Tutorial 18: Going for Speed

09:00	**Introduction**
09:15	**Part 1: Efficient Frontend Design**
09:40	Q&A
09:50	Coffee Break
10:00	**Part 2: High-Performance Networking**
10:40	Q&A
10:50	Coffee Break
11:00	**Part 3: Scalable Backend Architectures**
11:40	Q&A
11:50	Coffee Break
12:00	**Part 4: Performance Tracking & Analysis**
12:00	The Core Web Vitals (Google Guest Speaker!)
12:30	**Measuring Web Performance**
12:50	Q&A

Up next!

Baqend

Going for Speed

Part 4:

Performance Tracking & Analysis

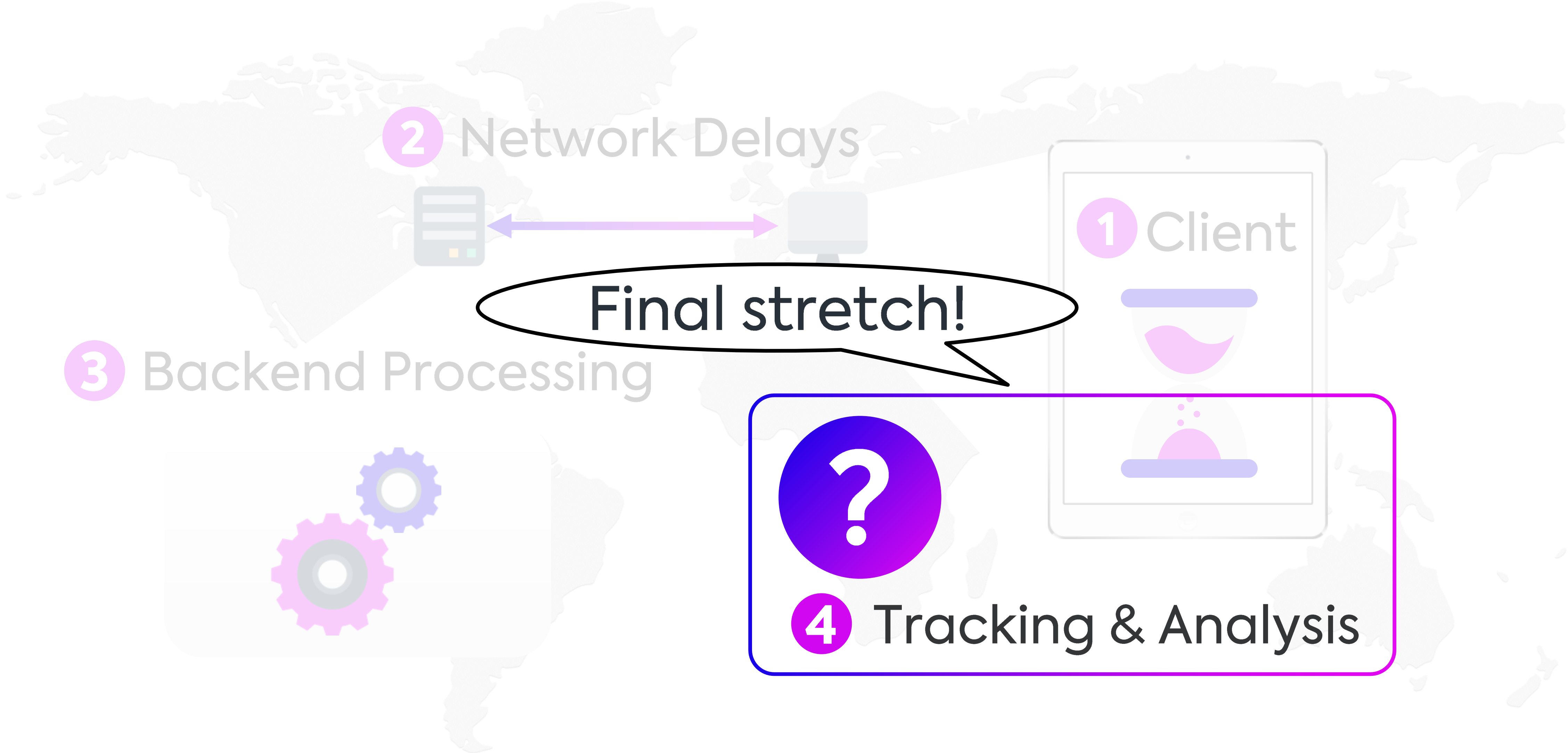
The Web Conference

April 15, 2021

Tutorial

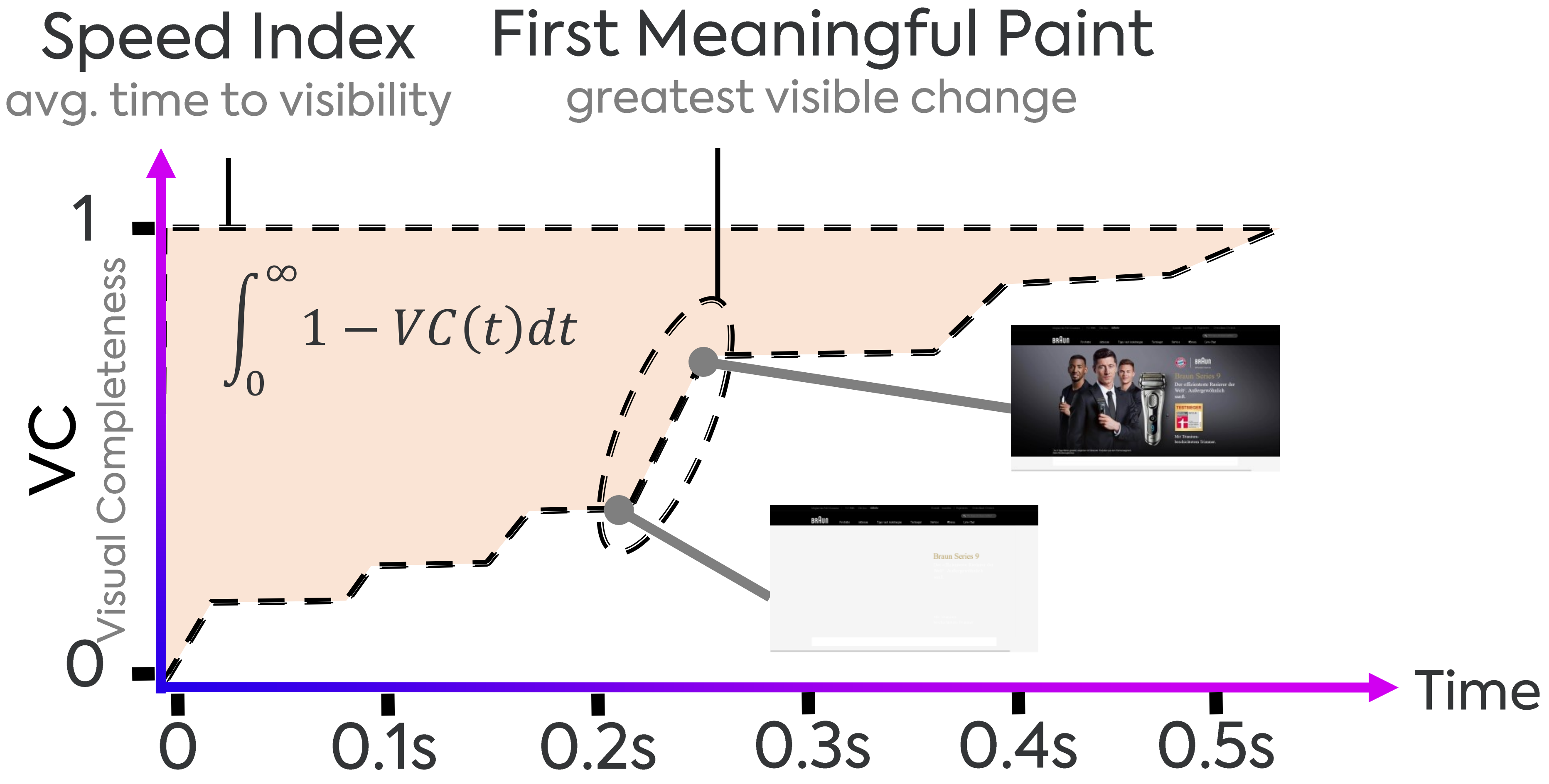
Wolfram Wingerath, Benjamin Wollmer, Felix Gessert, Stephan Succo, Norbert Ritter

The 4 Challenges of Web Performance

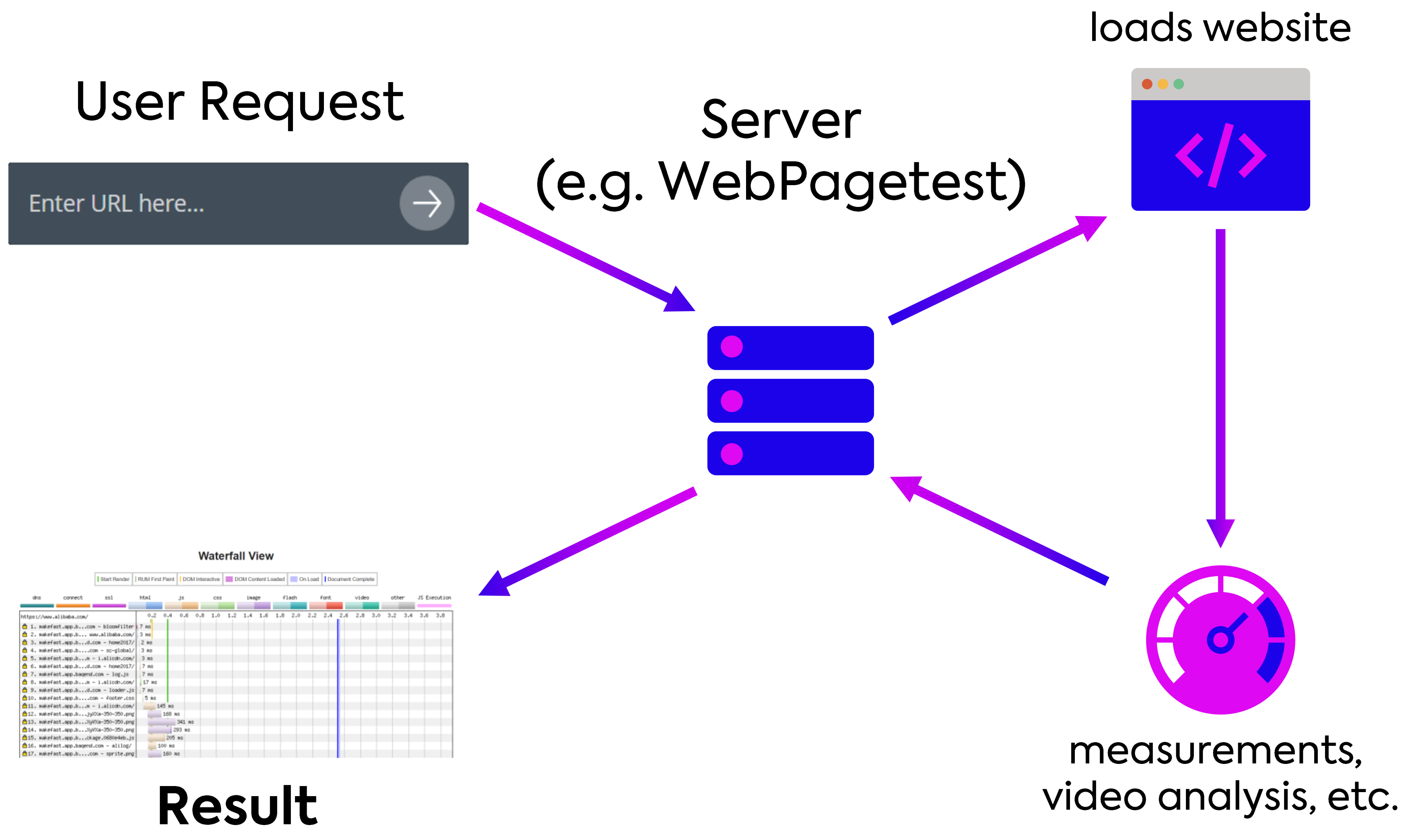


How Do you Measure Page Speed?

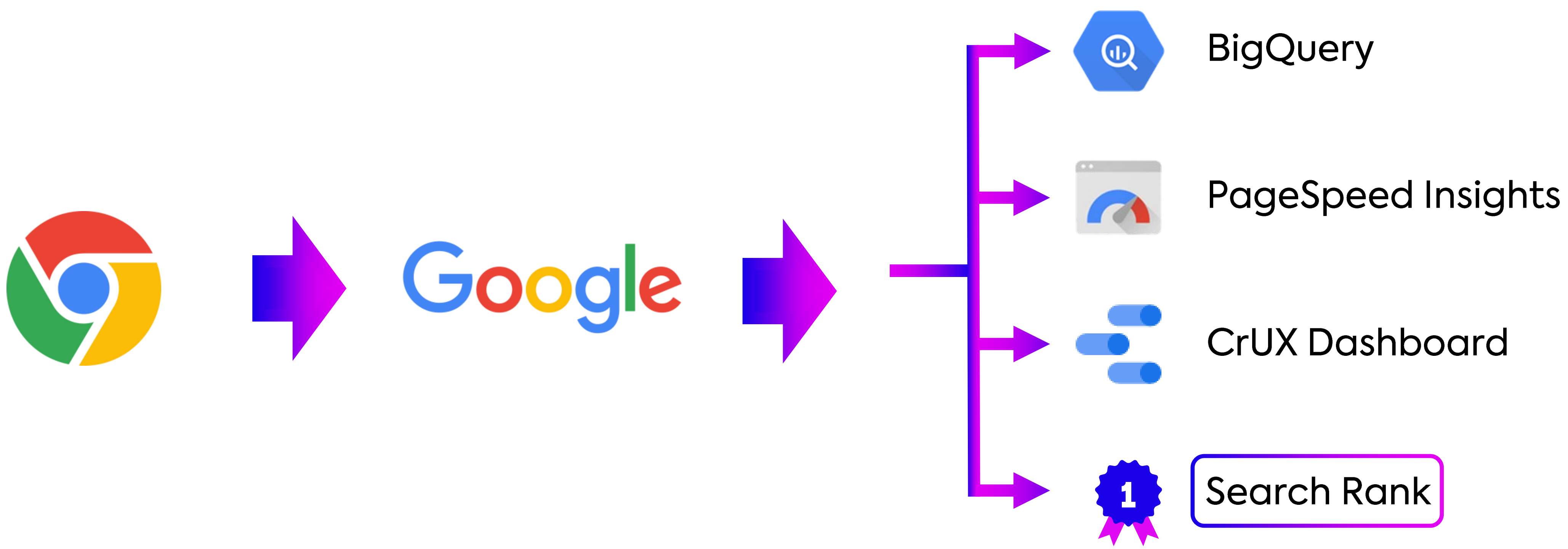
What Do Users **Perceive**?



Synthetic Performance Testing



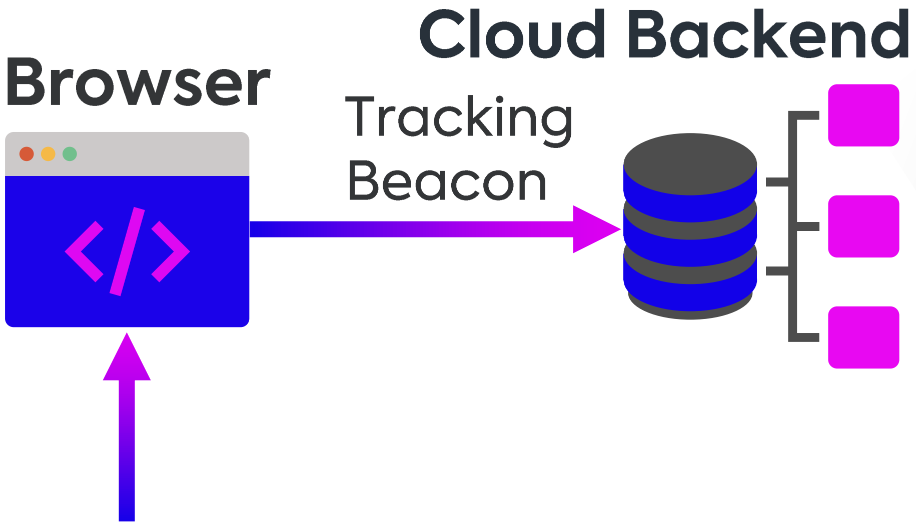
CrUX Data Analysis



- Performance data from Chrome desktop & mobile users
- Domain granularity

- Publicly available
- Performance distributions (histograms)
- SEO-critical

Real-User Monitoring (RUM)

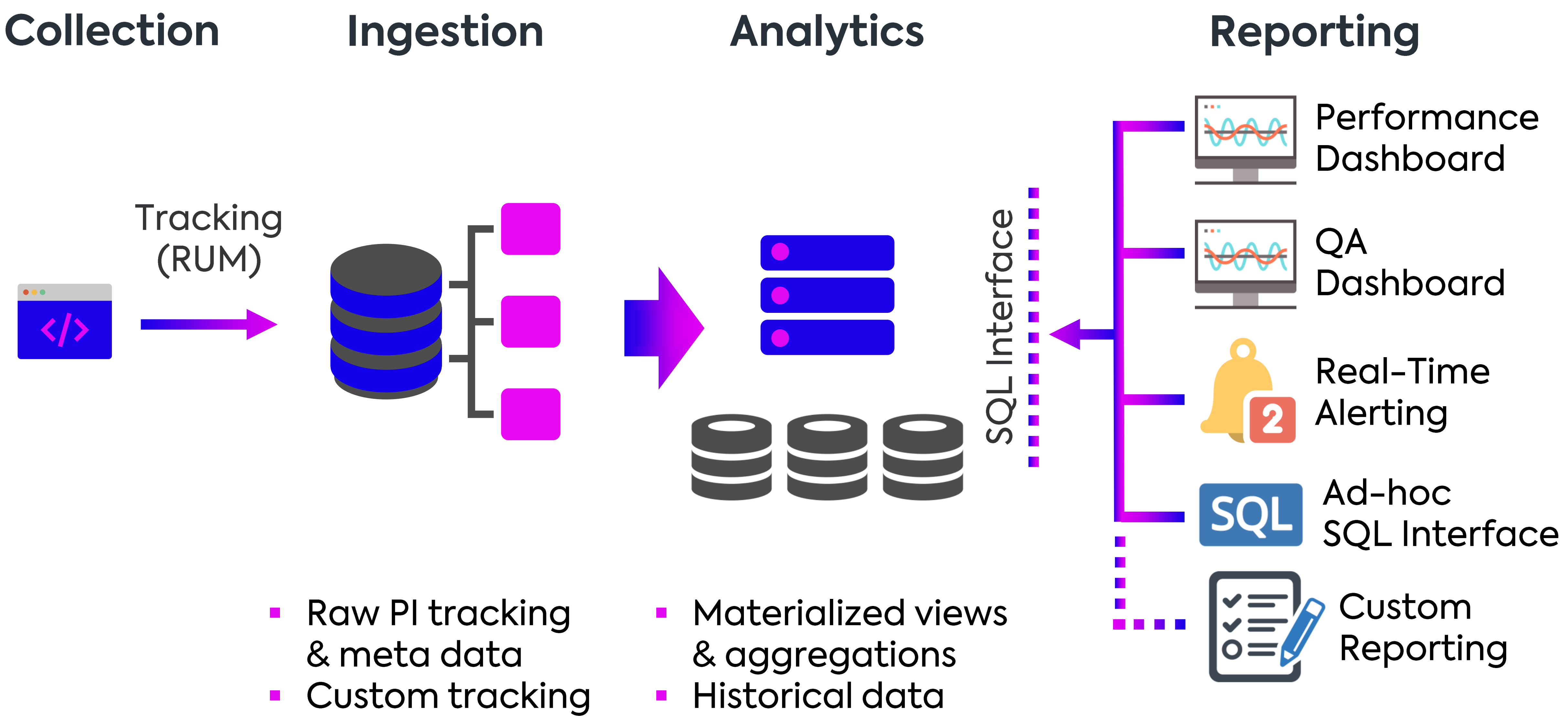


- Timing API
- Service Worker
- Unhandled Errors

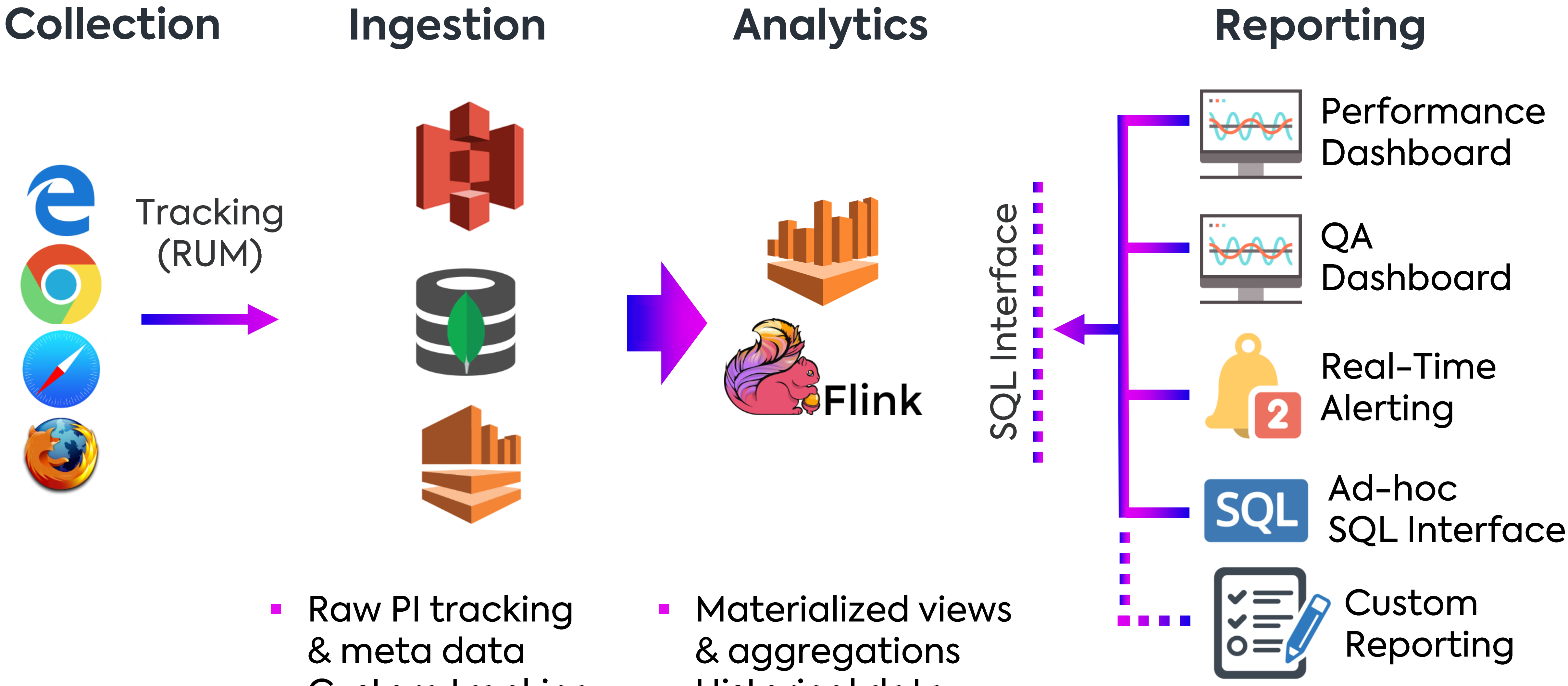
Metrics	Category
Time-to-First-Byte First (Contentful) Paint DOM Timer First Input Delay	Performance
Session Length Time on Site First User Interaction Bounce Rate	User Engagement
Page Views & Sessions Browser Distribution JavaScript Errors Caching Insights	QA Metadata

Real–User Monitoring

Real-User Monitoring (RUM)



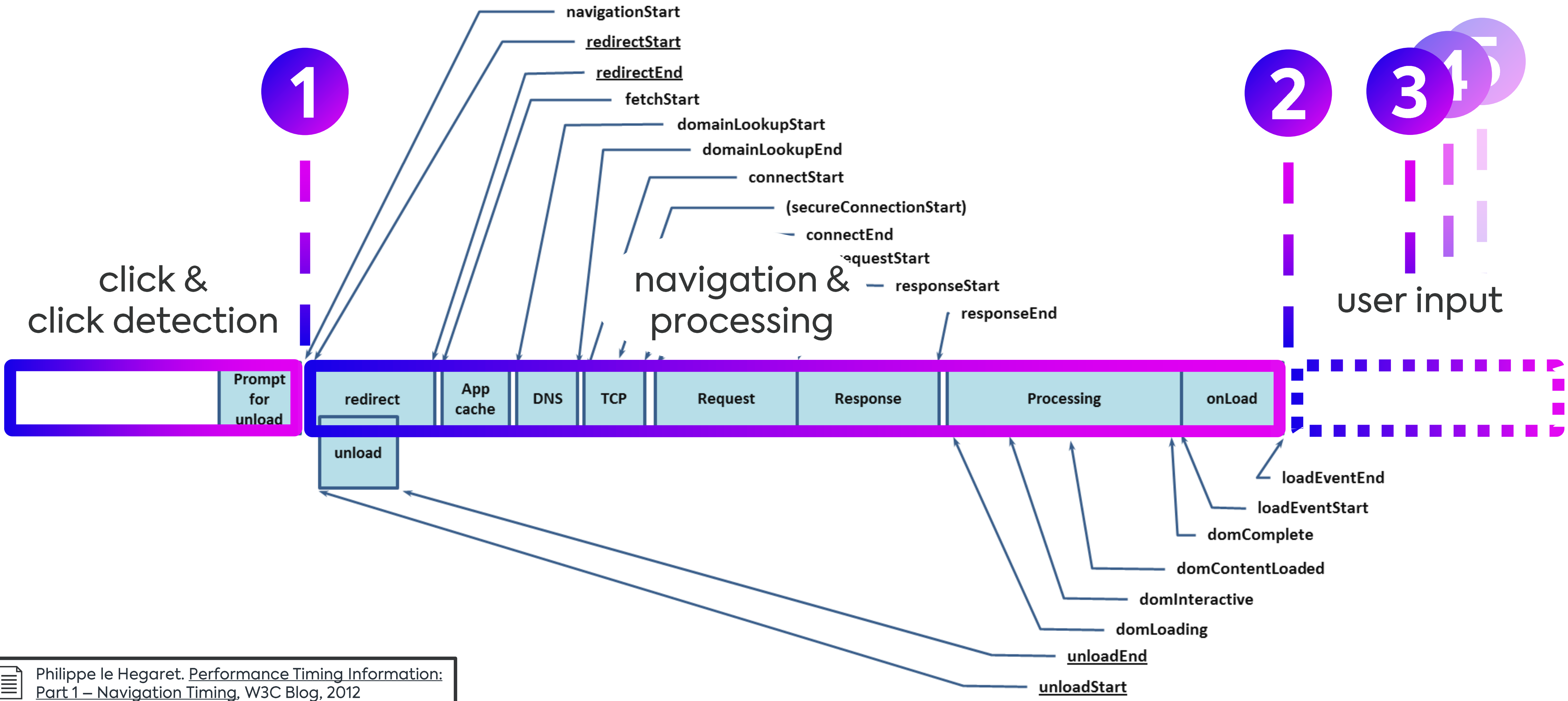
Real-User Monitoring (RUM)



- Raw PI tracking & meta data
- Custom tracking

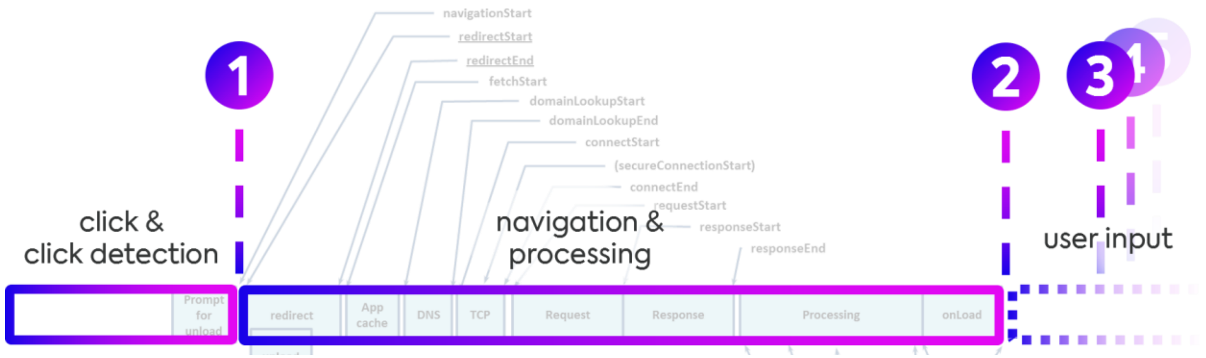
- Materialized views & aggregations
- Historical data

When to Send Data Beacons?



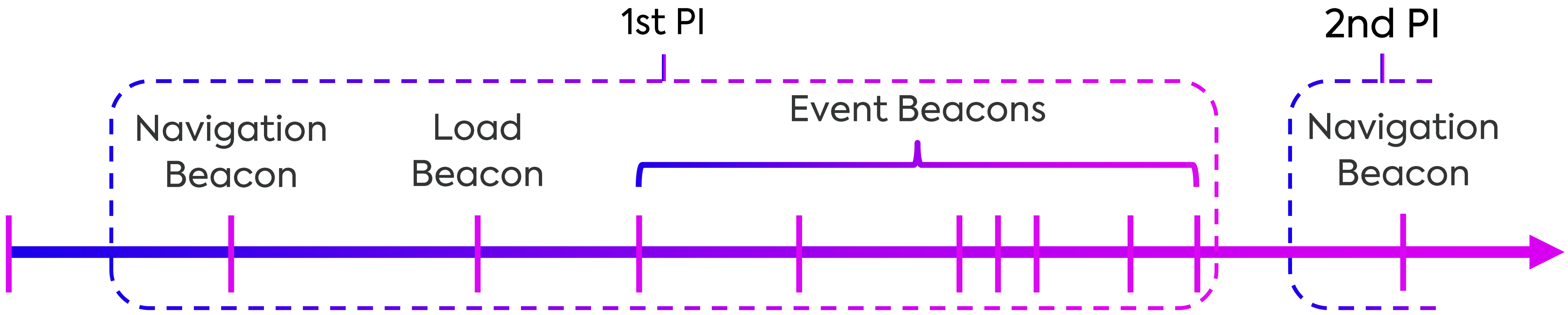
Philippe le Hegaret. Performance Timing Information: Part 1 – Navigation Timing, W3C Blog, 2012

Types of Data Beacons



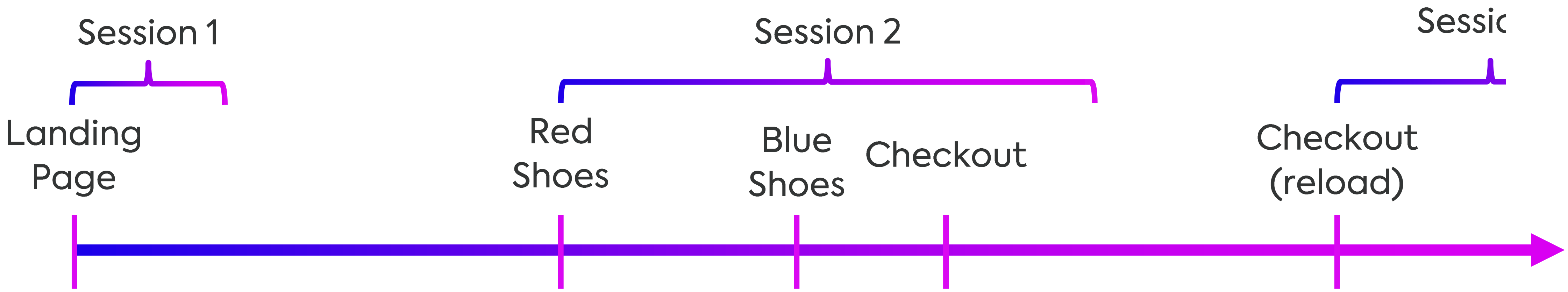
1. 1 for **static info**
   (URL, user agent, session ID, ...)
2. 1 for **timings**
   (TTFB, load time, FCP, ...)
3. 0-n for **events**
   (first input, JavaScript errors, ...)

Schema:PI



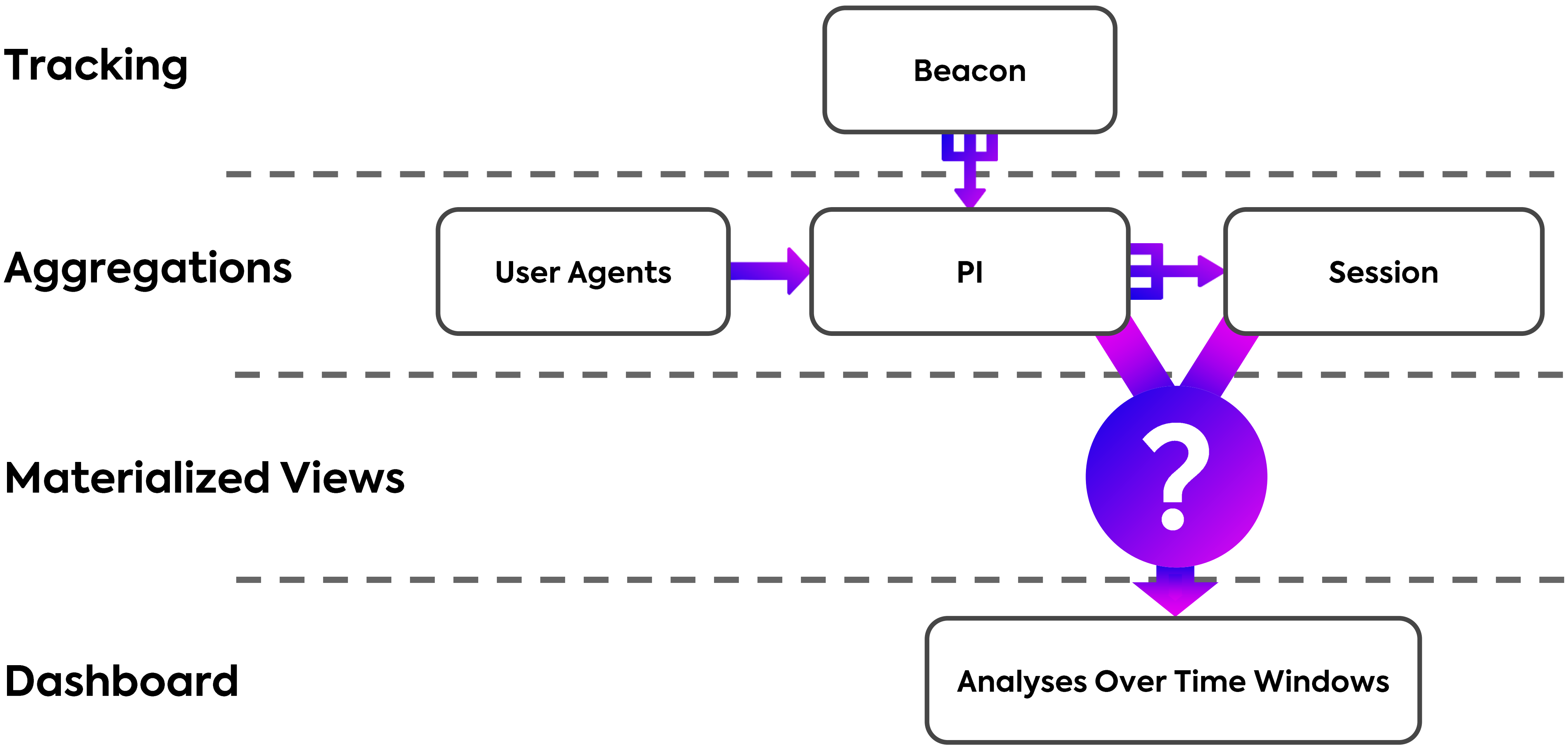
- **Beacon Join → PI**: How do we handle events that come late?
  - Simply wait 5 minutes?
  - Wait for next PI or session timeout?
  - ...?
- How to resolve **user agents**?

Schema: Sessions

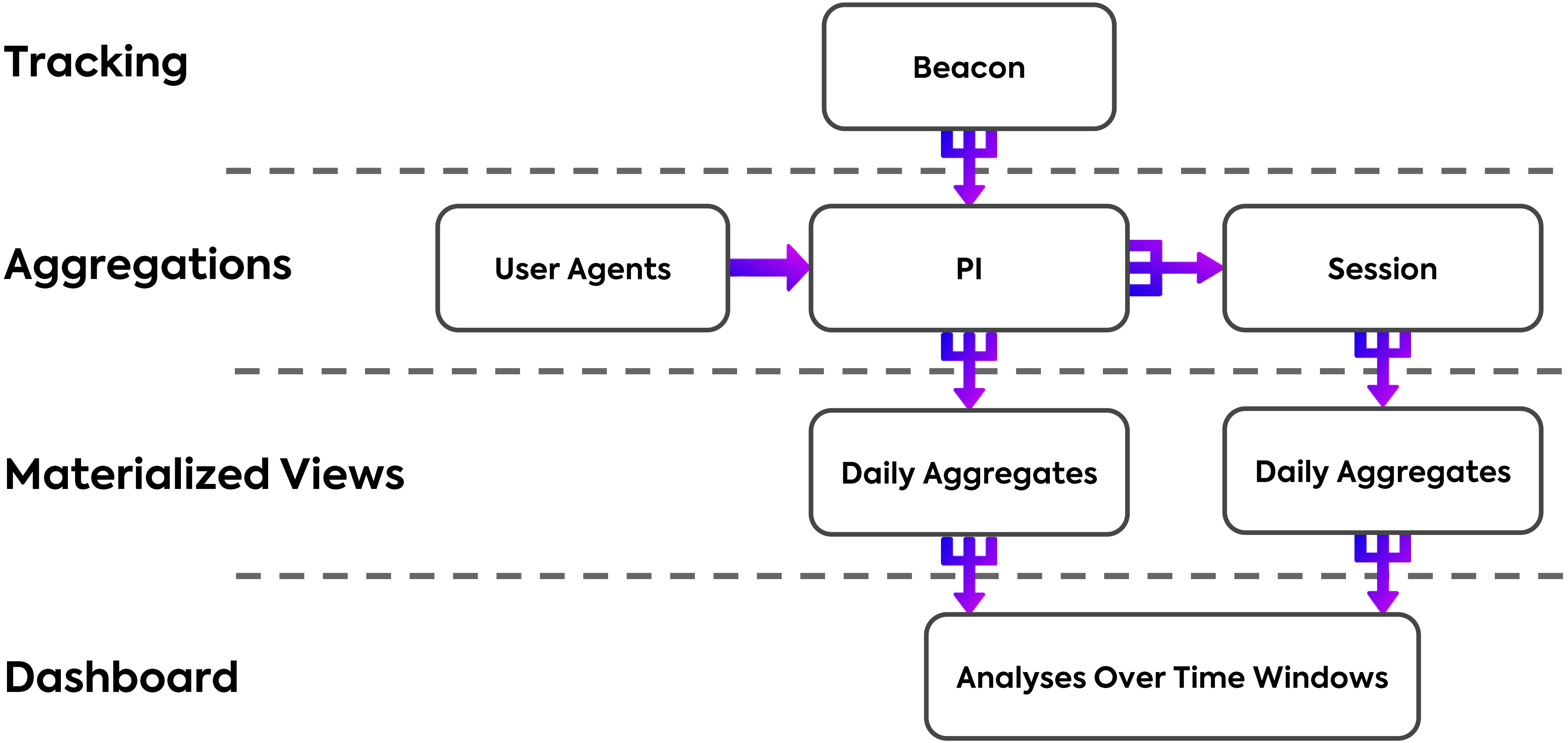


- **Bounces & Session End**: find out when and where people leave
- **Session timeout** after 30 minutes of <u>*inactivity*</u>

Schema Overview



Schema Overview

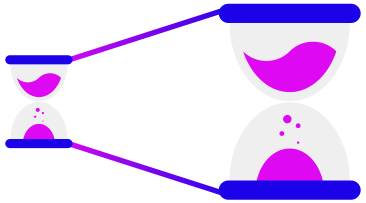


Processing & Latency

Alerting

- Simple metrics / little context
  - Counters
  - Extreme values
  - Specific errors

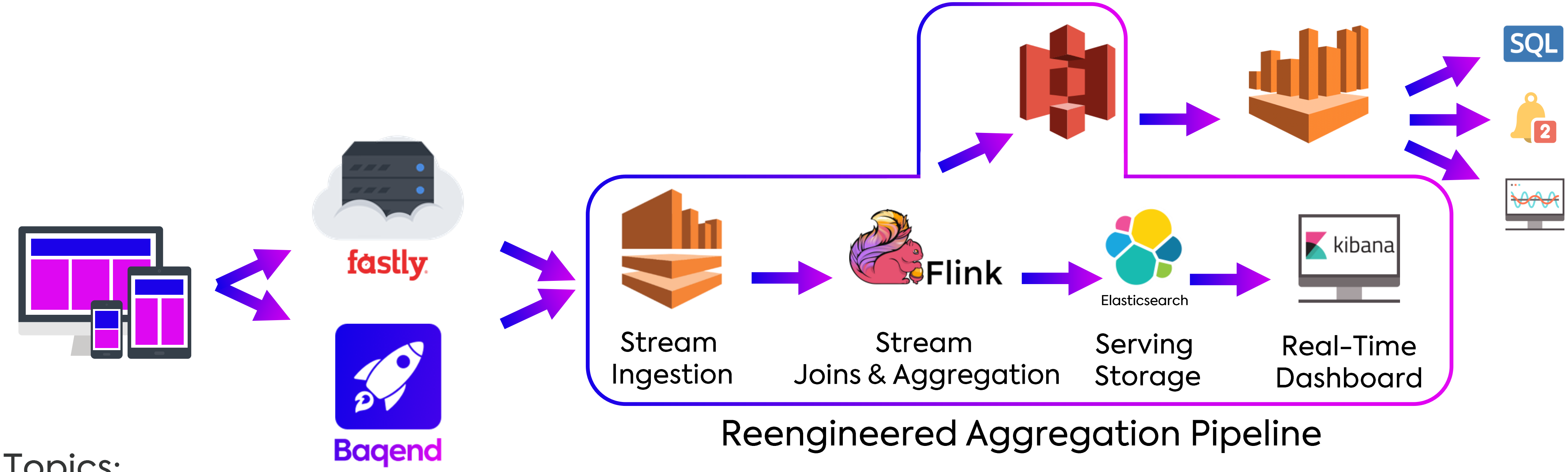
Processing Time



Trend Analysis

- Complex aggregations / huge time windows
  - Average session length
  - Performance by month
  - Seasonal effects

2020 Focus: Low-Latency Reporting

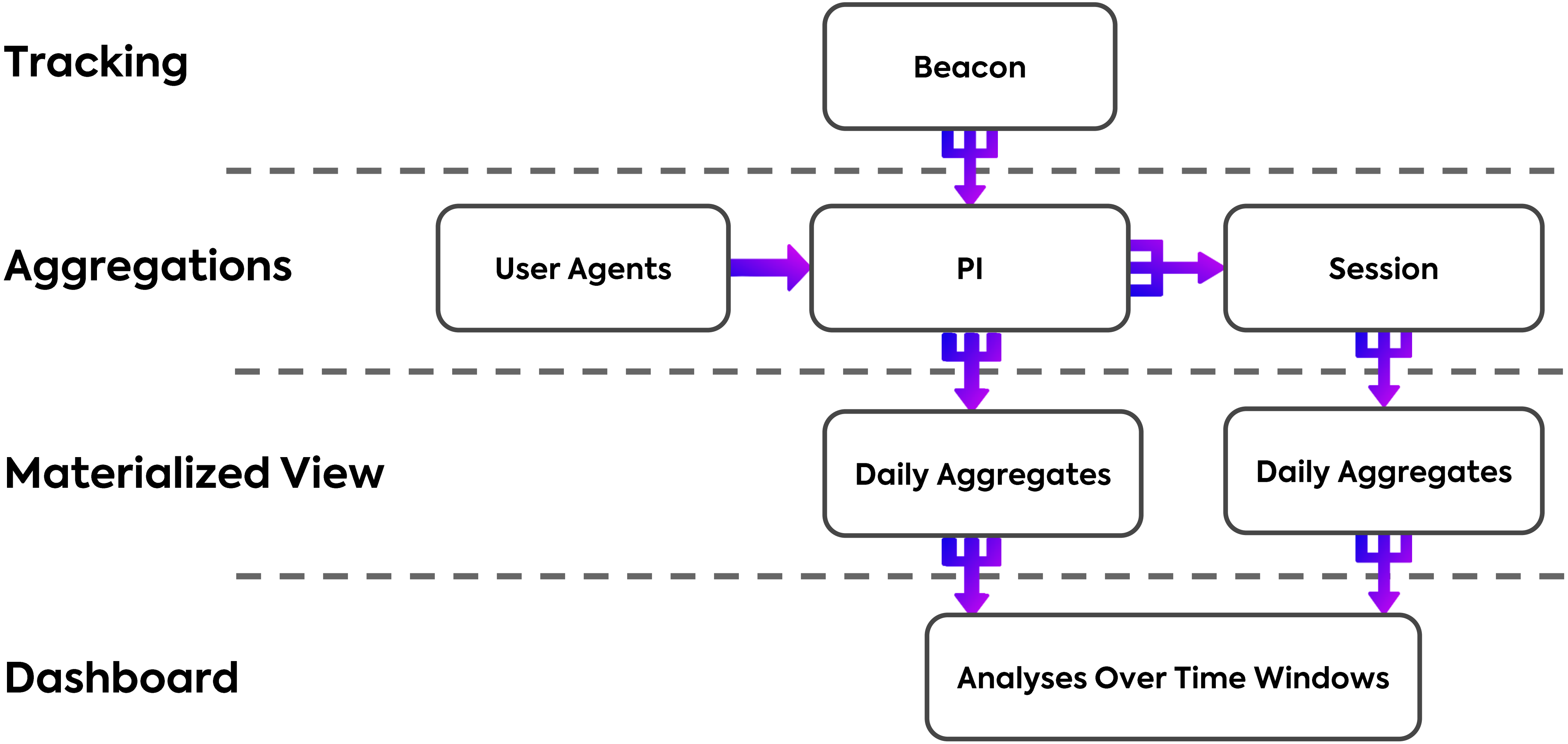


Key Topics:

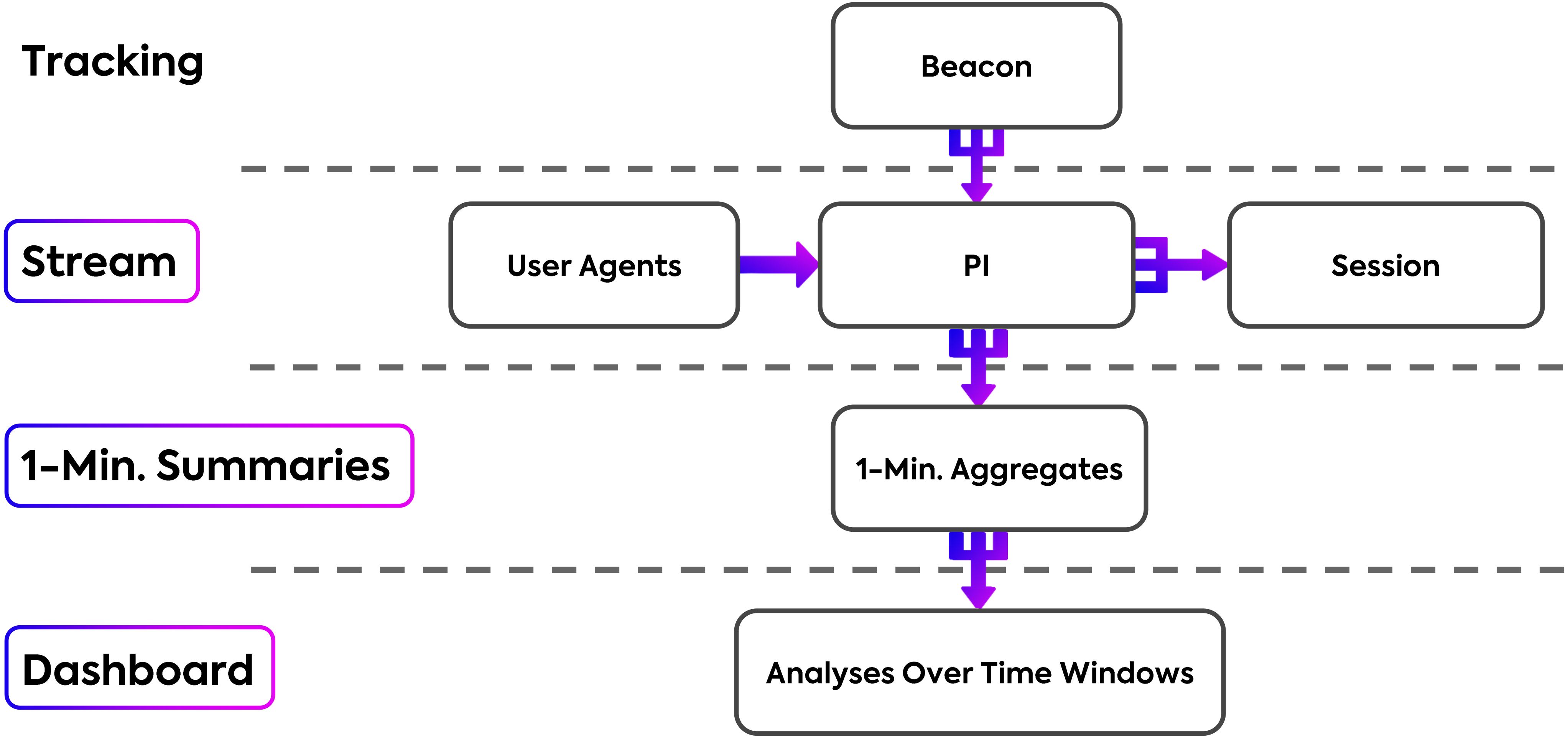
- ✓ Continuous Aggregation
- ✓ Real-Time Reporting & Analytics
- ✓ Extreme Scalability

Wolfram Wingerath, Florian Bücklers, et al.: How Baqend Built a Real-Time Web Analytics Platform Using Amazon Kinesis Data Analytics for Apache Flink, AWS Big Data Blog (2021)

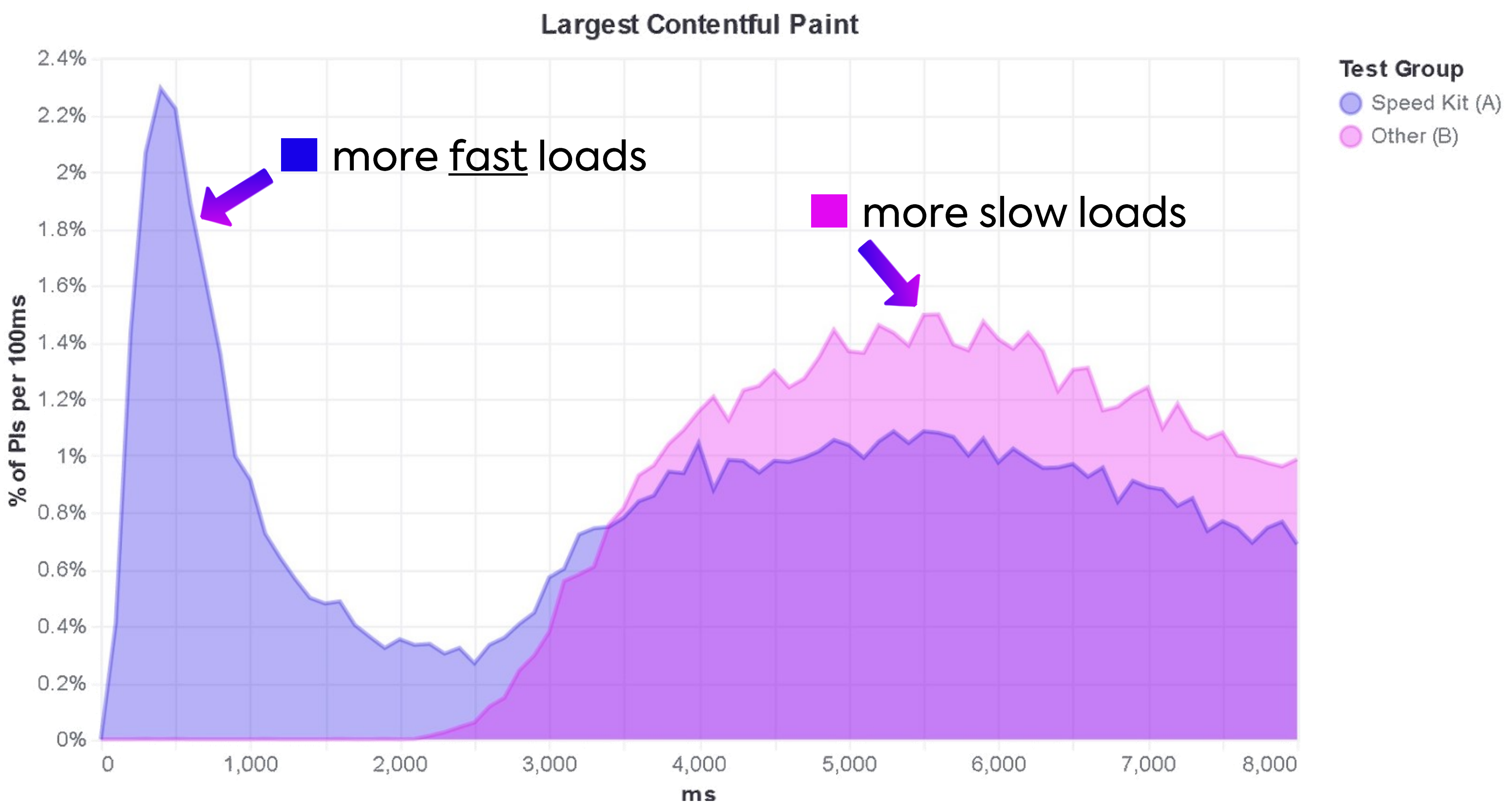
Old & Lame Schema



Shiny & New ~~Old & Lame~~ Schema



Kibana Dashboard: Performance Uplift

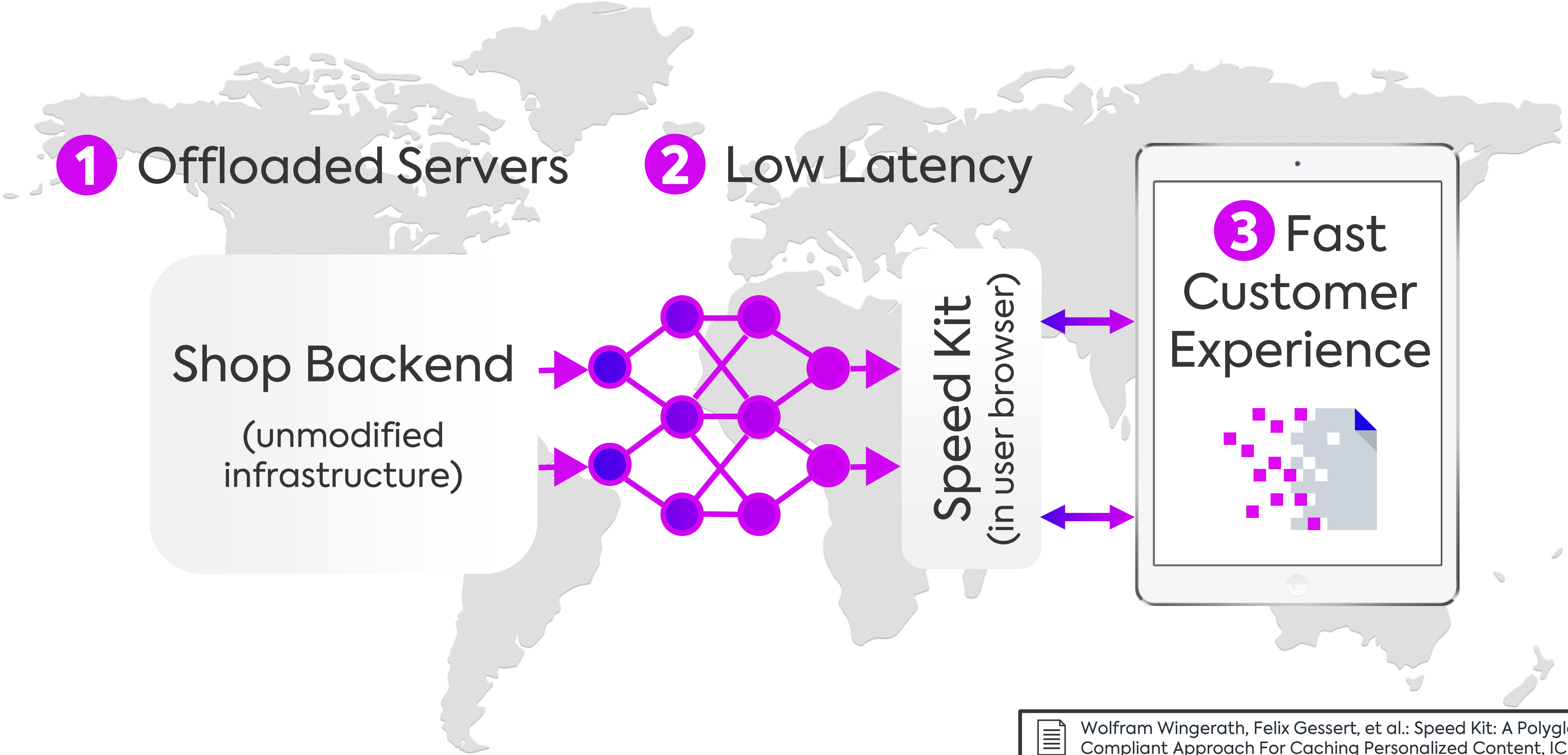


Summary: Measuring Performance

Synthetic	Logs	RUM
WebPagetest	CrUX	Google Analytics
Lighthouse	CDN Logs	mPulse
GTMetrix	Server Logs	Adobe Analytics
✔ User-centric metrics	✔ Readily available	✔ Data from actual users
✘ Only simulated	✘ Hard to interpret	✘ Complex to operate

How Does Speed Correlate To Business Success Exactly?

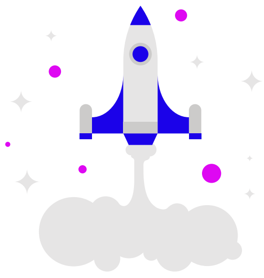
Speed Kit: Web Performance Plugin



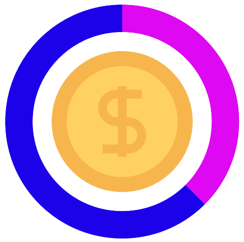
Wolfram Wingerath, Felix Gessert, et al.: Speed Kit: A Polyglot & GDPR-Compliant Approach For Caching Personalized Content, ICDE (2020).

Split Testing for Web Performance

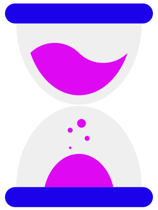
Speed Kit Users



vs.



Normal Users



Tracking →

← Tracking

- Speed Kit enabled

- **Measurable uplift:**
  + Performance
  + User engagement
  + Error discovery

- Speed Kit disabled (no acceleration)

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Thanks! Any Questions?

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