CLOUD NATIVE SUMMIT MUNICH 2026

Beyond “Supports OpenTelemetry”: A maturity model for Cloud Native Observability

Kasper Borg Nissen

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Beyond “Supports OpenTelemetry”: A maturity model for Cloud Native Observability

Kasper Borg Nissen, Director of Developer Relations at Dash0

kaspernissen.xyz /in/kaspernissen kaspernissen

Who?

Director of Developer Relations at Dash0

KubeCon+CloudNativeCon EU/NA 24/25 Co-Chair (former)

Author of OpenTelemetry for Dummies

CNCF, AAIF, MergeForward Ambassador

Golden Kubestronaut

CNCG Aarhus, KCD Denmark Organizer

Co-founder & Community Lead Cloud Native Nordics

Scattered signals. Growing haystacks.

Every signal its own tab. Every tab its own query language or filter. And one engineer trying to correlate it all - in their head.

COGNITIVE OVERLOAD

THREE BROWSER TABS OF OBSERVABILITY

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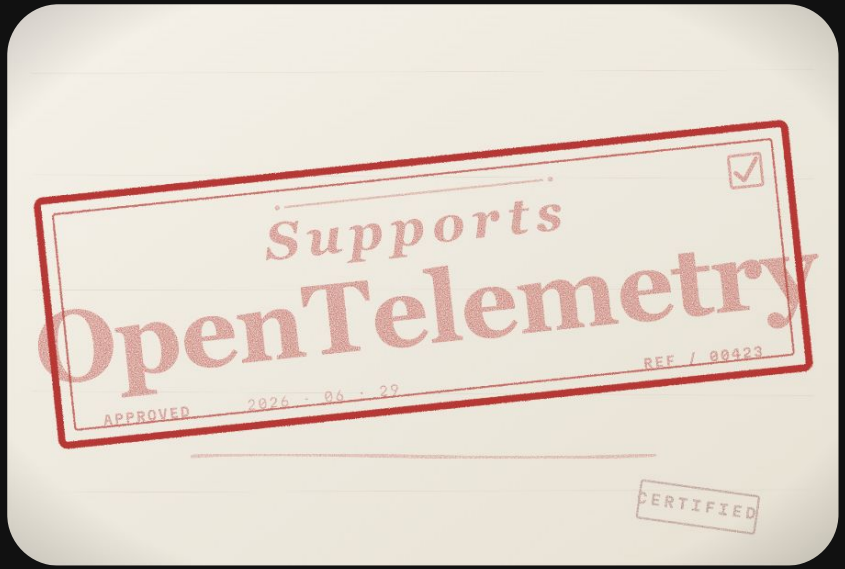
Stamped on every project page.

Same two words on READMEs and release notes. The ink is everywhere — what's underneath varies wildly.



“Supports OpenTelemetry” has become the new “Supports Kubernetes”.

A phrase that means everything - and nothing - at the same time

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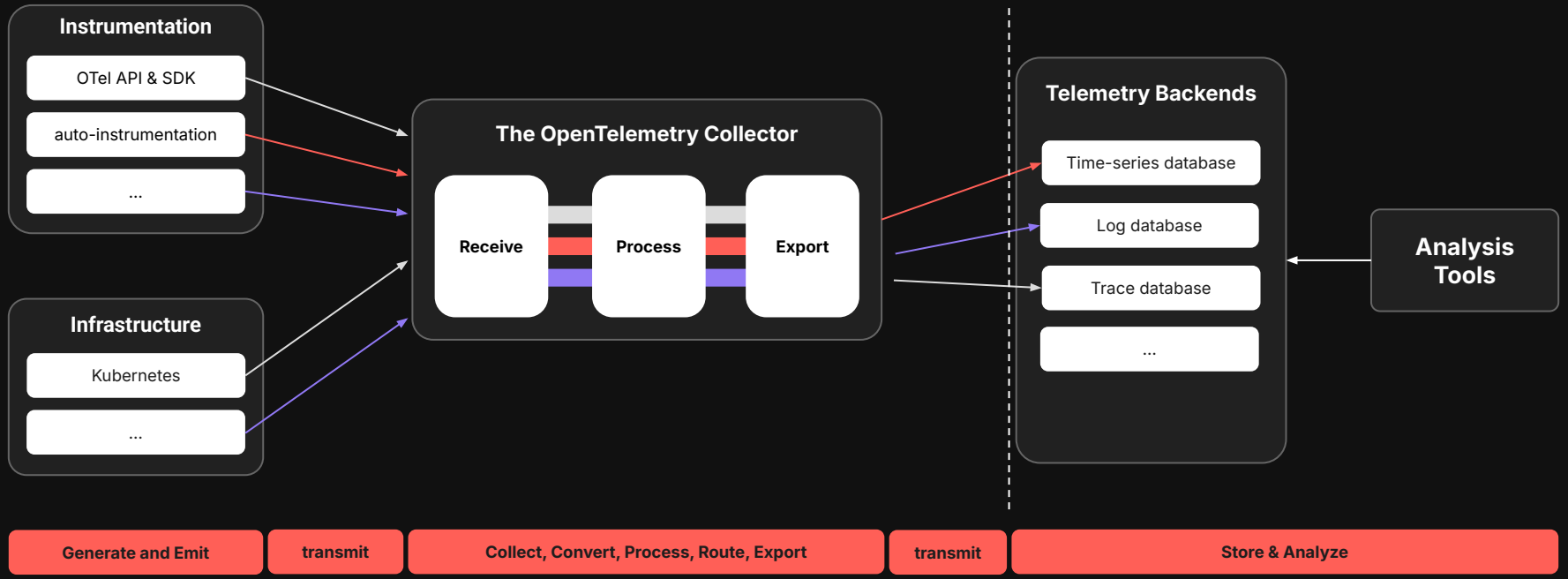
OpenTelemetry: a 1000-mile view.



Three signals. One context.

The building blocks behind the diagram

Produce & Move

SDKs
Auto & manual instrumentation - in apps and on the request path.

OTLP
The wire protocol. One pipe, three signals - spoken by SDK, Collector, and backends.

Collector
Shared plumbing: filter, batch, sample, route - outside your apps.

Make it meaningful

Semantic Conventions
Agreed names & shapes - so data mean the same thing across tools.

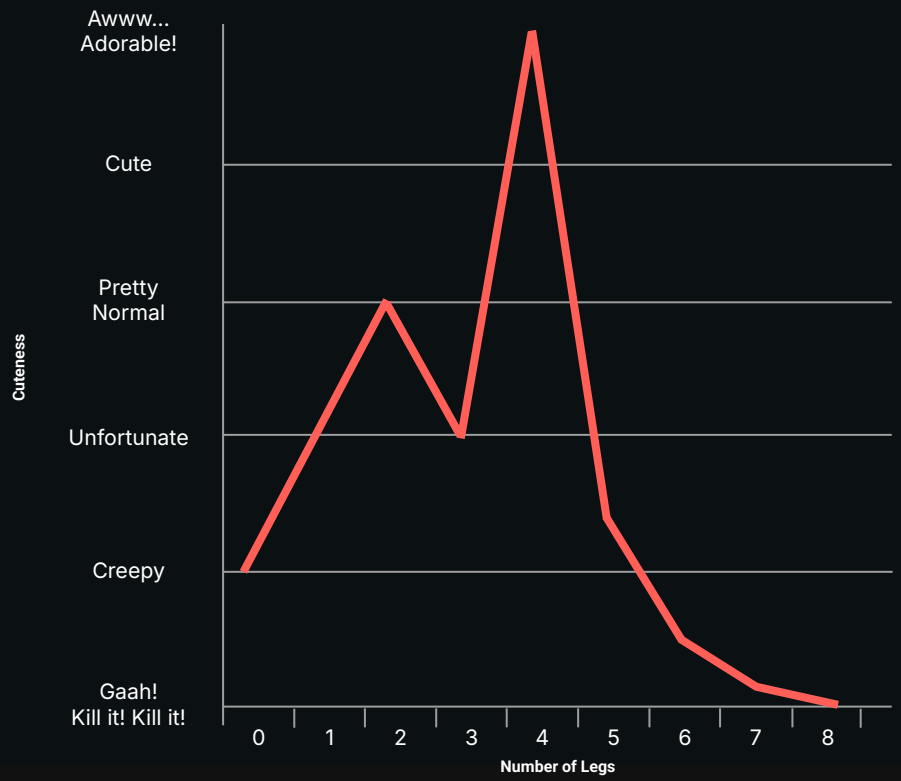
Resource attributes
The identity on every signal - who emitted this.

Context
How trace context & baggage flow through sync and async hops.

Telemetry without context is just data

What are we looking at?

What are we looking at?



Reddit /r/funny, "Cuteness Vs Number of legs" (circa 2010)

How we talk about system context

Organization (By whom)
Which team owns it?
“Who you gonna call?”

Architecture (What / Why)
Which **service** / system component is this?

Compute (How/2)
Which container?
Which process? Pid? Startup args?
Which runtime is it? Node.js? JVM? .NET?
Which build? Which version?
…

Platform (How)
Kubernetes? Which cluster / namespace / deployment / cronjob / job / pod?
AWS ECS? Which cluster / service / task? …

Infrastructure (Where)
Which datacenter / Cloud region / availability zone / account does it run in? …

OpenTelemetry semantic conventions to context layers

1. **Organization** 😢
2. **Architecture**
   Service (stable) and (experimental)
   Deployment Environment
3. **Compute**
   Telemetry SDK (stable) and (experimental)
   Compute Unit and Instance
   Operating System
   Process & Process Runtimes
   Device, Browser, Webengine, …
   …
4. **Platform**
   Kubernetes
   Cloud (cloud.platform specifically)
   Cloud-provider specific
5. **Infrastructure**
   Cloud (general stuff)

Resource is the identity layer - and it belongs at the source.

Every span, metric, and log is emitted by something. Resource describes who — the hinge on which correlation, routing, and ownership all turn.

Resource, concretely

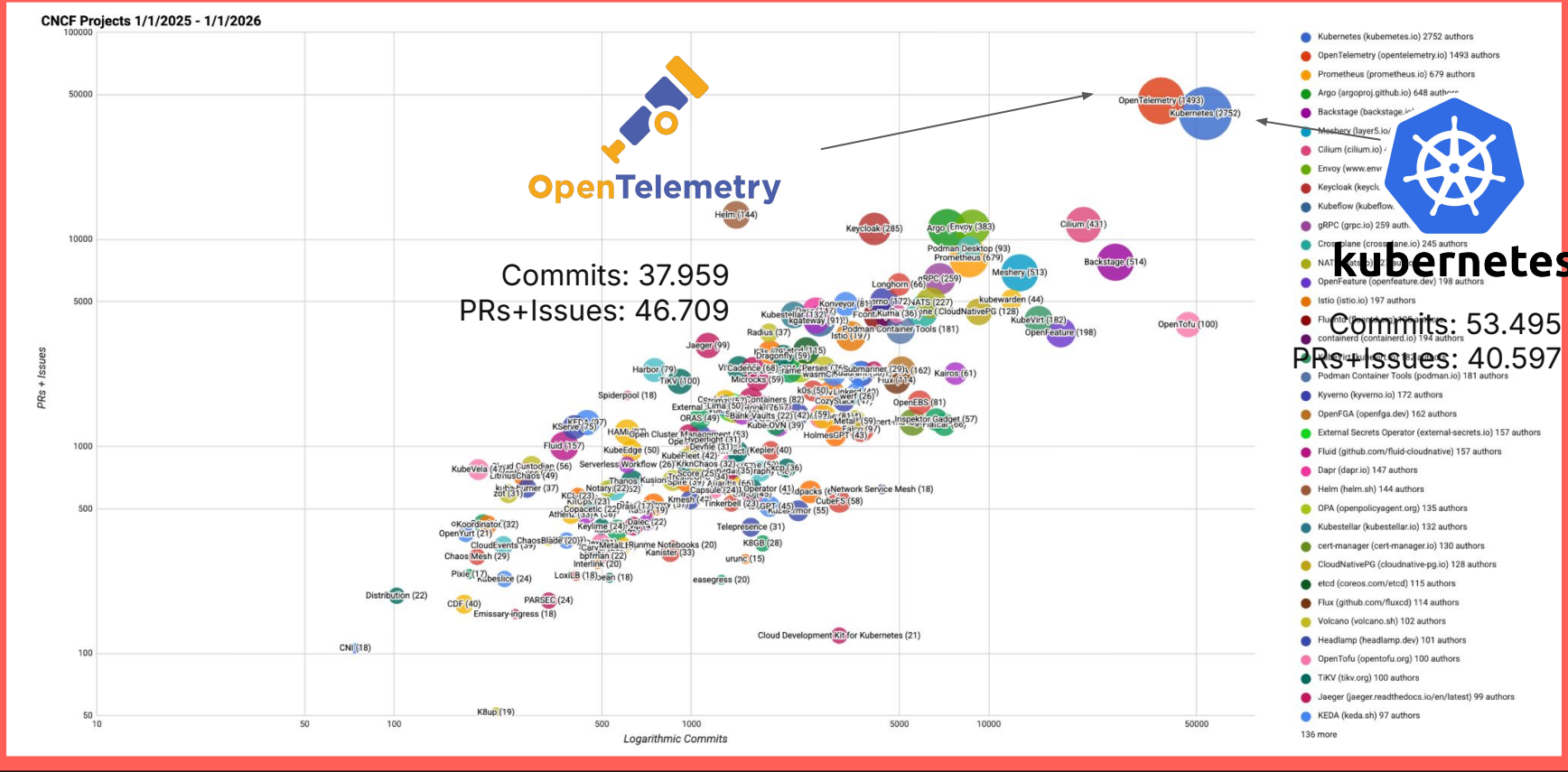
A stable bundle of attributes attached once, at process start - then carried on every signal the process emits.

```
# Emitted with every span, metric, log
resource:
  service.name:           api-gateway
  service.namespace:      payments
  service.version:        2.14.0
  deployment.environment: production
  k8s.cluster.name:       eu-west-1-prod
  k8s.namespace.name:     payments
  k8s.pod.name:           api-gateway-7b9f-x2k
```

Source > Pipeline

- At the source, the component knows what it is - deployment metadata, config, versioning.
- In the pipeline, the Collector is guessing - joining on pod IPs, racing pod lifecycle, correlating by convention.
- Drift is silent. Reconstructed downstream, signals can quietly disagree about who - correlation breaks.

1/1/2025-1/1/2026



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Source: CNCF Velocity Report

49%

of respondents using OpenTelemetry in production.

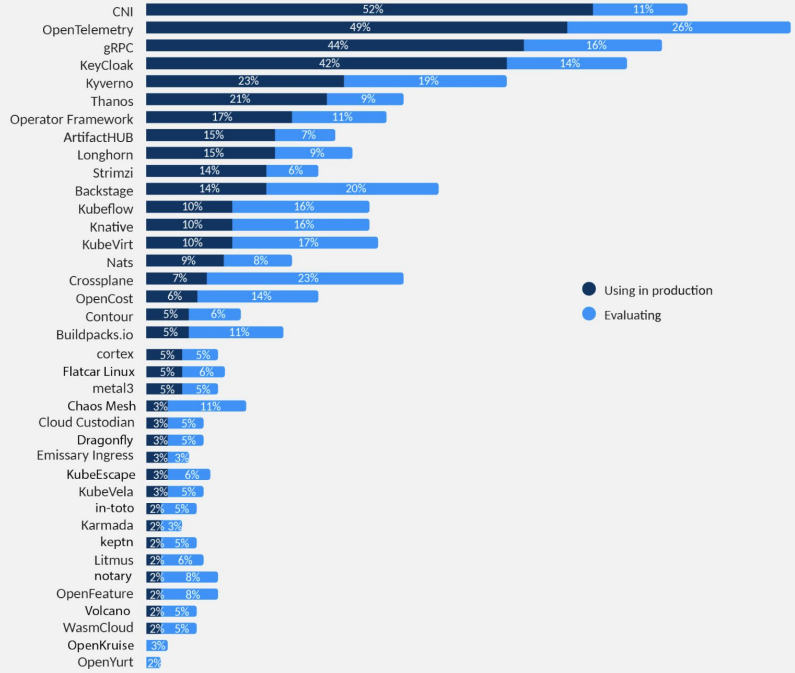
26%

of respondents evaluating OpenTelemetry.

FIGURE 20

CNCF INCUBATING PROJECTS

Which of these incubating CNCF projects is your organization using in production or evaluating? (select one)



2025 CNCF Annual Survey, Q33, Sample size = 395-502, DKNS excluded

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Source: https://www.cncf.io/wp-content/uploads/2026/01/CNCF_Annual_Survey_Report_final.pdf

Foundational infrastructure **raises expectations** on the ecosystem.

A natural consequence…

01 **Plug into existing pipelines**
INTEGRATION

Connect to an OpenTelemetry Collector without custom adapters, sidecars, or per-project flags.

02 **Speak a shared language**
SEMANTICS

Consistent attributes across traces, metrics, and logs - so dashboards and alerts transfer.

03 **Stable, predictable, documented**
IDENTITY & STABILITY

Resource identity you can trust across environments. Telemetry treated as a long-lived contract.

Users don’t just want OTLP ingest - they want a component that behaves like a first-class citizen of their observability platform.

Ecosystem support is **scattered**.

In practice…

WHAT MOST PROJECTS SHIP

Supports OTLP

→ a wire protocol

- Can export to a Collector
- Metric/log/trace bytes on the wire

≠

WHAT PLATFORM TEAMS NEED

Supports OpenTelemetry

→ a platform capability

- Semantic correctness & resource identity
- Trace modeling & propagation
- Multi-signal correlation
- Stable, documented configuration surface.

“Supports OpenTelemetry” is often interpreted as “can export OTLP”. That framing hides major differences in how well projects actually integrate.

The Collector becomes a compensation layer.

Every project that ships half-baked resource identity adds another processor to someone else's pipeline.

01 **k8sattributes**
reach back into the API server to discover what pods this even is.

02 **resource / transform**
rewrite `service.name` , synthesise `deployment.environment.name`.

03 **attribute processor**
paper over wrong SemConv names from individual projects.

04 **filter / redact**
strip PII the component leaked into attribute values.

05 **.. & a per-project branch for every new onboarding**
Pipeline grows linearly with the estate. Unowned. Untested.

THE SHIFT

Identity missing *at the source* becomes **config sprawl** in the platform

Each layer is a heuristic, not a contract - racing pod lifecycle, joining on IP's, re-naming attributes. Silent drift is the default outcome.

Correlation isn't emitted. You **manufacture** it.

What "supports OpenTelemetry" looked like in practice

AT THE SOURCE – CONTOUR.YAML

```
# turn tracing on, wire the Collector by hand
tracing:
  serviceName: contour-gateway
  extensionService: { name: otel-collector }

# then hand-inject the trace id into a log string
accesslog-format: envoy
accesslog-format-string: |
  { ..., "traceparent": "%REQ(traceparent)%", ... }
```

IN THE COLLECTOR – OTEL-COLLECTOR (OTTL)

```
# recover correlation downstream, by hand
transform/trace-extract:
  log_statements:
    - set(attributes["b"], ParseJSON(body))
        where IsMatch(body, ".*traceparent.*")
    - set(trace_id.string, Substring(b["traceparent"], 3, 32))
    - set(span_id.string,  Substring(b["traceparent"], 36, 16))

k8sattributes:  # ...and backfill identity too
  extract: [ k8s.namespace.name, k8s.pod.name, k8s.node.name ]
```

The trace ID ships as a string inside a log line. To correlate logs with traces, I parse the JSON and substring out 32 hex characters myself - per component, forever.

Where the **bill is paid**

When projects ship weak OpenTelemetry support, platform teams absorb the cost.

01
Collector YAML sprawl

Per-component transform rules, schema mappings, ad-hoc enrichment.

02
Silos & stitching

Logs, tracing, and metrics correlate only after pipeline massaging.

03
Fragile dashboards

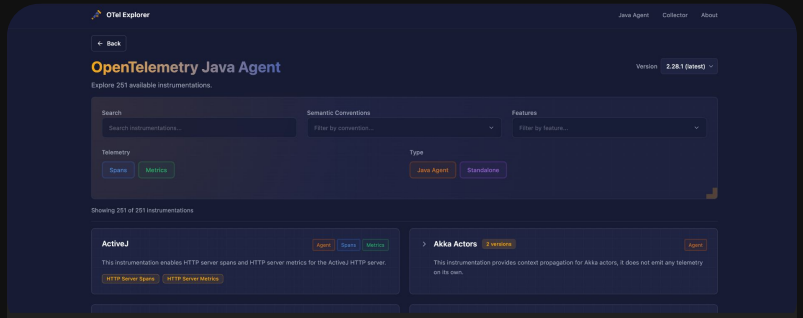
A refactor upstream silently breaks alerts and runbooks downstream.

04
MTTR flatlines

More tooling. Same debugging. Same outcomes.

Platform components are **long-lived dependencies**. Weak OpenTelemetry support limits the value platforms can extract - from reliable debugging to automation and AI-assisted analysis.

We have **discovery**. We have **runtime quality**.

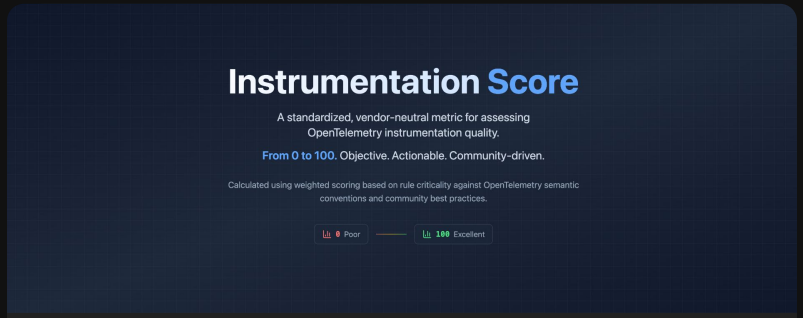


DISCOVERY

Ecosystem Explorer

A registry. Tells you *what exists* - binary inclusion, no maturity dimension.

`explorer.opentelemetry.io`



RUNTIME QUALITY

Instrumentation Score

Rule-based checks on live OTLP. Tells you *how clean* the emitted data is.

`instrumentation-score.com`

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DRAFT PROPOSAL

OpenTelemetry Support Maturity Model.

A shared vocabulary for evaluating how intentionally a project supports OpenTelemetry - not whether it can speak the protocol.

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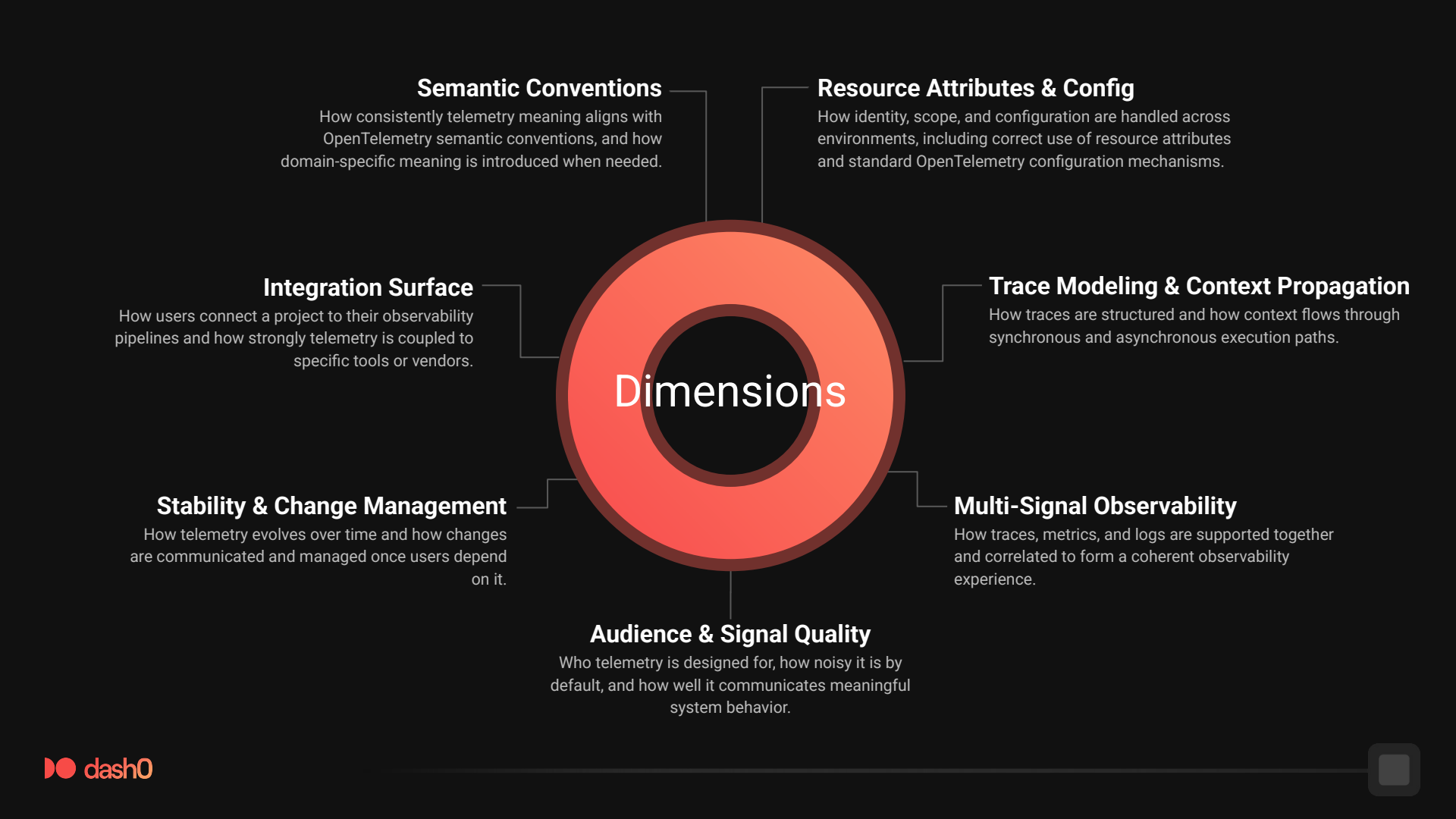
Four **levels** - from instrumented to optimized.

Telemetry exists - mostly to serve internal debugging. OpenTelemetry is not yet a design concern.

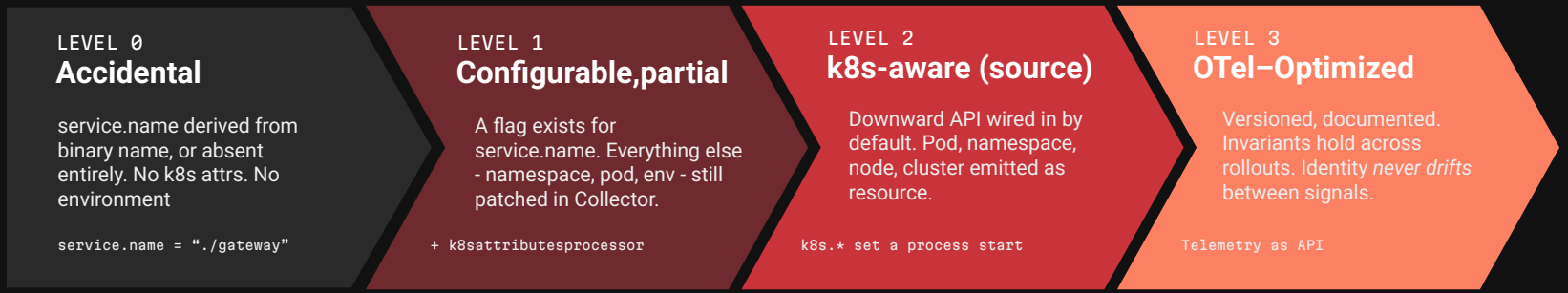
OTel supported explicitly - often alongside legacy exporters. Works for common cases; legacy assumptions still shape design.

OpenTelemetry is the integration surface. Telemetry is designed intentionally for correlation and UX.

Telemetry as a long-lived product surface. Continuously refined for scale, cost, quality and stability.


Semantic Conventions
How consistently telemetry meaning aligns with OpenTelemetry semantic conventions, and how domain-specific meaning is introduced when needed.
Resource Attributes & Config
How identity, scope, and configuration are handled across environments, including correct use of resource attributes and standard OpenTelemetry configuration mechanisms.
Integration Surface
How users connect a project to their observability pipelines and how strongly telemetry is coupled to specific tools or vendors.
Dimensions
Trace Modeling & Context Propagation
How traces are structured and how context flows through synchronous and asynchronous execution paths.
Stability & Change Management
How telemetry evolves over time and how changes are communicated and managed once users depend on it.
Multi-Signal Observability
How traces, metrics, and logs are supported together and correlated to form a coherent observability experience.
Audience & Signal Quality
Who telemetry is designed for, how noisy it is by default, and how well it communicates meaningful system behavior.

Resources - where identity is set decides who pays



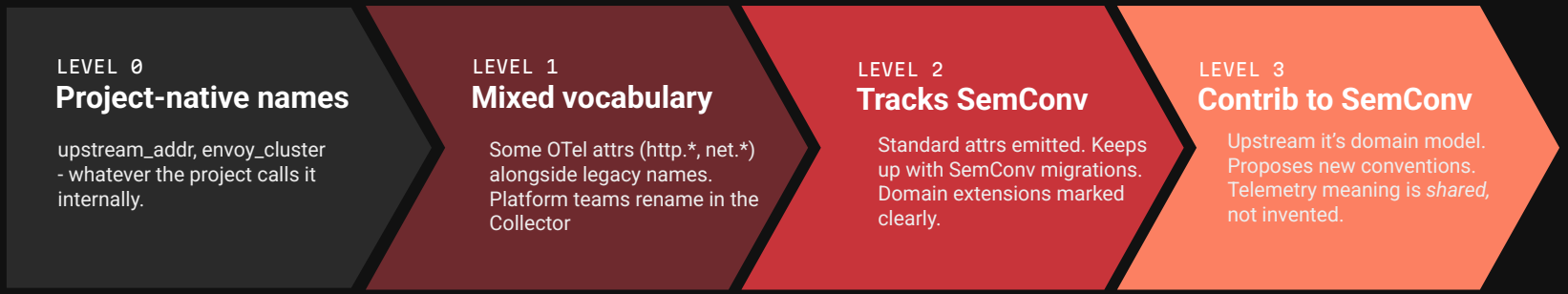
TELLS FROM THE OUTSIDE

- Does it emit k8s.* attrs *without* the Collector k8sattributesprocessor?
- Is service.name first-class config - or reverse-engineered from a flag?

INGRESS REALITY

- Traefik - resource intentional, k8s-aware at source
- kgateway/Contour/Istio Gateway - partial; expect Collector patching.
- Emissary-Ingress - minimal resource modeling.

Semantic Conventions - the **vocabulary** that makes data transferable.



WHY OPERATORS FEEL THIS

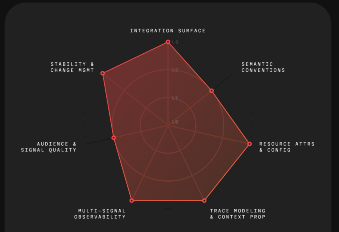
- **Dashboards don't transfer**. Swap a component → rebuild every panel.
- **Alerts break silently** on the upstream rename
- **AI & automation can't generalize** without a shared vocabulary

TELLS FROM THE OUTSIDE

- Spans use http.route, url.path, server.address - or project-local names?
- Do docs reference semconv by version?
- Did the http → client/server SemConv migration land?

I tested the model against 5 ingress controllers

Ingress is the edge – every request passes through it. If any component should be OpenTelemetry-native



Traefik

OTel-first design

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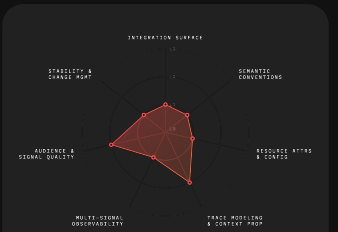

Istio Gateway

Envoy-based, battle-tested

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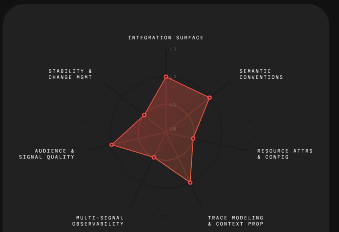

kgateway

Envoy + Gateway API.

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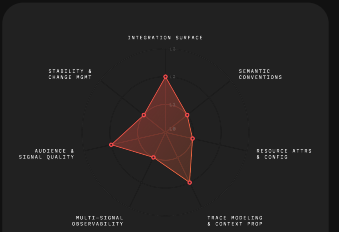

Contour

Envoy-native, CNCF

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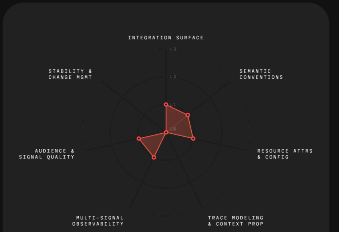

Emissary Ingress

Envoy, API-gateway lineage

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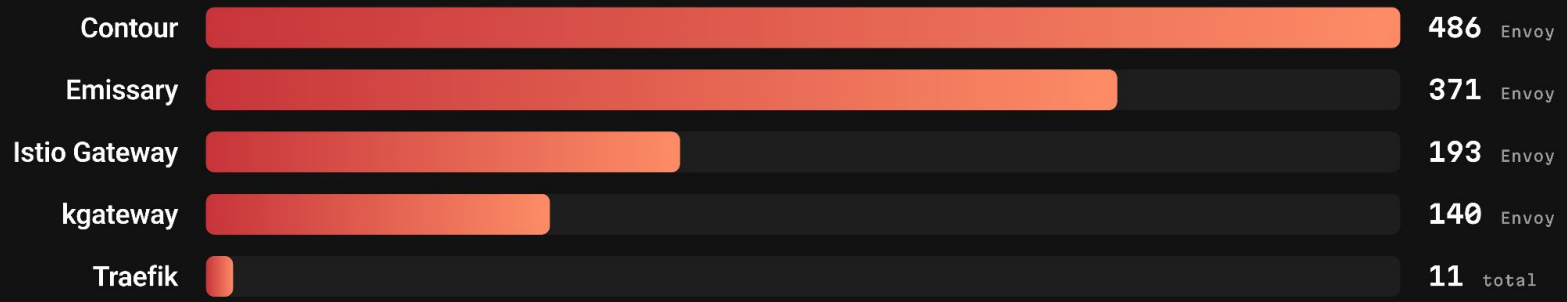
More telemetry ≠ better telemetry.

Default metrics exposed by each ingress controller — same job, the edge of your cluster.



A **44× spread** for the same job - no two projects agree on what “enough” looks like. More isn't better: the Envoy four inherit a firehose you mostly filter and drop. But **fewer isn't better either** - Traefik's 11 may not answer the question you actually ask. What counts is whether they're the right signals, follow semantic conventions, and let you answer it. **Count is not quality**.

Same box ticked. Very different shapes.

01 Only one is OTel-native end-to-end

Traefik. Everyone else is OpenTelemetry-aligned at best - legacy assumptions still shape the design.

02 Metrics still reflect Prometheus gravity

Traces go out via OTLP; metrics still come from a /metrics scrape. The Collector bridges the two. Hybrid by default.

03 Resource identity leaks into your pipeline

Most controllers expect you to enrich service.name, workload, and environment downstream in the Collector.

04 Correlation is not free

Trace-to-log correlation emerges in the pipeline, not at the source. You assemble it; the component doesn't hand it to you.

05 Stability is rarely discussed

Telemetry changes show up in refactors, not release notes. Dashboards break quietly.

06 "Supports OpenTelemetry" hides all of it

Every project ticks the same box. The shape tells a completely different story.

From a draft to a **community proposal**

It's now an OpenTelemetry community proposal — community#3435.
Shaped in the open — and already evolving with the community's input.

WHERE IT STARTED

A comparative maturity score — levels 0–3 on every dimension, one number-shaped verdict per project.

WHERE IT'S HEADING

The same seven dimensions as **self-assessment tooling & applied guides** - guidance for improving, not grades.

The community's steer was clear: not a ranking, not a certification. A shared vocabulary for getting better - on purpose.

This only works in the open.

Next steps & how to help.

01	Find it a home	Land the model in an OpenTelemetry SIG so it has owners and a process — not a doc that rots.
02	Turn dimensions into applied guides.	One guide per project type — libraries, services, collectors, gateways — with concrete "good looks like this" examples.
03	Build the self-assessment tooling	Point it at a project's telemetry and get back a guidance report — what to improve next, not a grade.
04	Maintainers: self-assess and shape the criteria.	You know your project best. Tell us where the dimensions are wrong — and where you're already heading.

OpenTelemetry is the foundation for **much faster** incident resolution

Lower MTTR requires more than data - it requires telemetry that means the same thing across every component on the request path.

WITHOUT SHARED SEMANTIC CONVENTIONS

Stitching by hand in the war room

Engineers navigate multiple tools, align timestamps, and guess which attribute means what. MTTR stagnates despite "advanced" tooling.

WITH SHARED SEMANTIC CONVENTIONS

Symptom → cause without friction

Start from a metric, drill into a trace, land on correlated logs. Automation & AI-assisted analysis become viable because the data has meaning.

Platform Engineers are the **leverage point**.

You pick the components that every team inherits – the ingress, the service mesh, the message bus, the CI runner. Your selection is the contract your organization runs on, and it quietly decides how much observability tax every product team pays for the next five years.

Everything that can be automated should be automated. Everything that can't be automated should be standardized — and platform engineers are where that standard lands.

CONSUME

Select with intent

Use the model in technology radars and golden-path decisions. Prefer components whose shape matches your signal priorities.

PROVIDE

Observability as a contract

Guarantee baseline telemetry on the paved road. Not opt-in heroics - a provision every service gets for free.

ADVOCATE

Push upstream

File the issue. Ask the maintainer. "Which dimensions are you working on?" is a better question than "Does it support OTel?".

AI doesn’t replace platform thinking.

It increases the need for it.

GARBAGE IN

Inconsistent, fragmented, uncorrelated telemetry

AI/LLM

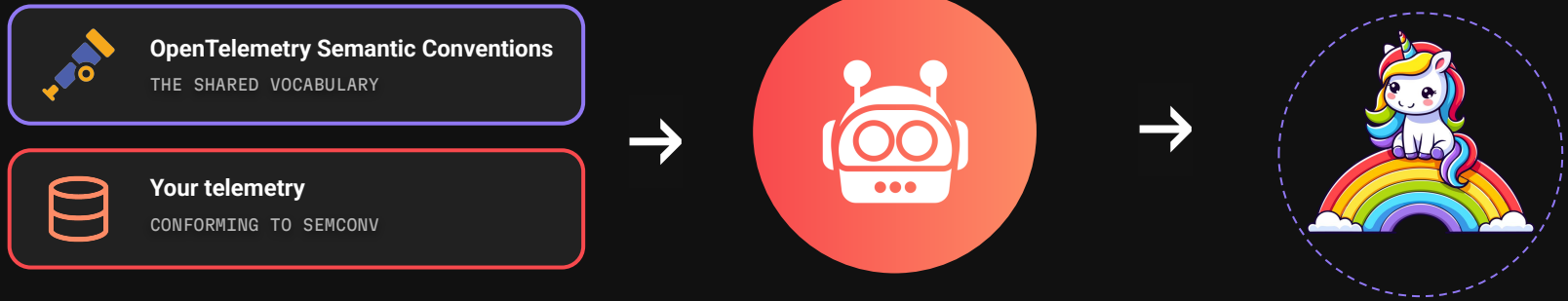
Doesn't invent clarity. Doesn't reason. Just summarizes.

GARBAGE OUT

Automated confusion. Faster. At scale.

Structure it to the semantic conventions.

Conventions are what turn telemetry into something an LLM understands.



YOUR DATA

Conform to them, and the magic is real.

AI/LLM

Now it has structure to reason over.

UNICORNS AND RAINBOWS

Correlation. Root cause. Answers you can trust.

Without conventions, correlation fails.
Without correlation, **AI guesses**.
With structure and context, **AI reasons**.

One vocabulary.

Shared vocabulary for GenAI workloads

```
# span.attributes
gen_ai.operation.name          = "chat"
gen_ai.system                  = "openai"
gen_ai.request.model           = "gpt-4o"
gen_ai.request.temperature     = 0.2
gen_ai.request.max_tokens      = 2048
gen_ai.usage.input_tokens      = 1283
gen_ai.usage.output_tokens     = 412
gen_ai.response.finish_reasons = ["stop"]

# tool call
gen_ai.tool.name               = "kubernetes.list_pods"
gen_ai.tool.call.id            = "call_84ax2"

# resource (process)
service.name                   = "agent-sre"
deployment.environment.name    = "production"
```

STABILIZED CONCEPTS

- Operation name & system
- Model + parameters
- Token usage
- Finish reasons
- Tool calls

One vocabulary? Not yet.

Five conventions for the same span

OTel GenAI SemConv

OPTIMIZES FOR VENDOR NEUTRALITY

`gen_ai.request.model`

OpenInference

OPTIMIZES FOR EVALUATION WORKFLOWS

7 span kinds - agent, tool, retriever, guardrail, evaluator…

OpenLLMetry

OPTIMIZES FOR DEVELOPER ERGONOMICS

`llm.model_name`

LangSmith

OPTIMIZES FOR THE LANGCHAIN ECOSYSTEM

Framework-native taxonomy

Langfuse

OPTIMIZES FOR IT'S OWN PLATFORM SCHEMA

Fifth name for the name

These are legitimate differences. Not naming preferences. They are not going away soon.

The platform answer.

Normalize at the edge.

OTel Collector processor

genainormalizer

Rewrites OpenInference and OpenLLMetry spans into GenAI semconv — in the pipeline, not in the apps.

OpenTelemetry

Spring AI

Arconia

All five conventions behind one config property. Switch flavors without touching application code.

By Thomas Vitale

Conformance for OpenTelemetry?

WE'VE DONE THIS BEFORE

CERTIFIED KUBERNETES

Objective conformance tests

Run the suite (Sonobuoy, originally Heptio), pass, get the mark. Machine-checkable. "Certified" means something.

PROMETHEUS CONFORMANCE

"Prometheus-compatible"

A program that verifies PromQL & remote-write compliance — so the claim is testable, not marketing.

TWO COMPLEMENTARY LAYERS

THE TRAJECTORY

Maturity model — descriptive guidance

How intentionally support evolves. A shape, not a verdict.

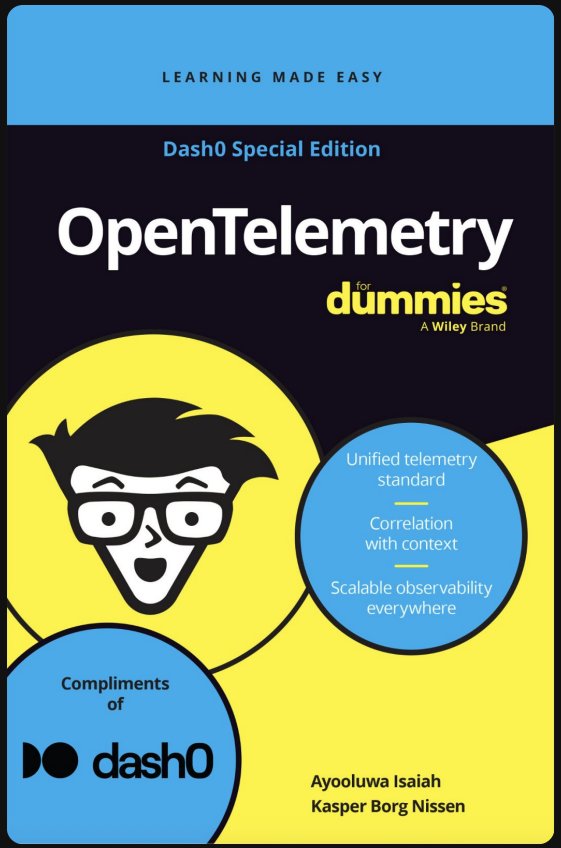
sits on top of

THE FLOOR

Conformance — pass / fail baseline

Does it emit (and ingest) OpenTelemetry correctly? Testable. The thing the TC actually asked for.

For projects (do you emit conformant OTel?) and vendors (do you ingest it faithfully?).



WANT TO GO DEEPER?

Free copy of OpenTelemetry for Dummies.

The Dash0 Special Edition - by Ayooluwa Isaiah and Kasper Nissen. Unified telemetry, correlation with context, and scalable observability, in plain language.

DOWNLOAD:

dash0.com/lp/opentelemetry-for-dummies

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Thank you!

Kasper Borg Nissen, Director of Developer Relations at Dash0

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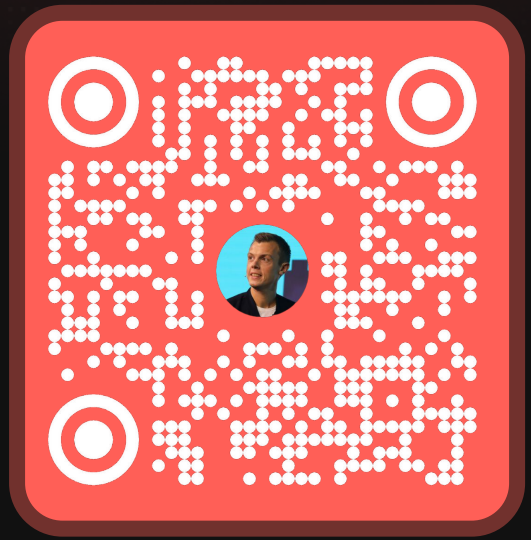
Get in touch!



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