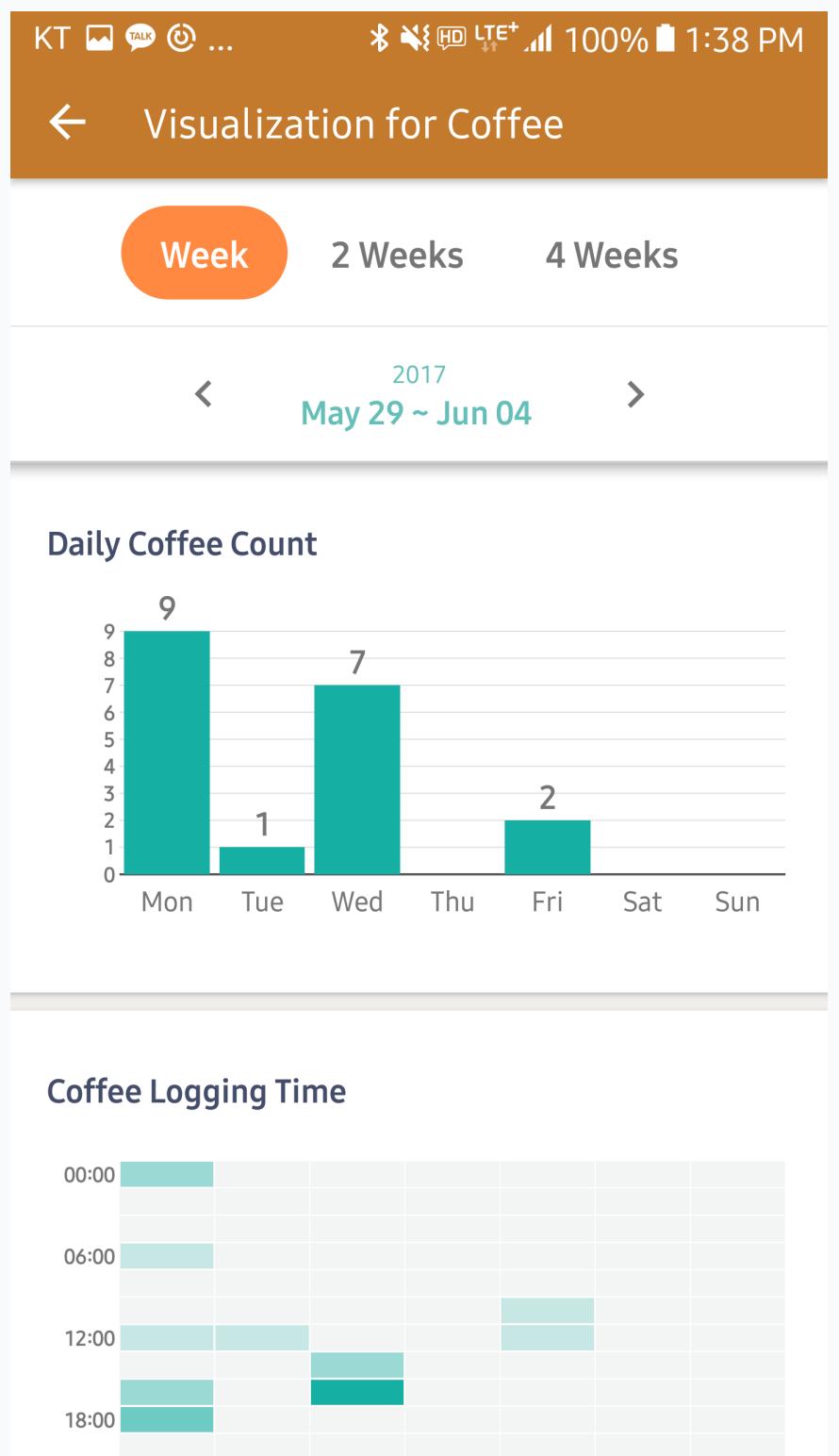
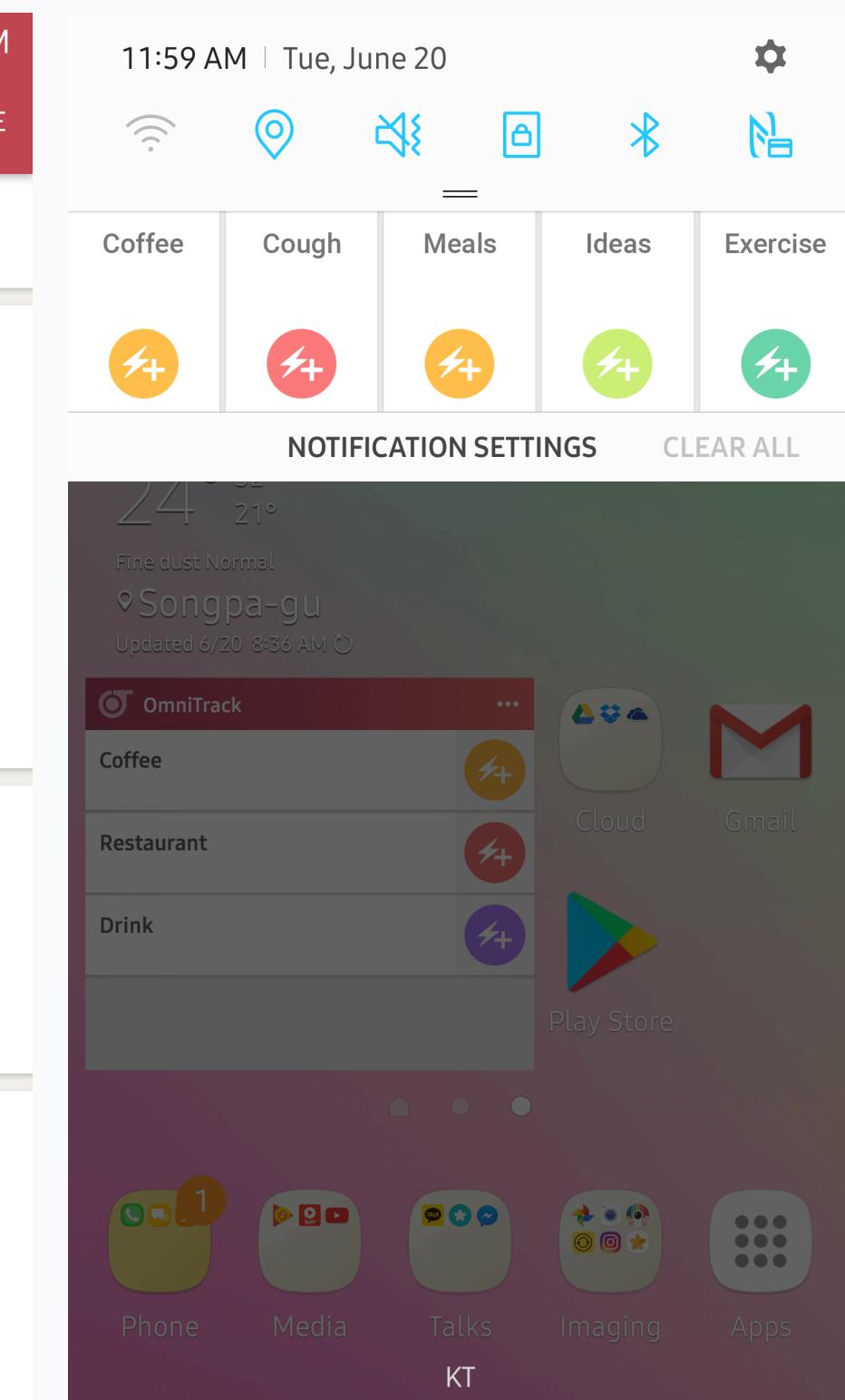
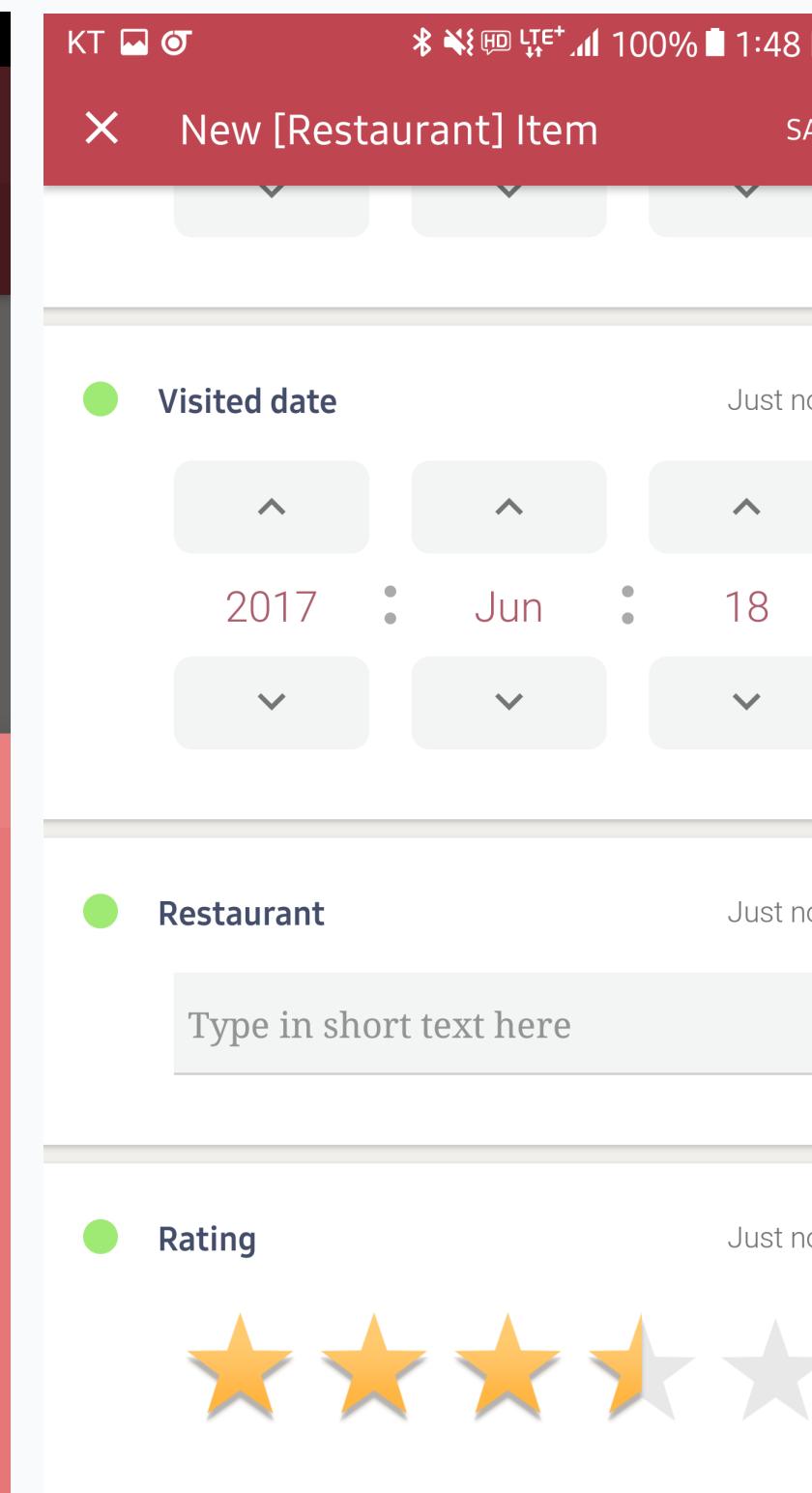
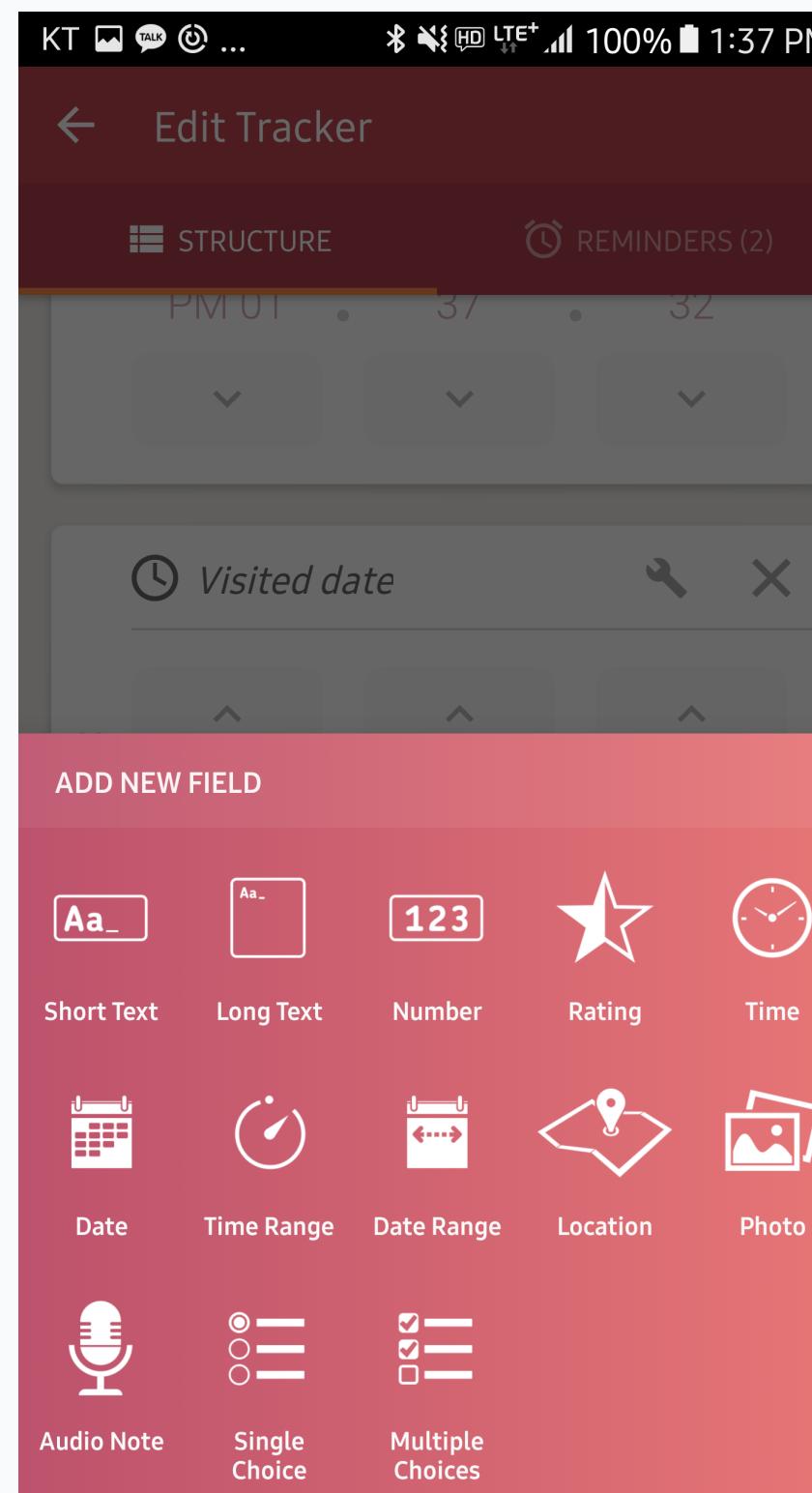
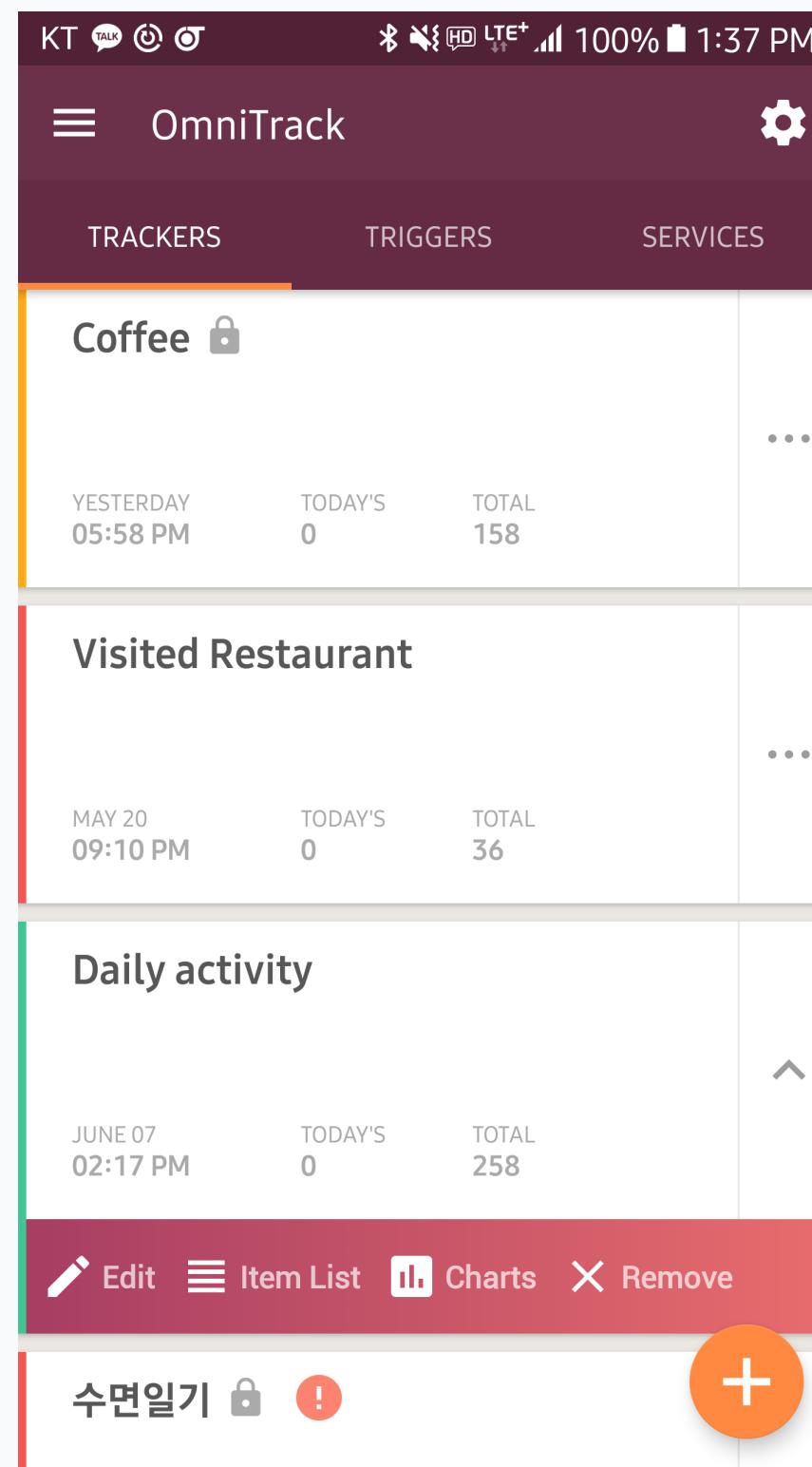
OmniTrack Research Toolkit



We are looking for researchers who are interested in conducting a diary study/ESM using OmniTrack.



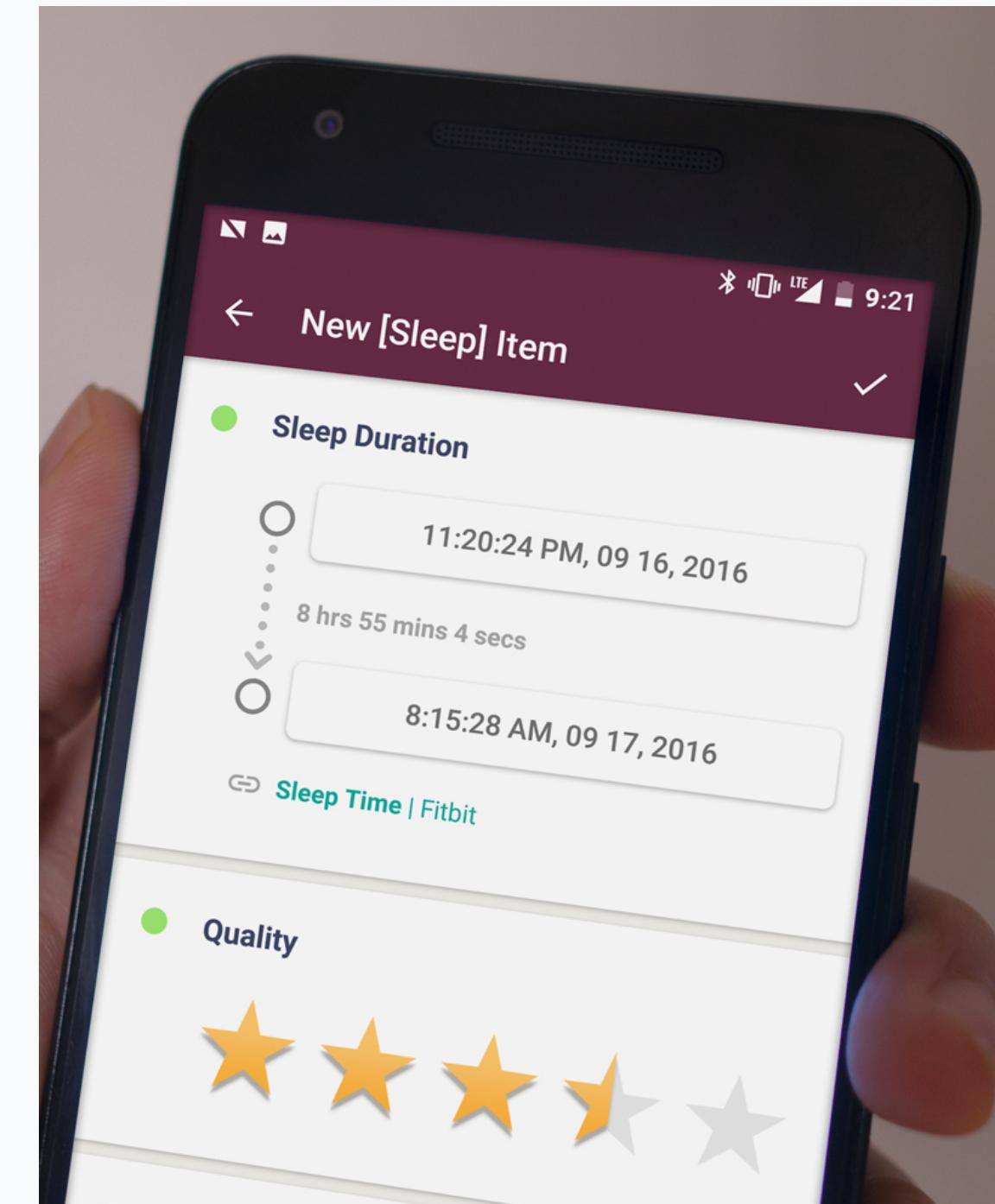
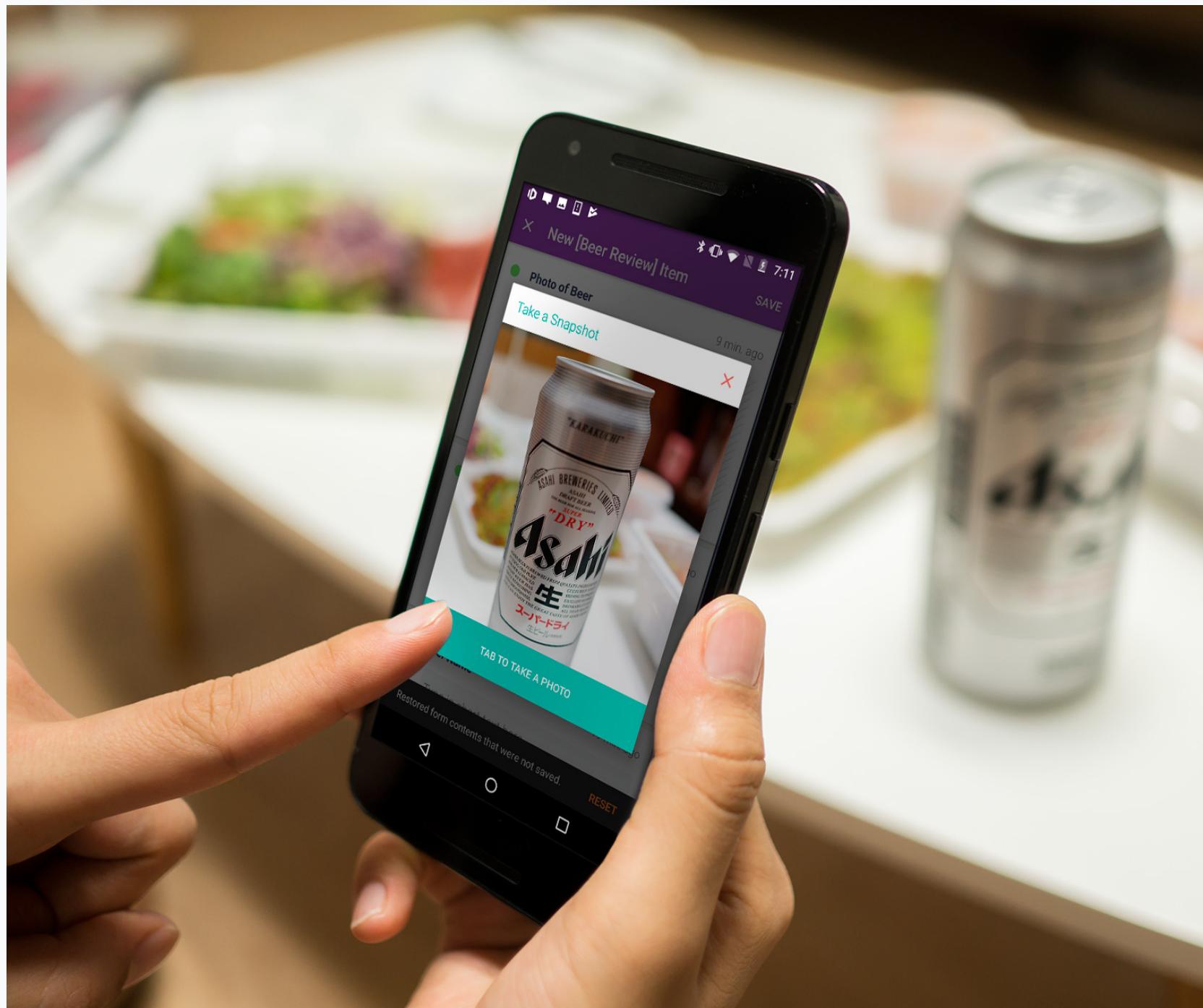
SUMMARY





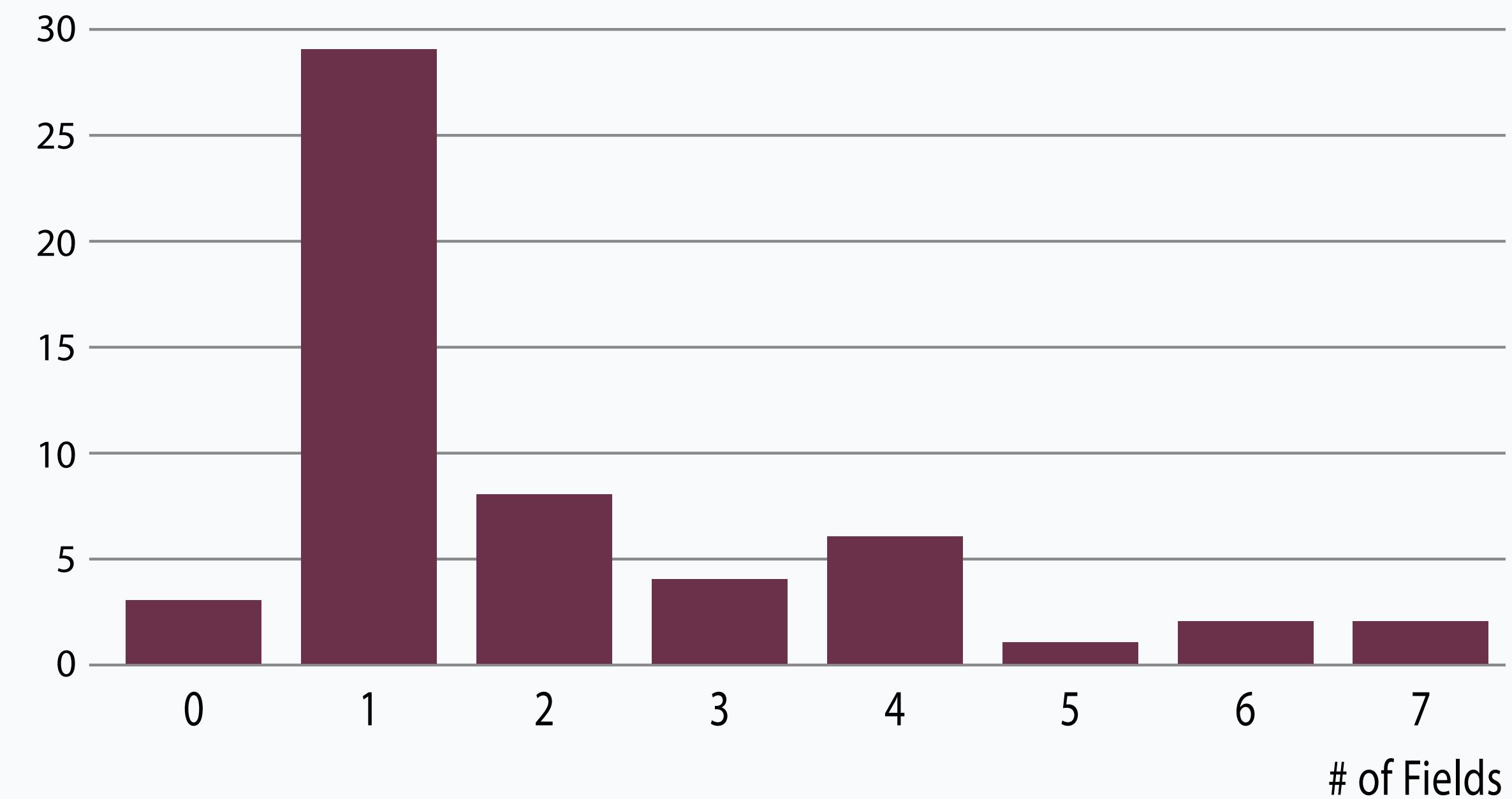
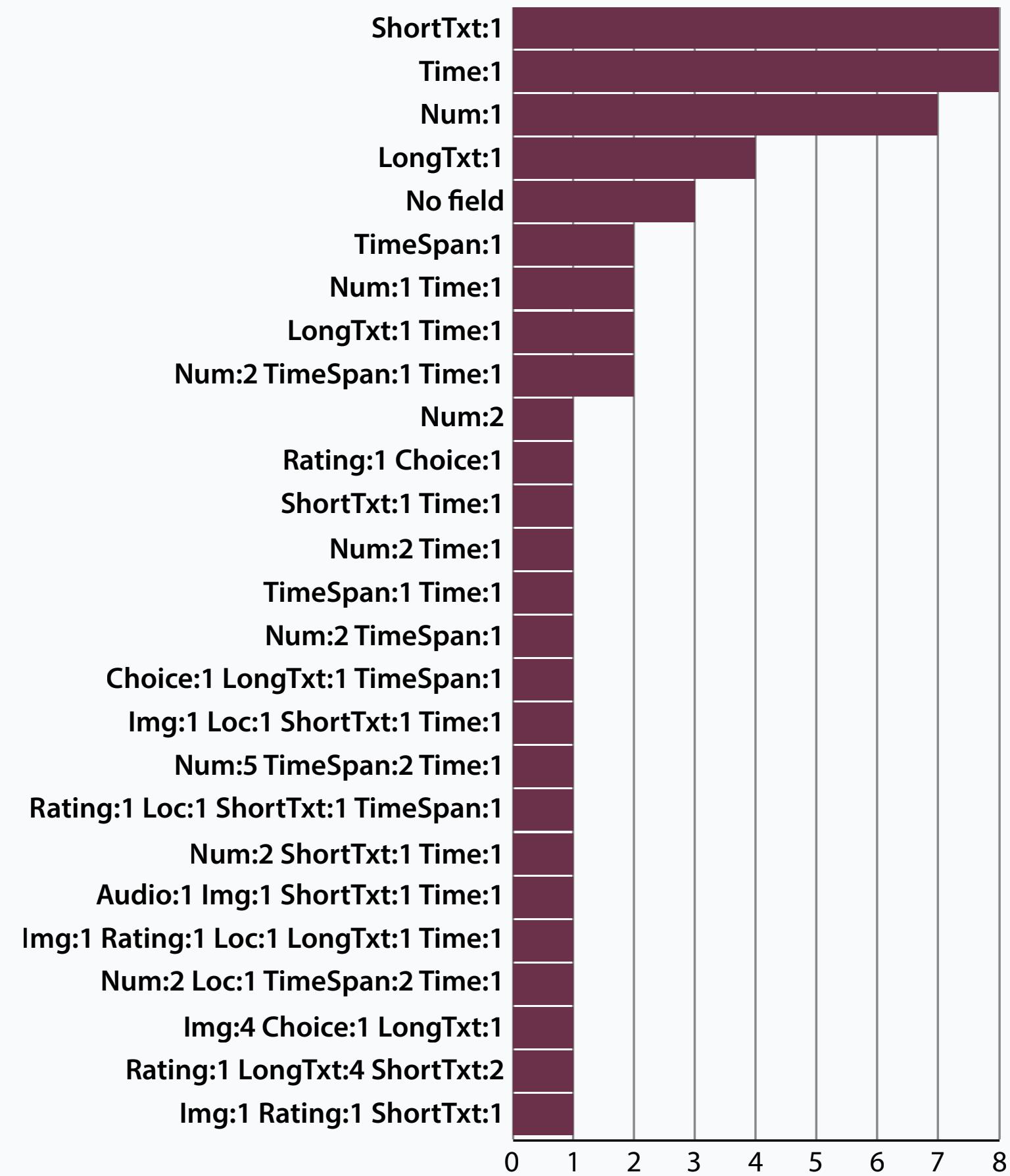
SUMMARY

Fully manual
tracking





SUMMARY



Field count distribution



SUMMARY

OmniTrack will be **open-sourced** very soon!
Stay tuned for the announcement on our website

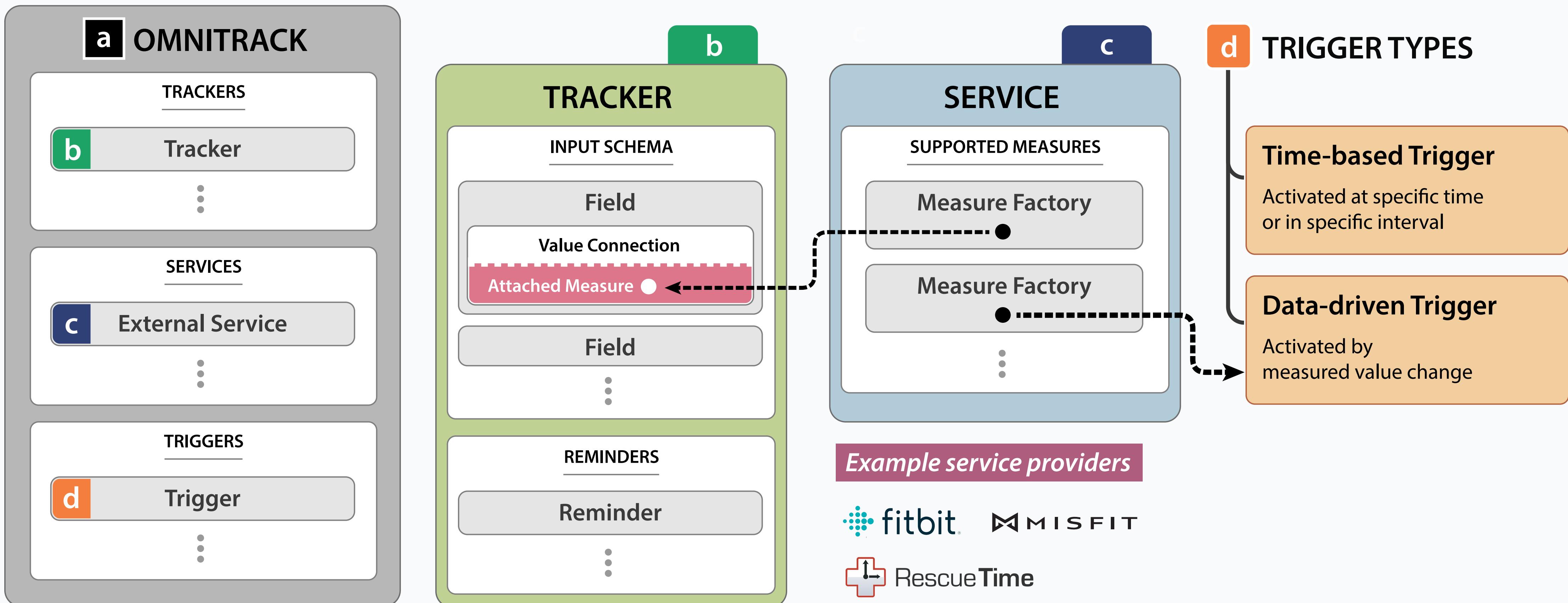
<https://omnitrack.github.io>

Detailed Information, Supplementary Materials

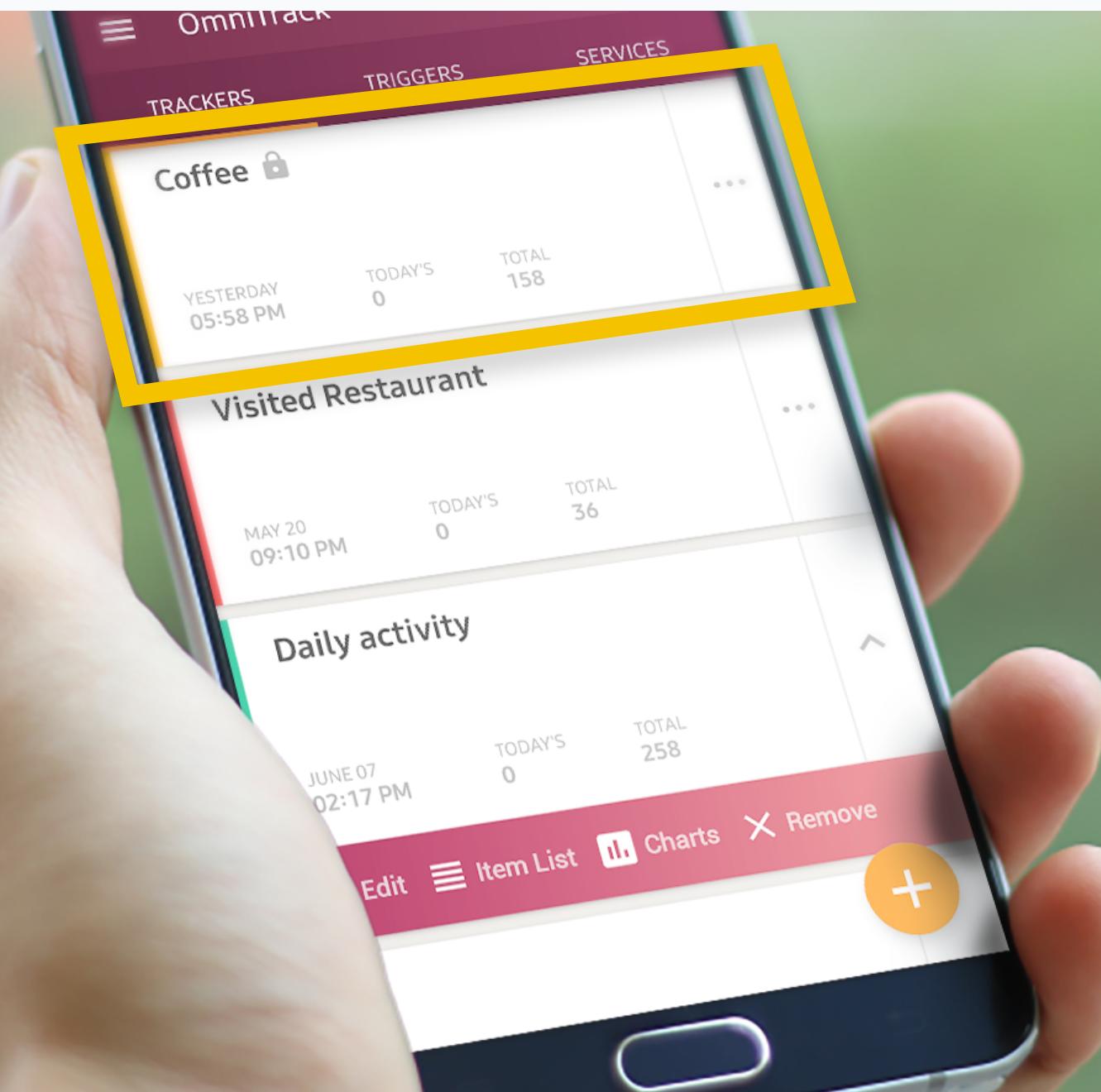
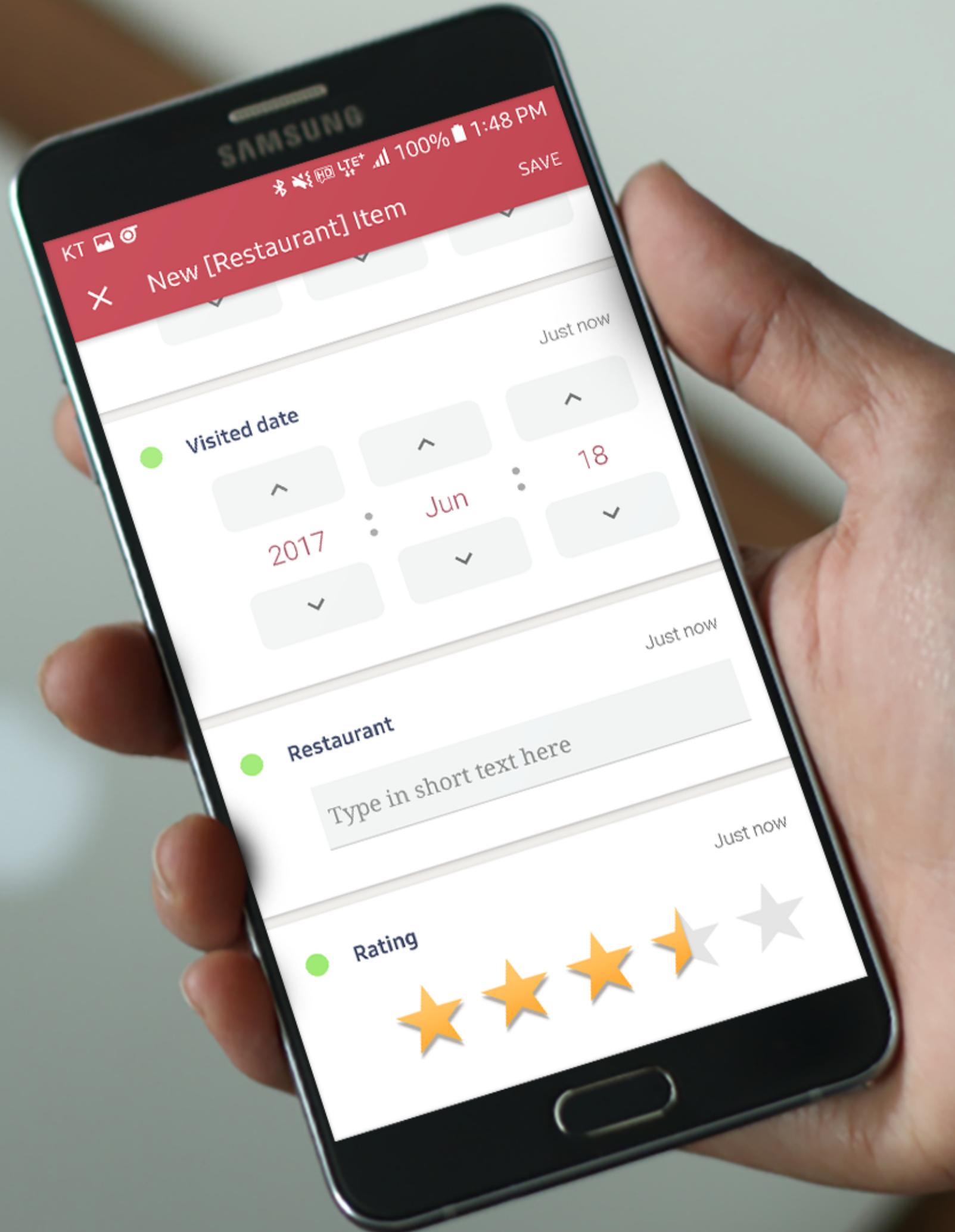


APPENDIX

SYSTEM ARCHITECTURE



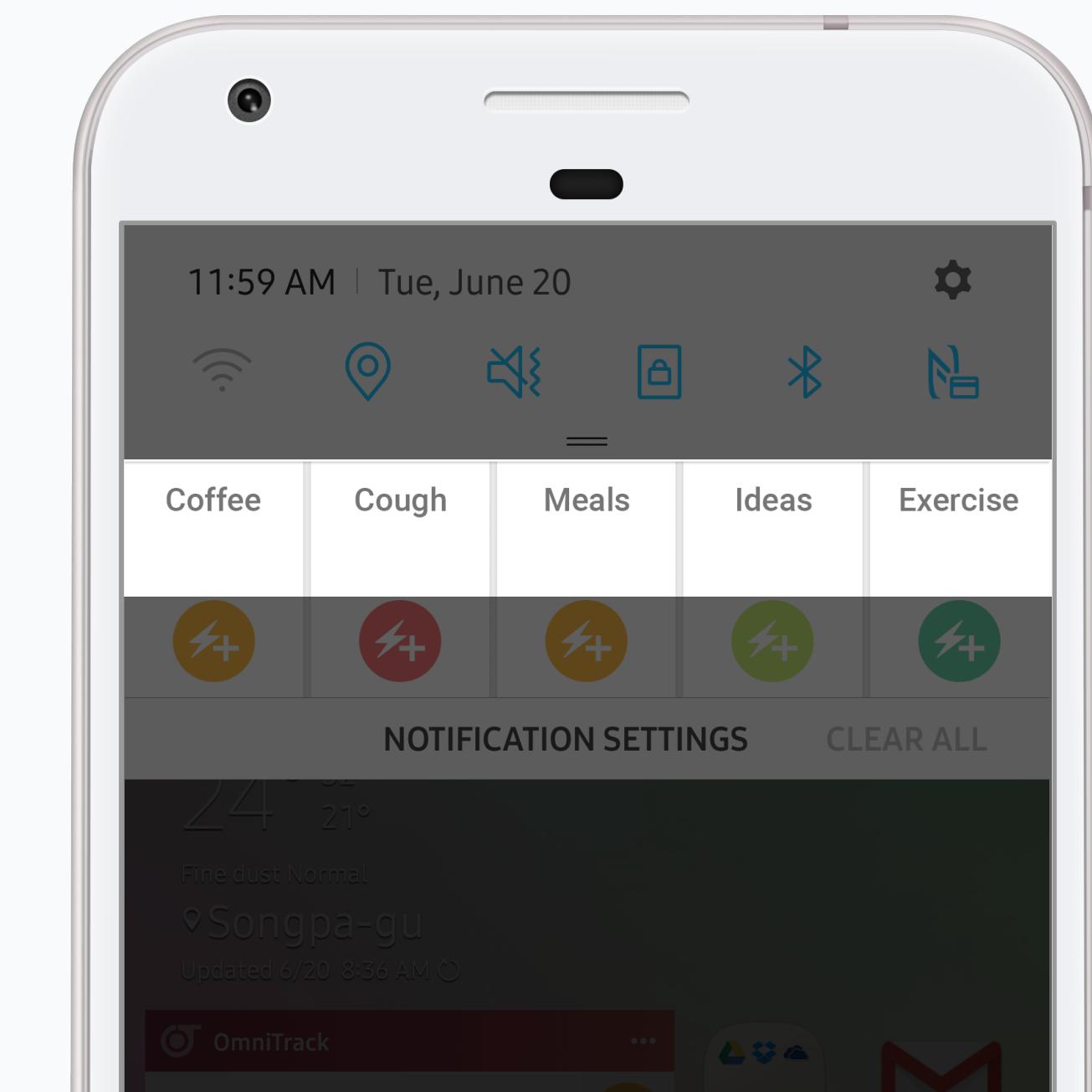
MANUALLY PUSHING AN ENTRY



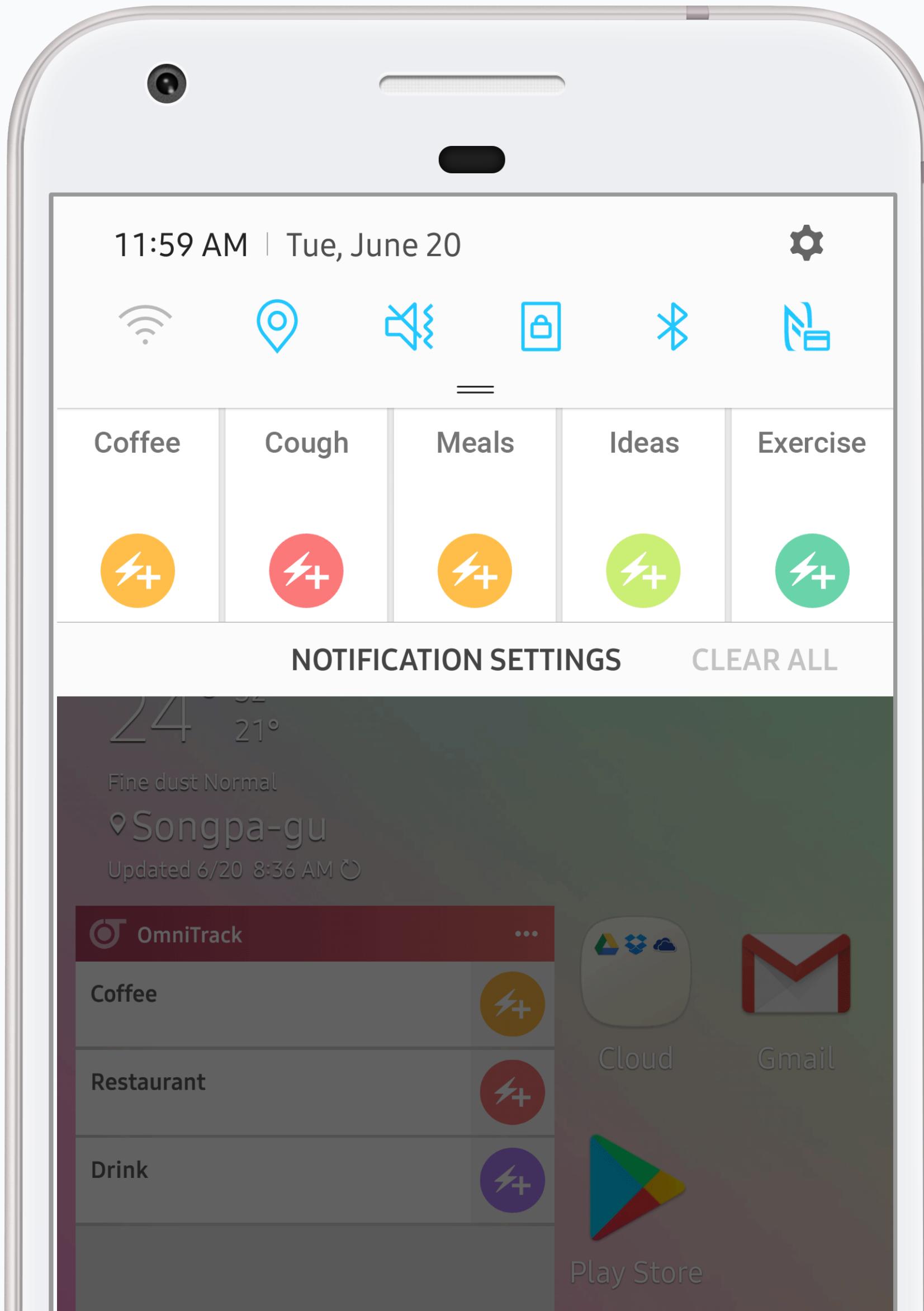
Logging through an Input Form:

Way 1: Open the form in the [tracker list](#)

Way 2: Tap on the [white area](#) on shortcuts



MANUALLY PUSHING AN ENTRY



Instant Logging with Autocomplete:

Tap the instant logging button on shortcuts

Field values are automatically filled in

- Time Fields ← Present Time
- Location Fields ← Current Location

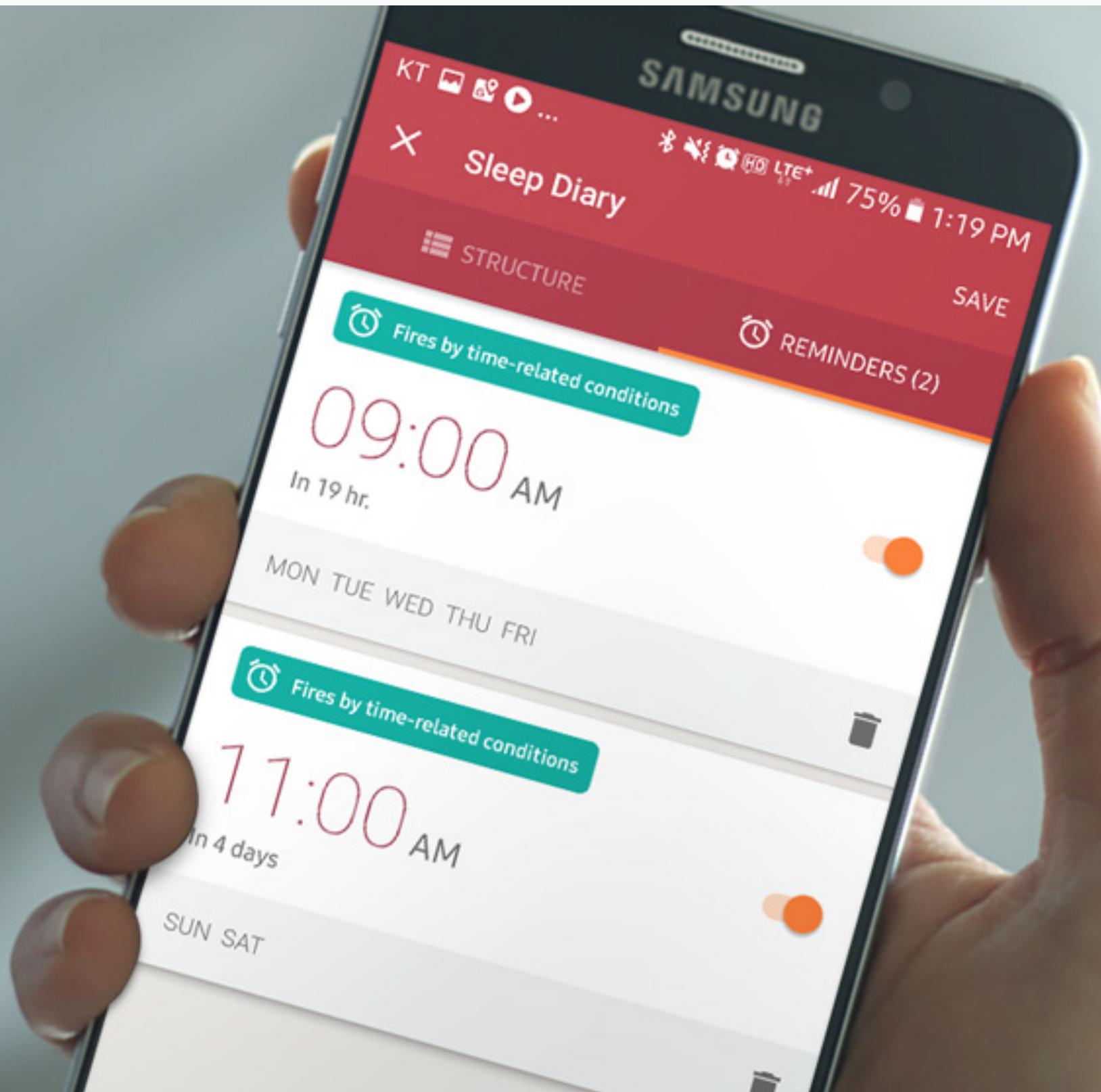
- **Single-button tracker examples**

Coffee timestamper (time)

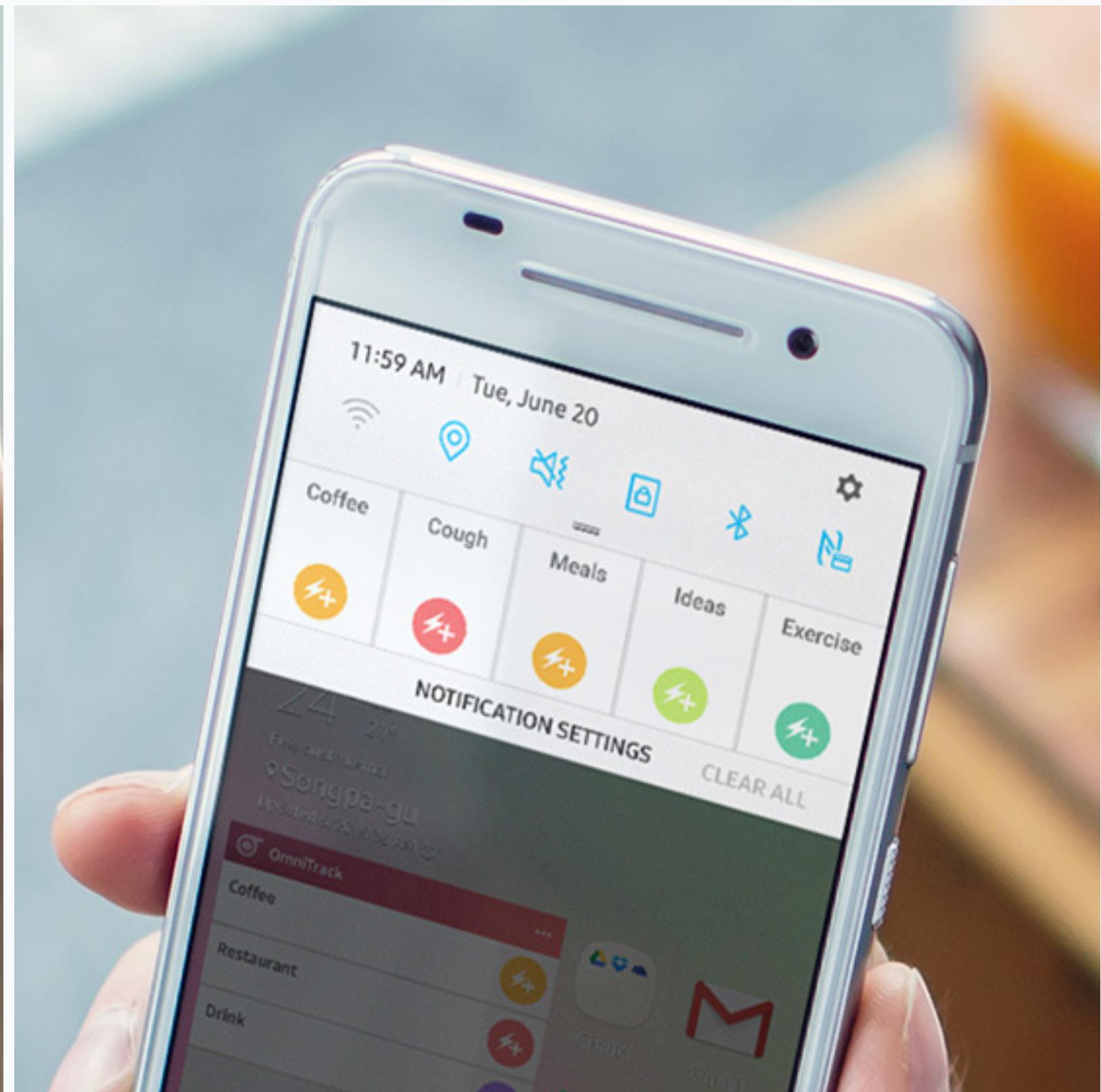
Location Pinner (time+location)

TRACKING FACILITATORS

OmniTrack
A Flexible Self-Tracking Approach
Leveraging Semi-Automated Tracking



Reminder Notifications



Shortcut Panel



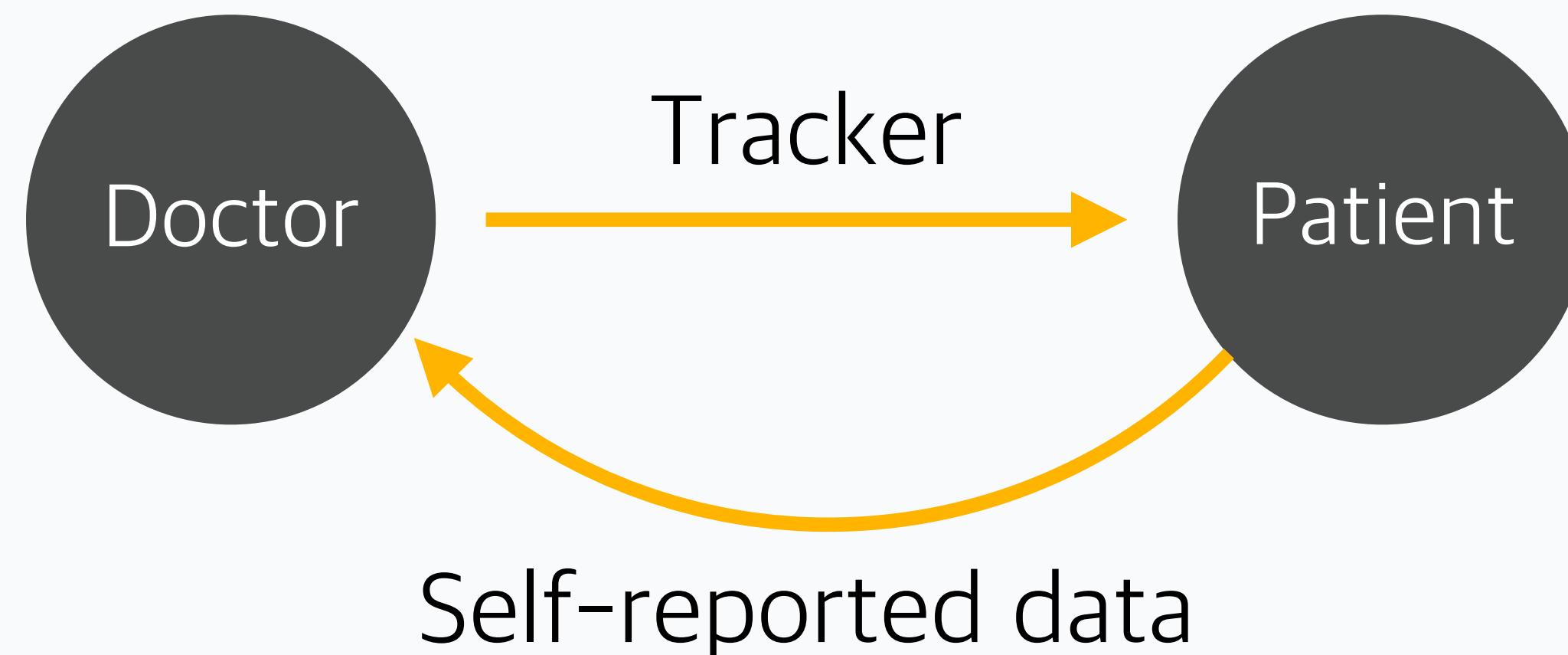
Shortcut Widgets



SHARING TRACKERS WITH OTHERS

Doctor-patient Communication

Prescribing a clinician-designed tracker to patient



Training Novice Users

Learning OmniTrack by adopting the experts-designed trackers



Uploading, searching, and downloading trackers