
# Common Event Expression

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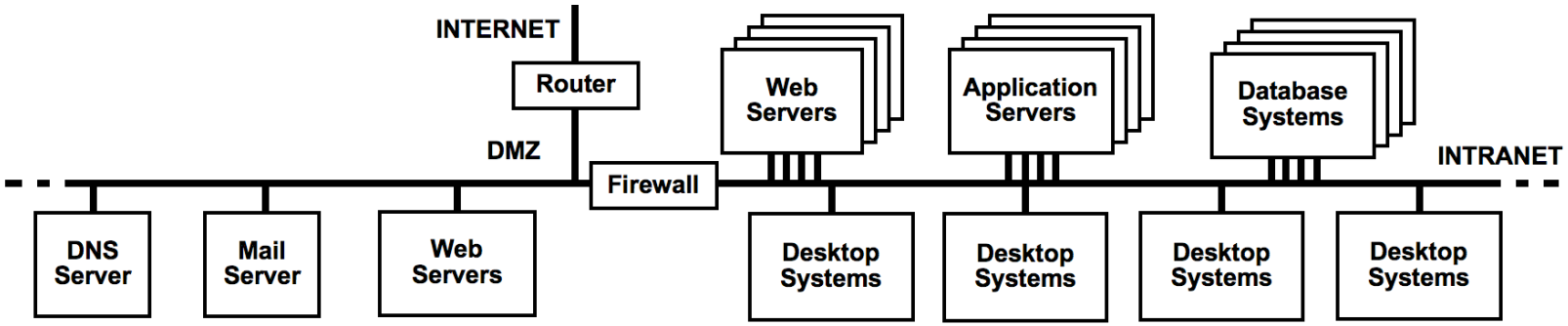
# Organization

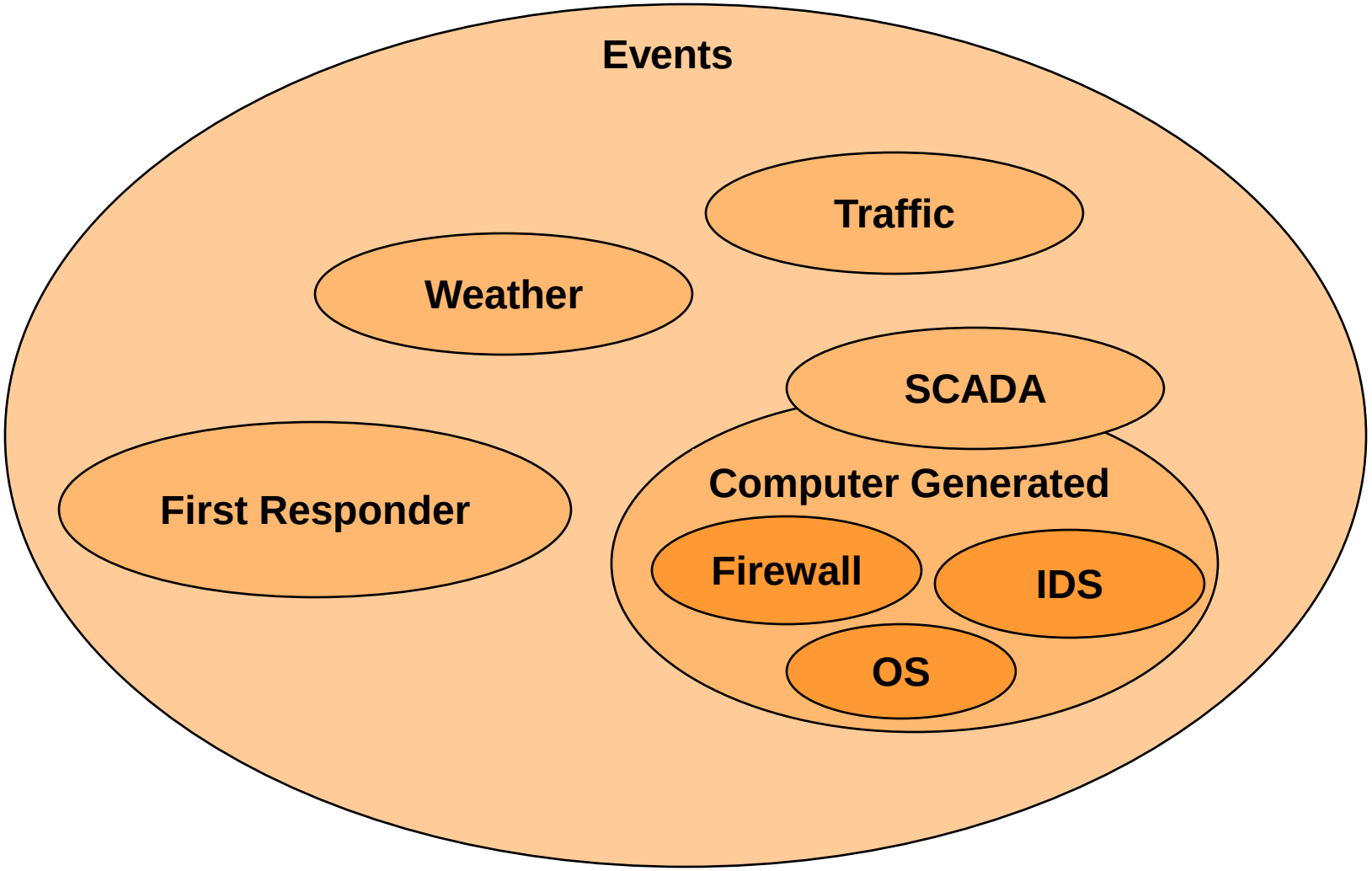
- The Situation
- The Problem
- The Goals
- The Solution
- The Standard: CEE
  - Common Event Expression Taxonomy (CEET)
  - Common Log Syntax (CLS)
  - Common Log Transport (CLT)
  - Common Event Log Recommendations (CELR)
- CEE & EMAP
  - Validation

# The Situation




- Firewall
- AV
- IDS/HIDS
- SIEM
- Log Infrastructure

# The Event Space



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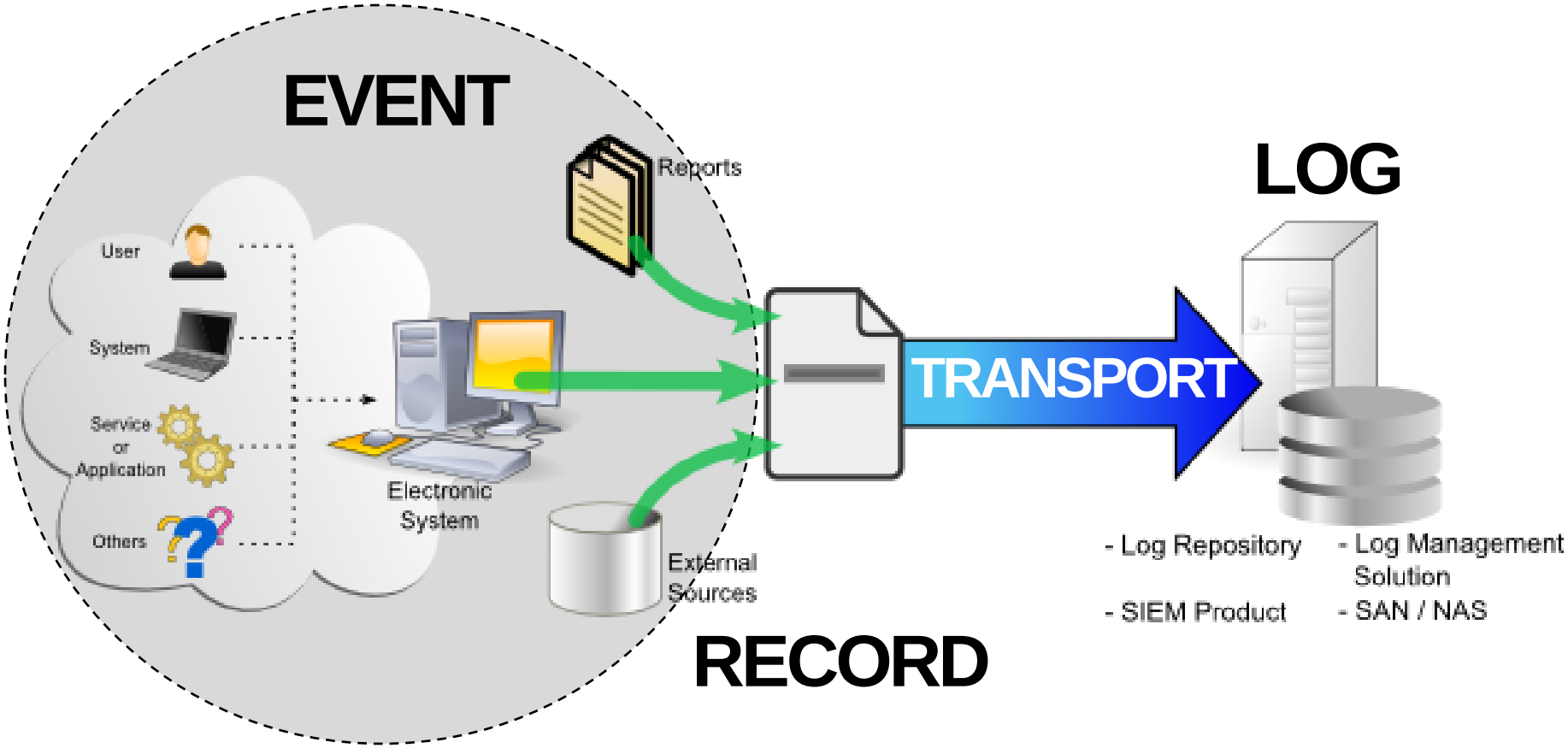
# Computer Generated Event Management



# What are our logs telling us?

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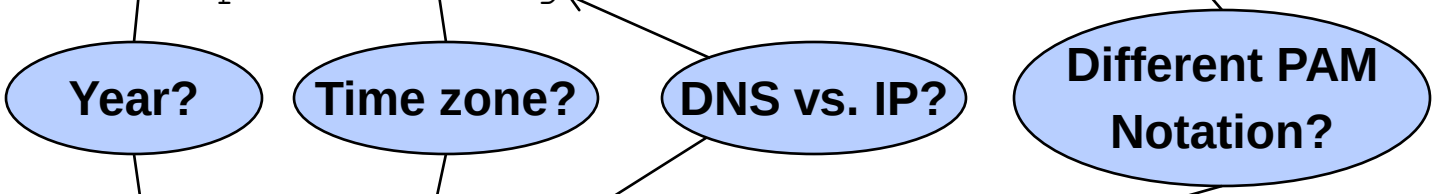
# Why Standardize?

- **Cryptic Records**

```
Sep 01 08:11:53 Last message repeated 5 times
```

- **Missing and Inconsistent Event Details**
  - **Problem: Inconsistent Success/Fail**

```
Apr 10 12:31:34 host sshd[16682]: error: PAM:
  Authentication failure for user from
  remote-pc.mitre.org
```




```
Apr 10 12:31:39 host sshd[16701]: Accepted
  keyboard-interactive/pam for user from
  192.168.0.1 port 2880 ssh2
```

# Why Standardize – Another Example

- **Inconsistent Event Descriptions**

```
Sep 22 10:02:00 myhost login(pam_unix)[808]: session
  opened for user root by LOGIN(uid=0)

Sep 26 12:17:32 myhost-- root[808]: ROOT LOGIN ON tty1

Sep 26 13:00:40 myhost snort: [1:5503:6] POLICY ROOT
  login attempt [Classification: Misc activity]
  [Priority: 3]: {TCP} 6.7.8.9:32804 -> 1.2.3.4:23
```

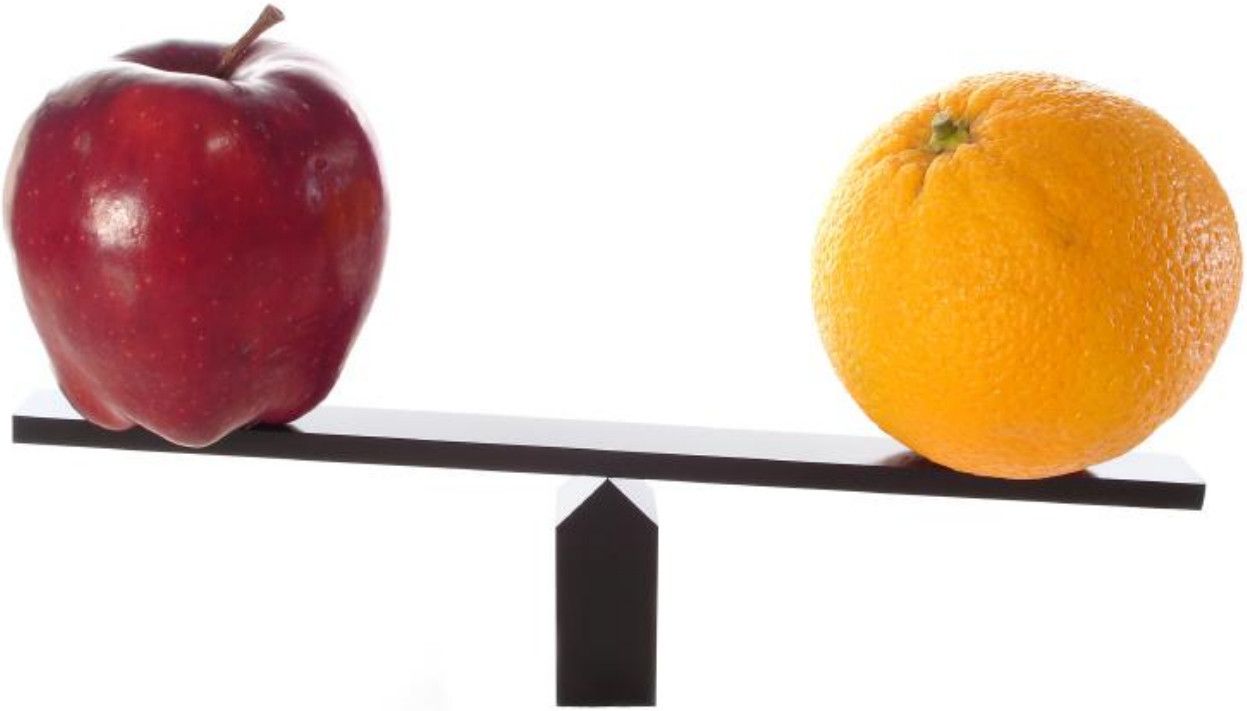
**Log events are like a box of chocolates, you never know what you're gonna get…**

# The Problem (The tl;dr Version)

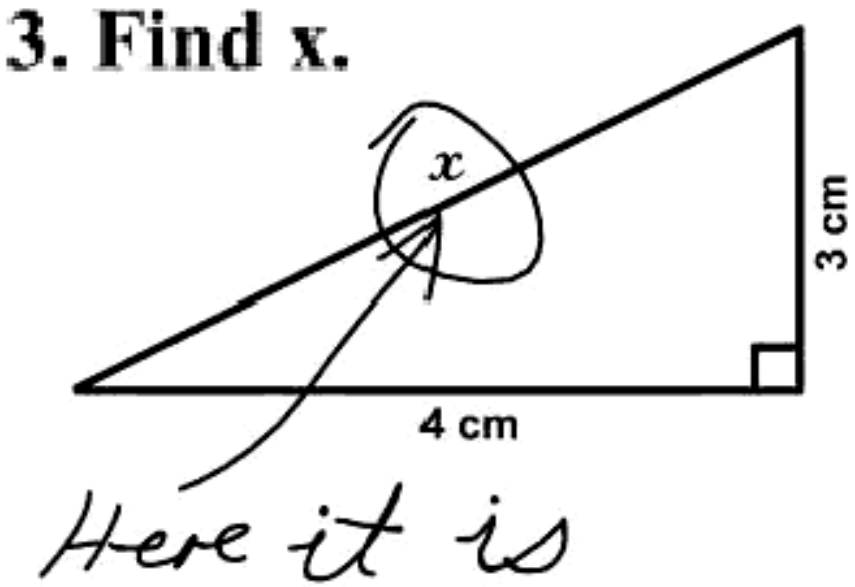
# LOGS ARE PRODUCED FOR THE WRONG AUDIENCE

**Humans understand semantics**
**Systems understand syntactics**

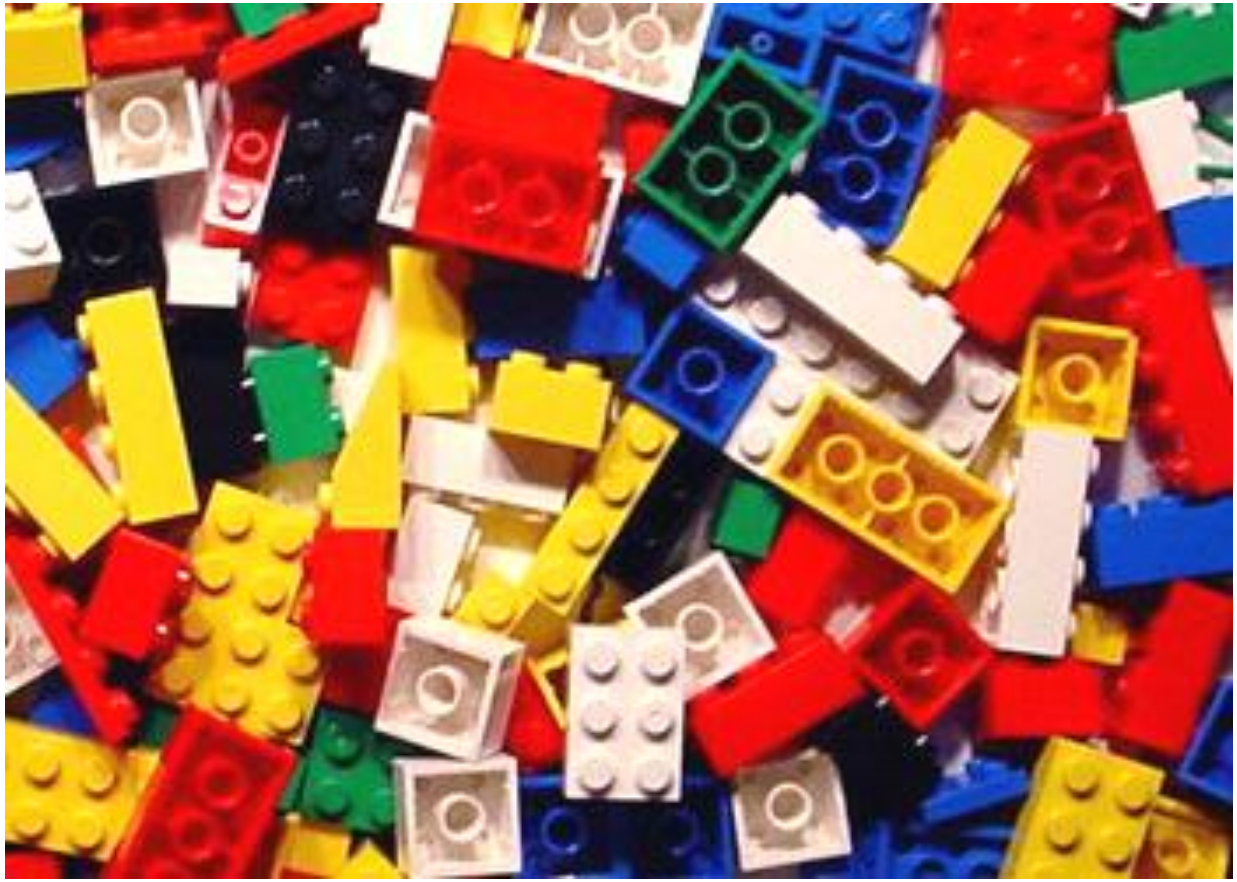
# The Goals: Format Neutrality



# The Goals: Simplicity



# The Goals: Extensibility

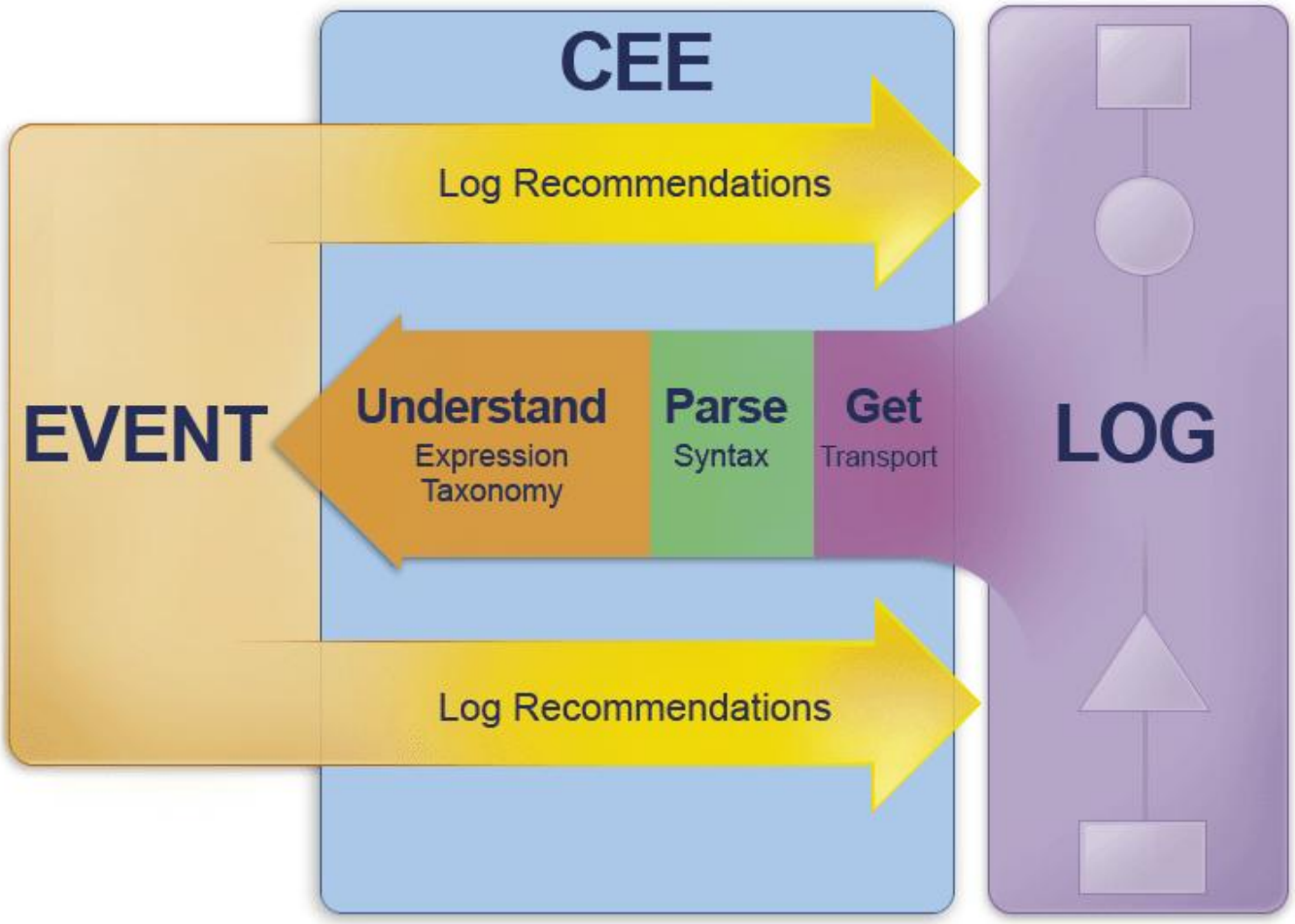


# Other Attempts to Standardize

| Standard | Description | Challenges |
|---|---|---|
| **CIDF** (Common Intrusion Detection Framework) | Started in 1998, LISP-like structure, Protocol & API for intrusion detection information exchange | Specifically focused on intrusion detection, no longer active |
| **IDMEF** (Intrusion Detection Message Exchange Format) | For IDS/IPS systems and management systems that interact with them | Narrow focus on intrusion detection events, XML over BEEP format only |
| **CEF** (Common Event Format) | Created by ArcSight, name/value pair based, can leverage flat files or syslog | Vendor specific, small number of attributes (those needed/used by the product) |
| **XDAS** (Distributed Audit Services) | Start in 1998 as an API for Unix, adopted by SCO. In 2008 work taken by Novell to create v2, and make a more general standard. | Strong focus on audit use-case, Unix-centric API |

# The Solution

# From Events to Logs and Back Again



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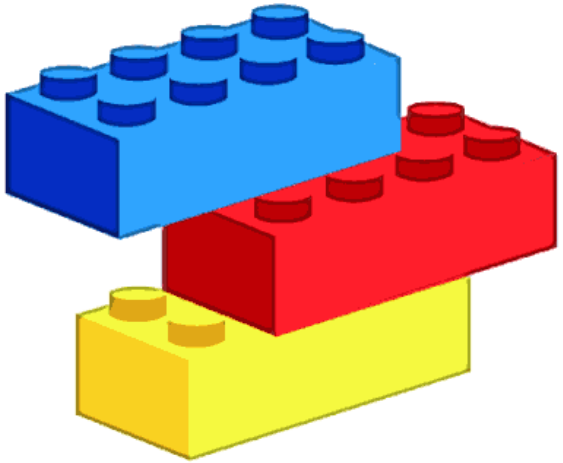
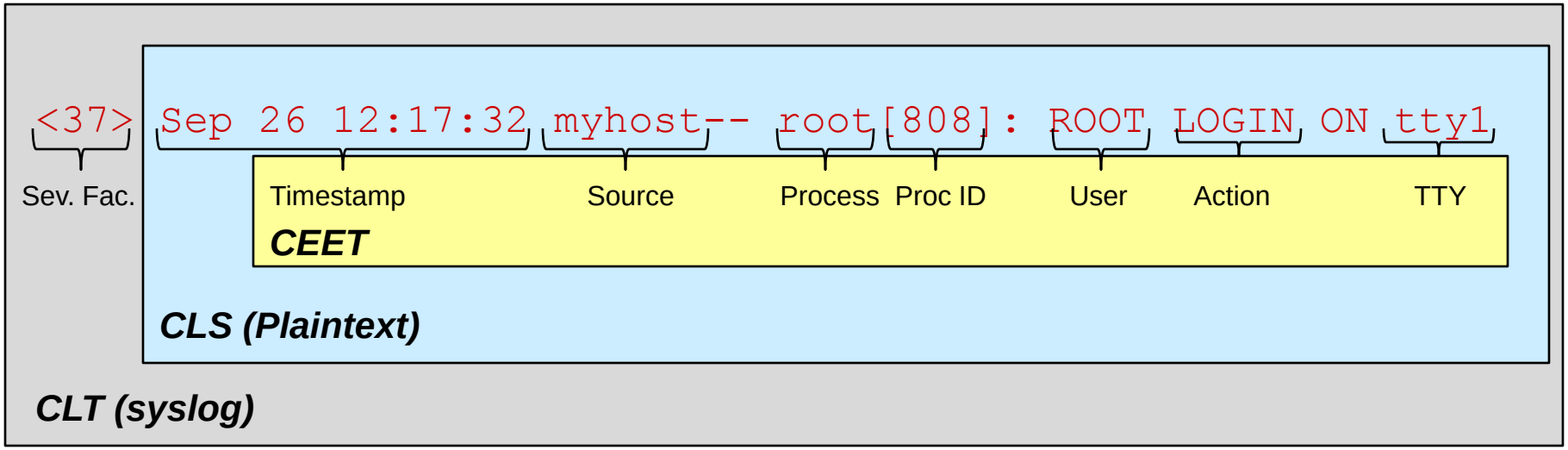
# CEE Building Blocks

- CEE Taxonomy (CEET)
  - Data Dictionary
  - Object-Action-Status (OAS) Taxonomy
- Common Log Syntax (CLS)
- Common Log Transport (CLT)
- Common Event Log Recommendations (CELR)
  - Best Practices
  - Device Profiles



# Building Blocks Today

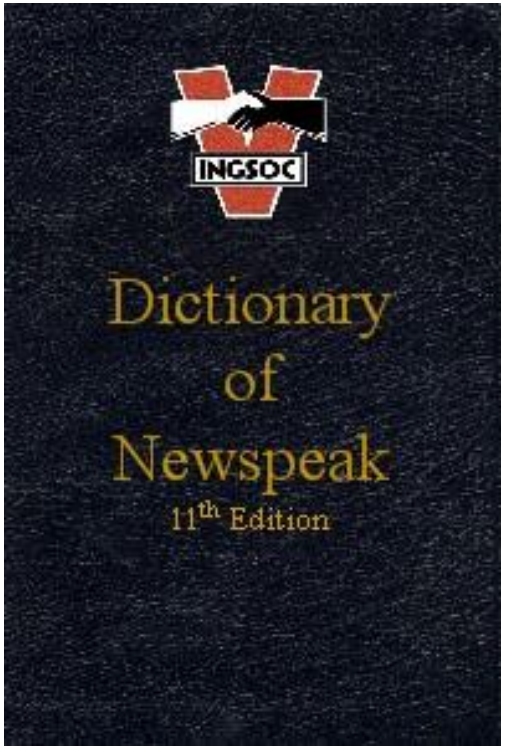



**Scenario**: An attacker has breached our network - determine if there were any successful logins

What do we search for? (‘log in’, ‘login’, ‘logged on’, etc.)

# CEE Taxonomy – Data Dictionary

| Unique Name | Type | Description | Restrictions |
|---|---|---|---|
| netDstPort | integer | Destination port | 0-65535 |
| logSrcMac | mac | MAC address of the log source | |
| eventTime | time | The time at which the event occurred | |
| logTime | time | The time when the event was recorded | |
| netSrcIpv6 | ipv6 | The IPv6 address of the network source | |




- **Event Attributes**
  - **Names are designed to be composable**
  - **Types to aide programming and validation**
  - **Restrictions not enforced – just expected values**

# CEE Taxonomy – OAS Taxonomy

- **Context**
- **Object**
- **Action**
- **Status**

- **Example:**

```
Sep 26 12:17:32 myhost-- root[808]: ROOT LOGIN ON tty1
```

- **OAS Taxonomy:**

**firewall-admin-login-success**

- **Data Dictionary Elements:**

**logTime**

**netSrcHostname**

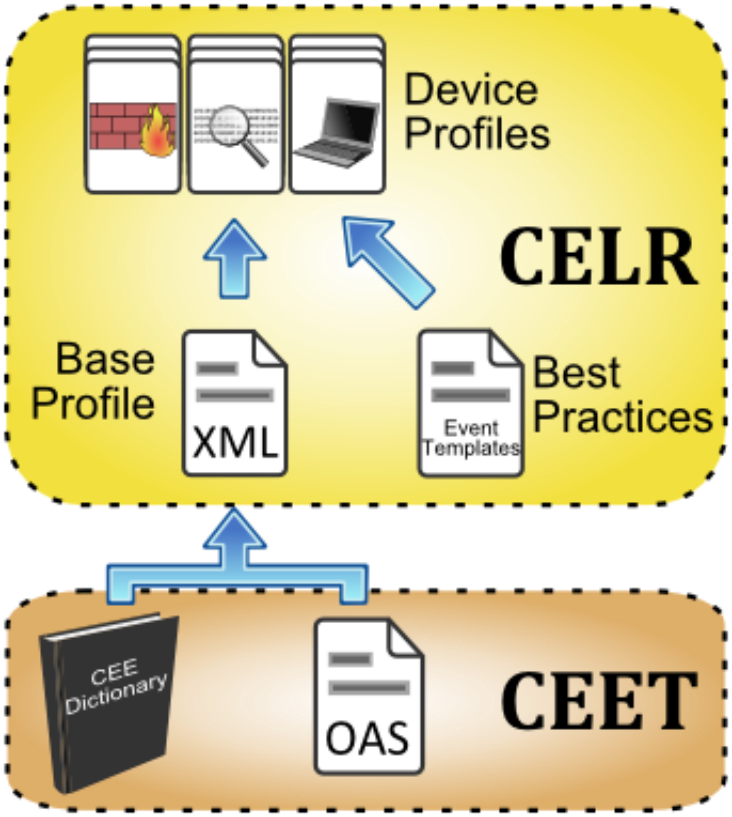
**procName**

**procId**

**acctName**

**ttyName**

# Common Event Logging Recommendations - Profiles




- **Specifies:**
  - **OAS Taxonomy Events**
  - **Required Data Elements**
  - **Recommended Data Elements**
- **Device specific profiles – guidance of what must/should be logged**
- **Provides ability to validate logged events to verify CEE compliance**

# Common Log Syntax Examples

```
Sep 26 12:17:32 myhost-- root[808]: ROOT LOGIN ON tty1
```

- **XML Example:**

```
<event name="firewall-admin-login-success">
    <logTime>2009-09-16T12:17:32</logTime>
    <netSrcHostname>myhost</netSrcHostname>
    <procName>root</procName>
    <procId>808</procId>
    <acctName>root</acctName>
    <ttyName>tty1</ttyName>
</event>
```


- **Plaintext Example:**

```
event="firewall-admin-login-success" logTime="2009-09-16T12:17:32"
    netSrcHostname="myhost" procName="root" prodId="808" acctName="root"
    ttyName="tty1"
```

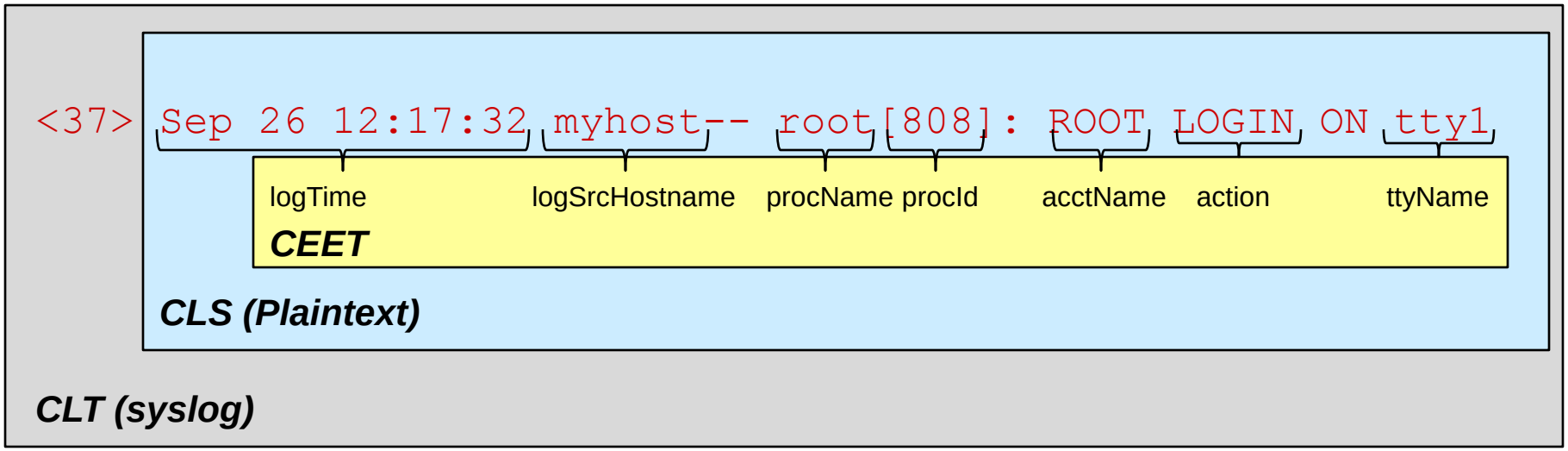
# Common Log Transport

- **Goal: Let's not reinvent the wheel!**

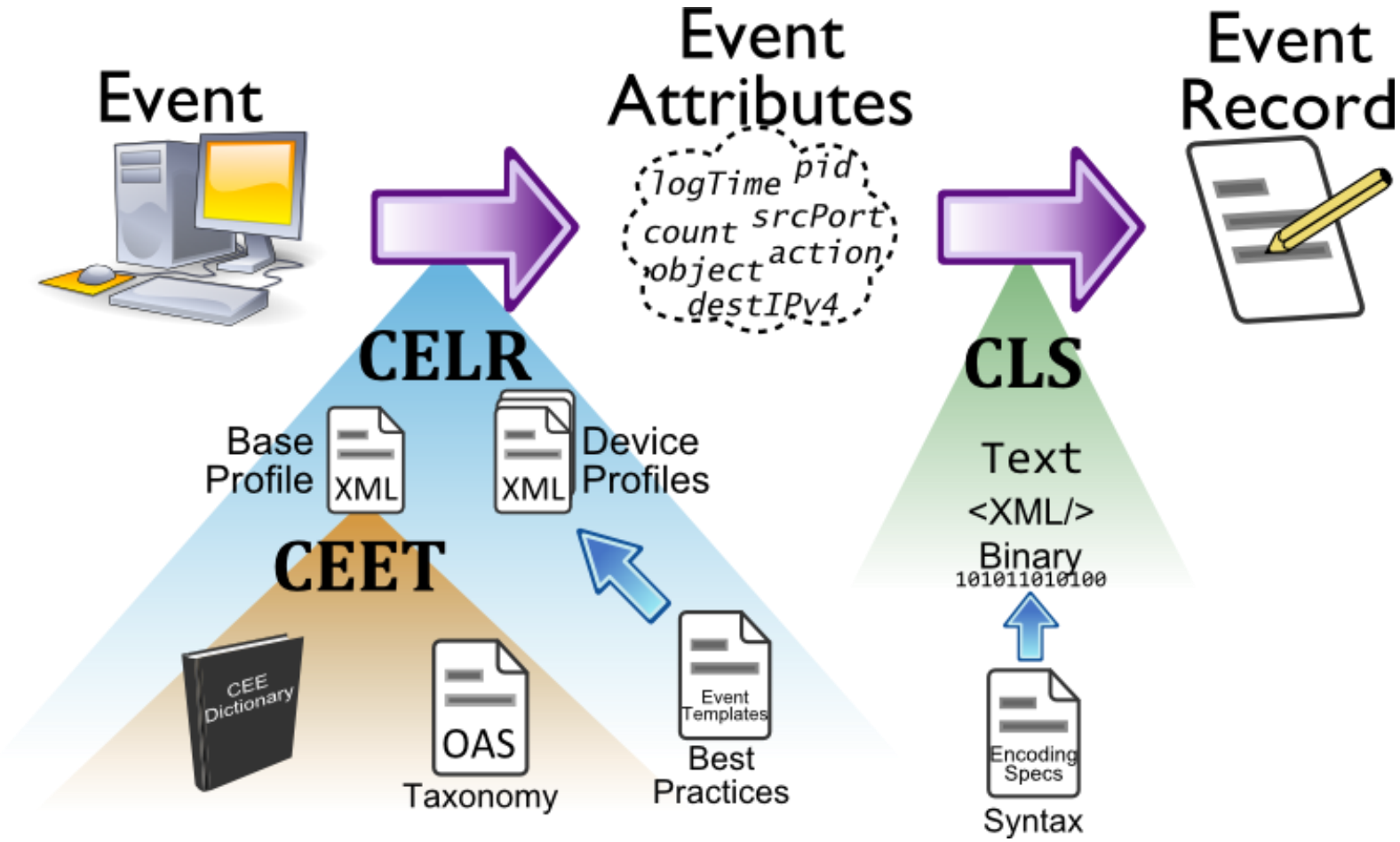
- **Leverage existing technologies based on the syntax desired**
- **Approve specific transport options for each syntax**

- **Examples:**
  - **XML ⇨ SOAP**
  - **Plaintext ⇨ Syslog**

# Deconstruction of Traditional Logs



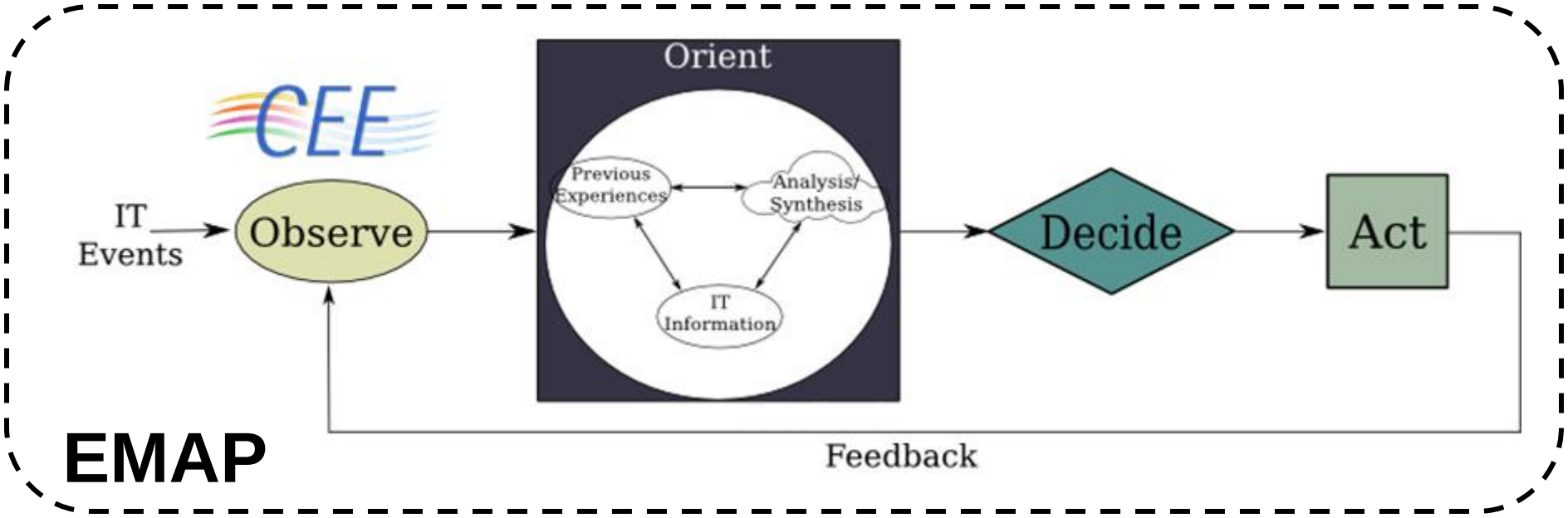
# Putting It Together



# CEE & Event Management Automation Protocol (EMAP)

- NIST Research Effort
- Extend concepts of SCAP to automate the event management space
- CEE is a critical foundation for EMAP
- Need standard way to know:
  - Required information will be present
  - Events in standardized format to aid tool consumption

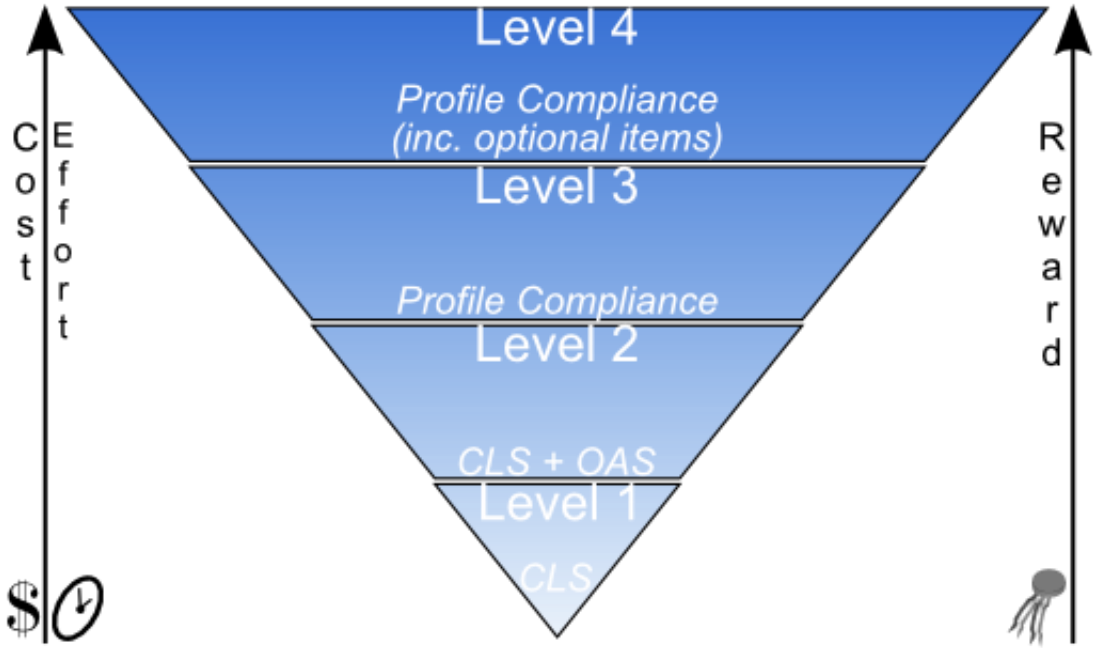
# CEE & EMAP – Automating an OODA Loop




- Observe –Meaningful Logs, Reports, and News
- Orient –Looking for Events of Possible Interest
- Decide –Determine Good, Bad, Unknown, Watch, Ignore…
- Act – Block or Allow? Refine Rules or Policy?
- Feedback – Alter CEE configuration?

# CEE & EMAP Validation

- **Validate log compliance to a CELR Profile**
  - **Not necessarily the same one used to configure logs**



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# Upcoming Timeline

| Task Summary | Target Date (CY) |
|---|---|
| Draft Specification | Q3 2009 |
| XML and Text CLS Support | Q4 2009 |
| Firewall and IDS CELR | Q1 2010 |
| Final CEE Draft 1.0 (CEE Specification) | Q1 2010 |
| Initial CLT Support | Q2 2010 |
| Initial Public Repository for CEET and CELR Data | Q2 2010 |

**Vendor / device support of CEE possible at end of Q2 2010**

# More Information Available

- **CEE Website:**
  - **http://cee.mitre.org/**
- **CEE Working Group Mailing List:**
  - **http://cee.mitre.org/discussiongroup.html**

# Questions?

**“Those who cannot remember the past are condemned to repeat it.”**

**– George Santayana**