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The bridge to possible

# Full-Stack Observability: The HOW!

## Subtitle goes here

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@capereir

# Agenda

- Full-stack observability (FSO):
  - How we got here
  - What is FSO and why now
  - What we mean by “full”
- Cisco FSO deliverables
  - Scope and Approach
  - Use-cases and integrations
  - Cisco FSO Platform
    - Architecture and Extensibility detailed
- Demos:
  - Cisco & Partners solutions / modules


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# Evolution to Full-Stack Observability

## From per-domain Monitoring to Cross-Functional teams' insights

### Monitoring

Alerts and events
Dashboards and Views
Passive & Sampling

Main KPI: Availability
Per-operations domain


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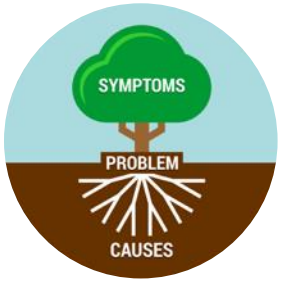
### Visibility / Observability




Root Cause Identification
Tools sprawl
Active & telemetry (M.E.L)

Main KPI: Performance
Per-operations domain

*M.E.L = Metrics, Events, Logs*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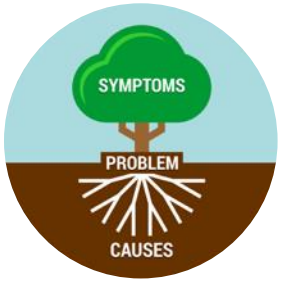


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### Full-Stack Observability

Business Context & Impact
DevSecOps and SRE
"M.E.L.T" + Security

Main KPI: Experience
Cross-operations domains

*M.E.L.T = Metrics, Events, Logs, Traces*


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# What is Cisco Full-Stack Observability

**Full Stack Observability** (FSO) is emerging as a preferred way for businesses to deliver the most optimal and secure experience to users and applications.

**Cisco Full-Stack Observability** brings together data from multiple operations domains and derive real-time insights helping to:

**Focus on what matters most:** revenue, user experience, risk, costs

**Reduce time to resolution** of incidents and performance issues;

**Minimize tool sprawl;** and **break down silos** by reducing friction among teams

**Proactive and predictive** approach to issues and incidents, even before they happen


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# Why Full-Stack Observability and Why Now

## Market Timing

- Digitization (of businesses)
  - Process
  - People interaction
- User “attributes”
  - Experience Expectations
  - Patience / tolerance
- Accelerators
  - Previous: Pandemic
  - Current: GenAI

## Pervasive Availability

- Mobile & multi-access
  - user & devices
- Cloud / Multi-cloud
- Open Source
- Flexible consumption models

## Technology Capability

- Distributed Tracing
- Streaming telemetry
- OpenTelemetry “standardization”
- High Cardinality with time-series
  - Big datasets
  - Lower storage and compute cost
- Predictive and GenAI
- Business Contextualization


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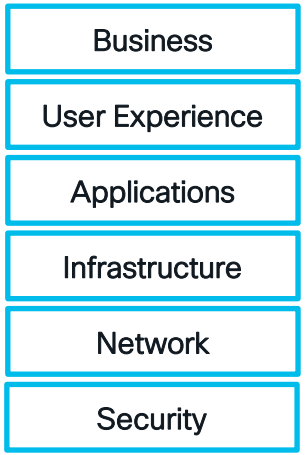
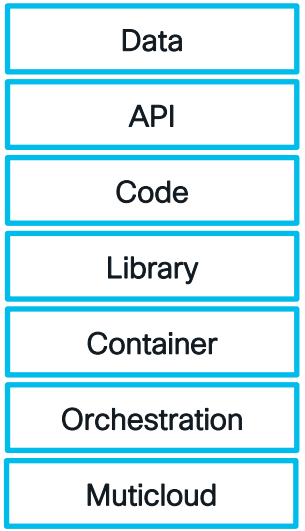
# What one may consider as ”full-stack” ?

The teams / persona perspective




The application / dev / technology perspective





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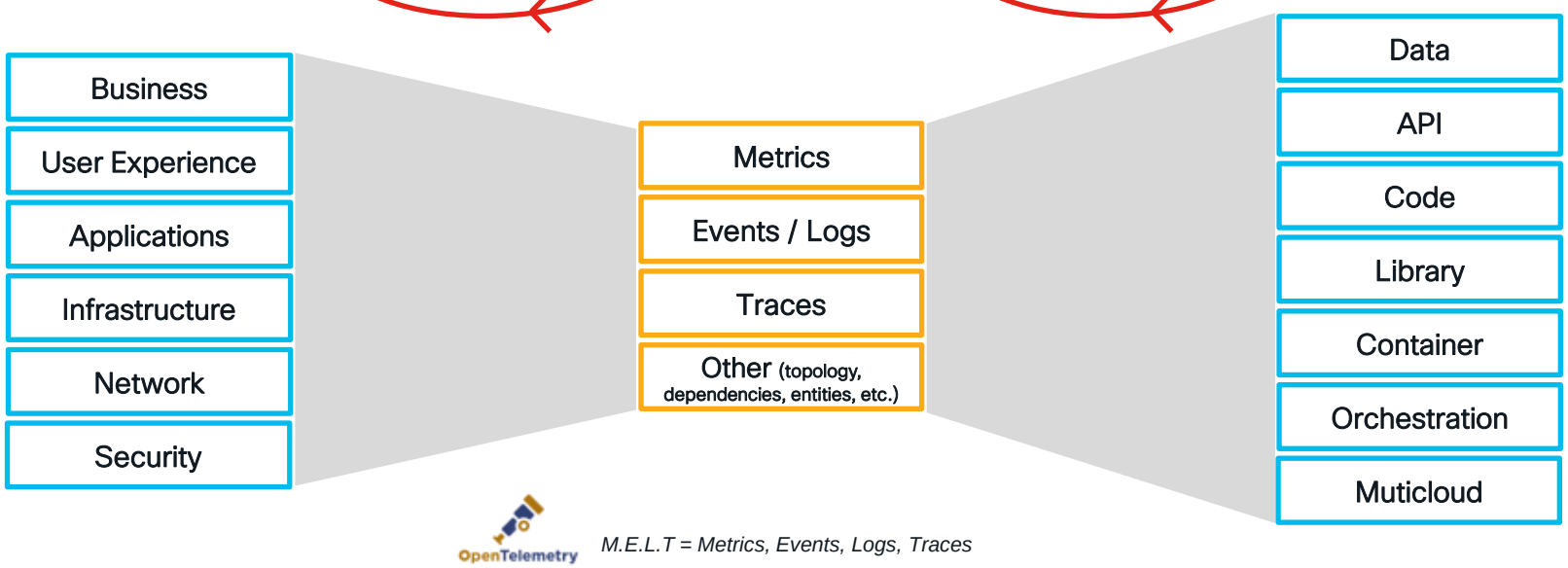
# What is required to enable “full-stack observability”?

The “teams / persona” stack + The “telemetry data” stack + The “application stack”




*M.E.L.T = Metrics, Events, Logs, Traces*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# M.E.L.T. “stack”

**METRICS**: aggregated set of measurements grouped or collected at regular intervals or a given time span, therefore not discrete

| Timestamp | Count | Metric Name | Total | Average |
|---|---|---|---|---|
| 05/Jun/2023 – 11:00:35 | 5 | PurchaseValue | $27.50 | $5.50 |

This is 1 min aggregate, so some details are lost (per-purchase specifics such as individual values, time, etc.). It helps save storage but requires proper pre-planning on what metrics to consider.

---

**EVENTS**: a discrete action happening at a moment in time. The more metadata associated with an Event, the better.

| Timestamp | Event Type | Item Purchased | Value |
|---|---|---|---|
| 05/Jun/2023 – 11:00:35 | PurchaseEvent | PizzaSlice | $5.50 |

Helpful to confirm that a particular action occurred at a particular time. Event collection frequency versus real time computational (for queries) plus storage cost is a concern


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# M.E.L.T. “stack” (continued)

**LOGS**: strings of text with a discrete timestamp associated with them. Either unstructured or structured (e.g.: JSON)

```
Mar  4 11:00:35 10.91.25.254 141121: *Apr 14 17:17:10.249: %SYS-5-CONFIG_I: Configured from console by vty4 (1
Mar  4 11:00:35 10.91.25.254 141122: *Apr 14 17:17:11.457: %LINK-5-CHANGED: Interface GigabitEthernet0/9, chan
Mar  4 11:02:39 10.91.25.254 141123: *Apr 14 17:19:14.669: %SYS-5-CONFIG_I: Configured from console by vty5 (1
Mar  4 11:38:34 10.91.25.254 141124: UK-LAB-SW-01: *Apr 14 17:55:09.073: %SYS-5-CONFIG_I: Configured from cons
Mar  4 11:43:51 10.91.1.4 254: UK-LAB-FW-01: *Sep 19 23:25:17.468: %SYS-5-CONFIG_I: Configured from console by
Mar  4 11:43:52 10.91.1.4 255: UK-LAB-FW-01: *Sep 19 23:25:18.468: %SYS-6-LOGGINGHOST_STARTSTOP: Logging to ho
```

Versatile and empowers many use cases. The most is for getting a detailed, play-by-play record of what happened at a particular time. Most software systems can emit log data.

---

**TRACES:** chains of events (or transactions) between different components in an application. Traces are discrete and irregular in occurrence.

| Timestamp | Event Type | Duration |
|---|---|---|
| 05/Jun/2023 – 11:00:35 | CreditCardPurchaseEvent | 37 seconds |

Item was purchased via credit card at a particular time, and it took 37 seconds to complete the transaction. All causal chain details and dependencies are part of the distributed traces.


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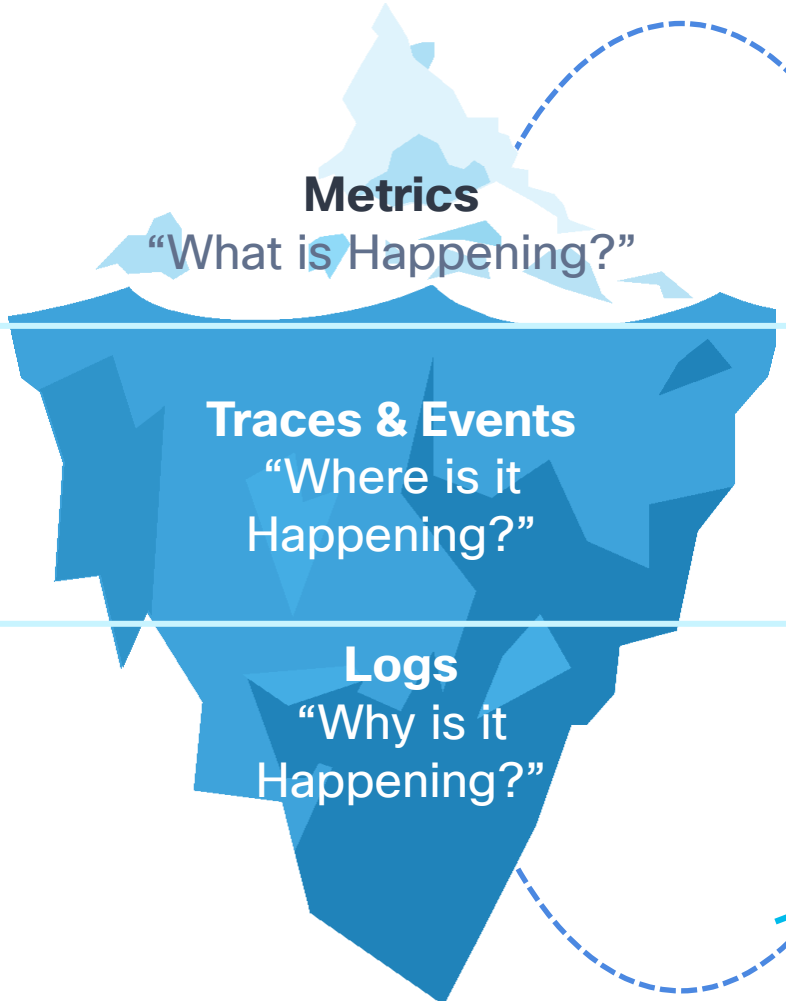
Monitor
(Detect)

Explore
(Troubleshoot)

Discover
(Root Cause)




**FULL-STACK OBSERVABILITY**

Experience
Contextualize
Correlate
Action

(Insights, Triage, Predict, Visualize, RCA, AIOps, Anomaly Detection, MTTD/MTTR reduction)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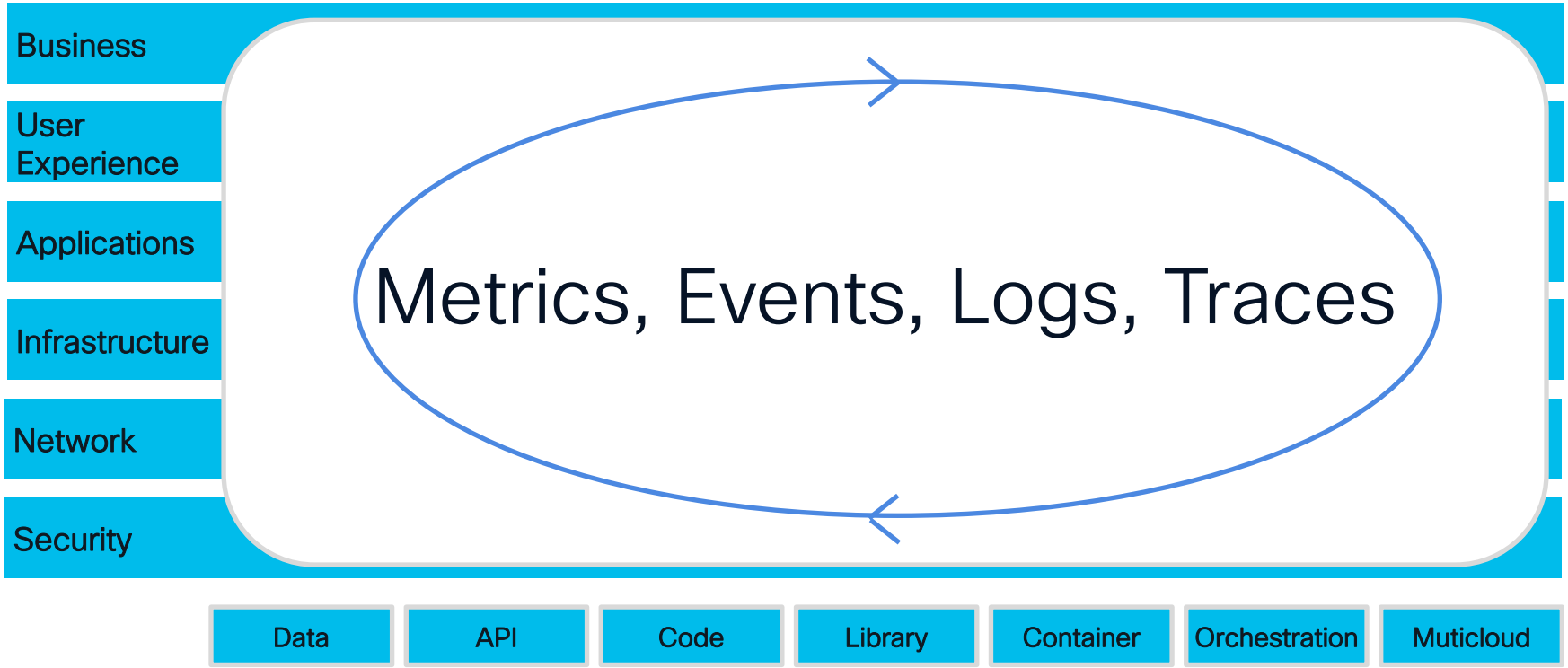
# What is required to enable “full-stack observability”?





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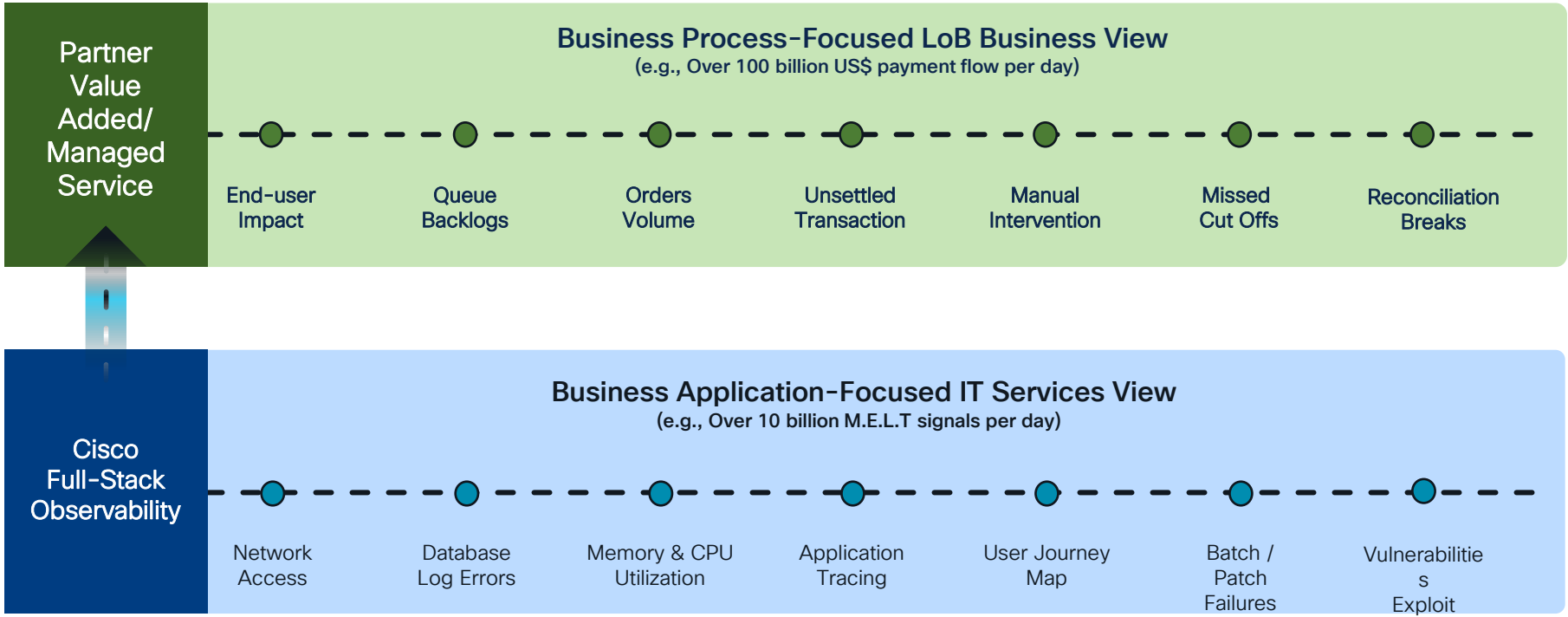
# Cisco FSO deliverables: scope and approach

# Ex.1: Cisco FSO & Payment Business Process





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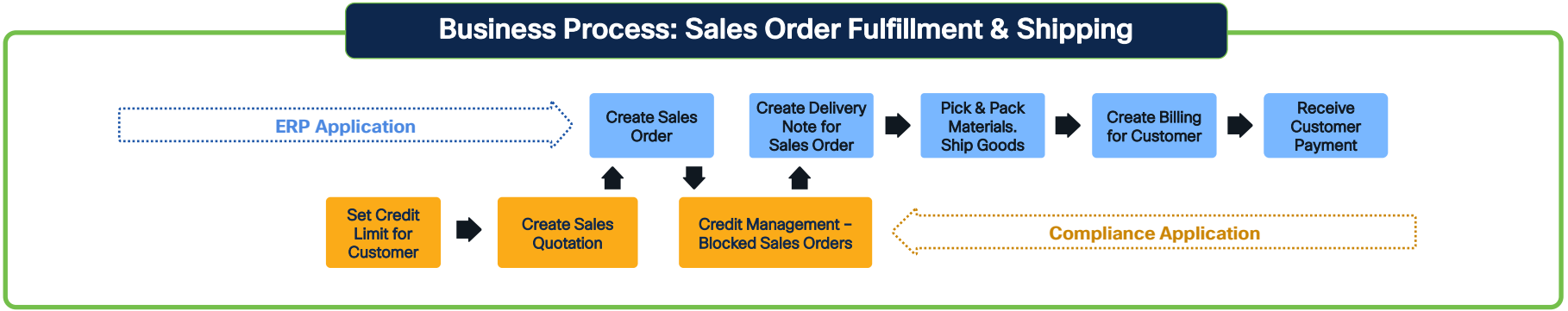
# Ex.2: Cisco FSO & Payment Business Process





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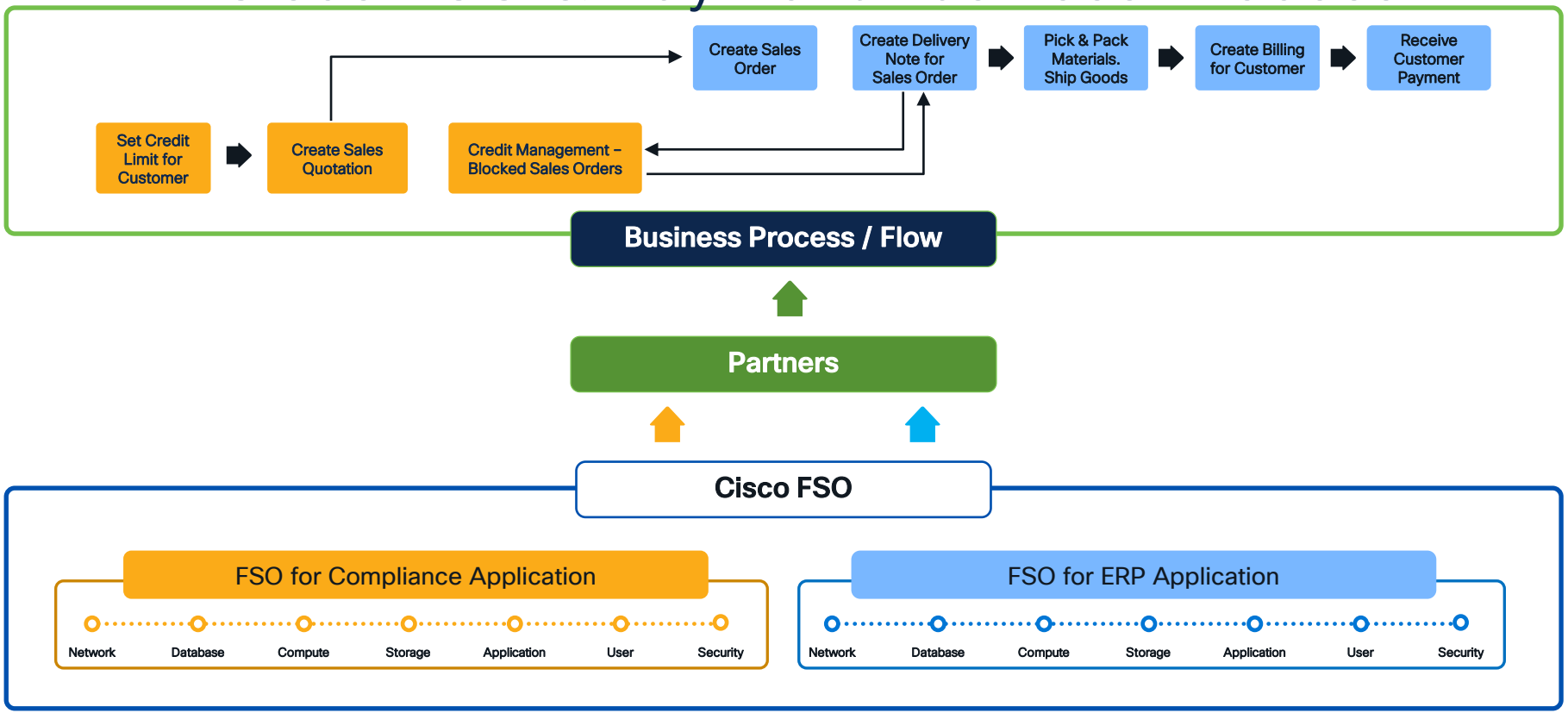
# Ex.2: Cisco FSO & Payment Business Process





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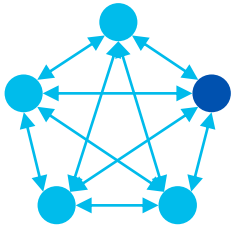
# Cisco FSO deliverables approach: Integrations and Platform

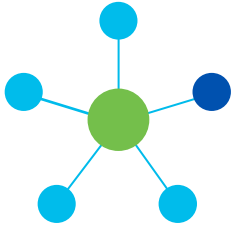
## Some business need this



### Tools based integration

- Pre-defined scope (associated with teams and tools).
- Doesn't scale as more tools / domains are considered.
- May imply telemetry data redundancy – no common data set
- Matches current paradigm for operations teams / silos.
- Faster and easier to adopt if / when tools are in place.

## Businesses are fast moving here



### Horizontal Platform for Full-stack Observability

- Ingestion based on MELT signals (Open Telemetry), not tools.
- New use-cases creation (extensibility)
- Collaboration among all operations domains;
- Enables AI / ML across common data set;
- Cost / resources optimization (helps reduce tools sprawl)

**Many customers will have both models for some time**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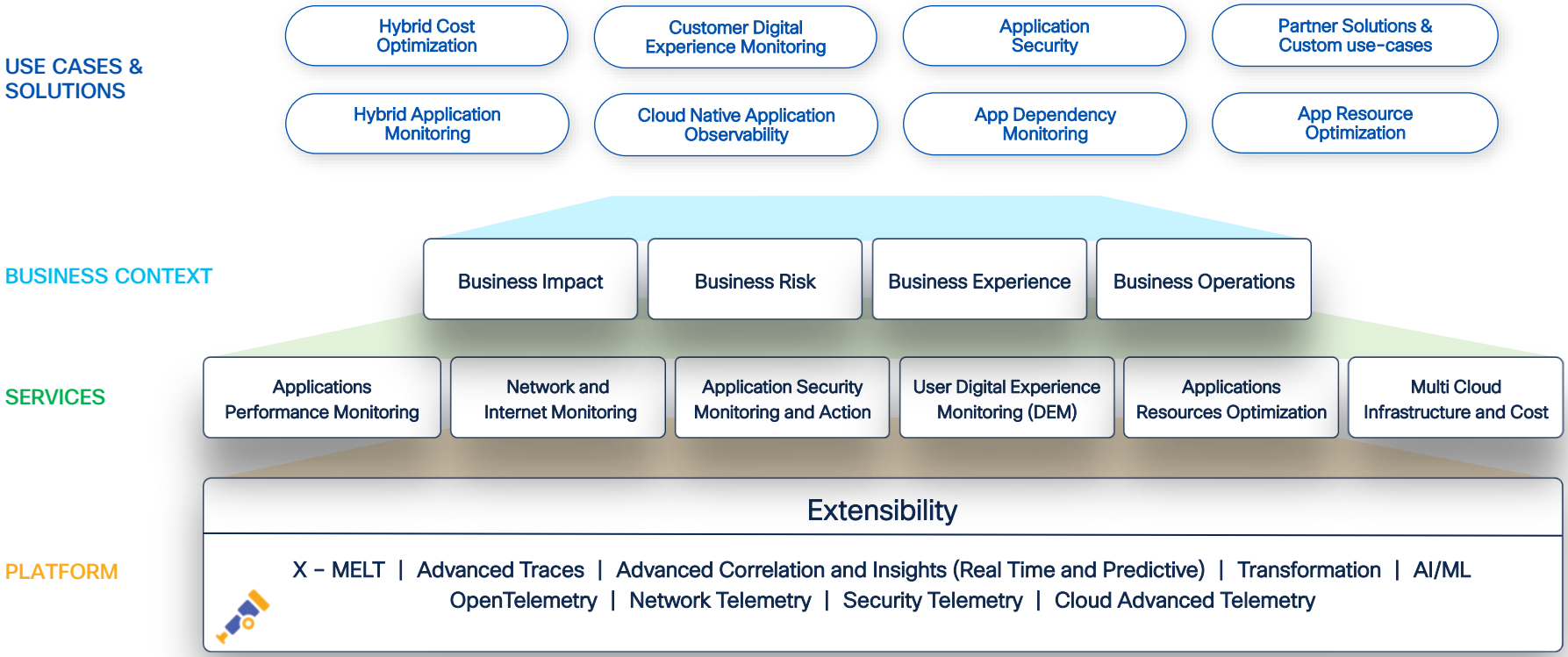
# Cisco Full-Stack Observability Architecture foundation





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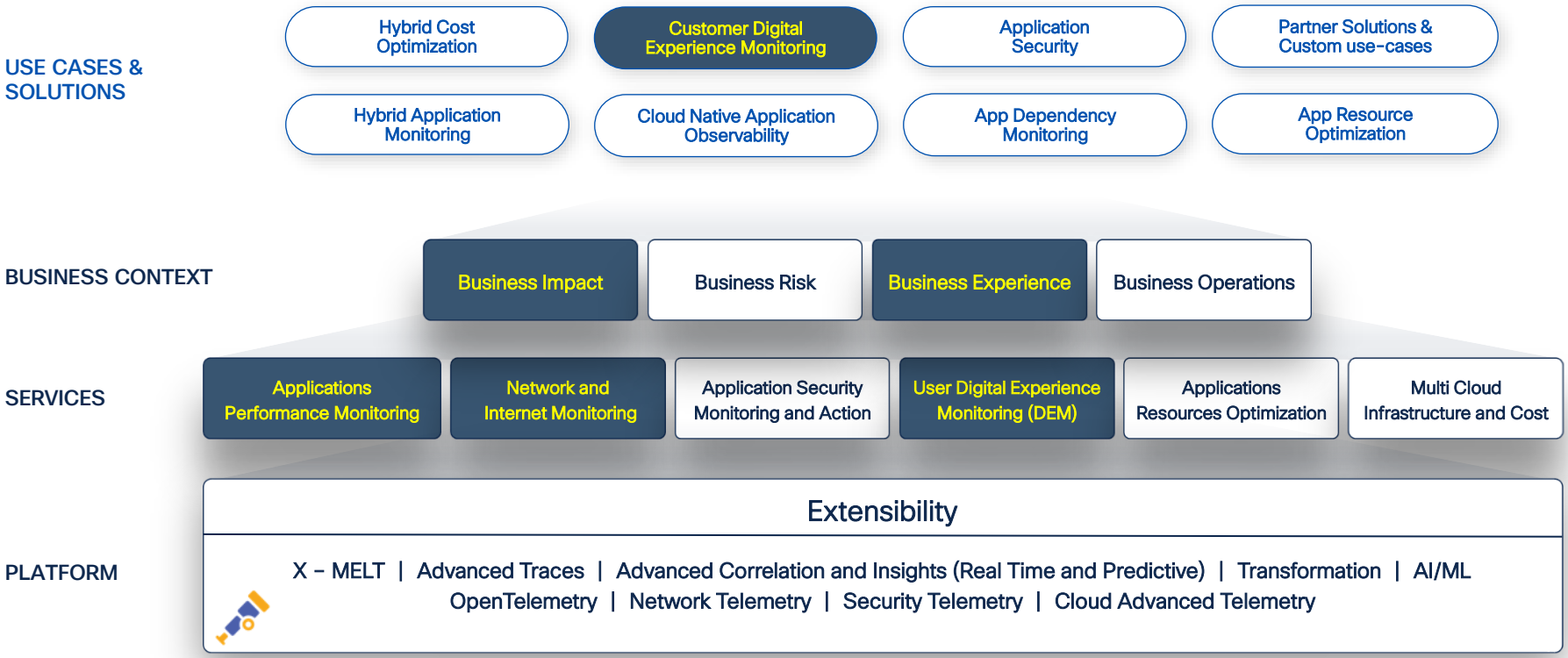
# Cisco FSO use-cases and integrations

# Cisco Digital Experience Monitoring





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# Why Digital Experience Monitoring (DEM)

- *Customer satisfaction and user experience remains a priority today*
- *Digital experience has a direct impact on revenue, retention and brand reputation*
- *APIs are very commonly used by developers, but they add security risk, impact performance and affect user-experience, so monitoring APIs performance is now critical*
- *Digitization has made environments complex today, while customers are fully geographically distributed. Because of that, DEM has expanded to gain deep visibility into how access control as well as private networks and public internet impacts business.*

Gartner


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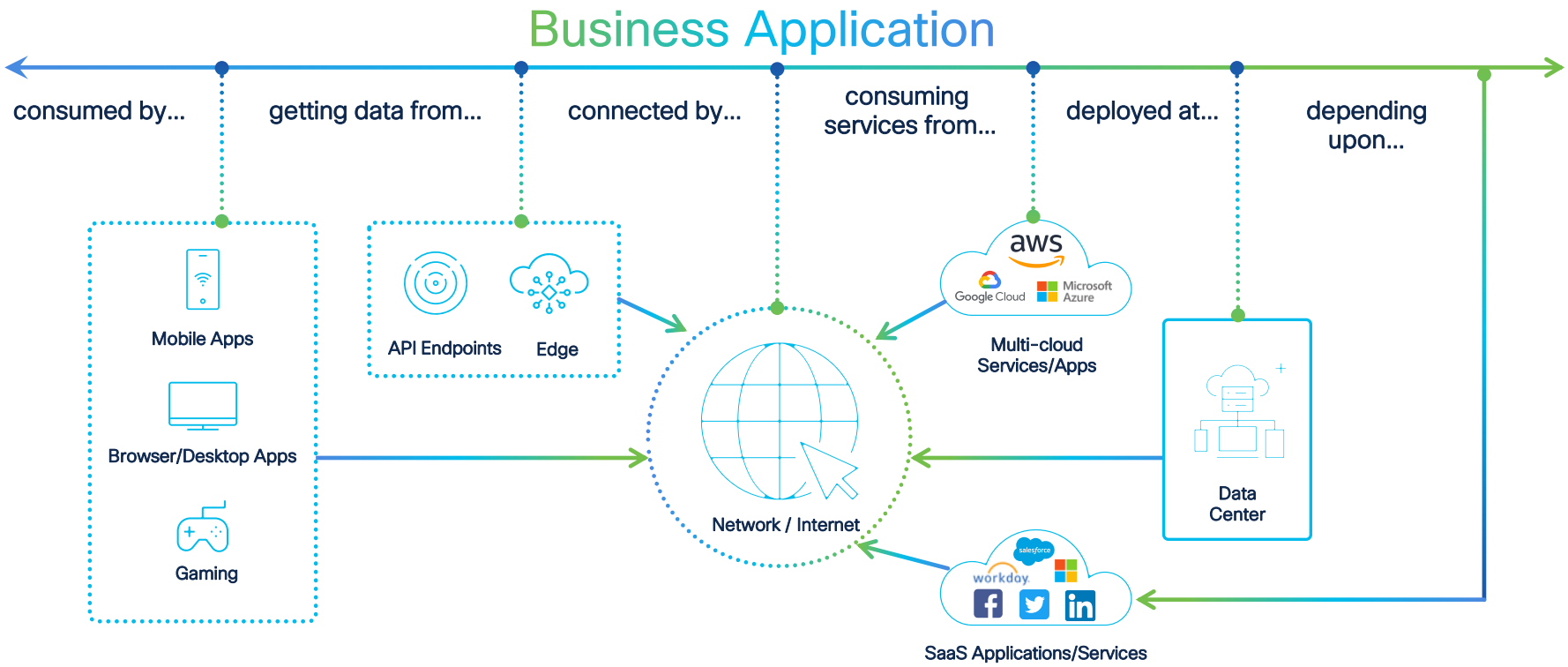
# Customer Digital Experience journey





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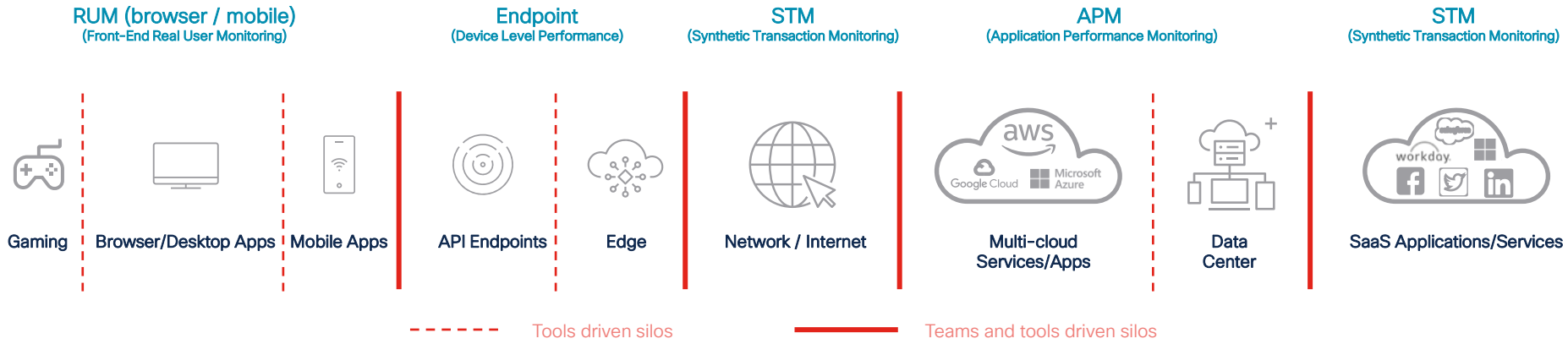
# Customer Digital Experience Monitoring Challenge




~5 hours to triage and recover from an end-user experience incident !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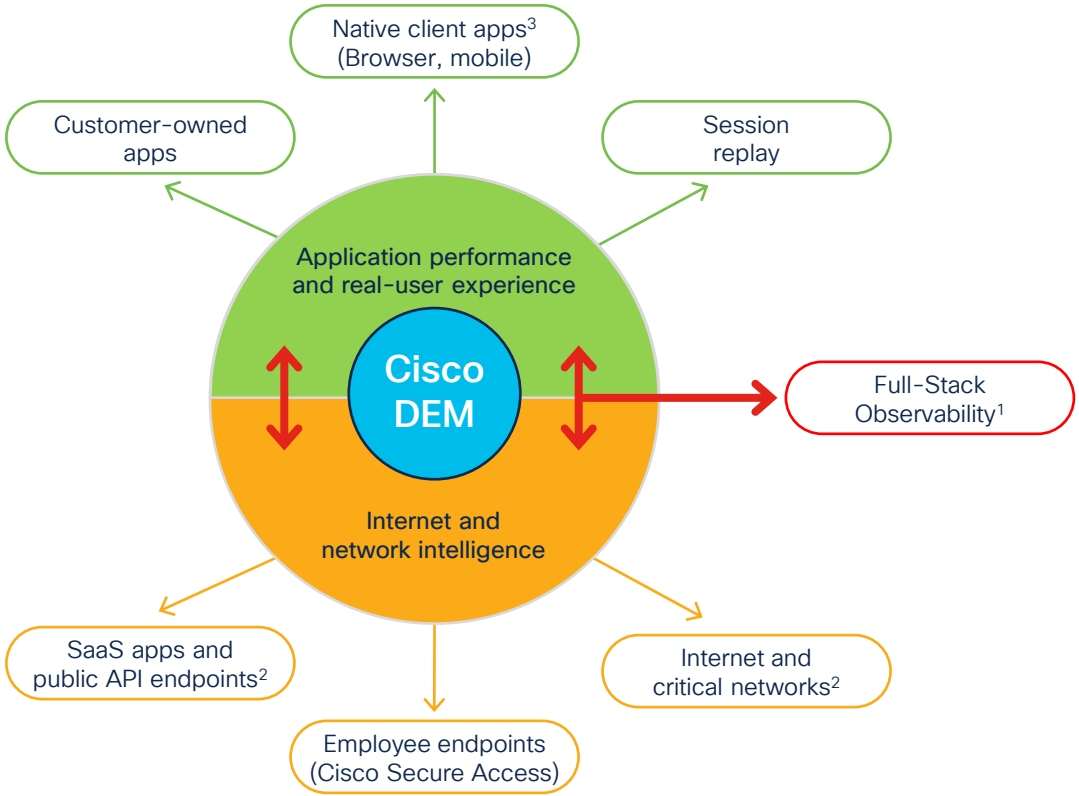
# Cisco Digital Experience Monitoring solution




[1] Front-end/back-end correlation, application/network correlation, session replay – Cisco Observability Platform
[2] Powered by synthetics – Cisco ThousandEyes
[3] Powered by real-user monitoring (RUM) – Cisco AppDynamics or Cisco Observability Platform

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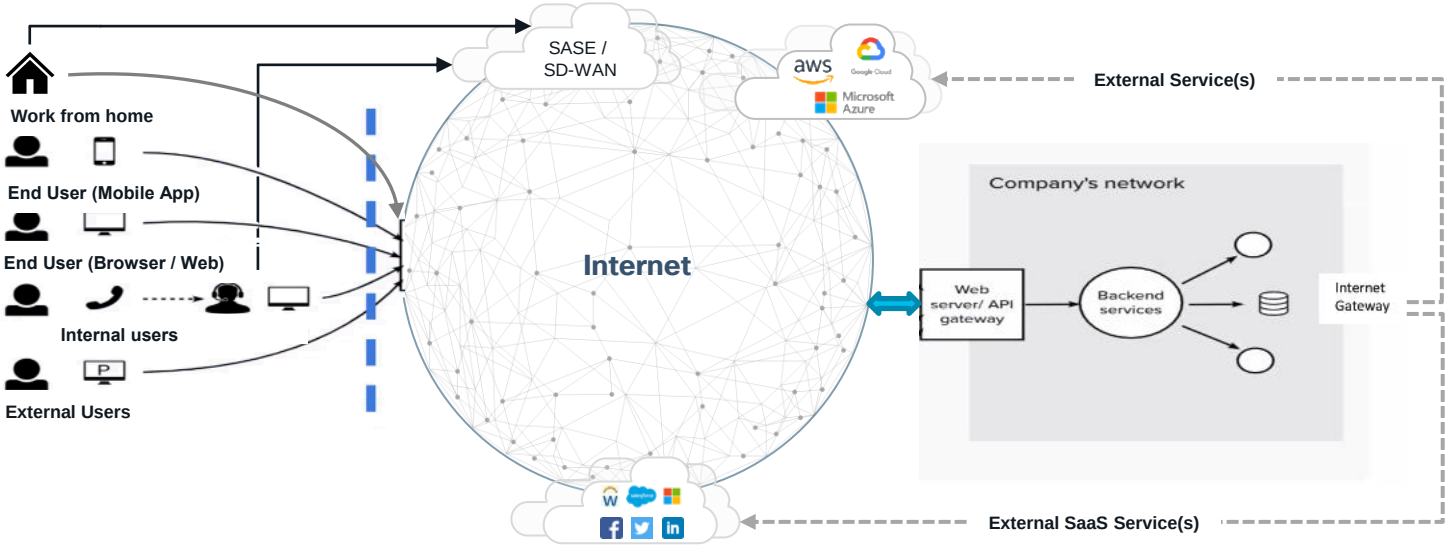
# Cisco Digital Experience Monitoring: detailed

Front-end Application (mobile / browser): RUM + Session Replay

Back-end Application + Internet: APM + Network insights




Client (laptop / cell phone): Security Access + Local Network

Internet + SaaS applications: Synthetics + Network

< 15 min to triage and recover from the same incident !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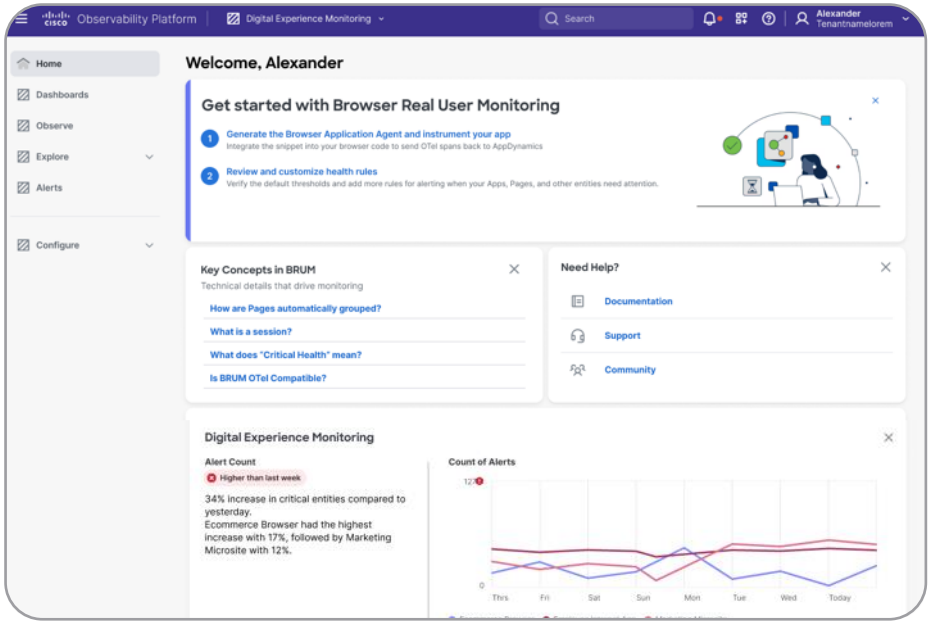
# Cisco Digital Experience Monitoring

## Correlated user experience and modern application observability

Empowers IT organizations with a holistic view of user experiences, facilitating precise troubleshooting and a proactive approach to performance optimization

Troubleshoot poor user experience with detailed analysis to quickly identify root cause and correlate with backend and network performance

Utilize Core Web Vitals and Android Vitals to evaluate health based on granular benchmarks, and monitor baseline and standard deviation for proactive issue identification





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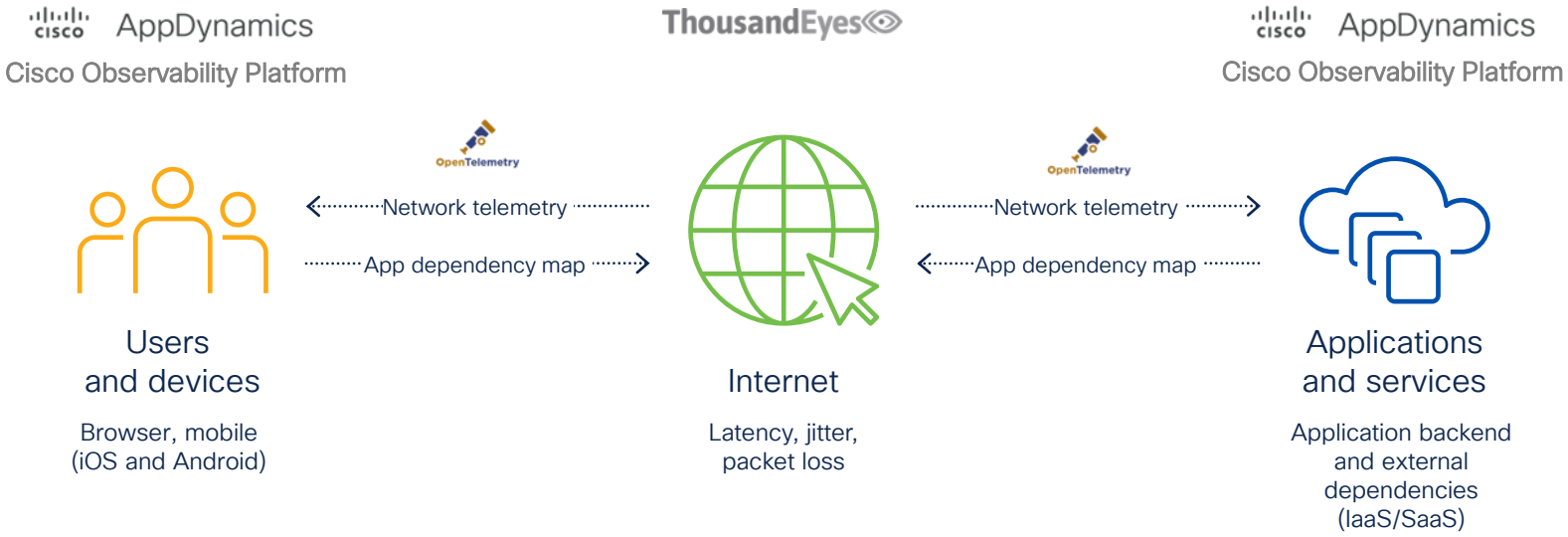
# Observability and Network Intelligence coming together

## Data-driven bi-directional integration





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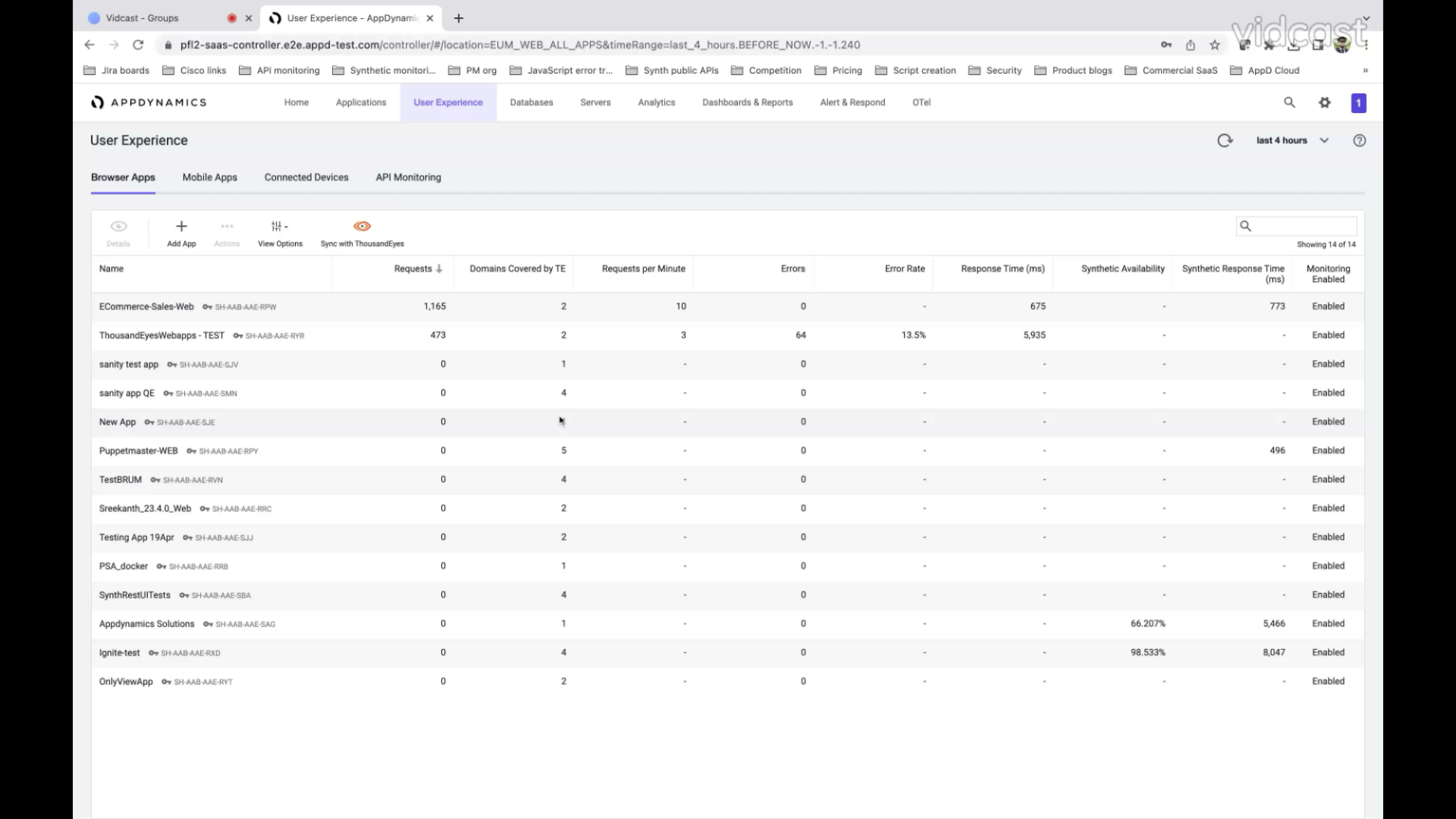
Vidcast - Groups
User Experience - AppDynamics
pfl2-saas-controller.e2e.appd-test.com/controller/#/location=EUM_WEB_ALL_APPS&timeRange=last_4_hours.BEFORE_NOW.-1.-1.240
Jira boards
Cisco links
API monitoring
Synthetic monitori...
PM org
JavaScript error tr...
Synth public APIs
Competition
Pricing
Script creation
Security
Product blogs
Commercial SaaS
AppD Cloud
APPDYNAMICS
Home
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User Experience
Databases
Servers
Analytics
Dashboards & Reports
Alert & Respond
OTel
User Experience
last 4 hours
Browser Apps
Mobile Apps
Connected Devices
API Monitoring
Details
Add App
Actions
View Options
Sync with ThousandEyes
Showing 14 of 14
Name
Requests
Domains Covered by TE
Requests per Minute
Errors
Error Rate
Response Time (ms)
Synthetic Availability
Synthetic Response Time (ms)
Monitoring Enabled
ECommerce-Sales-Web SH-AAB-AAE-RPW 1,165 2 10 0 - 675 - 773 Enabled
ThousandEyesWebapps - TEST SH-AAB-AAE-RYR 473 2 3 64 13.5% 5,935 - - Enabled
sanity test app SH-AAB-AAE-SJV 0 1 - 0 - - - - Enabled
sanity app QE SH-AAB-AAE-SMN 0 4 - 0 - - - - Enabled
New App SH-AAB-AAE-SJE 0 - 0 - - - - Enabled
Puppetmaster-WEB SH-AAB-AAE-RPY 0 5 - 0 - - - 496 Enabled
TestBRUM SH-AAB-AAE-RVN 0 4 - 0 - - - - Enabled
Sreekanth_23.4.0_Web SH-AAB-AAE-RRC 0 2 - 0 - - - - Enabled
Testing App 19Apr SH-AAB-AAE-SJJ 0 2 - 0 - - - - Enabled
PSA_docker SH-AAB-AAE-RRB 0 1 - 0 - - - - Enabled
SynthRestUITests SH-AAB-AAE-SBA 0 4 - 0 - - - - Enabled
Appdynamics Solutions SH-AAB-AAE-SAG 0 1 - 0 - - 66.207% 5,466 Enabled
Ignite-test SH-AAB-AAE-RXD 0 4 - 0 - - 98.533% 8,047 Enabled
OnlyViewApp SH-AAB-AAE-RYT 0 2 - 0 - - - - Enabled

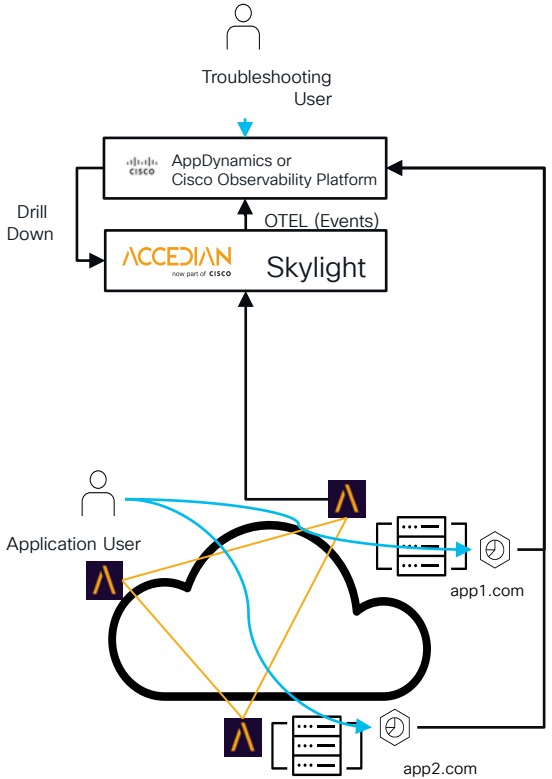
# FSO for Critical Networks

Measuring ”critical networks” where milliseconds and microsecond accuracy is required

Integration of Accedian metrics and events into Cisco AppDynamics and Cisco Observability Platform

Network probes can measure KPIs (like latency) on private enterprise networks and service provider connectivity services

Observability for applications that are extremely sensitive to latency





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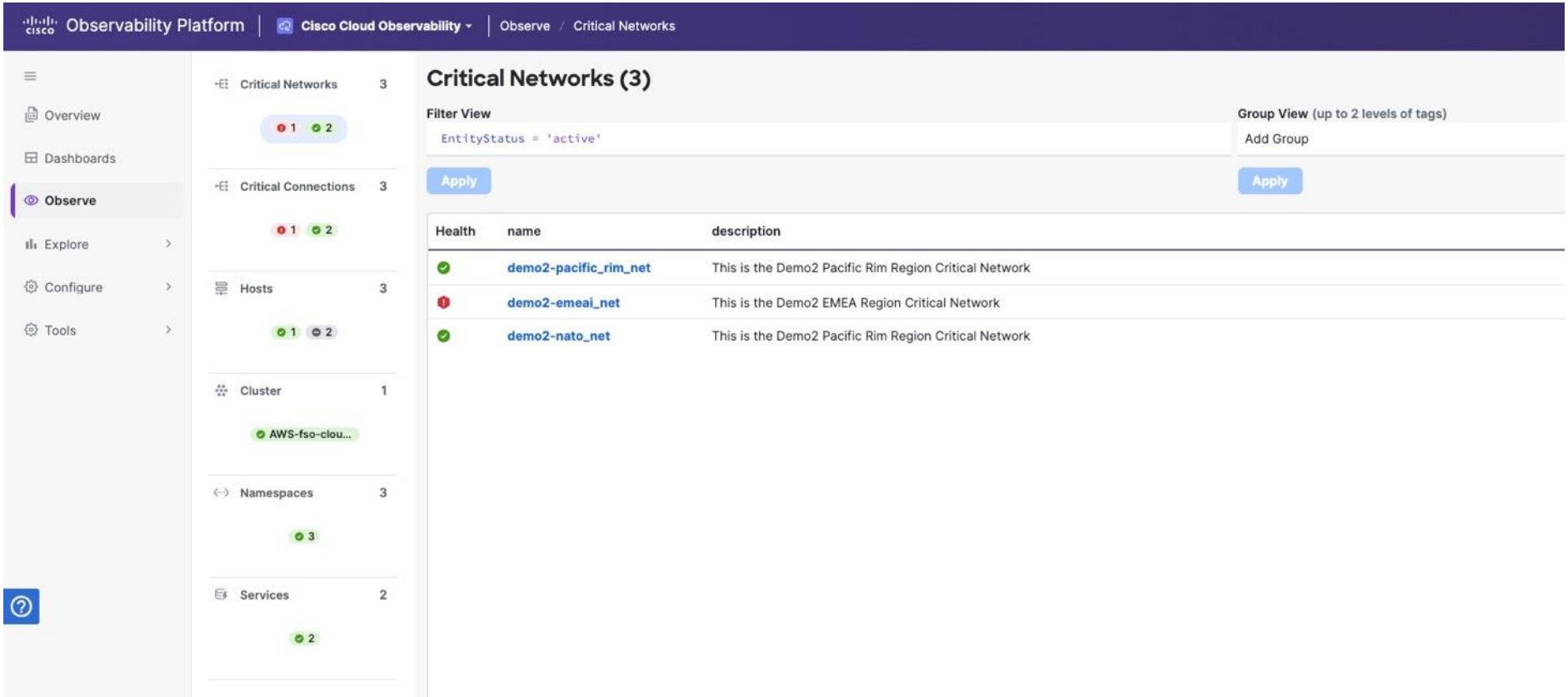
# FSO for Critical Networks





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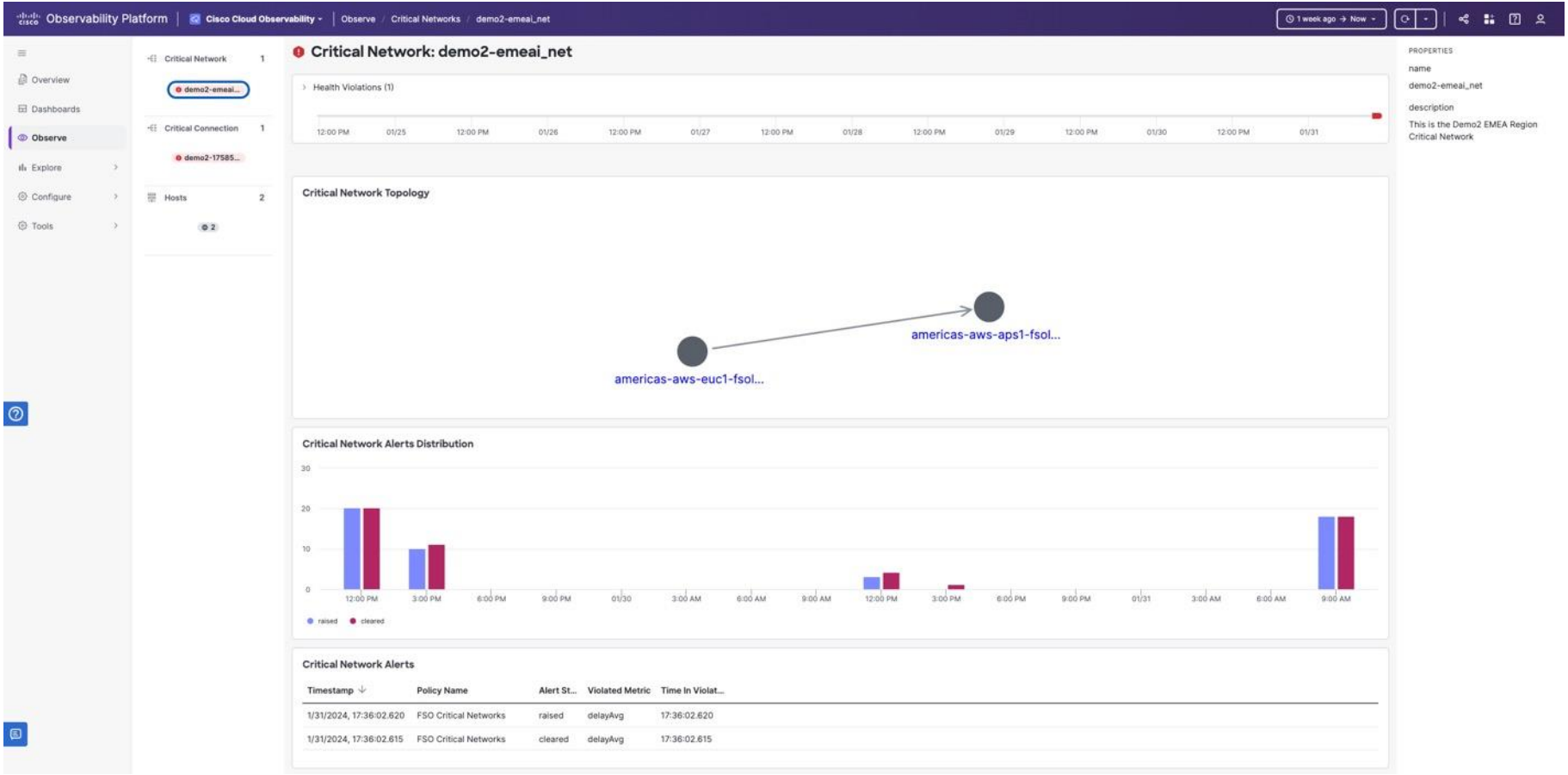



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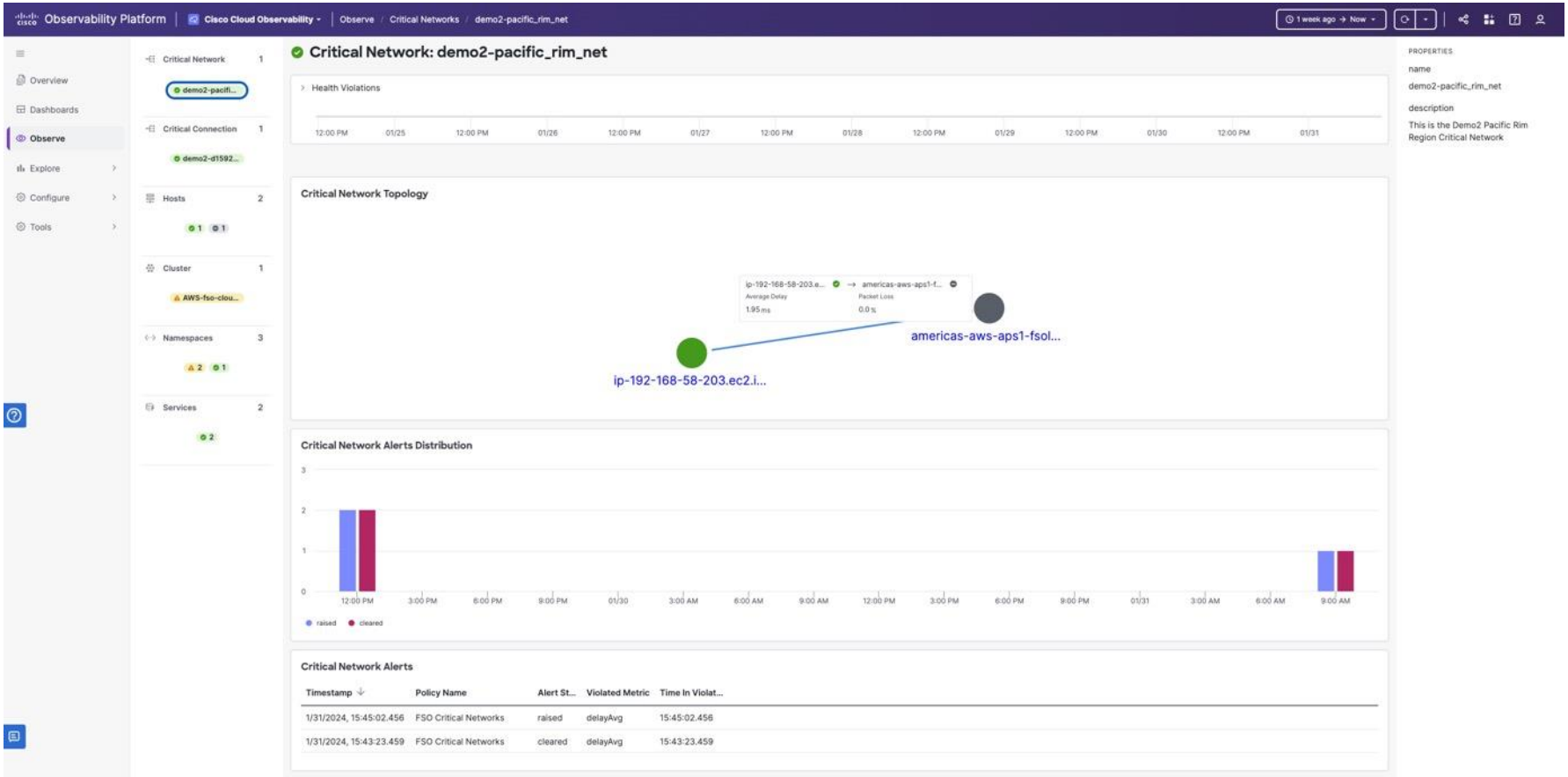



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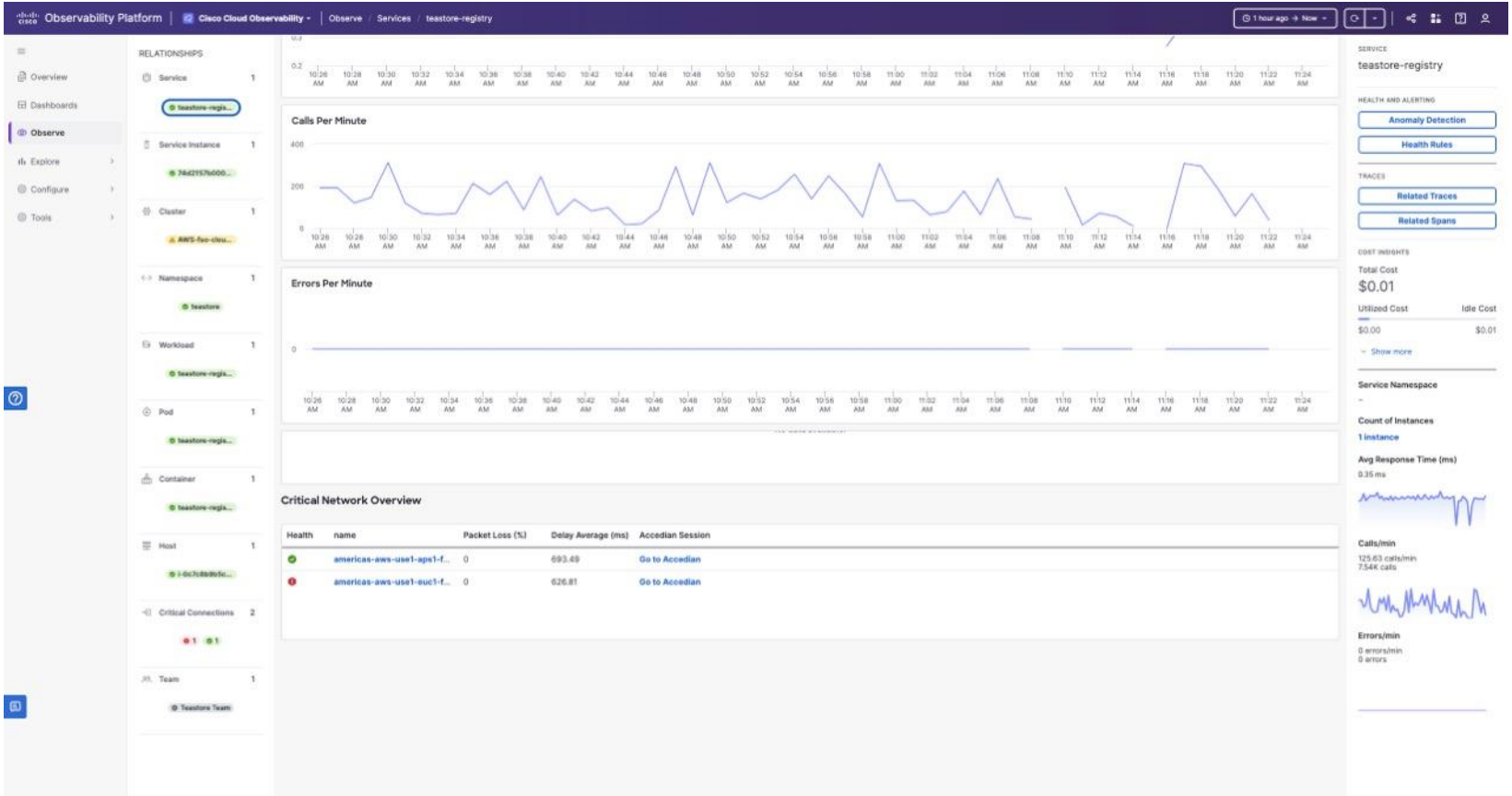



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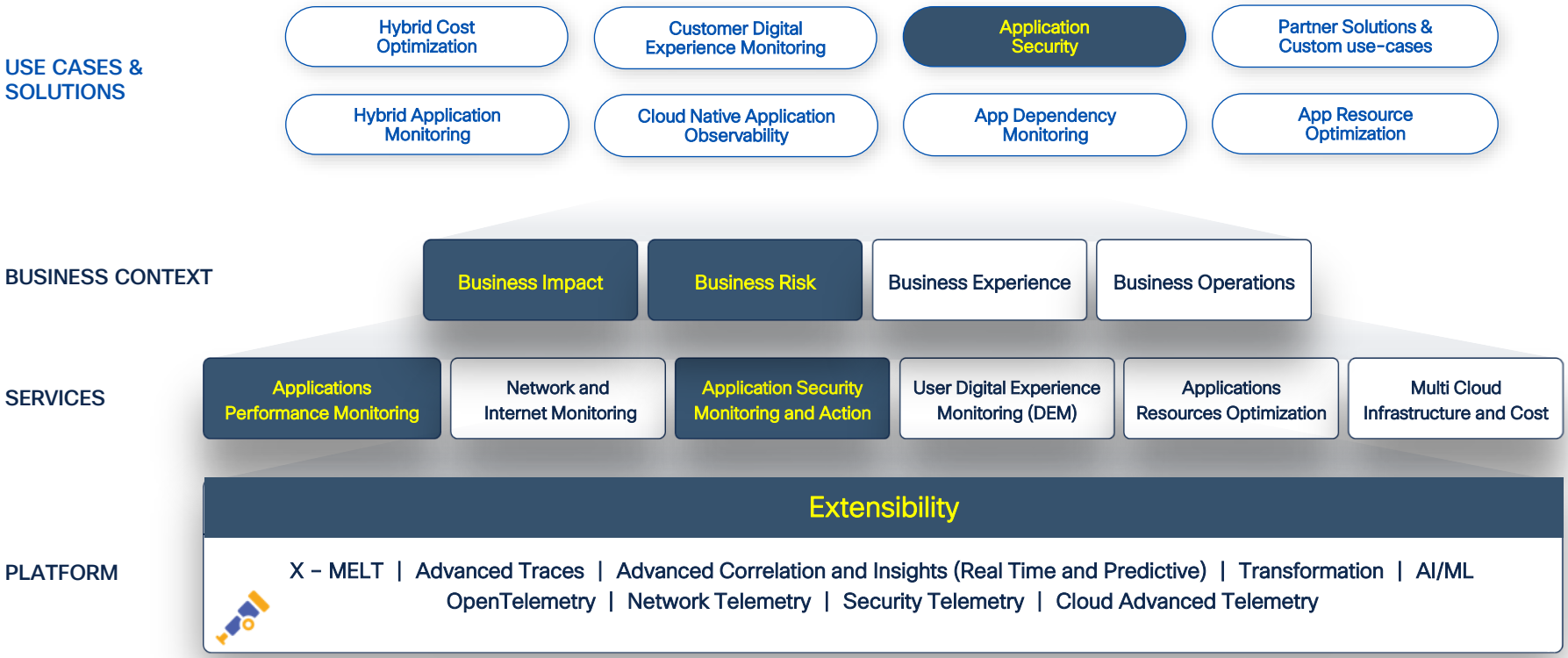
# Business Risk Observability





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# Business Risk Observability for Applications

Provides the business context needed to rapidly assess risk and align teams based on potential Impact

## Business Context Mapping

Mapping vulnerabilities and attacks to common transactions provides the business context to help you quickly understand the location and impact of threats.

+

## Vulnerability and Threat Intelligence

Threat intelligence feeds from multiple yet complementary sources provide the threat context to understand the likelihood of threat exploits.

=

## Business Risk Scoring

Scoring composited from analysis of runtime behavior + business impact + intelligence provides complete business risk context to instantly assess and prioritize action across ITOps and SecOps teams


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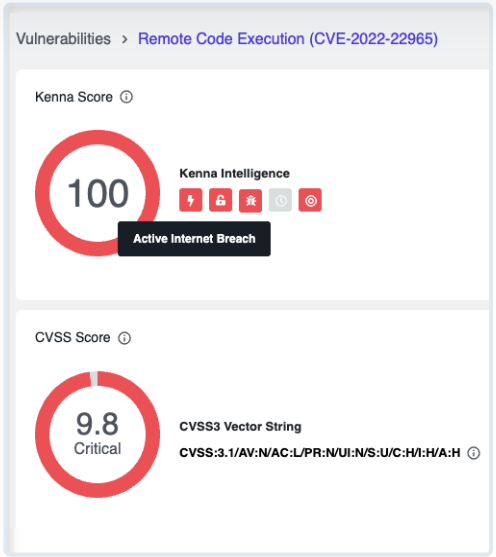
# Cisco Business Risk Observability in action

**Per Business Transaction**

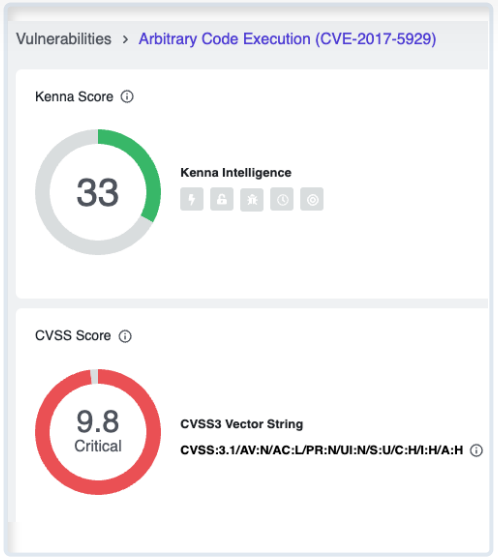
**Real-time Score**: Estimate of the likelihood of exploitation based what is happening in real-time.

**CVSS Score**: Qualitative ratings of Public Disclosed Vulnerabilities

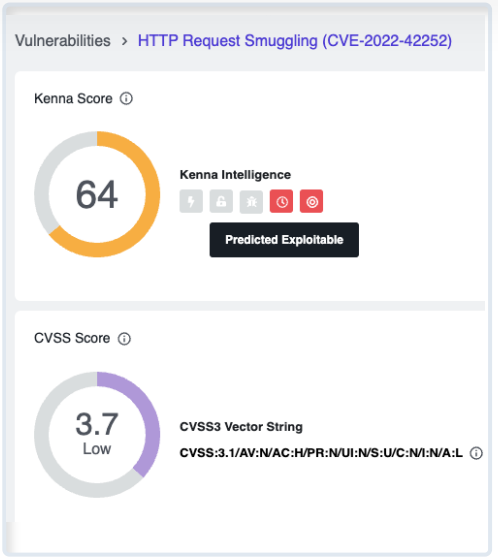
High risk of exploitation with a correlated high business impact. Operator must act due to active nature of threat.




Differentiate between what's important versus what's urgent. High severity, but low likelihood of exploitation or business impact




Operator often ignore this case due to low CVSS score, but must act because of high business risk and impact potential





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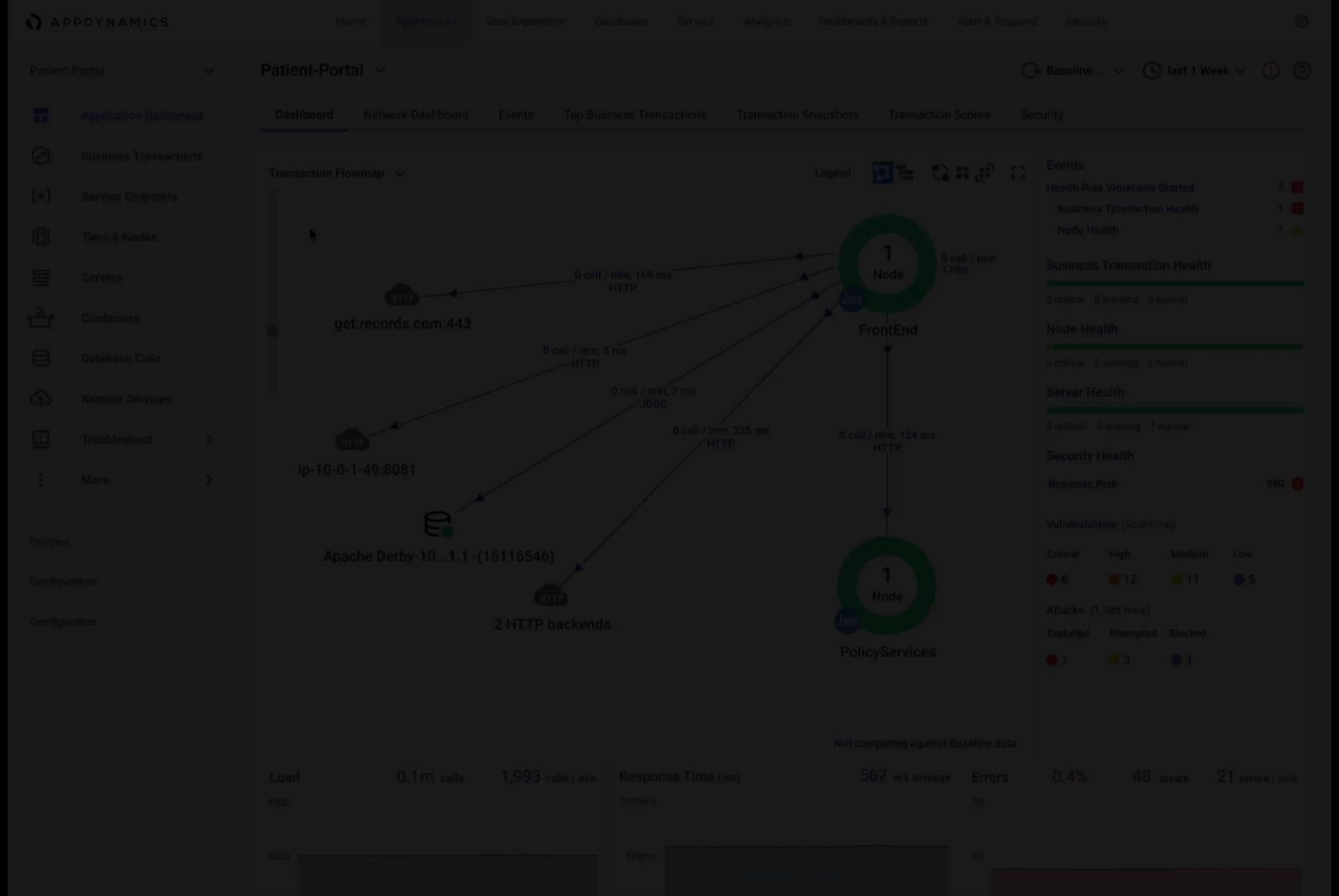
APPDYNAMICS
Home
Applications
User Experience
Databases
Servers
Analytics
Dashboards & Reports
Alert & Respond
Security
Patient-Portal
Patient-Portal
Baseline...
last 1 Week
Application Dashboard
Business Transactions
Service Endpoints
Tiers & Nodes
Servers
Containers
Database Calls
Remote Services
Troubleshoot
More
Policies
Configuration
Configuration
Dashboard
Network Dashboard
Events
Top Business Transactions
Transaction Snapshots
Transaction Scores
Security
Transaction Flowmap
Legend
0 call / min, 169 ms
HTTP
get.records.com:443
1
Node
0 call / min
17ms
FrontEnd
0 call / min, 3 ms
HTTP
0 call / min, 7 ms
JDBC
0 call / min, 325 ms
HTTP
0 call / min, 124 ms
HTTP
ip-10-0-1-49:8081
Apache Derby-10...1.1 -(16116546)
2 HTTP backends
1
Node
PolicyServices
Events
Health Rule Violations Started 2
Business Transaction Health 1
Node Health 1
Business Transaction Health
0 critical 0 warning 3 normal
Node Health
0 critical 2 warning 1 normal
Server Health
0 critical 0 warning 1 normal
Security Health
Business Risk 980
Vulnerabilities (Real-time)
Critical High Medium Low
6 12 11 5
Attacks (1 last hour)
Exploited Attempted Blocked
1 3 1
Not comparing against Baseline data
Load 0.1m calls 1,993 calls / min
Response Time (ms) 567 ms average
Errors 0.4% 48 errors 21 errors / min

# Agenda

- Full-stack observability (FSO):
  - How we got here
  - What is FSO and why now
  - What we mean by “full”
- Cisco FSO deliverables
  - Scope and Approach
  - Use-cases and integrations
  - Cisco FSO Platform
    - Architecture and Extensibility detailed
- Demos:
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# Cisco Observability Platform

## Simplified experiences and Extensibility

Scale and performance

Unified experience

Extensible

Anchored on MELT

Provides fully extensible entity-based data model

Natively supports OpenTelemetry

Provides Unified Query language

**Extensibility**

X-MELT | Advanced traces | Advanced Correlation and insights (real time and predictive) | Transformation | AI / ML

OpenTelemetry | Network telemetry | Security telemetry | Cloud advanced telemetry



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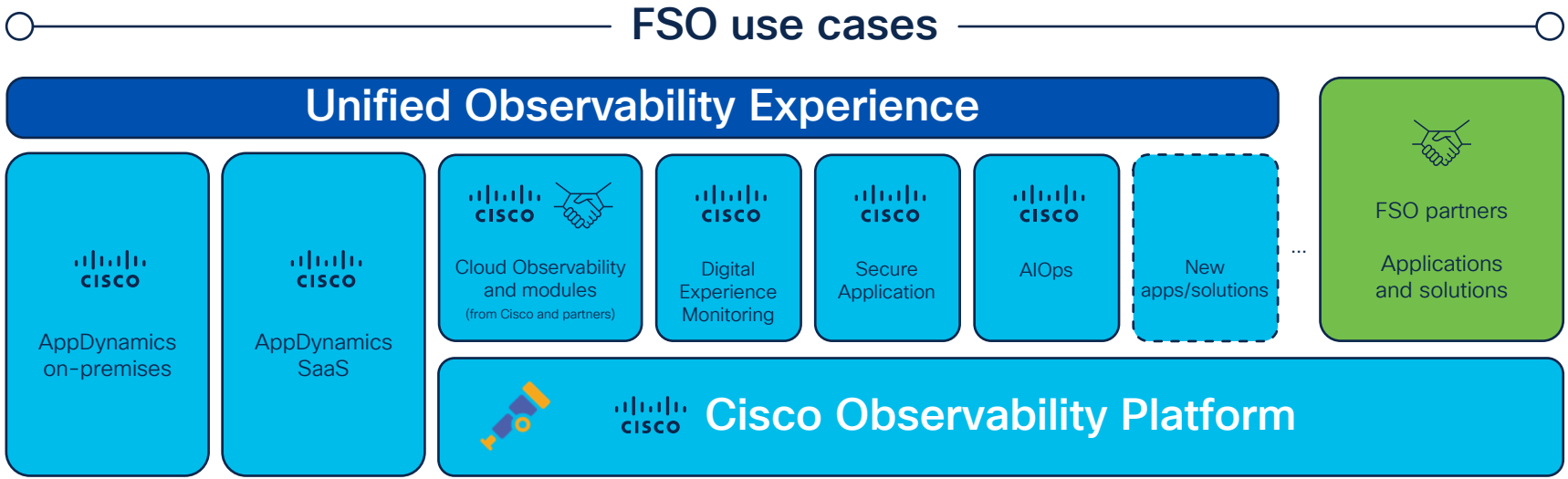
# Cisco Observability Platform @ Cisco FSO portfolio





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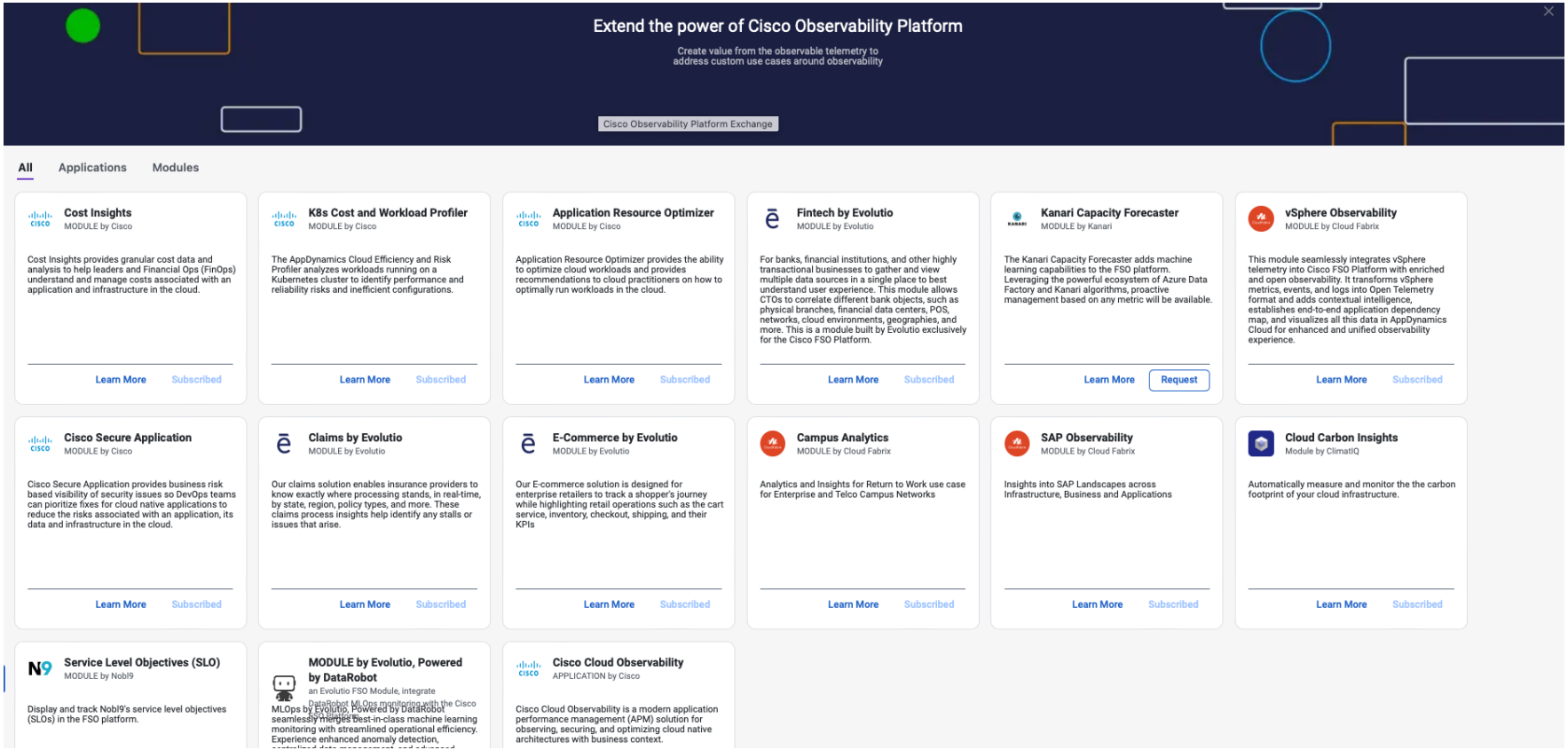
# Cisco Observability Platform Exchange
## by Jan/24





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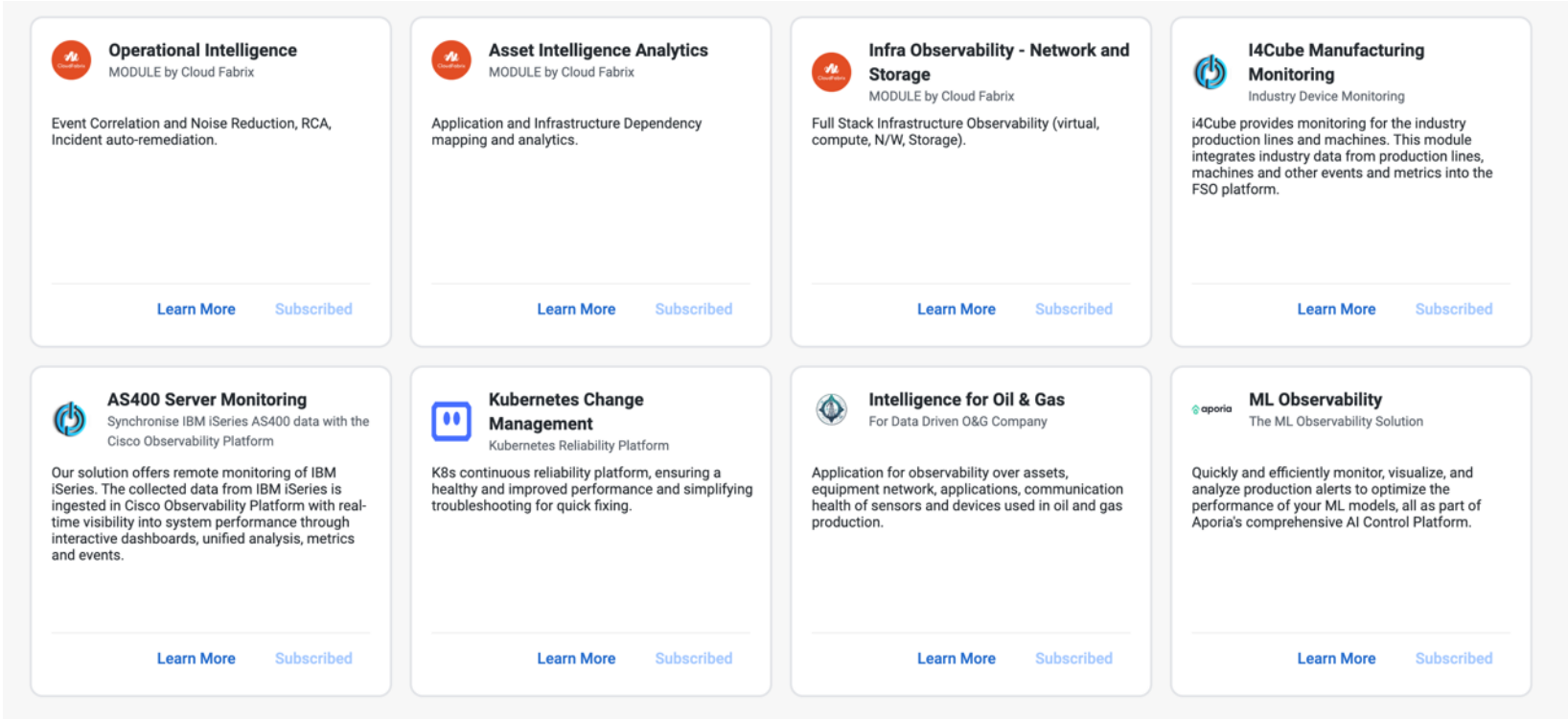
# Cisco Observability Platform Exchange
## by Cisco Live Amsterdam 2024





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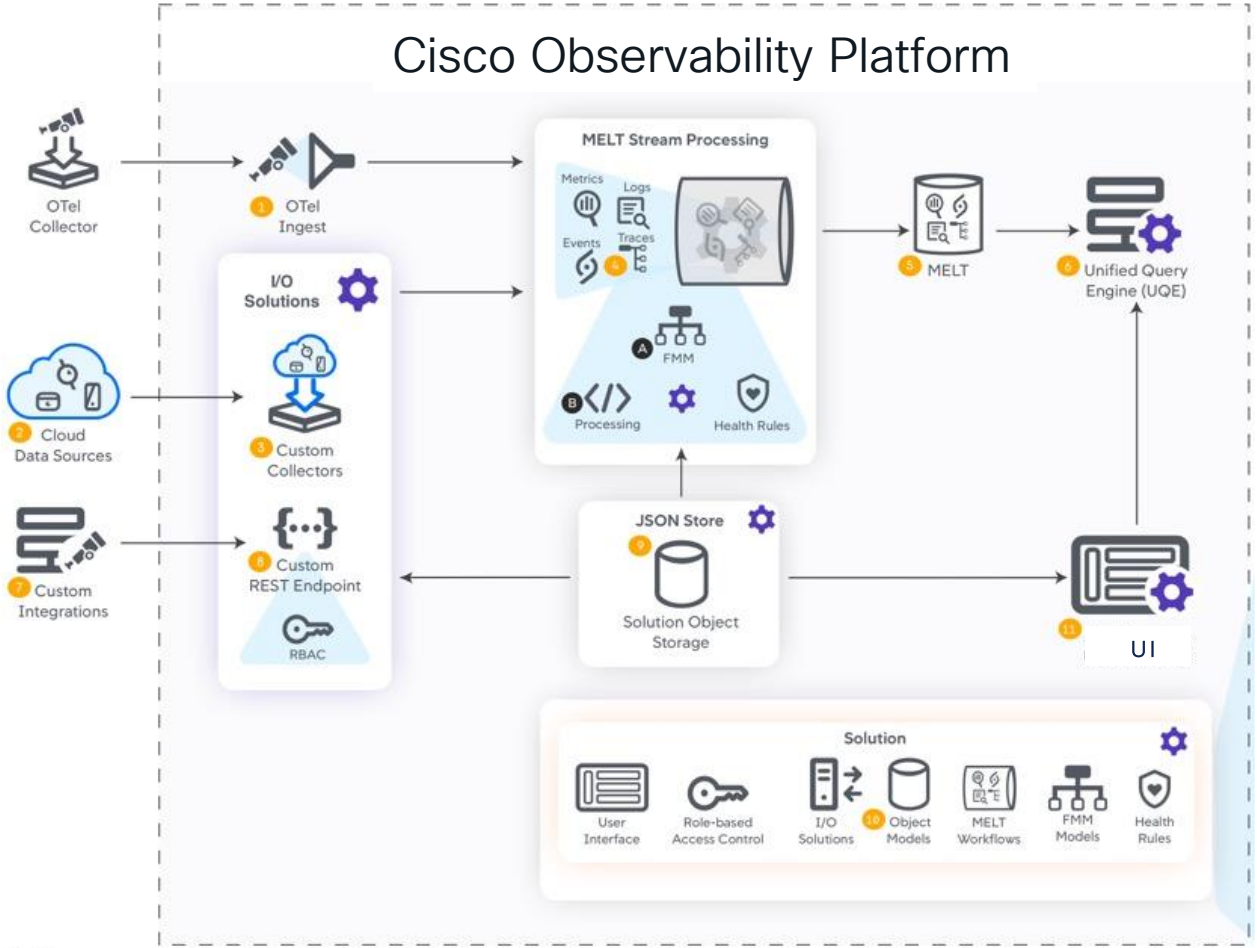



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# Telemetry data ingestion

cisco AppDynamics

## Smart Hybrid Agents

- Depth in data (code-level visibility)
- Extract additional context without code modification (MIDC) and Business Intelligence (BiQ)
- Control plane to be configured remotely
- Ease of Use (Auto-Instrumentation!) and Hybrid (support OTLP)
- Advanced features (Live Mode, Developer Mode, Intelligent Snapshots …)
- Integration with runtime security (Secure Applications)
- End-User & Database Monitoring
- Less ”chatty” protocol


## SDK & Agents

- Observability as Code (agents are optional)
- Standardised data format (Semantic Conventions!)
- Potential support for more technologies and more vendor data
- Send data to multiple backends


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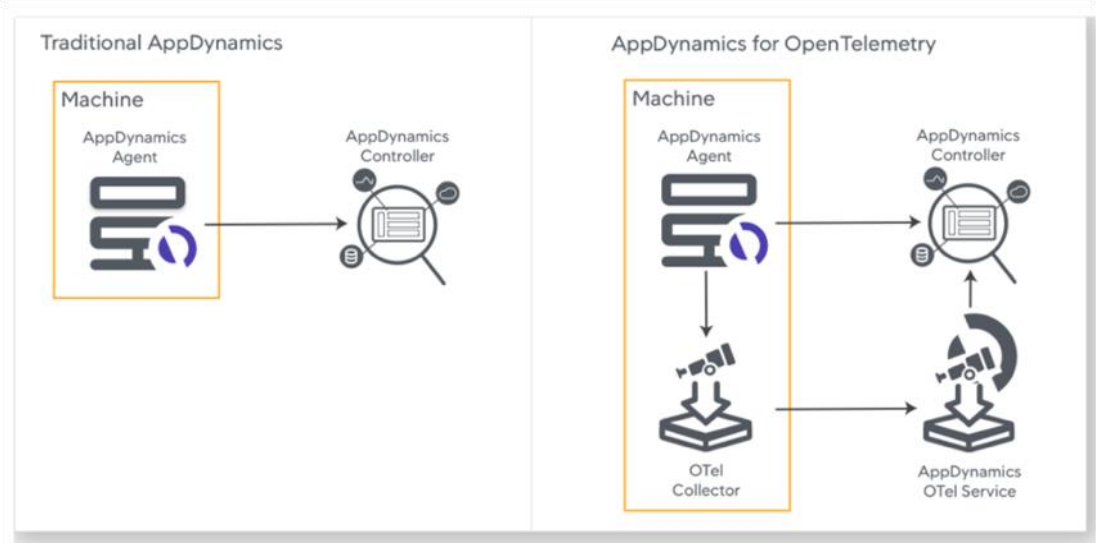
# AppDynamics Hybrid Agent

OpenTelemetry is a collection of tools, APIs, and SDKs used to instrument, generate, collect, and export telemetry data (metrics, logs, and traces) to help you analyze software performance and behavior.

AppDynamics provides an OpenTelemetry-compatible backend to ingest OpenTelemetry trace data using OpenTelemetry components. The ingested data is processed by the AppDynamics backend and displayed in the Controller UI. This service is referred to as AppDynamics for OpenTelemetry.





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# Open Telemetry Instrumentation

- How we get applications / services to emit traces / logs / metrics
- Automatic or manual
- Support for most popular languages



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# OTEL Instrumentation Status Grid
(as of Jan/2024)

| Language | Traces | Metrics | Logs |
|---|---|---|---|
| C++ | ✓ | ✓ | ✓ |
| C# / .NET | ✓ | ✓ | ✓ |
| Erlang / Elixir | ✓ | ⚠ | ⚠ |
| Go | ✓ | ✓ | ⊘ |
| Java | ✓ | ✓ | ✓ |
| JavaScript | ✓ | ✓ | ⚙ |
| PHP | ✓ | ✓ | ✓ |
| Python | ✓ | ✓ | ⚠ |
| Ruby | ✓ | ⊘ | ⊘ |
| Rust | β | α | α |
| Swift | ✓ | ⚠ | ⚙ |

https://opentelemetry.io/docs/instrumentation/

✓ Stable
☹ Mixed
⊘ Not yet implemented
⚠ Experimental
α/β Alpha/Beta
⚙ In Development


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# Simplified Agent Lifecycle Management

Improve operational efficiency with Smart Agent

## Simplify agent management in a few clicks

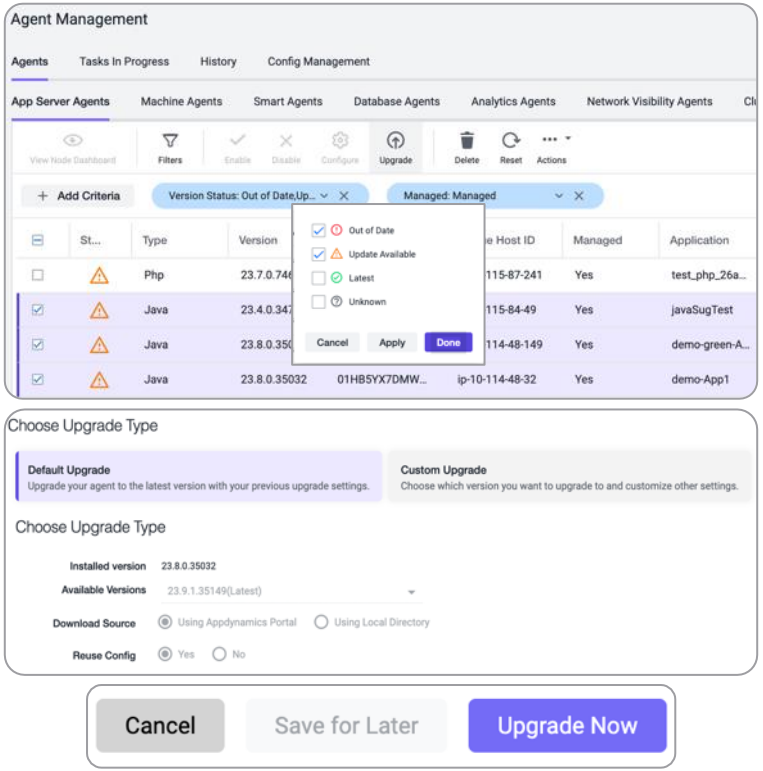
- Inventory, filter, select and generate reports

## Quickly access new capabilities with push-button upgrades

- Utilize new features as they are released
- Select and upgrade with two clicks
- Or customize options for full control

## Automatically gain business and performance insights faster*

- With a single Smart Agent install
- Smart Agent will auto-discover all processes
- And auto-deploy agents per your policies




* Auto-detect and auto-deploy coming spring 2024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# Cisco Observability Platform Terminology

**Solution** – a collection of functionality available for subscription;

**Package** – a declarative collection of Cisco FSO Platform components, the instruction set programmed by the user and packaged as a zipfile. A Package's zipfile contains exactly one solution.

**Application** – a solution that contains a full Cisco FSO Platform application, which becomes selectable - and extensible (through modules) - via the FSO Platform Exchange.

E.g.: Cloud Native Application Observability

**Module / Enrichment** – a solution add-on that depends on, and enhances another solution

E.g.: Cost Insights


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# Cisco FSO Platform Extensibility – Solution Package



```
{
  "manifestVersion": "1.0.0",
  "name": "k8scost-demo",
  "solutionVersion": "0.0.71",
  "dependencies": [
    "zodiac",
    "fmm"
  ],
  "description": "k8scost-demo solution",
  "contact": "support@cisco.com",
  "homepage": "solutions.cisco.com/demofunction",
  "gitRepoUrl": "https://bitbucket.corp.appdynamics.com/projects/ZODIAC/repos/k8scost-demo",
  "readme": "readme.md",
  "types": [
    "types/customConfiguration.json"
  ],
  "objects": [
    {
      "type": "zodiac:function",
      "objectsFile": "objects/functions/collector.json"
    },
    {
      "type": "fmm:namespace",
      "objectsFile": "objects/fmm/k8sCostNamespace.json"
    },
    {
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      "objectsFile": "objects/fmm/k8sCostMetricsDefinition.json"
    },
    {
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      "objectsFile": "objects/fmm/k8sCostMetricsDefinitionEfficiency.json"
    },
    {
      "type": "fmm:extension",
      "objectsFile": "objects/fmm/k8sCostExtension.json"
    }
  ]
}
```



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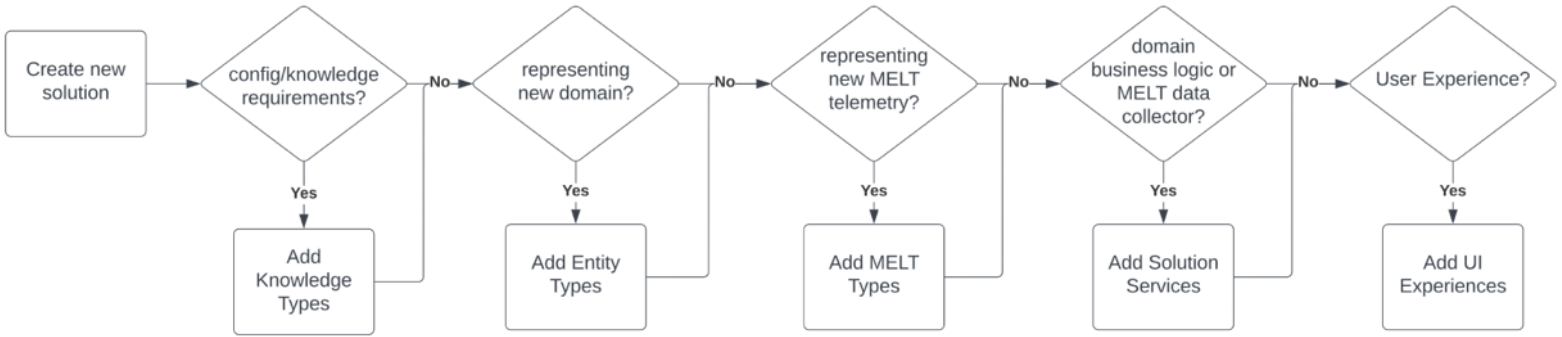
# Cisco FSO Platform Extensibility

## Solution package creation flow example





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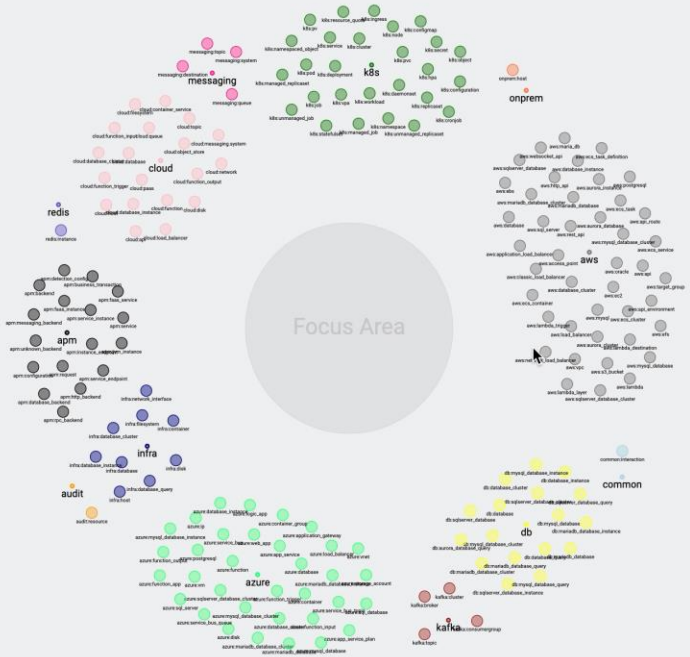
Schema Browser

Find entity

Zoom to namespace: common | infra | k8s | db | apm | aws | azure | cloud | kafka | redis | onprem | audit | messaging




## Schema

Filter by name

Entities (178)

Metrics (742)

Events (7)

Guide Me

Feedback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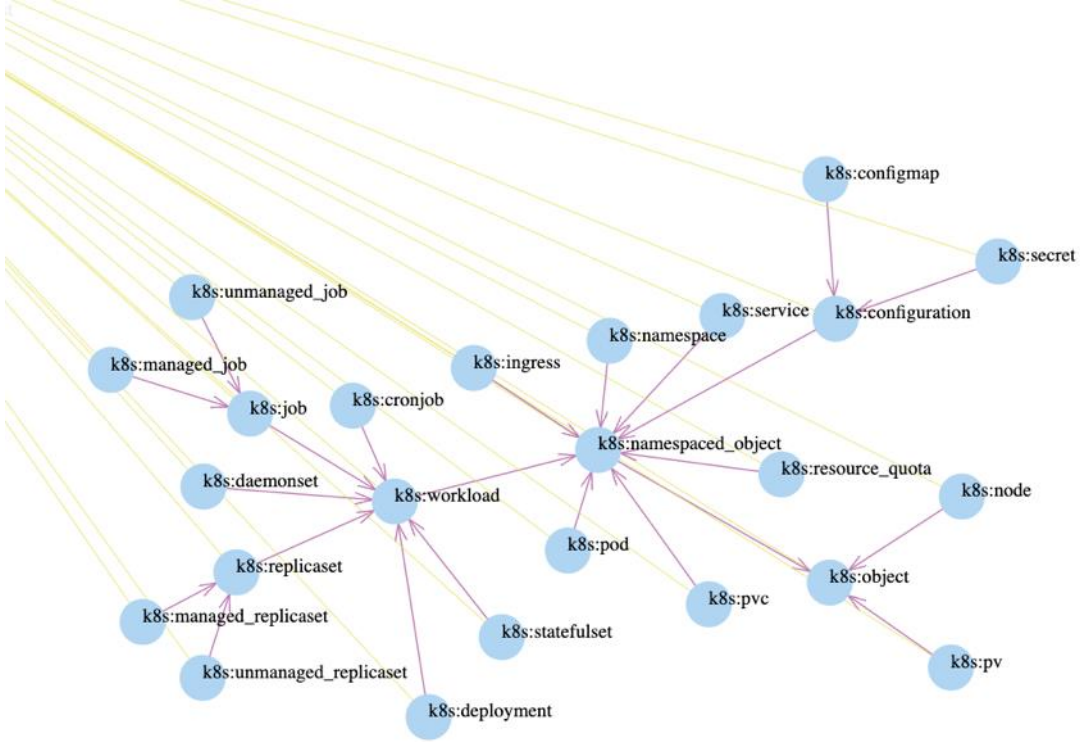
# Eg.1: Kubernetes Entity Model





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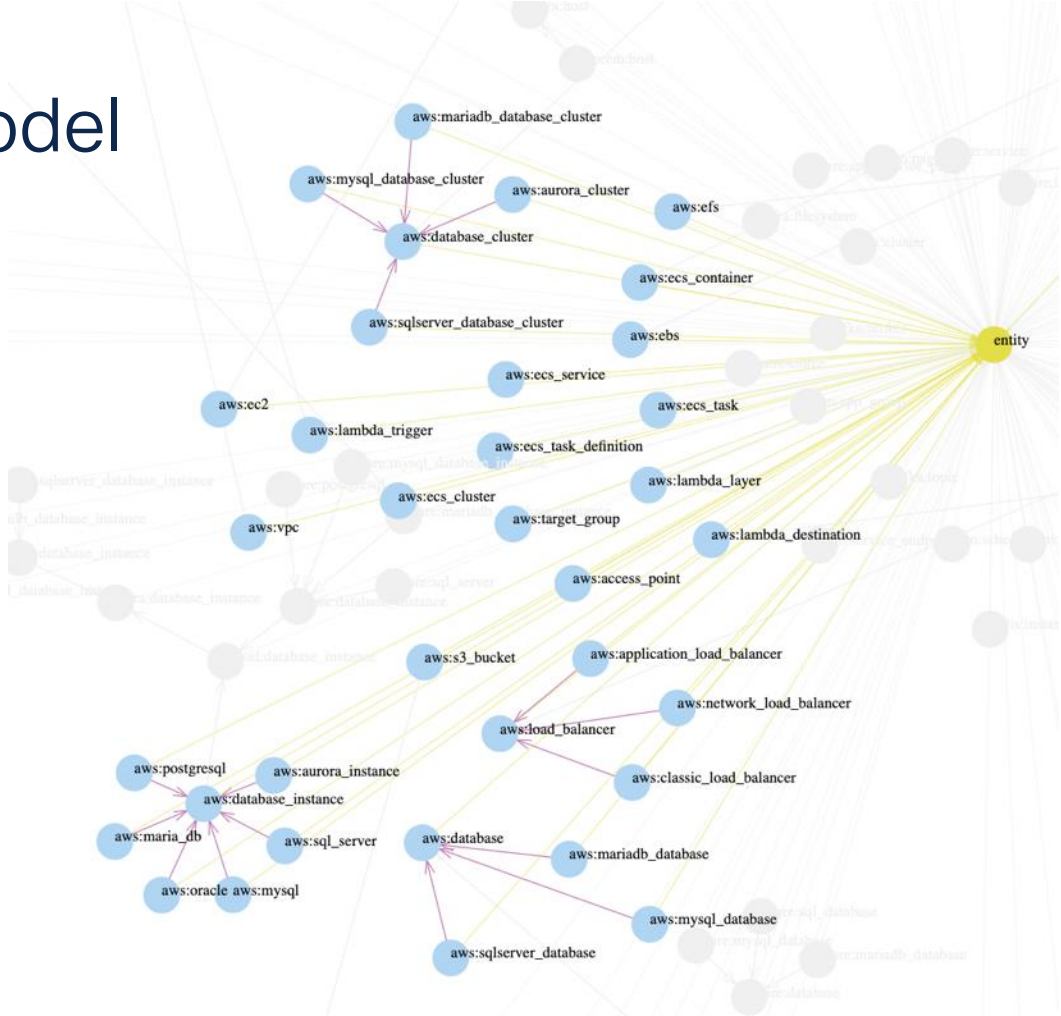
# Eg.2: AWS Entity Model





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# Eg.3: Related models



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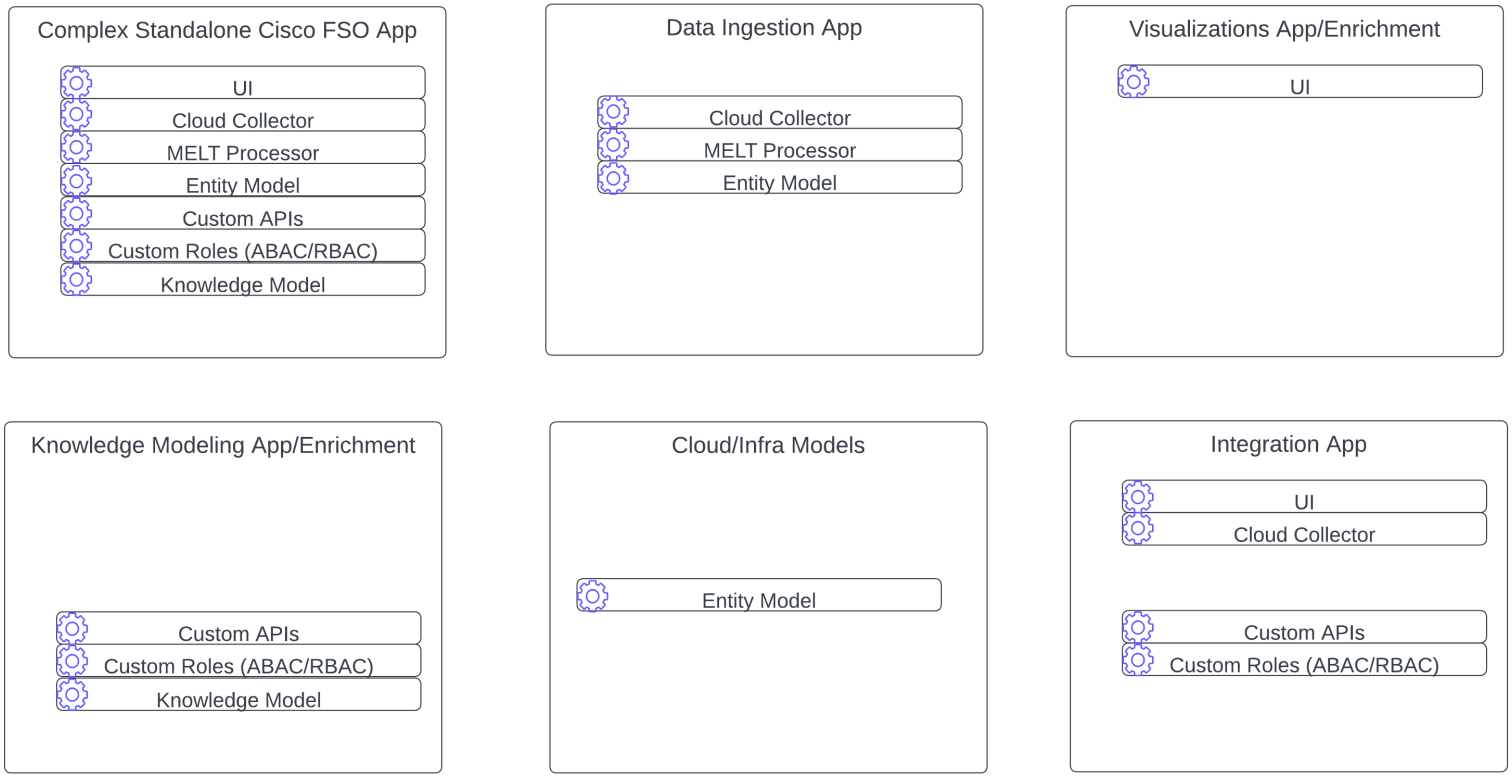
# Cisco FSO Platform – comprehensive Solution model





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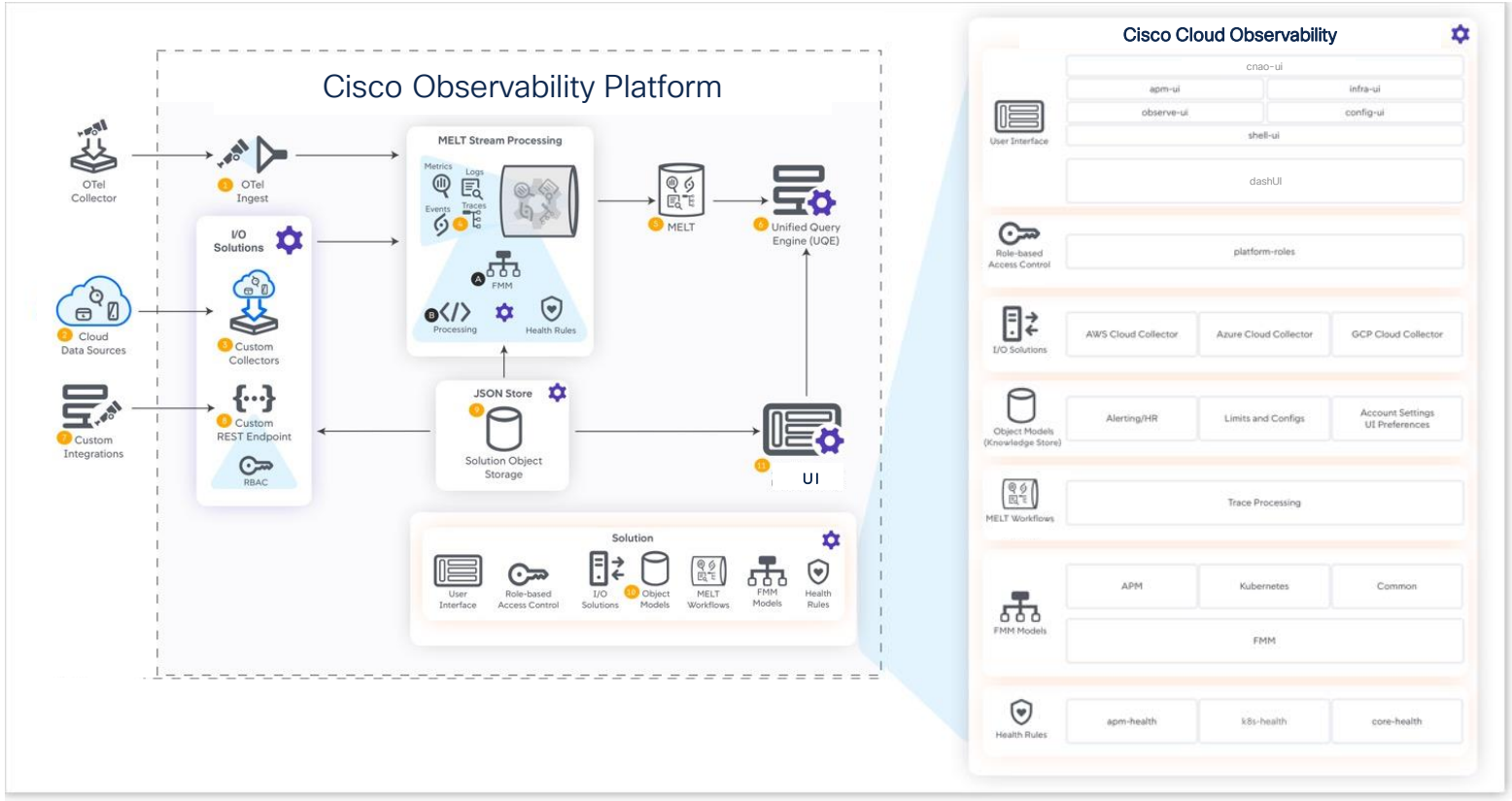
# Example: Cisco Cloud Observability

## A complete application on Cisco Observability Platform





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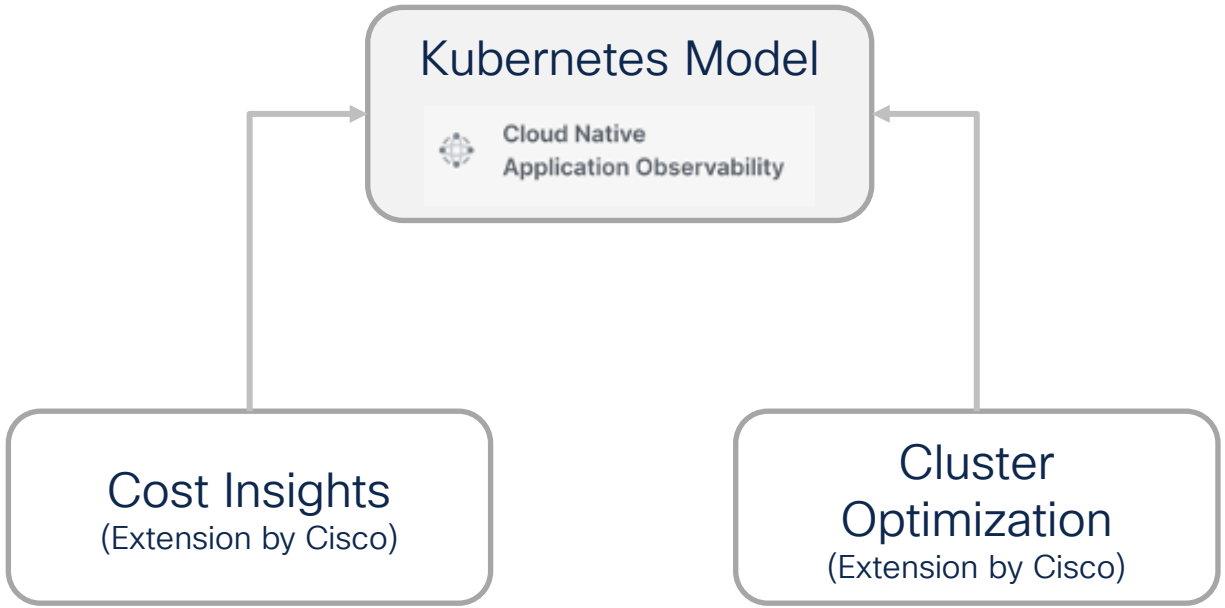
# Example: Extensibility via entity model enrichments





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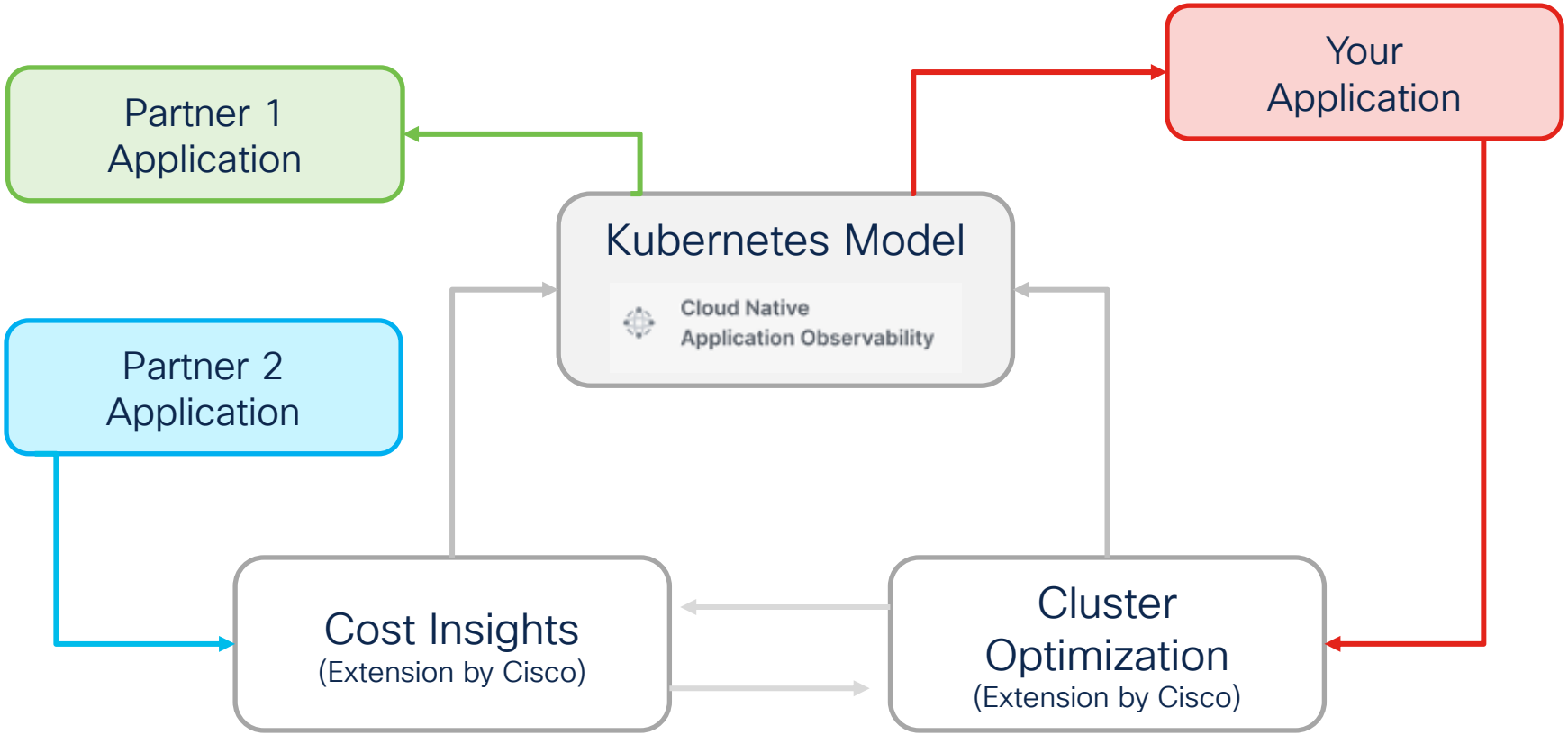
# Example: mutually beneficial relationships





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# Agenda

- Full-stack observability (FSO):
  - How we got here
  - What is FSO and why now
  - What we mean by “full”
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  - Use-cases and integrations
  - Cisco FSO Platform
    - Architecture and Extensibility detailed
- Demos:
  - Cisco & Partners solutions / modules


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# 18 Partner Modules @ Cisco Cloud Observability
## by Cisco Amsterdam 2024

**FSO use cases**

| Vertical Business Insights | SAP | Networking Infrastructure & Operations | MLOps DevOps AI | Sustainability |
|---|---|---|---|---|
| 5 | 1 | 7 | 4 | 1 |

Cisco Cloud Observability

Digital Experience Monitoring

Secure Application

AIOps

**Cisco Observability Platform**


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# 18 Partner Modules @ Cisco Cloud Observability
## by Cisco Live Amsterdam 2024





### Vertical business insights

evolutio

Fintech

Claims

Ecommerce

softserve

Operational Intelligence for Oil fields

performit

I4Clube Business Performance Monitoring

### SAP

CloudFabrix

SAP Observability

### Networking and infrastructure

CloudFabrix

vSphere Observability

Campus Analytics

Asset Intelligence

Operational Intelligence

Infrastructure Observability

performit

AS400 Monitoring

komodor

Kubernetes Change Management

### MLOps / DevOps / AI

evolutio

MLOps powered by DataRobot

aporia

ML Observability

NOBL9

Service Level Objectives

KANARI

Capacity Planner

### Sustainability

climatiq

Cloud Carbon Insights



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# Cost Insights by Cisco (1/2)

- Cost Analysis for K8s Resources
  - Understanding costs for K8s components
  - Visibility at Clusters, Workloads, Namespaces, Pods
  - Gain a deeper visibility into Cloud Spend
- Allocation vs Utilization
  - Compare allocation of resources to usage
  - Understand usage trends of Compute and Memory
  - Identify over-provisioned resources and saving opportunities



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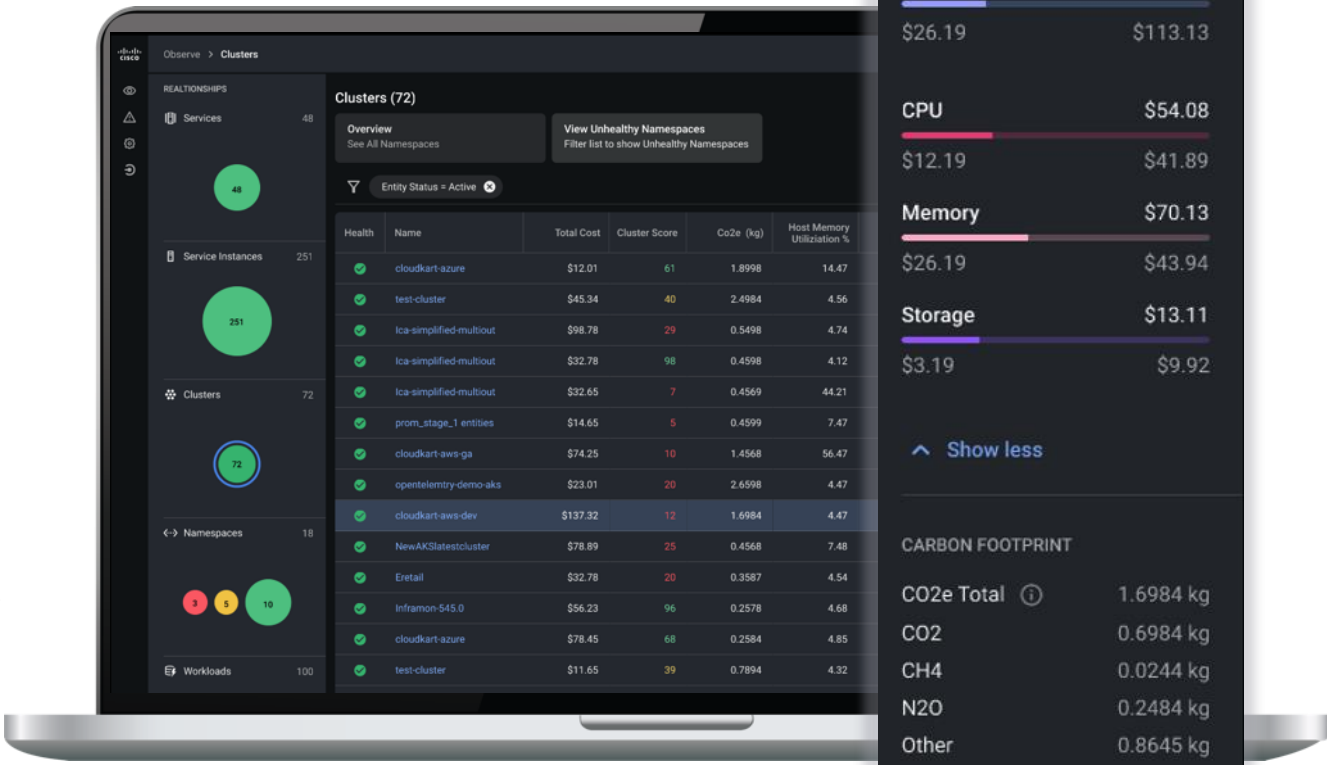
# Cost Insights by Cisco (2/2)

- Cost Insights for APM services
  - Correlate Cost data from Infrastructure with APM
  - Ability to track costs over time to understand spend
  - Manage Cost for cloud native services effectively
- Helping Customers become Sustainable
  - Granular visibility for customers to gauge their environmental impact
  - Identify workloads with high Co2 Impact with lower costs
  - Provide visible usage for ESG reporting
  - Leveraging Climatiq APIs to collect emissions data
  - Ability to offset carbon footprint by optimizing resources





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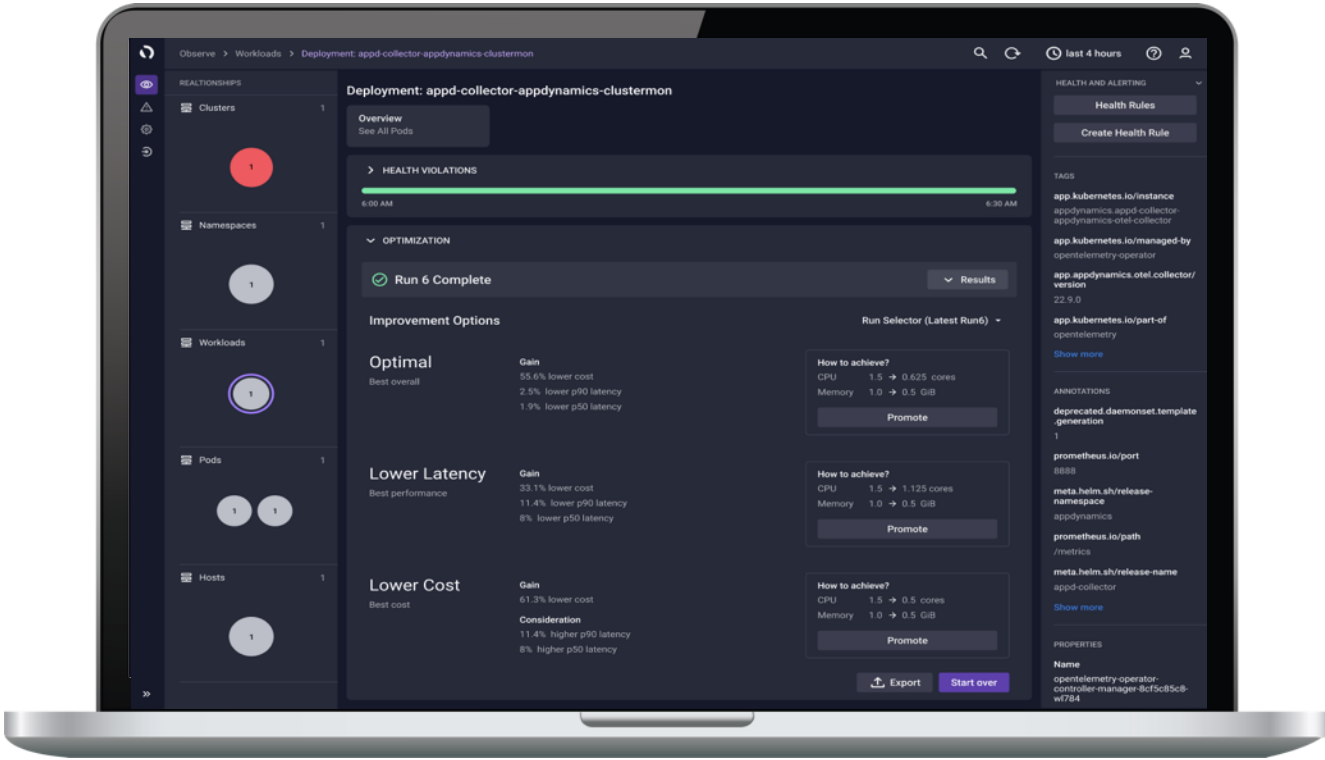
# Application Resource Optimizer by Cisco

- Provide deeper insights into a K8S workload and provide visibility into the workload's resource utilization
- Analyse and optimize application workloads to maximize resource usage and reduce excessive cloud spend





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# Security Insights by Cisco

Locate and highlight threats and vulnerabilities across k8s and containers, securing deployment of modern applications on k8s

Detect and protect against leakage of sensitive data with pre-defined expressions to enable faster adoption of cloud services.

Combine threat and vulnerability intelligence with business impact and runtime behavior to provide a business risk score



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# Business Risk Observability @ Security Insights

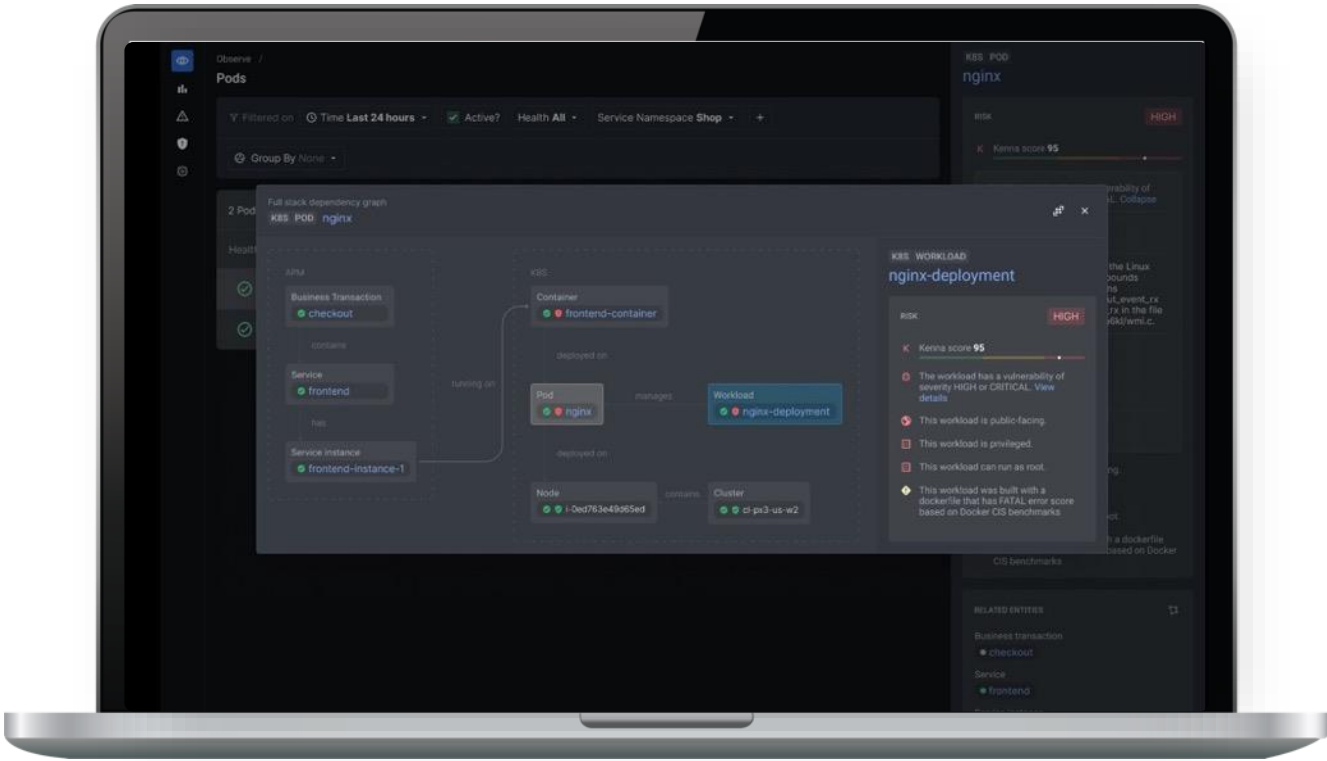
## Threats and Vulnerabilities Across Cloud-Native Kubernetes and Containers

### Integrated view on FSO

Detect, prioritize, and address container vulnerabilities and security threats right from your observability dashboard

### Factor in business risk

Combine findings into your application context for business-level risk scoring





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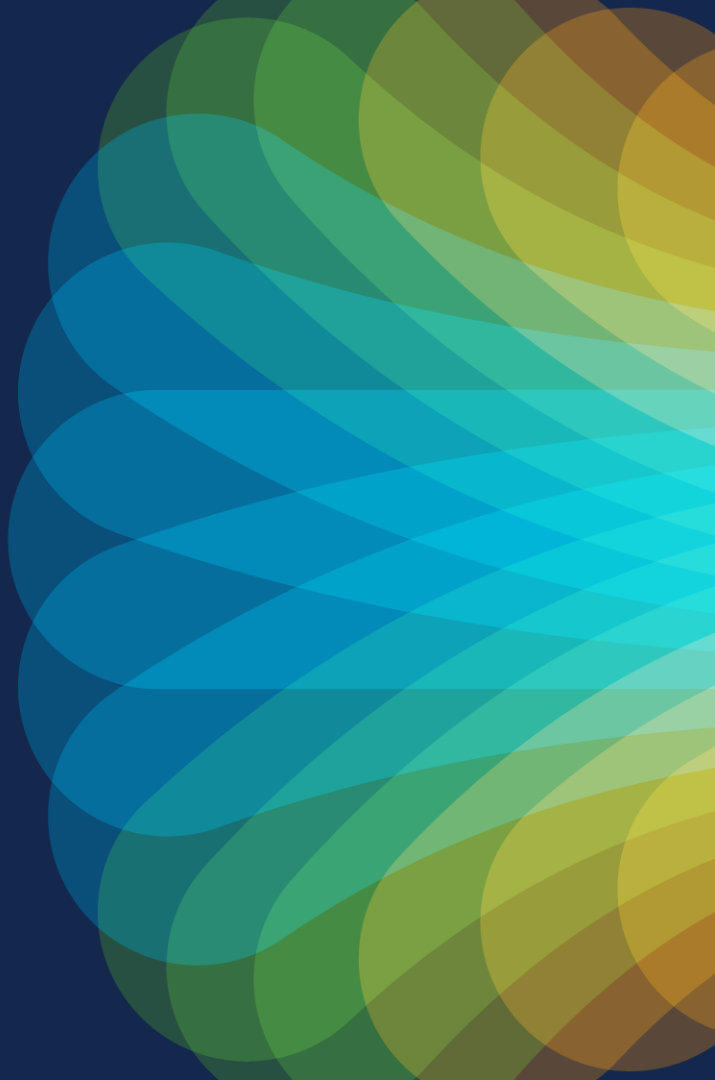
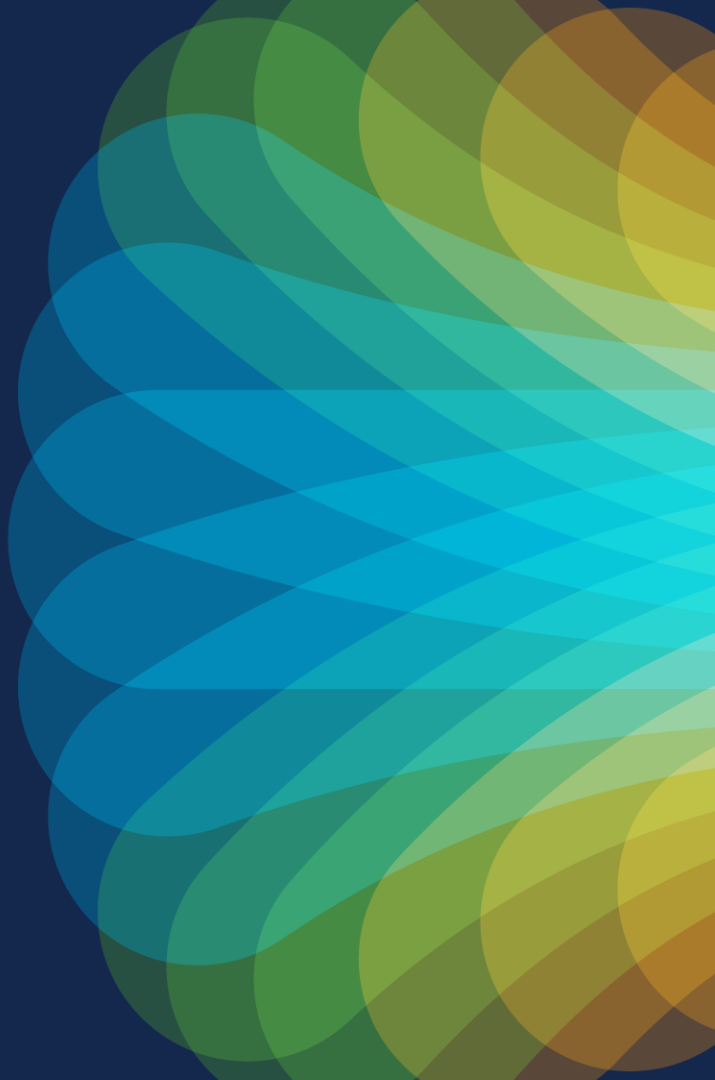
# DEMOS



The bridge to possible

# Thank you



cisco Live!


cisco Live!
Let's go