Detection 2

Threat Intelligence + Security Operations Centres

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Scientific Computing

Introduction

- Building on yesterday, consider the development of Security Operations Centres

- Combination of people, processes and technology to augment our detection capabilities

Recall the Landscape

- Recall from our discussion of the landscape
- Must work together
- Must share information about ongoing incidents

The approach

- During incident response, we generate useful Indicators of Compromise (IoCs)
- Give a fingerprint by which to identify malicious traffic and your or another site
- We **must** share this information

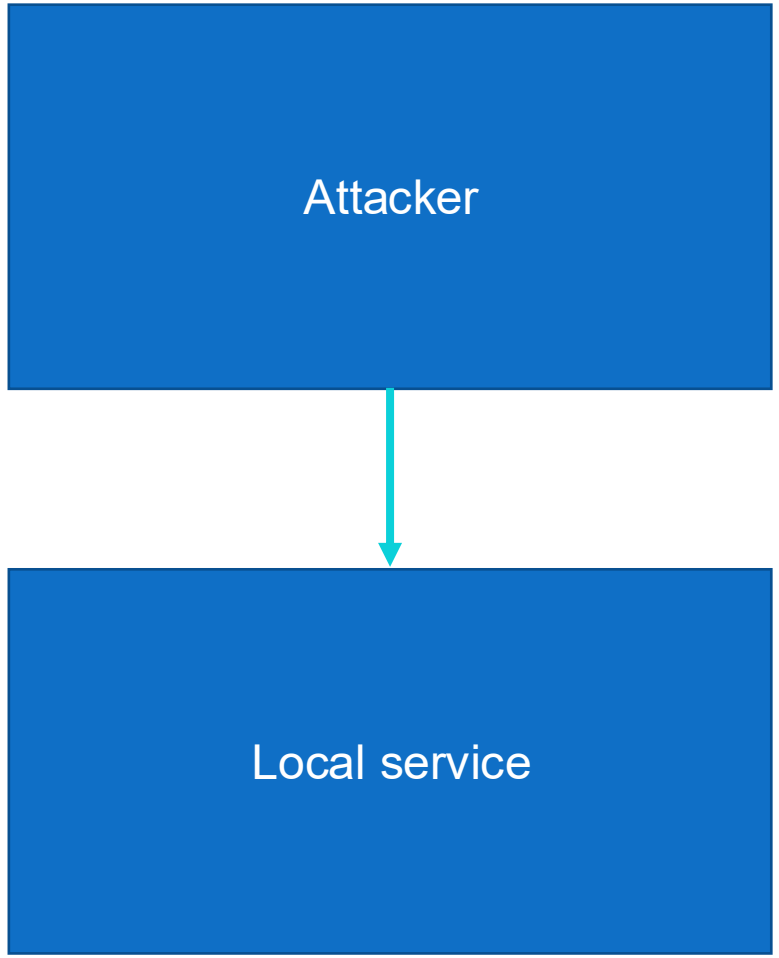
Threat intelligence

- Threat intelligence is the collection of these IoCs in a way that can help identify an attack

- It **does not** include specific information about your facility or service

Local vs attacker evidence

- Let's imagine that your Drupal CMS has been compromised via a recent unpatched vulnerability
- You're doing incident response and have a lot of information about the impact on your services
- You have some information on where the attacker came from and what actions they took on your network



What information to share?

- The information that is useful to others are the **IoCs that identify the attacker**
- **Not** the impact on your service
- **“**The attacker’s IP was…”

  vs
- “My Drupal with all my group information was hacked and it’s a disaster!”

Sharing threat intelligence

- Sharing information this way means you are giving others the most important information

- **Without** giving away sensitive information
  - not in the data protection sense here

Type of IoCs

- Network
  - IP
  - Port
  - Timestamps
- Files
  - Checksums
- TTP information
  - Tactics Techniques Procedures

Who to share with

- Build trust groups
- Share with others that are similar to you
  - What is useful to me?
  - What is useful to them?
- Make the information as useful as possible

What makes good intelligence?

- Accuracy
- Timeliness
- Relevance

- Bulk lists of IPs are less useful than
  - I saw this set of indicators in active use today and these are developing
  - I saw evidence that X/Y/Z may be affected right now

Traffic Light Protocol (TLP)

- TLP is a set of 4 designations
- Designed to indicate the conditions under which information can be shared
- And with which audience

Traffic Light Protocol v2 (TLP)

RED	Not for disclosure, restricted to participants only.	For the eyes and ears of *individual* recipients only, no further disclosure. In the context of a meeting, for example, TLP:RED information is limited to those present at the meeting.
AMBER	Limited disclosure, restricted to participants' organisations.	Limited disclosure, recipients can only spread this on a need-to-know basis within their organization and its clients. Note that TLP:AMBER+STRICT restricts sharing to the organization only. **Sources are at liberty to specify additional intended limits of the sharing: these must be adhered to.**
GREEN	Limited disclosure, restricted to the community.	Limited disclosure, recipients can spread this within their community, but not via publicly accessible channels.
CLEAR	Disclosure is not limited	Recipients can spread this to the world, there is no limit on disclosure.

https://www.first.org/tlp/

TLP:AMBER

- For TLP:AMBER we can and **should** specify any specific restrictions
  - Only for security teams
  - Only for **this** security team, but all members of it

TLP Examples

Example	Category
Information about a vulnerability which impacts our community badly, but is not (yet) public knowledge	
I met my colleague and they had very timely information that would have an extremely high impact if it were to be generally available	
I have information that is timely and relevant about an ongoing incident that would be useful to my fellow incident responders	
I read about a critical vulnerability on The Register and $GIANTPLATFORM is impacted!	

TLP Examples

Example	Category
Information about a vulnerability which impacts our community badly, but is not (yet) public knowledge	TLP: GREEN
I met my colleague and they had very timely information that would have an extremely high impact if it were to be generally available	TLP: RED
I have information that is timely and relevant about an ongoing incident that would be useful to my fellow incident responders	TLP: AMBER
I read about a critical vulnerability on The Register and $GIANTPLATFORM is impacted!	TLP: CLEAR

Data classification over time

- When determining which designation to use, what are the circumstances under which it will change?
  - We will tell you
  - After two weeks
  - …
- Specificity is at the heart of all good communication

Chatham House Rule

Chatham House Rule

“

When a meeting, or part thereof, is held under the Chatham House Rule, participants are free to use the information received, but neither the identity nor the affiliation of the speaker(s), nor that of any other participant, may be revealed.

https://www.chathamhouse.org/about-us/chatham-house-rule

Threat Intelligence technology

- OK, we now have
- **Intelligence**
  - That is timely and relevant
- And we know
- **Who we want to share with**
  - And under which restrictions

Threat Intelligence technology

- How best to share this?

- Word of mouth
- Email
- …

- Specific service

MISP

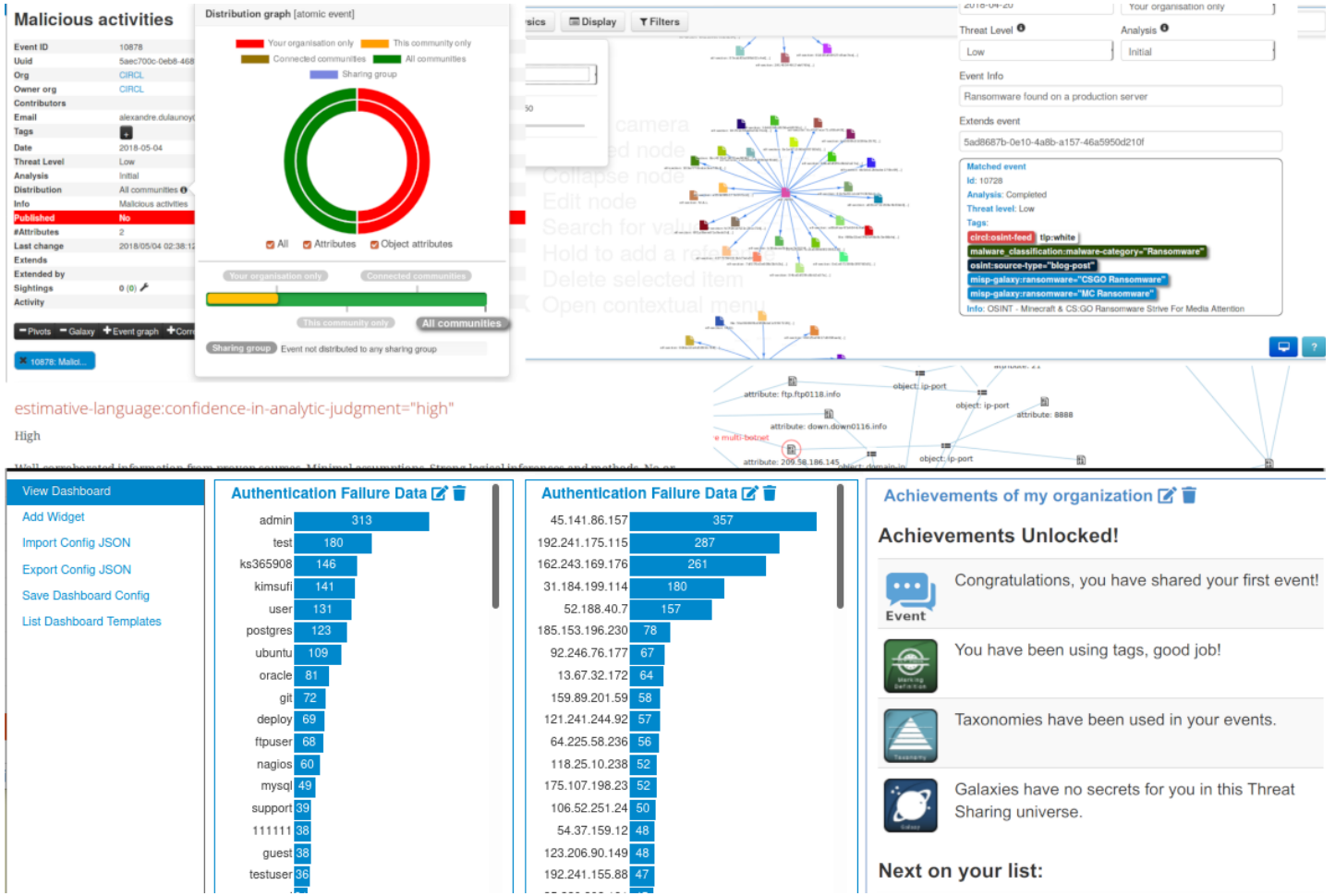
- Previously **Malware Information Sharing Platform**

https://www.misp-project.org

- Incredibly flexible threat intelligence sharing tool developed by CIRCL.LU

- Web application with API

MISP



https://www.misp-project.org

MISP

- Technical expression of trust
- Share information within a pre-defined set of sites / other MISP instances
  - Tags/comments/...

MISP

- One of the most important tools we are using and will use

- Genuinely broad usage across gov/commerce/academia

Research & Education threat intelligence

- R&E threat intelligence instance hosted by CERN
- Grew from activity for WLCG, available to the sector
- Either sync or use API

R&E threat intelligence

- EGI CSIRT currently distributes IoCs via broadcasts to our sites
- Now working on incorporating threat intelligence sharing directly into our procedures
- Highly relevant intelligence on ongoing incidents to our scope

Other sector intelligence sharing

- Jisc
  - UK NREN
- SAFER-TRUST
  - R&E trust group designed to support sharing intelligence across national and orgnisational boundaries

Security Operations Centres (SOCs)

- We have a great source of intelligence: what now?
- We need to understand what is happening in our service/facility/network
  - Host/network logging
- Let's integrate these

Security Operations Centres

- From a high level a SOC is the combination of
  - Technology
  - People
  - Processes

- **Note**: “SOC” is unfortunately an overloaded term
  - Take care in which aspect is being discussed

UK NCSC guidance

- The NCSC has a useful overview of building a SOC

- “help organisations design a SOC and security monitoring capability proportionate to the threat they face, their resources and assets.”

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Operating Model

- Threat profile
  - What is the threat faced by your scope?
- Assets
  - What assets are you trying to protect?
- Governance + Resources

Teams and Processes

- Does senior management support the SOC capability?
- Who maintains the SOC?
  - Next year?
- Where does the next tranche of hardware come from?
- Who analyses the alerts?

SOC Pillars

- Informing the SOC
  - Threat intelligence
- Developing capability
  - Turn requirements into technical detection capability
- Detect and respond
- Supporting the SOC
  - Internal vs third-party support
  - Community efforts

SOC Functions

- Threat Intelligence (TI)
- Threat hunting
- Analytics
- Engineering
- Incident Response
- Incident Management

Data Sources and Incident Management

- Application Logs
- Host Logs
- **Network**
- Cloud

- How does the SOC fit into existing processes?
  - Does it operate 24x7?
  - Who responds to alerts?

Security Operations Centres

- From a technology standpoint, a SOC is the combination of
  - threat intelligence
  - fine-grained logging information
  - storage and visualization
  - alerting

How to deploy a SOC [engineering]

- Understand what scope you need to cover
- What outcome do you want?
- What logging capabilities do you already have?
- What staffing is available to you?

- **Start small enough to be useful**
  - MVP (minimum viable product)

Considerations

- Important to identify a realistic starting point
- Your capabilities with the tools will grow with experience
- Want to make your processes effective rather than throw hardware at the problem
  - You do need some of that!

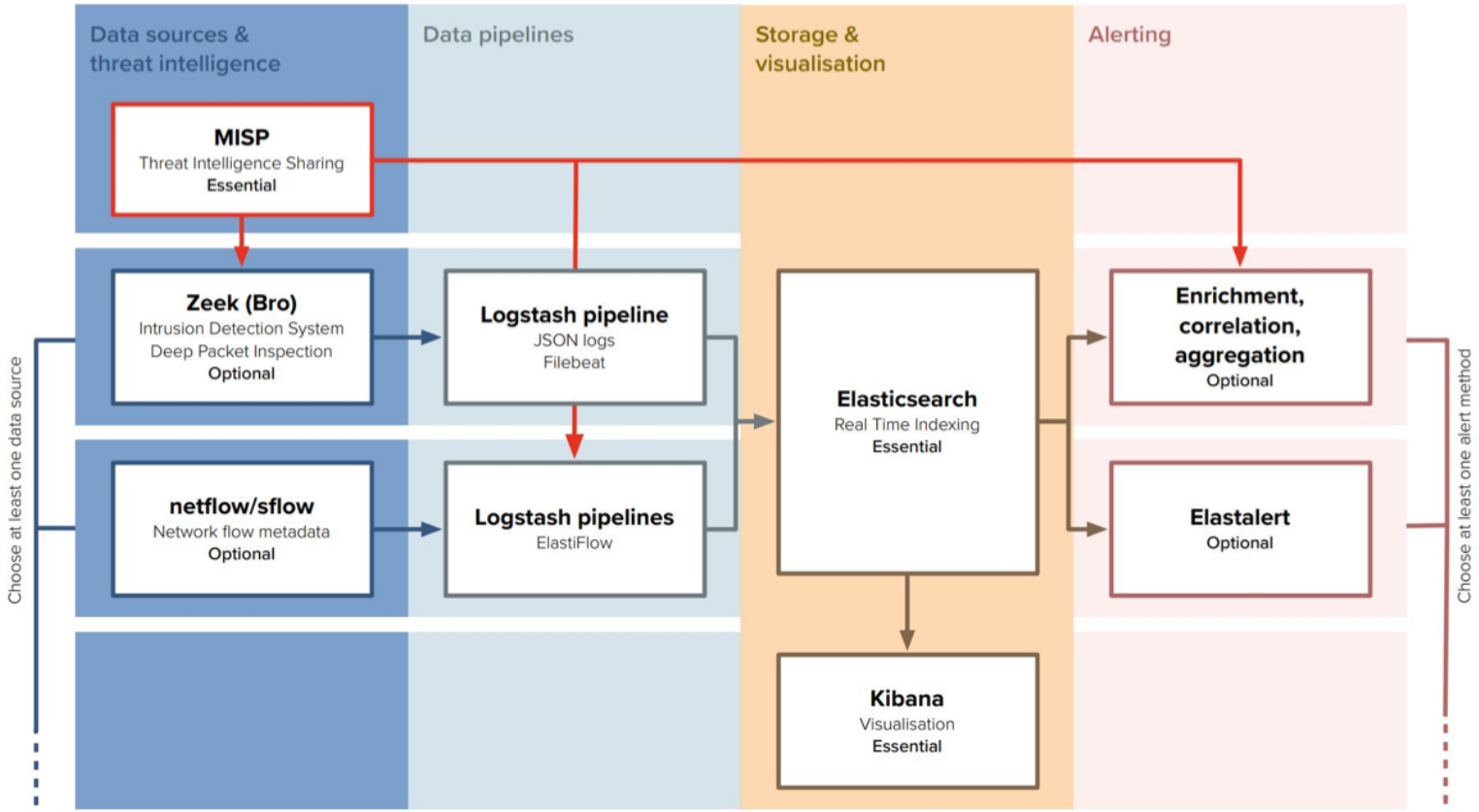
SOC Engineering Components

- Talked about some of the key components
  - Threat intelligence
  - Fine-grained network monitoring
- Let's look at an overall structural diagram
- In the context of building a SOC process, we're now focusing on the engineering part
  - But don't forget the higher level considerations

SOC Engineering Components

- **NOTE**: this is the reference design created by the SOC WG
  - Coordinated by WLCG but open to R&E
  - Contains necessary core elements
    - https://wlcg-soc-wg-doc.web.cern.ch

SOC Engineering Components



Data sources and threat intelligence

- Already discussed
  - MISP: threat intelligence
  - Zeek: network monitoring
  - Net/sflow: network monitoring
  - +host logs

- Start with one and grow from there

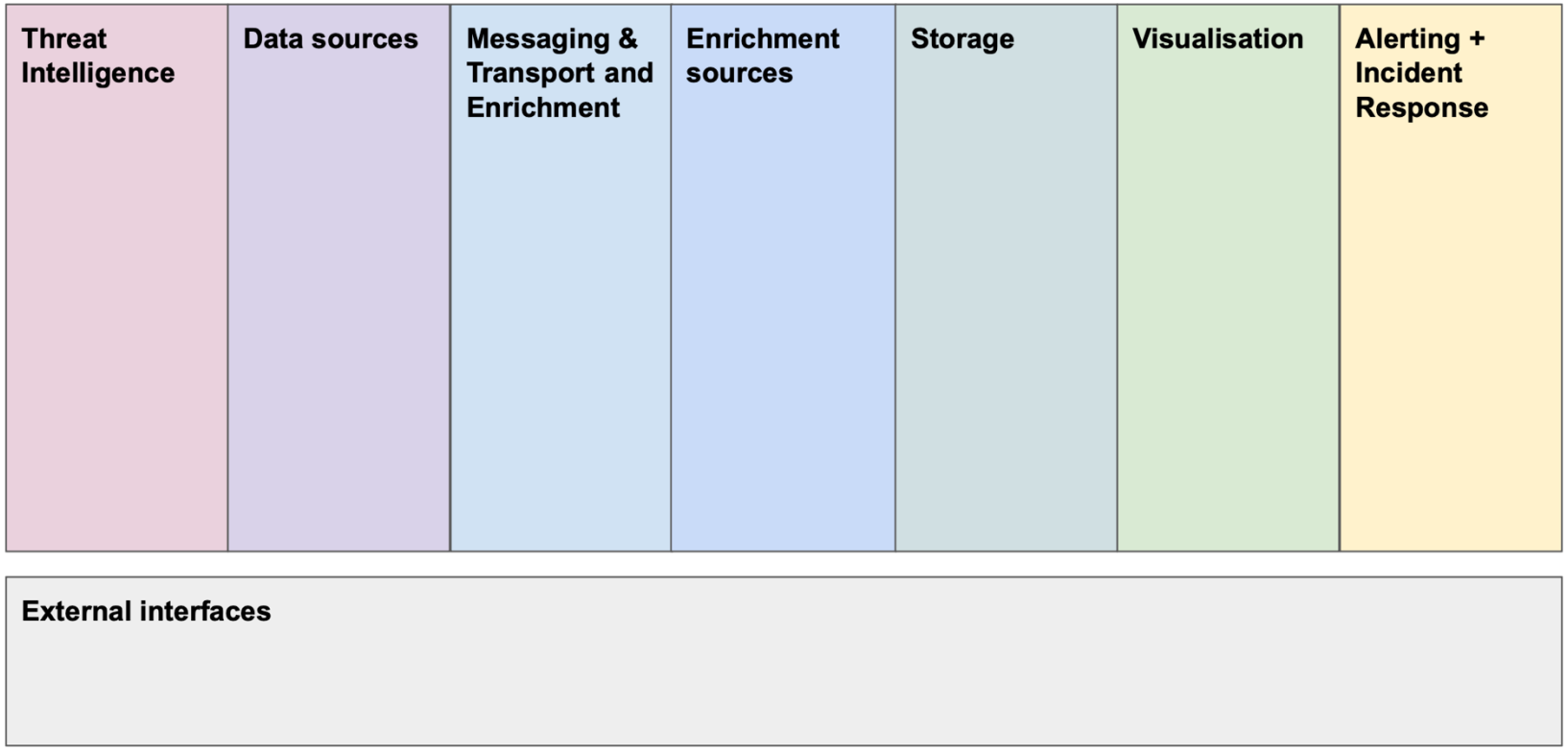
Storage and visualisation

- OpenSearch + OpenSearch Dashboards
  - Common, well understood components
  - Open source distribution of Elasticsearch, Logstash and Kibana
  - Includes security plugins from the outset

Alerting

- Alerting directly from Zeek
- Alerting from OpenSearch
- Aggregation of information into emails
  - In use in CERN SOC

SOC Components



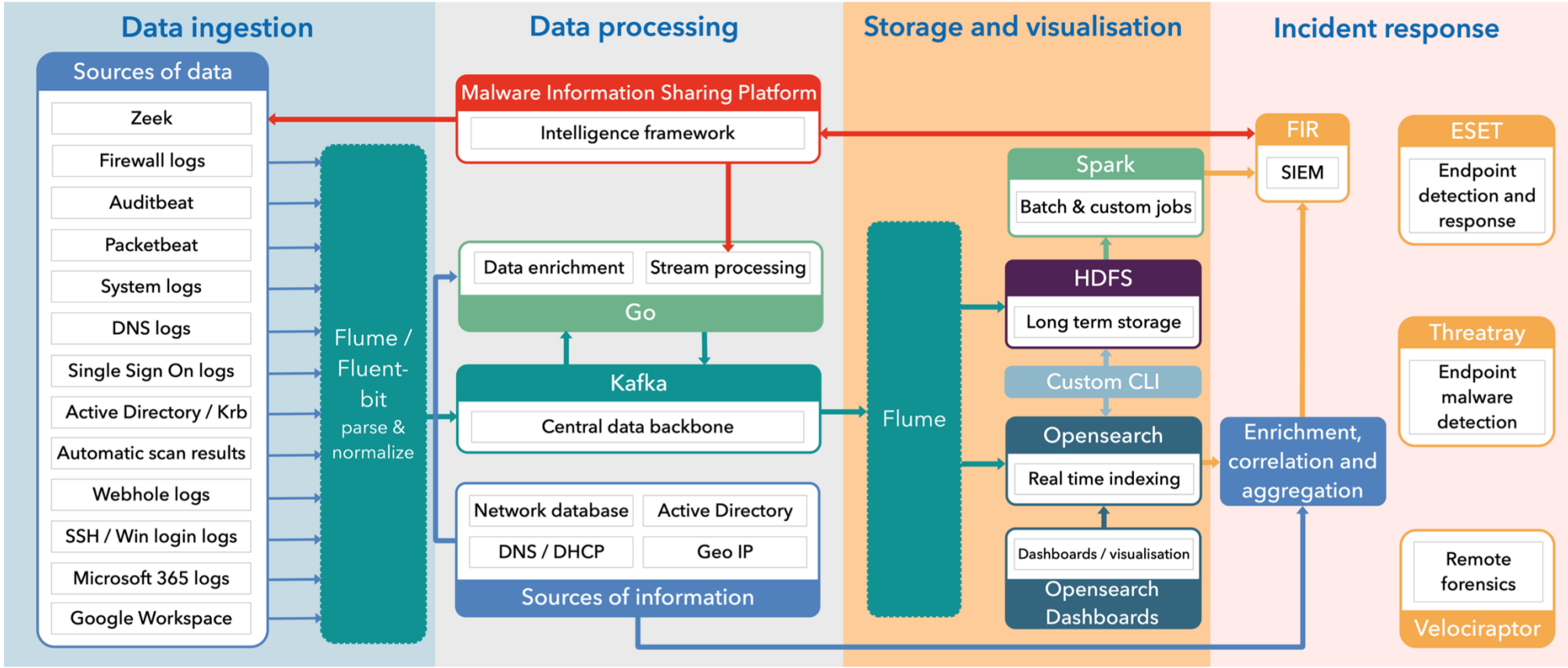
- Draft Reference Design v2

External interfaces

- A key part of deploying SOC capabilities in our community is how they **interoperate**

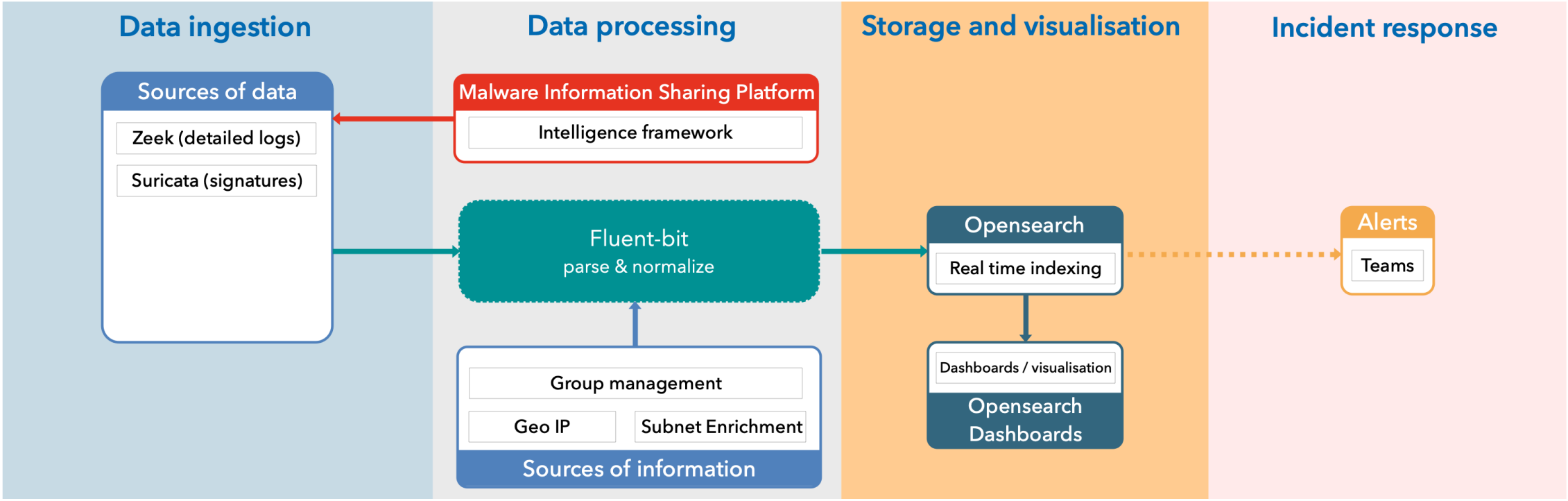
- Thus, when considering options for different SOC elements, think about how they might – if they need to – interoperate with other facilities

CERN SOC


Data ingestion
Data processing
Storage and visualisation
Incident response
Sources of data
Zeek
Firewall logs
Auditbeat
Packetbeat
System logs
DNS logs
Single Sign On logs
Active Directory / Krb
Automatic scan results
Webhole logs
SSH / Win login logs
Microsoft 365 logs
Google Workspace
Flume / Fluent-bit
parse & normalize
Malware Information Sharing Platform
Intelligence framework
Data enrichment
Stream processing
Go
Kafka
Central data backbone
Network database
Active Directory
DNS / DHCP
Geo IP
Sources of information
Flume
Spark
Batch & custom jobs
HDFS
Long term storage
Custom CLI
Opensearch
Real time indexing
Dashboards / visualisation
Opensearch Dashboards
Enrichment, correlation and aggregation
FIR
SIEM
ESET
Endpoint detection and response
Threatray
Endpoint malware detection
Remote forensics
Velociraptor

updated

STFC SOC-NDR



Zeek specification

- When designing a zeek worker node, what are the main factors?

- Zeek works by:
  - splitting the traffic across cores
  - running a set of internal protocol analysers against each packet
  - running a set of scripts on top of these

Zeek specification + deployment

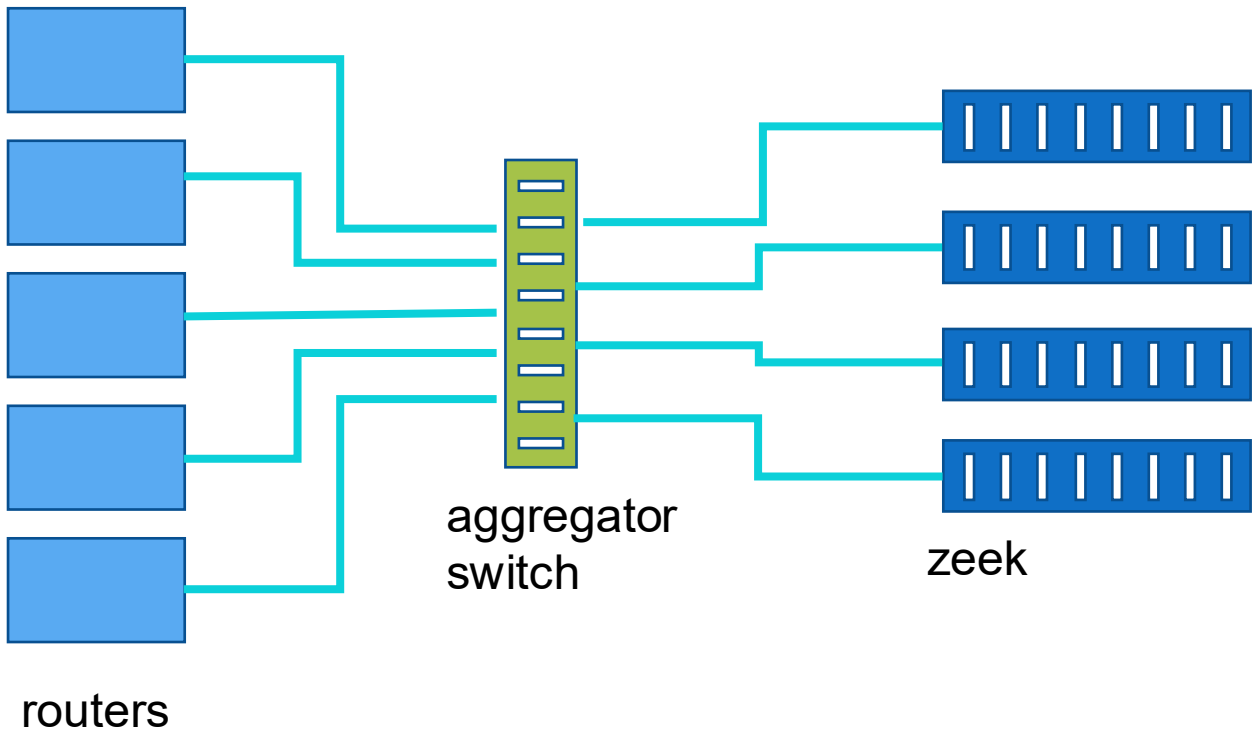
- Modern servers with ~hundreds of cores are particularly suitable for zeek processing

- A useful way of deploying the zeek farm is to consider the aggregation of network traffic

STFC example

- 4 x 100 Gb/s links to Janet
  - General internet provided by Jisc (UK NREN)
  - In fact 8 links acting as primary/seconday
- 2 x 100 Gb/s LHCOPN links to CERN
- Need to make sure each zeek worker sees both halves of any one connection
- But can distribute these

Traffic aggregation and load balancing



Incident management / Alerting

- A key part of deploying a SOC is how to escalate information for operator/responder consideration

- SOC WG perspective is to leave this to local considerations
  - Different ticketing systems…

Zeek + OpenSearch alerting

- Can alert from Zeek based on matches between MISP events and matching traffic
- Alert from OpenSearch based on outcomes of specific queries
- Key to put these alerts where they are most useful

SOC deployment summary [1]

- We’ve spoken about the high level concept of a SOC
  - People
  - Processes
  - Technology

SOC deployment summary

- We’ve spoken about some specifics around engineering
- Tomorrow in the workshop we will have a chance to look at some of these hands-on

Conclusions: Detection

- In this two lecture block we've looked at
  - The basics of logging, and logging technologies
  - The importance of identifying the most useful logs to avoid "data as noise"
  - The vital role that central logging plays
  - The difference between flow based and deep packet inspection network monitoring

Conclusions: Detection

- We've also discussed
  - The importance of sharing threat intelligence for our community
  - Tools to help share intelligence responsibly
  - The MISP platform
  - Components of a SOC
    - People, Process, Technology
- Last part of Detection track: containerised SOC deployment workshop