An Introduction to Cybersecurity Information Sharing

MISP - Threat Sharing

CIRCL / Team MISP Project

MISP Project
https://www.misp-project.org/

CIRCL - Uni-Lorraine

MISP
Threat Sharing

Agenda

- Agenda and details available
  https://www.foo.be/cours/dess-20252026/

MISP and starting from a practical use-case

- During a malware analysis workgroup in 2012, we discovered that we worked on the analysis of the same malware.
- We wanted to share information in an easy and automated way **to avoid duplication of work**.
- Christophe Vandeplas (then working at the CERT for the Belgian MoD) showed us his work on a platform that later became MISP.
- A first version of the MISP Platform was used by the MALWG and **the increasing feedback of users** helped us to build an improved platform.
- MISP is now **a community-driven development**.

ABOUT CIRCL

The Computer Incident Response Center Luxembourg (CIRCL) is a government-driven initiative designed to provide a systematic response facility to computer security threats and incidents. CIRCL is a CERT with national responsibilities for the private sector, communes and non-governmental entities in Luxembourg and is operated by LHC (Luxembourg House of Cybersecurity).

MISP and CIRCL

- CIRCL is mandated by the Ministry of Economy and acting as the Luxembourg National CERT for private sector.
- CIRCL leads the development of the Open Source MISP threat intelligence platform which is used by many military or intelligence communities, private companies, financial sector, National CERTs and LEAs globally.
- **CIRCL runs multiple large MISP communities performing active daily threat-intelligence sharing.**

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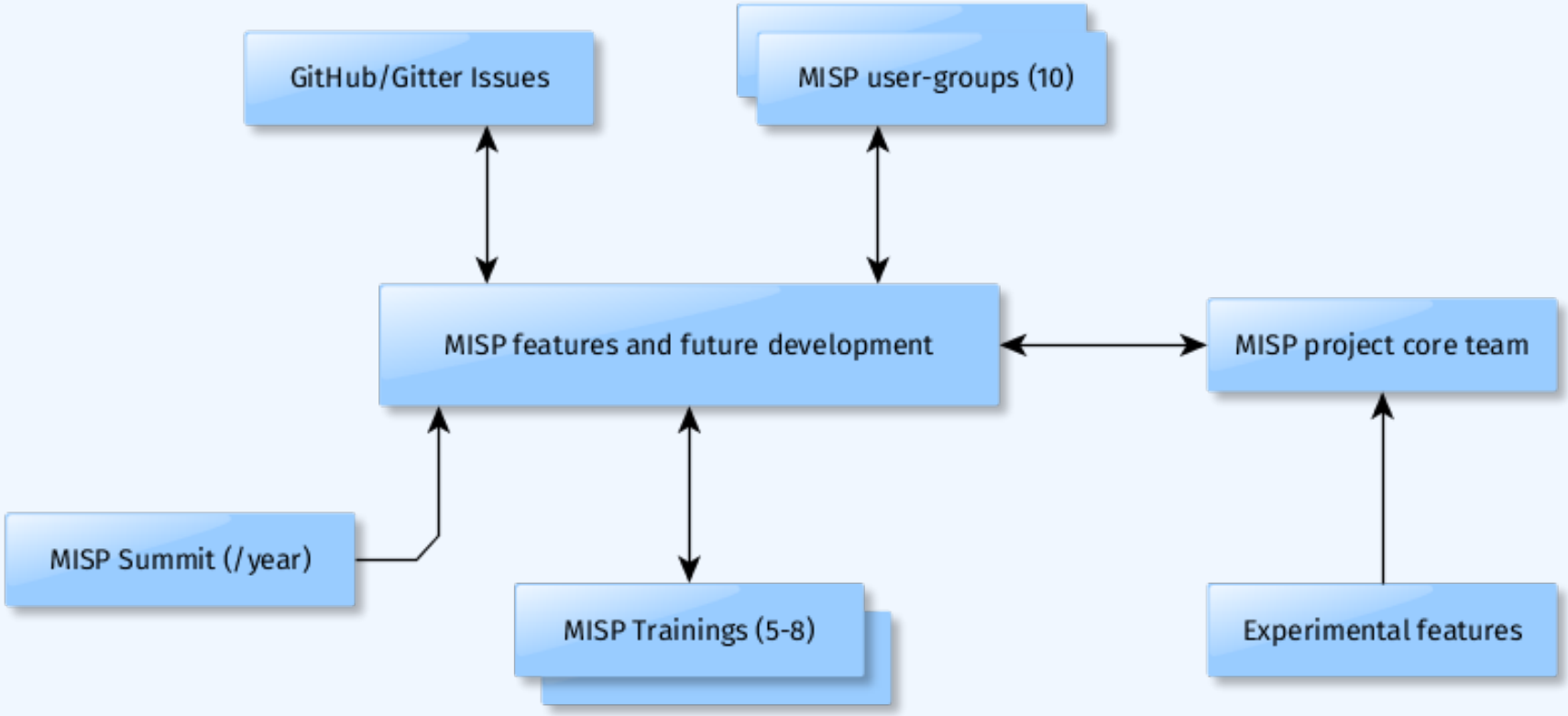
What is MISP?

- MISP is a **threat information sharing** platform that is free & open source software
- A tool that **collects** information from partners, your analysts, your tools, feeds
- Normalises, **correlates**, **enriches** the data
- Allows teams and communities to **collaborate**
- **Feeds** automated protective tools and analyst tools with the output

Development based on practical user feedback

- There are many different types of users of an information sharing platform like MISP:
  - **Malware reversers** willing to share indicators of analysis with respective colleagues.
  - **Security analysts** searching, validating and using indicators in operational security.
  - **Intelligence analysts** gathering information about specific adversary groups.
  - **Law-enforcement** relying on indicators to support or bootstrap their DFIR cases.
  - **Risk analysis teams** willing to know about the new threats, likelyhood and occurences.
  - **Fraud analysts** willing to share financial indicators to detect financial frauds.

MISP MODEL OF GOVERNANCE



Many objectives from different user-groups

- Sharing indicators for a **detection** matter.
  - 'Do I have infected systems in my infrastructure or the ones I operate?'
- Sharing indicators to **block**.
  - 'I use these attributes to block, sinkhole or divert traffic.'
- Sharing indicators to **perform intelligence**.
  - 'Gathering information about campaigns and attacks. Are they related? Who is targeting me? Who are the adversaries?'
- $\rightarrow$ These objectives can be conflicting (e.g. False-positives have different impacts)

Communities using MISP

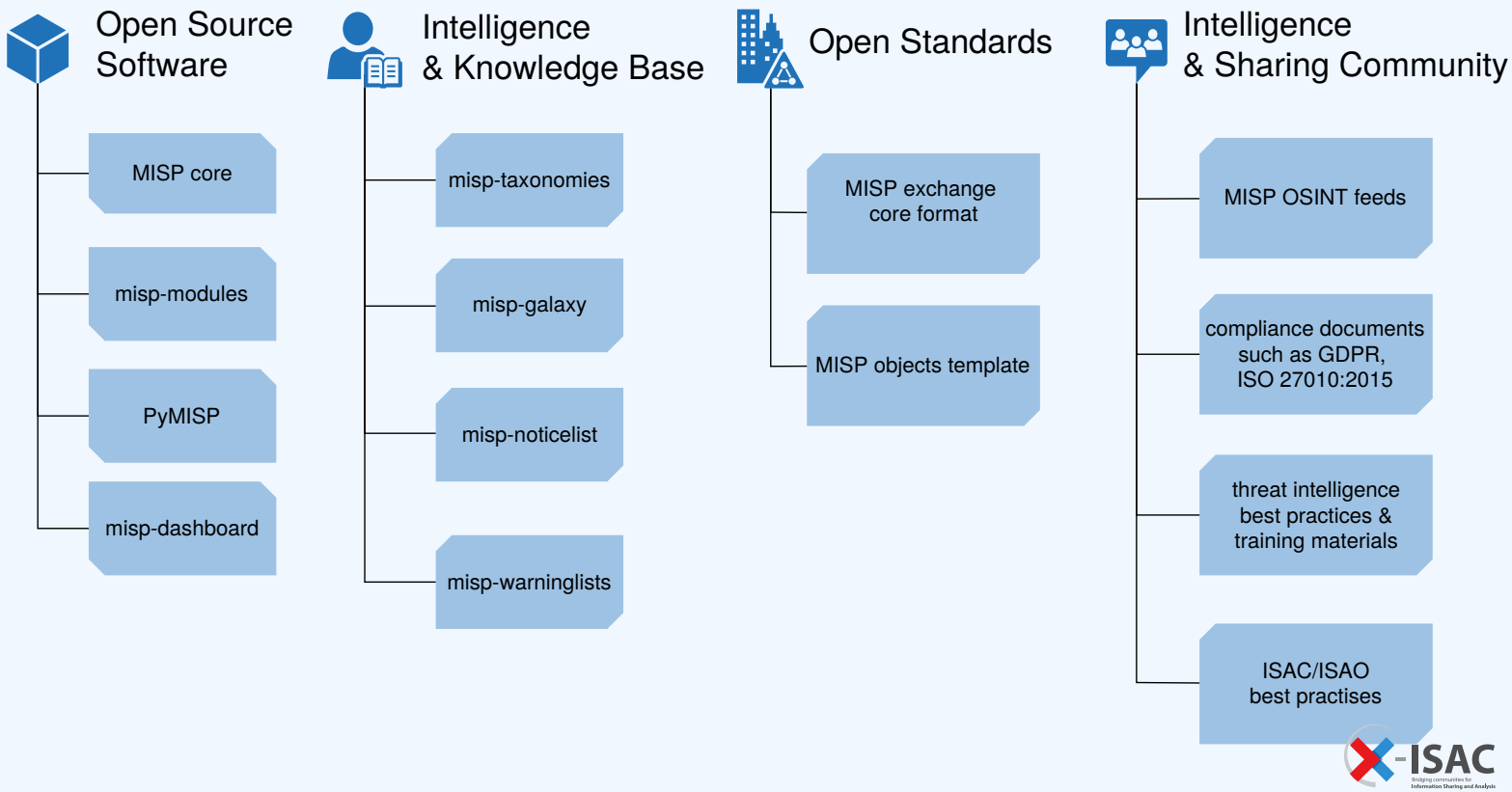
- Communities are groups of users sharing within a set of common objectives/values.
- CIRCL operates multiple MISP instances with a significant user base (more than 1200 organizations with more than 4000 users).
- **Trusted groups** running MISP communities in island mode (air gapped system) or partially connected mode.
- **Financial sector** (banks, ISACs, payment processing organizations) use MISP as a sharing mechanism.
- **Military and international organizations** (NATO, military CSIRTs, n/g CERTs,...).
- **Security vendors** running their own communities (e.g. Fidelis) or interfacing with MISP communities (e.g. OTX).
- **Topical communities** set up to tackle individual specific issues (COVID-19 MISP)

Sharing Difficulties

- Sharing difficulties are not really technical issues but often it's a matter of **social interactions** (e.g. **trust**).
- Legal restriction[1]
  - "Our legal framework doesn't allow us to share information."
  - "Risk of information-leak is too high and it's too risky for our organization or partners."
- Practical restriction
  - "We don't have information to share."
  - "We don't have time to process or contribute indicators."
  - "Our model of classification doesn't fit your model."
  - "Tools for sharing information are tied to a specific format, we use a different one."

[1] https://www.misp-project.org/compliance/

MISP Project Overview



Getting some naming conventions out of the way...

- Data layer
  - **Events** are encapsulations for contextually linked information
  - **Attributes** are individual data points, which can be indicators or supporting data
  - **Objects** are custom templated Attribute compositions
  - **Object references** are the relationships between other building blocks
  - **Sightings** are time-specific occurances of a given data-point detected
- Context layer
  - **Tags** are labels attached to events/attributes and can come from **Taxonomies**
  - **Galaxy-clusters** are knowledge base items used to label events/attributes and come from **Galaxies**
  - **Cluster relationships** denote pre-defined relationships between clusters

Terminology about Indicators

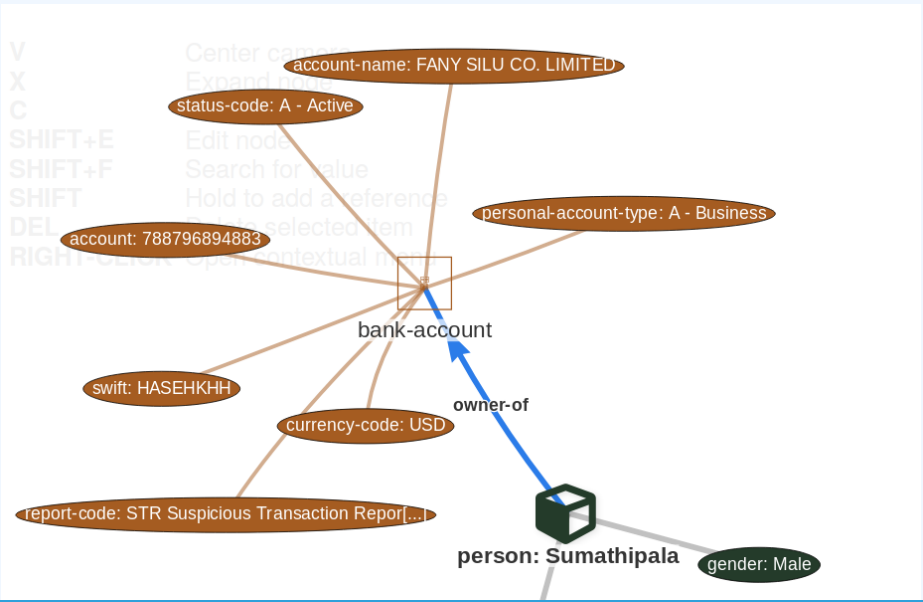
- Indicators[2]
  - Indicators contain a pattern that can be used to detect suspicious or malicious cyber activity.
- Attributes in MISP can be network indicators (e.g. IP address), system indicators (e.g. a string in memory) or even bank account details.
  - **A type (e.g. MD5, url) is how an attribute is described**.
  - An attribute is always in a category (e.g. Payload delivery) which puts it in a context.
    - **A category is what describes** an attribute.
  - An IDS flag on an attribute allows to determine if **an attribute can be automatically used for detection**.

[2] IoC (Indicator of Compromise) is a subset of indicators

A RICH DATA-MODEL: TELLING STORIES VIA RELATIONSHIPS

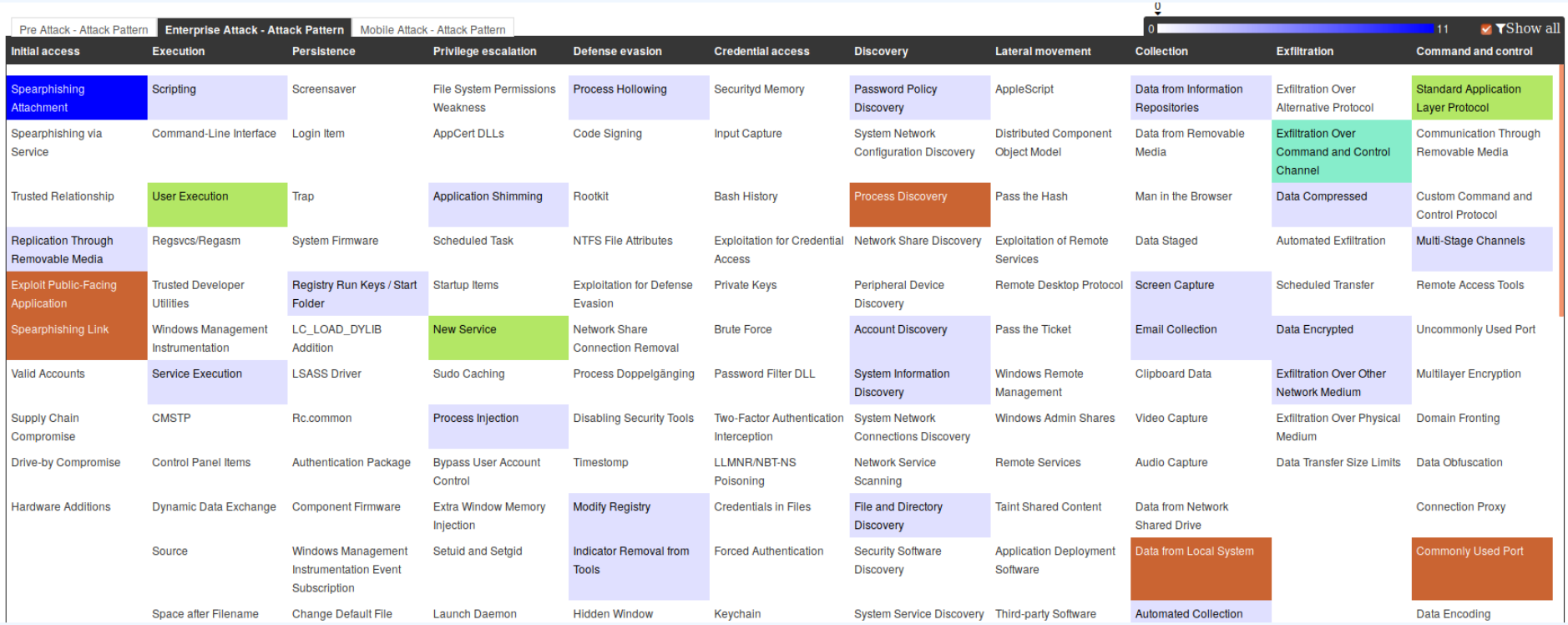
Filters: All | File | Network | Financial | Proposal | Correlation | Warnings | Include deleted attributes | Show context fields

Date	Org	Category	Type	Value	Tags	Galaxies	Comment	Correlate	Related Events
2018-09-28			**Name:** bank-account **References:** 0						
2018-09-28		Other	**status-code:** text	A - Active		Add			
2018-09-28		Other	**report-code:** text	STR Suspicious Transaction Report		Add			
2018-09-28		Other	**personal-account-type:** text	A - Business		Add			
2018-09-28		Financial fraud	**swift:** bic	HASEHKHH		Add		☑	3849 11320 11584
2018-09-28		Financial fraud	**account:** bank-account-nr	788796894883		Add		☑	
2018-09-28		Other	**account-name:** text	FANY SILU CO. LIMITED		Add		☑	
2018-09-28		Other	**currency-code:** text	USD		Add			



Contextualisation and aggregation

- MISP integrates at the event and the attribute levels MITRE's Adversarial Tactics, Techniques, and Common Knowledge (ATT&CK).



Pre Attack - Attack Pattern | **Enterprise Attack - Attack Pattern** | Mobile Attack - Attack Pattern

0 — 11 — Show all

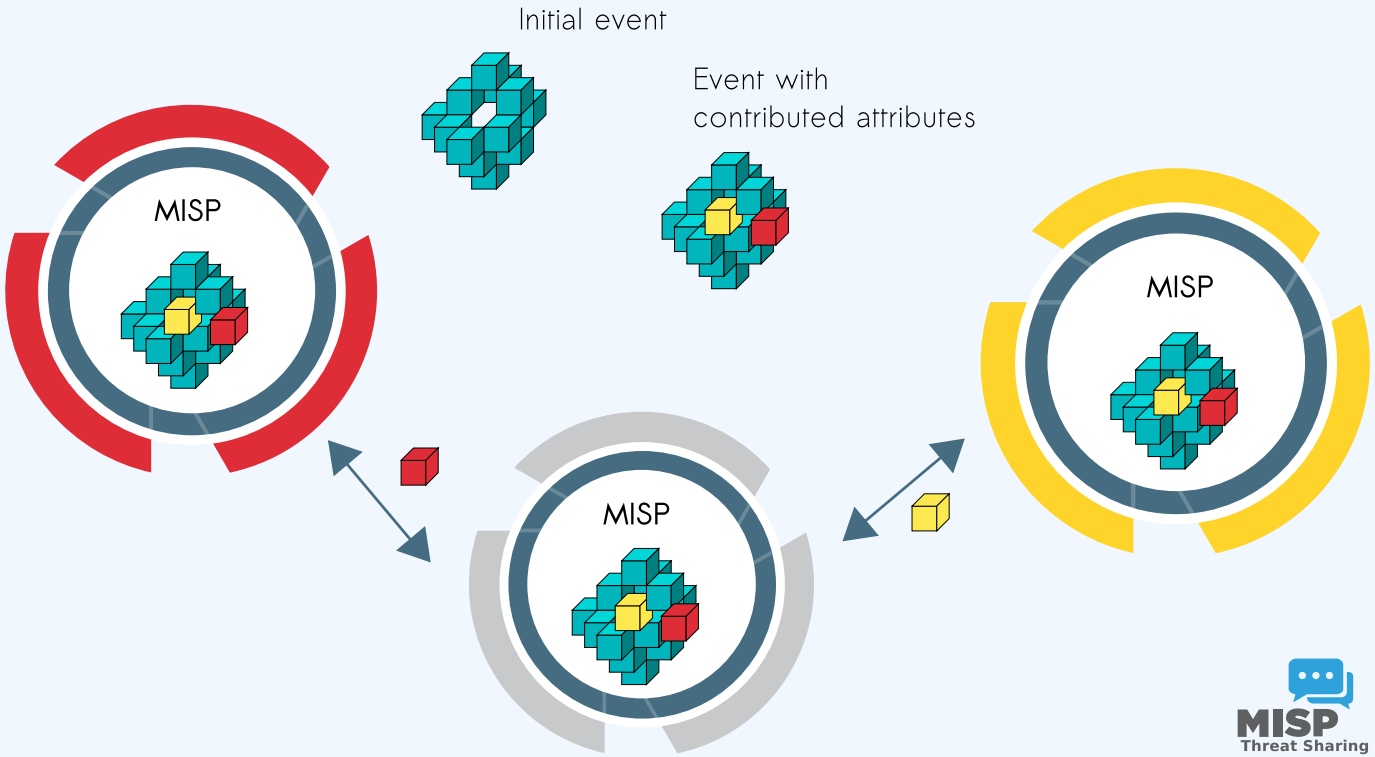
Initial access	Execution	Persistence	Privilege escalation	Defense evasion	Credential access	Discovery	Lateral movement	Collection	Exfiltration	Command and control
Spearphishing Attachment	Scripting	Screensaver	File System Permissions Weakness	Process Hollowing	Securityd Memory	Password Policy Discovery	AppleScript	Data from Information Repositories	Exfiltration Over Alternative Protocol	Standard Application Layer Protocol
Spearphishing via Service	Command-Line Interface	Login Item	AppCert DLLs	Code Signing	Input Capture	System Network Configuration Discovery	Distributed Component Object Model	Data from Removable Media	Exfiltration Over Command and Control Channel	Communication Through Removable Media
Trusted Relationship	User Execution	Trap	Application Shimming	Rootkit	Bash History	Process Discovery	Pass the Hash	Man in the Browser	Data Compressed	Custom Command and Control Protocol
Replication Through Removable Media	Regsvcs/Regasm	System Firmware	Scheduled Task	NTFS File Attributes	Exploitation for Credential Access	Network Share Discovery	Exploitation of Remote Services	Data Staged	Automated Exfiltration	Multi-Stage Channels
Exploit Public-Facing Application	Trusted Developer Utilities	Registry Run Keys / Start Folder	Startup Items	Exploitation for Defense Evasion	Private Keys	Peripheral Device Discovery	Remote Desktop Protocol	Screen Capture	Scheduled Transfer	Remote Access Tools
Spearphishing Link	Windows Management Instrumentation	LC_LOAD_DYLIB Addition	New Service	Network Share Connection Removal	Brute Force	Account Discovery	Pass the Ticket	Email Collection	Data Encrypted	Uncommonly Used Port
Valid Accounts	Service Execution	LSASS Driver	Sudo Caching	Process Doppelgänging	Password Filter DLL	System Information Discovery	Windows Remote Management	Clipboard Data	Exfiltration Over Other Network Medium	Multilayer Encryption
Supply Chain Compromise	CMSTP	Rc.common	Process Injection	Disabling Security Tools	Two-Factor Authentication Interception	System Network Connections Discovery	Windows Admin Shares	Video Capture	Exfiltration Over Physical Medium	Domain Fronting
Drive-by Compromise	Control Panel Items	Authentication Package	Bypass User Account Control	Timestomp	LLMNR/NBT-NS Poisoning	Network Service Scanning	Remote Services	Audio Capture	Data Transfer Size Limits	Data Obfuscation
Hardware Additions	Dynamic Data Exchange	Component Firmware	Extra Window Memory Injection	Modify Registry	Credentials in Files	File and Directory Discovery	Taint Shared Content	Data from Network Shared Drive		Connection Proxy
	Source	Windows Management Instrumentation Event Subscription	Setuid and Setgid	Indicator Removal from Tools	Forced Authentication	Security Software Discovery	Application Deployment Software	Data from Local System		Commonly Used Port
	Space after Filename	Change Default File	Launch Daemon	Hidden Window	Keychain	System Service Discovery	Third-party Software	Automated Collection		Data Encoding

Sharing in MISP

- Sharing via distribution lists - **Sharing groups**
- **Delegation** for pseudo-anonymised information sharing
- **Proposals** and **Extended events** for collaborated information sharing
- Synchronisation, Feed system, air-gapped sharing
- User defined **filtered sharing** for all the above mentioned methods
- Cross-instance information **caching** for quick lookups of large data-sets
- Support for multi-MISP internal enclaves

MISP core distributed sharing functionality

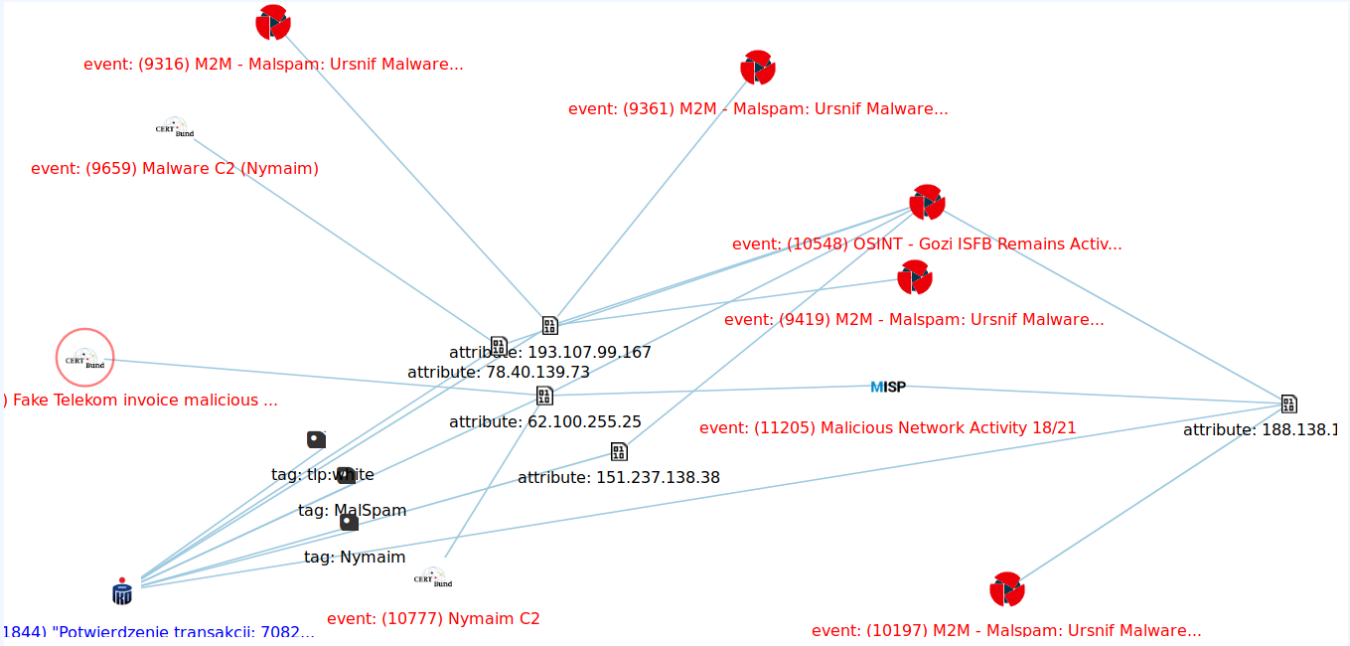
- MISPs' core functionality is sharing where everyone can be a consumer and/or a contributor/producer."
- Quick benefit without the obligation to contribute.
- Low barrier access to get acquainted to the system.



Information quality management

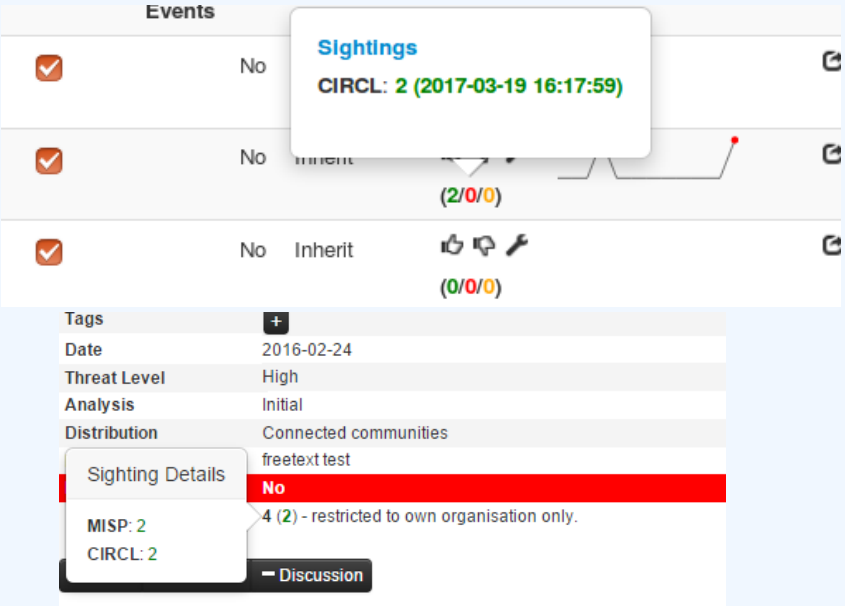
- Correlating data
- Feedback loop from detections via **Sightings**
- **False positive management** via the warninglist system
- **Enrichment system** via MISP-modules
- **Integrations** with a plethora of tools and formats
- Flexible **API** and support **libraries** such as PyMISP to ease integration
- **Timelines** and giving information a temporal context
- Full chain for **indicator life-cycle management**

Correlation features: a tool for analysts



- To **corroborate a finding** (e.g. is this the same campaign?), **reinforce an analysis** (e.g. do other analysts have the same hypothesis?), **confirm a specific aspect** (e.g. are the sinkhole IP addresses used for one campaign?) or just find if this **threat is new or unknown in your community**.

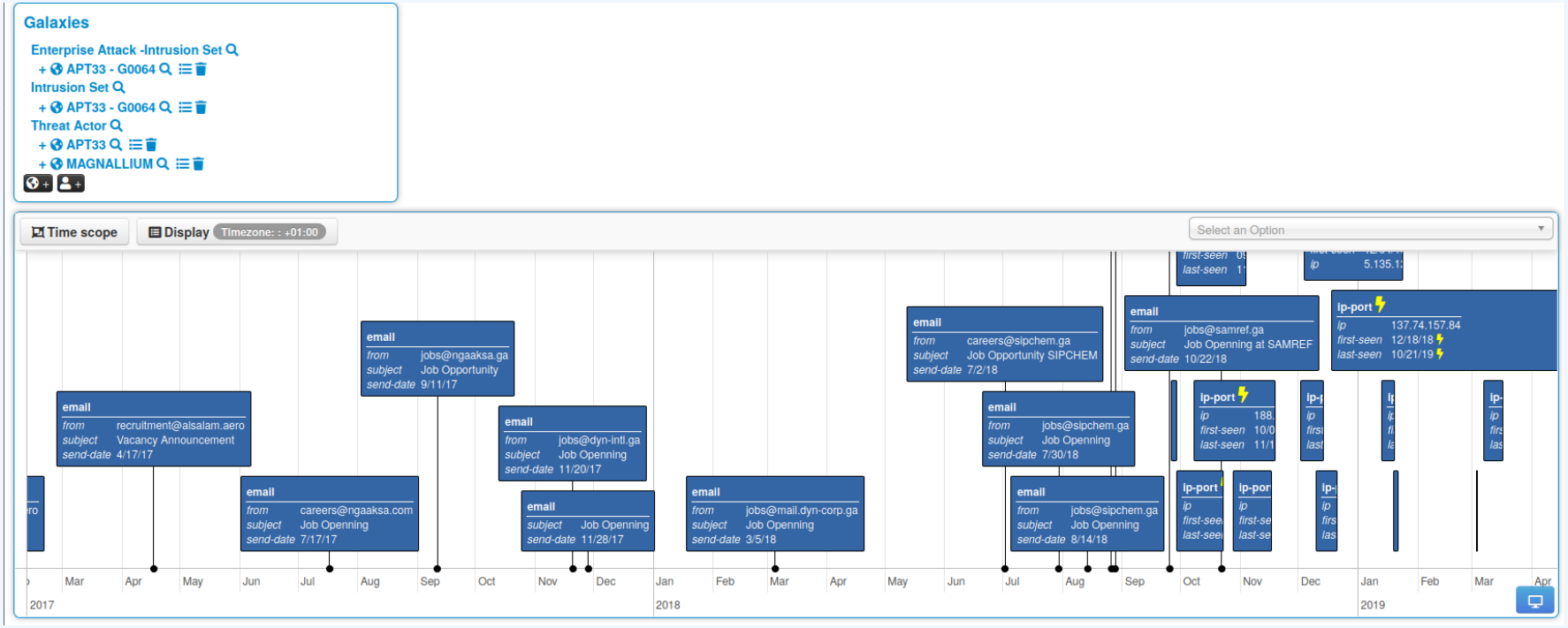
Sightings support



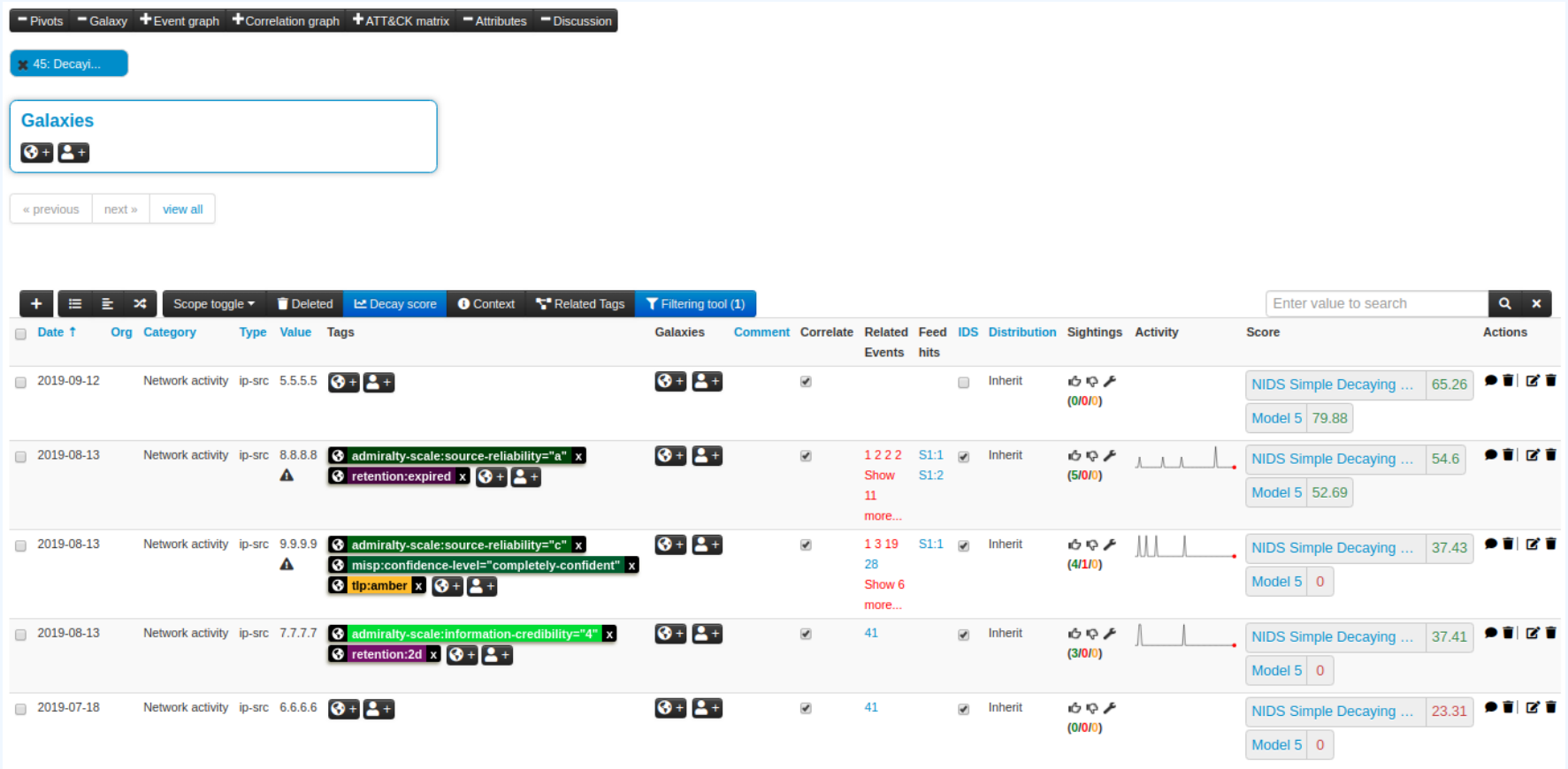
- Has a data-point been **sighted** by me or the community before?
- Additionally, the sighting system supports negative sigthings (FP) and expiration sightings.
- Sightings can be performed via the API or the UI.
- Many use-cases for **scoring indicators** based on users sighting.
- For large quantities of data, **SightingDB** by Devo

Timelines and giving information a temporal context

- Recently introduced **`first_seen`** and **`last_seen`** data points
- All data-points can be placed in time
- Enables the **visualisation** and **adjustment** of indicators timeframes

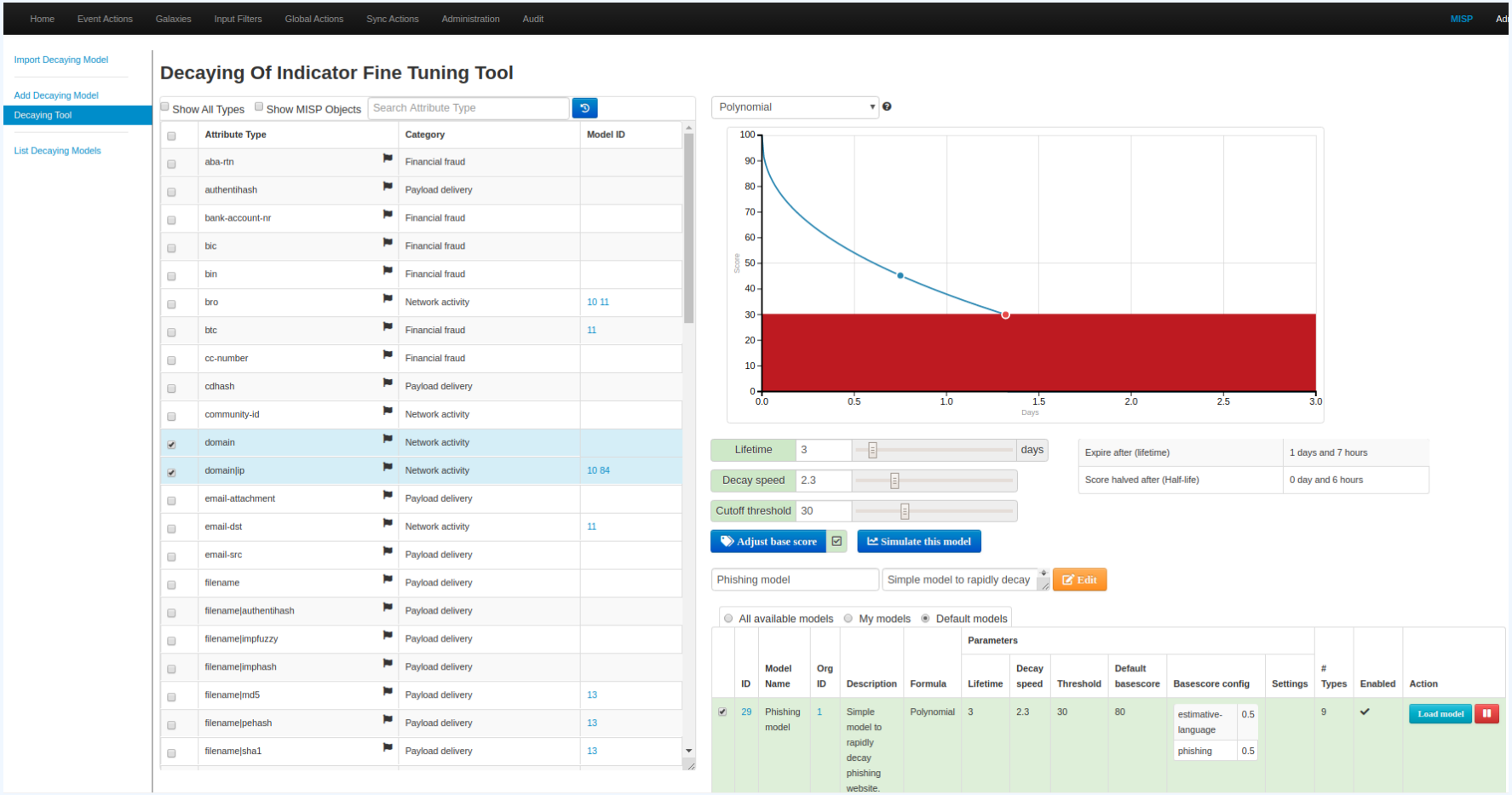


Life-cycle management via decaying of indicators



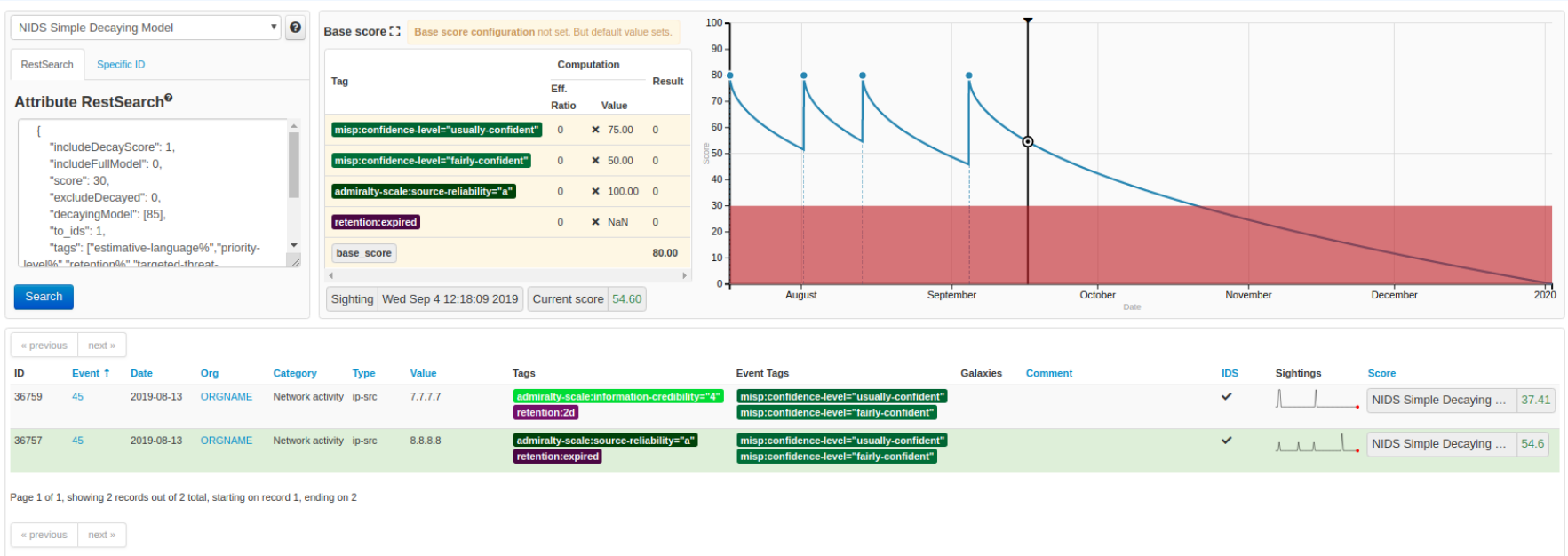
- Decay score toggle button
  - Shows Score for each *Models* associated to the *Attribute* type

Decaying of indicators: Fine tuning tool



Create, modify, visualise, perform mapping

Decaying of indicators: simulation tool



Simulate *Attributes* with different *Models*

Bootstrapping your MISP with data

- We maintain the default CIRCL OSINT feeds (TLP:WHITE selected from our communities) in MISP to allow users to ease their bootstrapping.
- The format of the OSINT feed is based on standard MISP JSON output pulled from a remote TLS/HTTP server.
- Additional content providers can provide their own MISP feeds. (`https://botvrij.eu/`)
- Allows users to **test their MISP installations and synchronisation with a real dataset**.
- Opening contribution to other threat intel feeds but also allowing the analysis of overlapping data[3].

[3] A recurring challenge in information sharing

Conclusion

- **Information sharing practices come from usage** and by example (e.g. learning by imitation from the shared information).
- MISP is just a tool. What matters is your sharing practices. The tool should be as transparent as possible to support you.
- Enable users to customize MISP to meet their community's use-cases.
- MISP project combines open source software, open standards, best practices and communities to make information sharing a reality.