IMS Caliper Analytics™
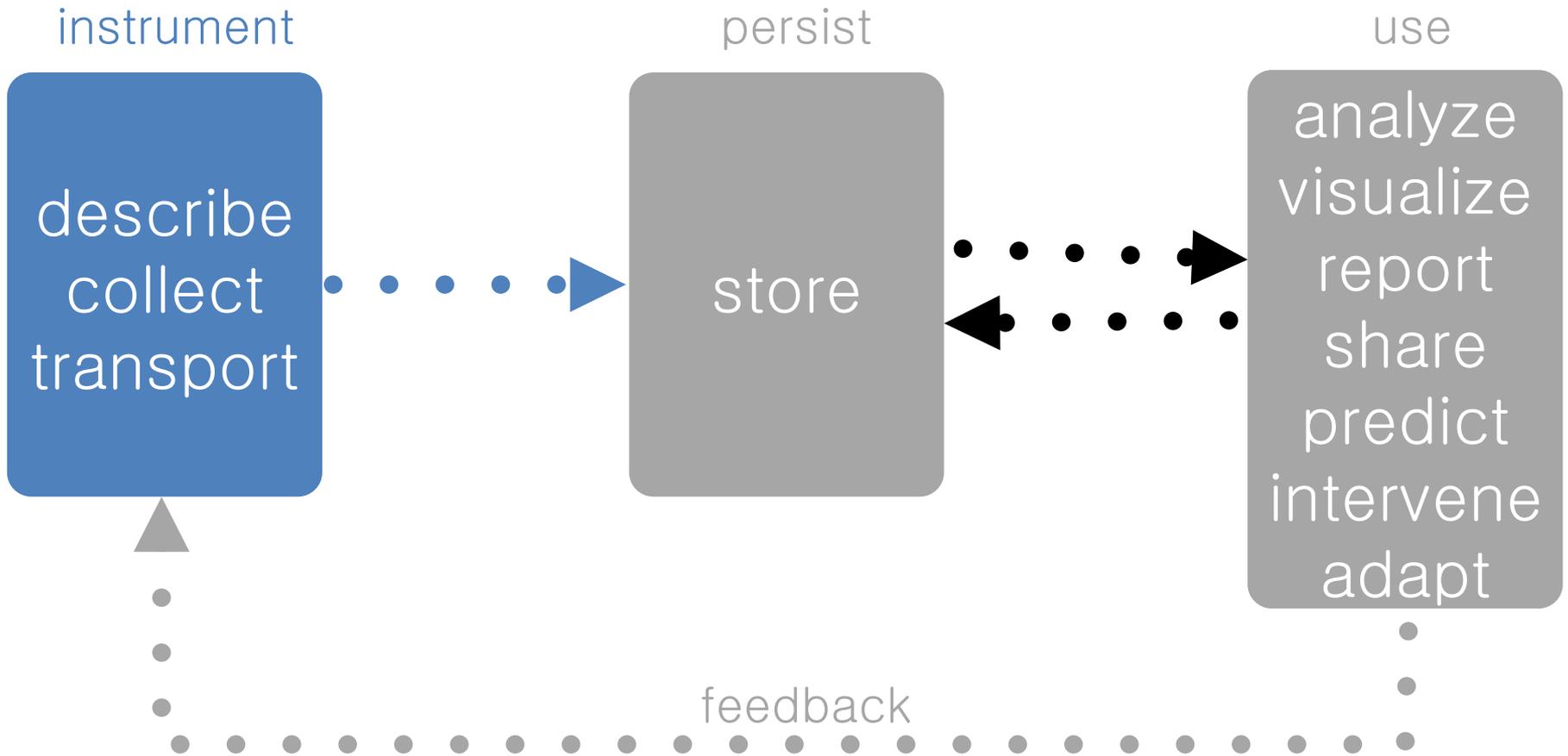
Stephen Vickers

IMS Global Learning Consortium

Overview

- Scope of Caliper Analytics

- Caliper events

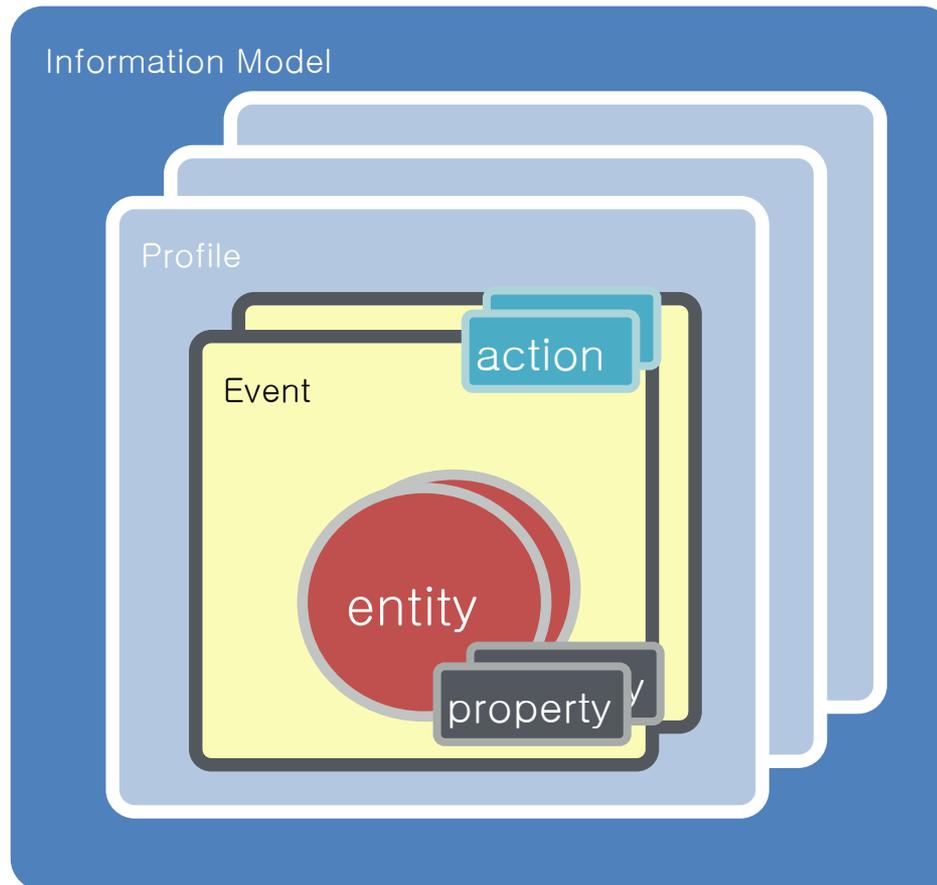- Caliper and LTI

Scope: Caliper 1.x

instrument

describe
collect
transport

persist

store

use

analyze
visualize
report
share
predict
intervene
adapt

feedback

Benefits of Caliper

- Data/semantic interoperability between systems, platforms, apps

- Extensible - enable innovation

- Implementation - Sensor API

- IMS – collaboration and certification

- Holistic – integrated with LTI
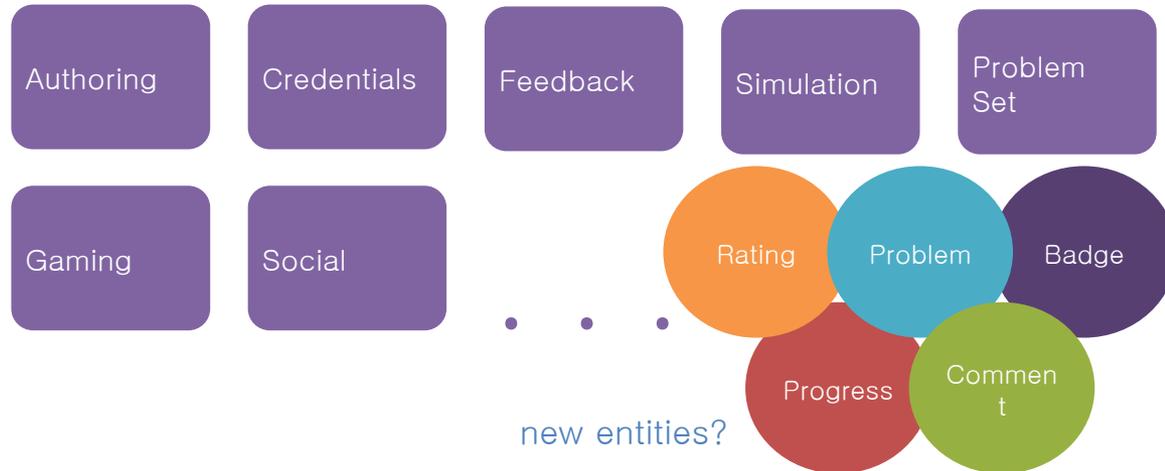
Caliper Information Model

Information model: profiles

current set

Annotation	Assessment	Forum	Media	Reading
Assignable	Session	Outcome	Basic	Content Management

future additions?

Authoring	Credentials	Feedback	Simulation	Problem Set
Gaming	Social			

Rating Problem Badge

Progress Comment

new entities?

Caliper event

```
{
  "@context": "http://purl.imsglobal.org/ctx/caliper/v1/Context",
  "@type": "http://purl.imsglobal.org/caliper/v1/ViewEvent",
  "actor": {<actor>},
  "action": "http://purl.imsglobal.org/vocab/caliper/v1/action#Viewed",
  "object": {<digitalResource>},
  "eventTime": " 2016-09-20T10:15:00.000Z ",
  "target": {<Frame>},
  "generated": null,
  "edApp": {<softwareApplication>},
  "group": {<organization>},
  "membership": {<member>, <organization>, <role>, <status>},
  "federatedSession": < LTI session identifier >
}
```

Caliper actions (n=53)

base

Action.NAVIGATED_TO
Action.VIEWED

annotations

Action.ATTACHED,
Action.BOOKMARKED,
Action.CLASSIFIED,
Action.COMMENTED,
Action.DESCRIBED,
Action.DISLIKED,
Action.HIGHLIGHTED,
Action.IDENTIFIED,
Action.LIKED,
Action.LINKED,
Action.RANKED,
Action.QUESTIONED,
Action.RECOMMENDED,
Action.REPLIED,
Action.SHARED,
Action.SUBSCRIBED,
Action.TAGGED

reading

Action.SEARCHED,
Action.VIEWED

assignable

Action.ABANDONED,
Action.ACTIVATED,
Action.COMPLETED,
Action.DEACTIVATED,
Action.HID,
Action.REVIEWED,
Action.SHOWED,
Action.STARTED

assessment

Action.STARTED,
Action.PAUSED,
Action.RESTARTED,
Action.SUBMITTED

assessmentItem

Action.STARTED,
Action.COMPLETED,
Action.SKIPPED,
Action.REVIEWED,
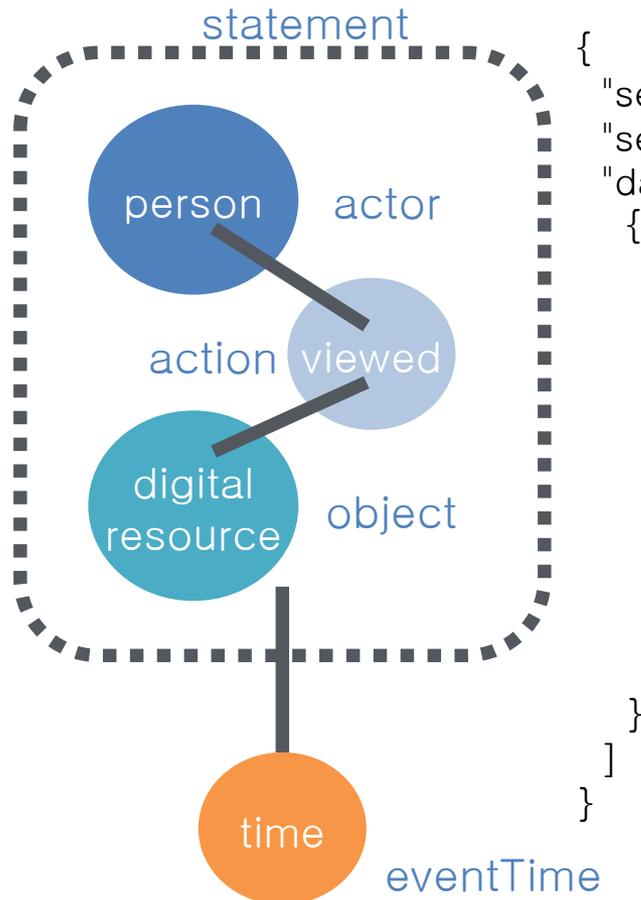Action.VIEWED

outcome

Action.GRADED

media

Action.OPENED_POPOUT,
Action.CLOSED_POPOUT,
Action.EXITED_FULLSCREEN,
Action.ENTERED_FULLSCREEN,
Action.CHANGED_SIZE,
Action.CHANGED_RESOLUTION,
Action.STARTED,
Action.REWOUND,
Action.RESUMED,
Action.FORWARDED_TO,
Action.PAUSED,
Action.JUMPED_TO,
Action.ENDED,
Action.CHANGED_SPEED,
Action.UNMUTED,
Action.MUTED,
Action.CHANGED_VOLUME,
Action.DISABLED_CLOSED_CAPTIONING,
Action.ENABLED_CLOSED_CAPTIONING

session

Action.LOGGED_IN,
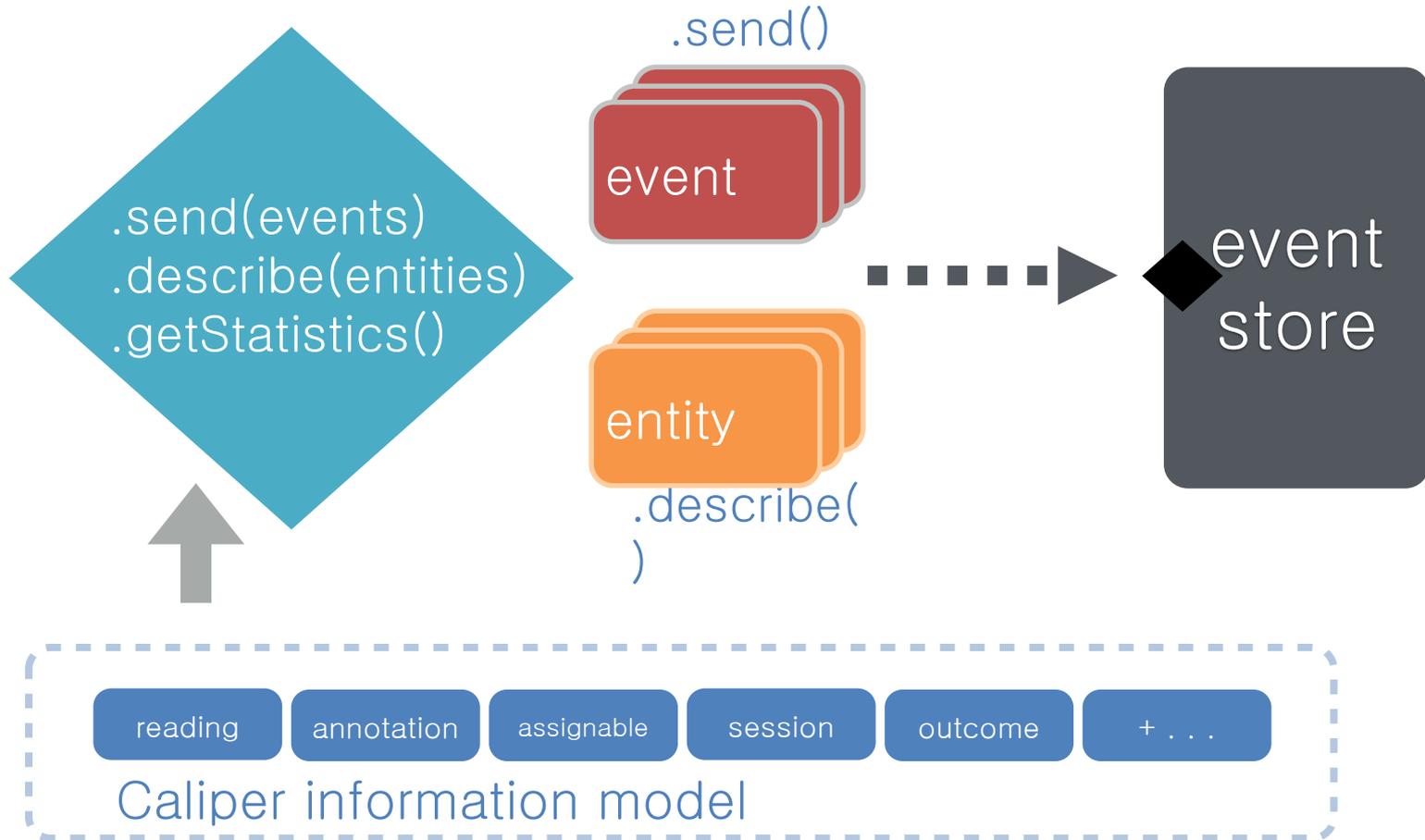Action.LOGGED_OUT,
Action.TIMED_OUT

Caliper "free-form" event

statement

person — actor

action — viewed

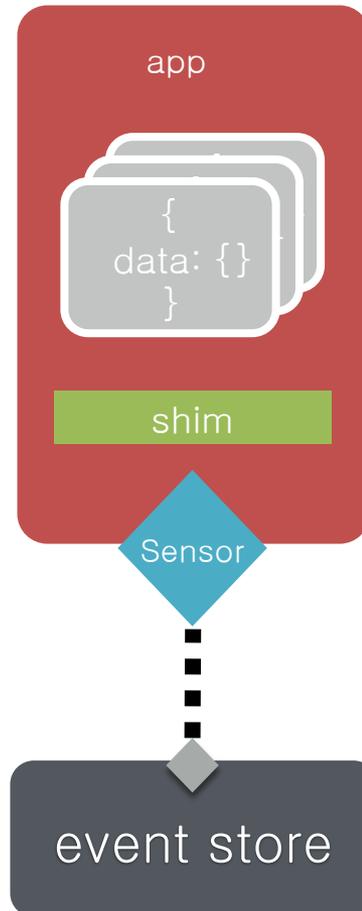digital resource — object

time — eventTime

```
{
  "sensor": "https://example.edu/sensor/001",
  "sendTime": "2015−09−15T11:05:01.000Z",
  "data": [
    {
      "@context": "http://purl.imsglobal.org/ctx/caliper/v1/Context",
      "@type": "http://purl.imsglobal.org/caliper/v1/Event",
      "actor": {
        "@id": "https://example.edu/user/554433",
        "@type": "http://purl.imsglobal.org/caliper/v1/lis/Person" },
      "action": "http://purl.imsglobal.org/vocab/caliper/v1/action#Viewed",
      "object": {
        "@id": "https://example.com/viewer/book/34843#epubcfi(/4/3)",
        "@type": "http://www.idpf.org/epub/vocab/structure/#volume" },
      "eventTime": "2015−09−15T10:15:00.000Z",
    }
  ]
}
```

Sensor API

.send()

event

.send(events)
.describe(entities)
.getStatistics()

entity

.describe(
)

event
store

reading   annotation   assignable   session   outcome   + . . .

Caliper information model
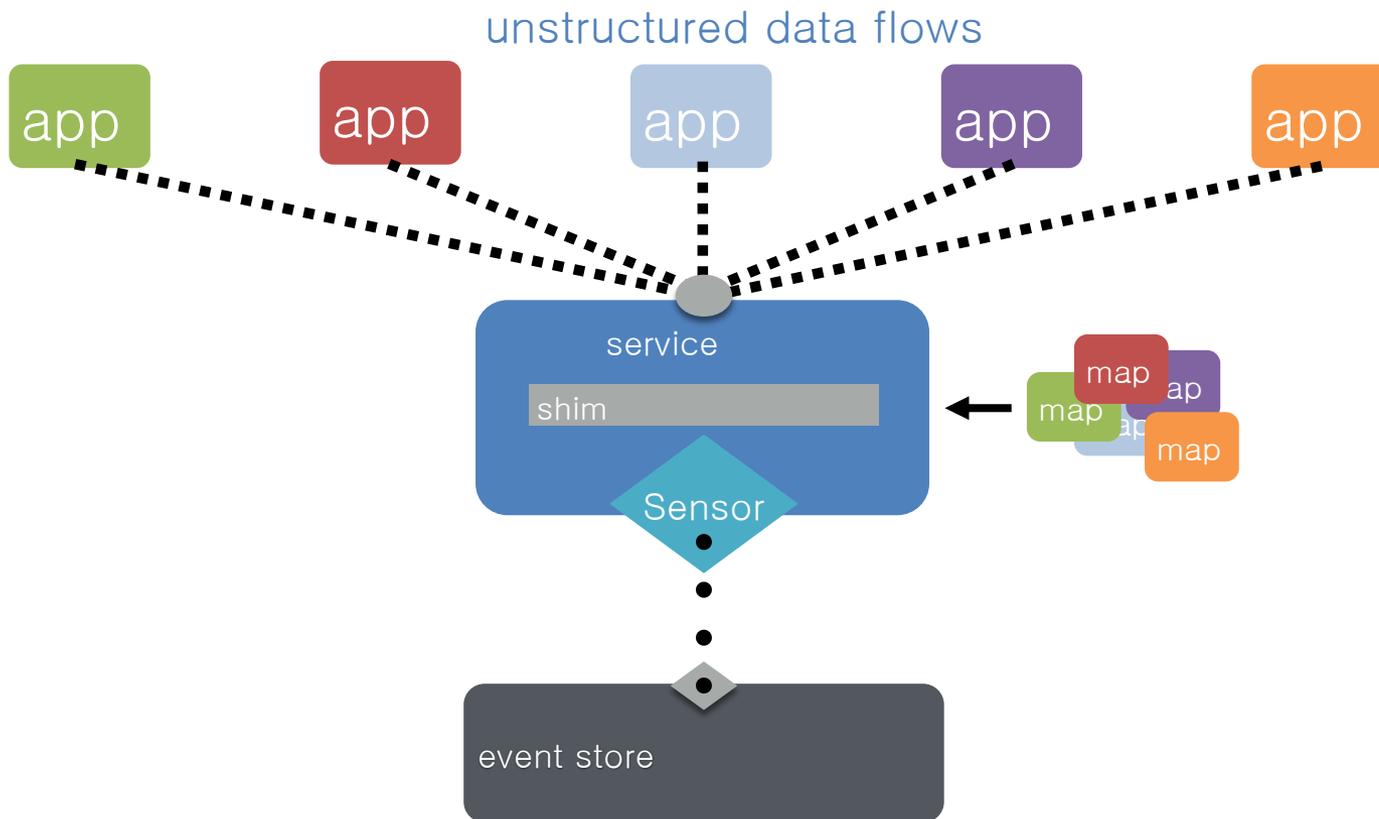
Instrumentation: app to store

Instrumentation: apps to service to store

unstructured data flows

LTI integration

launch request
POST
+ custom_caliper_profile_url,
+ custom_caliper_session_id

tool consumer

CPS response
apiKey, eventStore.url,
expiryTime

GET

tool provider

sensor config

Caliper profile service (CPS)

apiKey scoped to Caliper profile URL; CPS should specify an expiry in order to avoid repeated lookups of apiKey prior to expiration.

Sensor

CPS declared in Tool Consumer Profile

GET

CPS calls API Key service using SSL wire encryption & standard LTI credentials; call can be performed outside depicted sequence and the API key cached.

Caliper API key service

event store

data stream **secured** using SSL wire encryption and tuple: apiKey (header), sensor_id & session_id