



DDoS Clearing House for Europe (Task 3.2)

6th CONCORDIA General Assembly

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Key takeaways

- Key achievements Y2: advanced clearing house prototype's core components and supplementary services (demos, not today though)
- DDoS clearing house selected for EC's Innovation Radar (Jan 2021)
- Dutch ADC: moving to sustainable ecosystem (funding, CA) and draft planning to take clearing house into production
- Y3 focus: (1) coupling with production systems for NL pilot, (2) further technical improvements, (3) publish first version of cookbook





Deployment in the Netherlands



- DDoS clearing house R&D
- DDoS clearing house cookbook
- Technical evaluation through pilots in the Netherlands and Italy

- Sharing of operational experience
- Large-scale multi-party DDoS drills
- DDoS clearing house operations
- Operational ADC organization

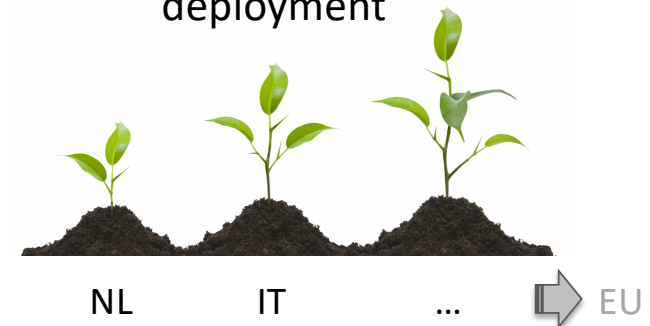


T3.2 objective

- Pilot a DDoS Clearing House with European industry for Europe to proactively and collaboratively protect European critical infrastructure against DDoS attacks
- Learn how to bridge **multidisciplinary gap** to deployment, more than tech!
- Key outputs: **pilots** in NL >> IT, DDoS clearing house **blueprint**



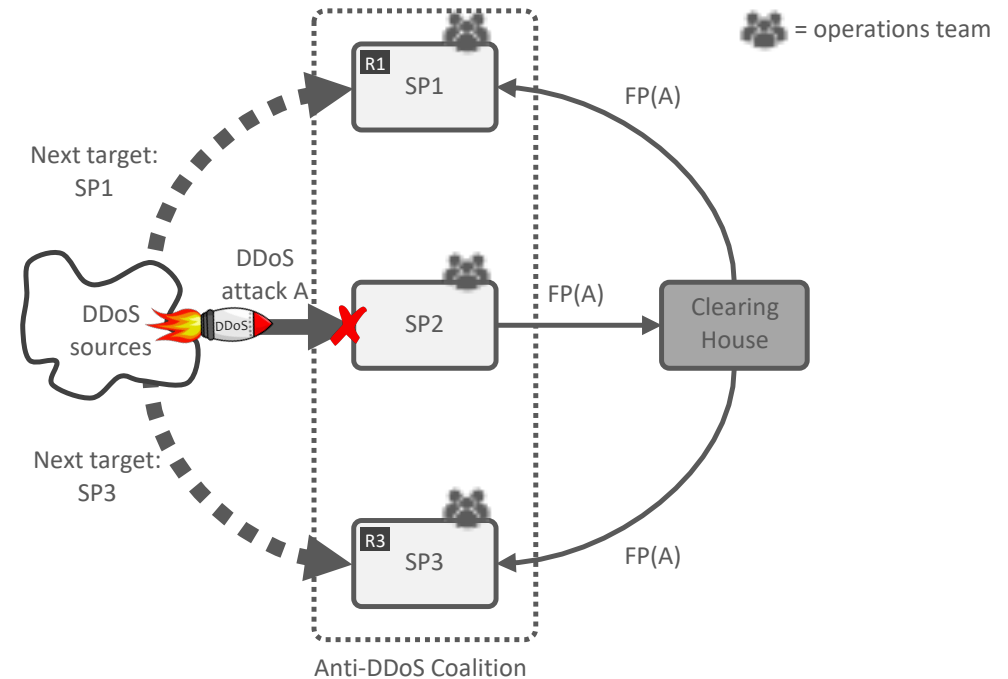
Key challenge: increase to
TRL 5-7 and grow
deployment





DDoS Clearing House Concept

- Continuous and automatic sharing of “DDoS fingerprints”, buys providers time (proactive)
- Extends DDoS protection services that critical service providers use and does not replace them
- Generic concept: per Member State, per sector, per business unit, etc.





Fingerprint Example

```
<snip>
{
  "dns_qry_type": [
    255
  ],
  "ip_proto": [
    "UDP"
  ],
  "highest_protocol": [
    "DNS"
  ],
  "dns_qry_name": [
    "evil.com"
  ],
  "eth_type": [
    "0x00000800"
  ],
  "srcport": [
    53
  ],
  "fragmentation": [
    false
  ],
  "tags": [
    "DNS",
    "DNS_QUERY",
    "AMPLIFICATION"
  ],
  "start_time": "2013-08-14 23:32:40",
  "total_dst_ports": 1043,
  "avg_bps": 28406714,
  "total_packets": 19183,
  "total_ips": 393,
}
<snip>
```

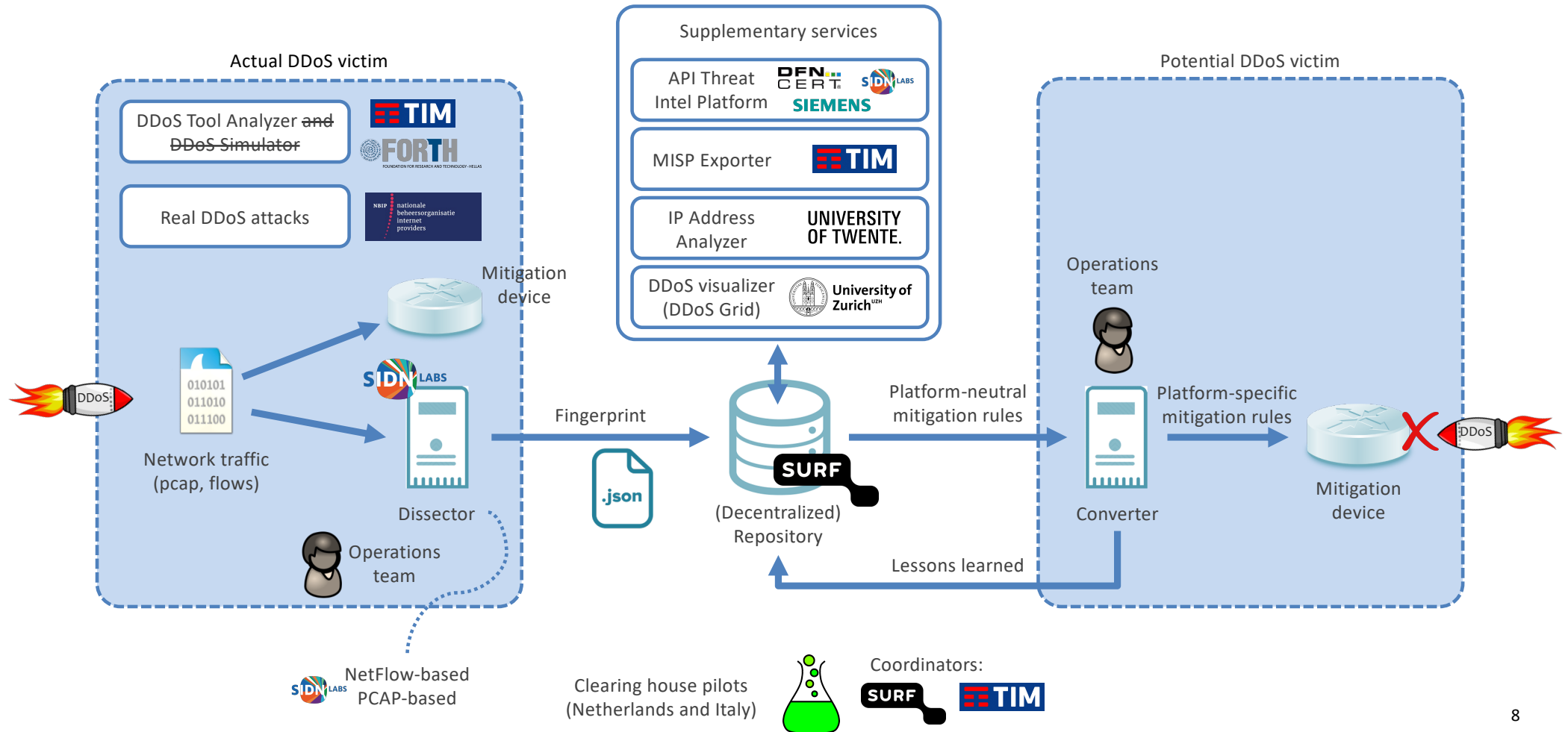


Clearing House increases Digital Sovereignty

- Increased **insight** of potential victims into DDoS attacks from their own narrow view to an ecosystem-wide view
- Increased **control** because the new insights give organizations more grip on how to handle DDoS attacks and the requirements for their DDoS mitigation facilities (their own or those of a contracted third party)
- ADCs also build up a joint **pool of expertise** independent of particular DDoS mitigation providers through drills and best common practices

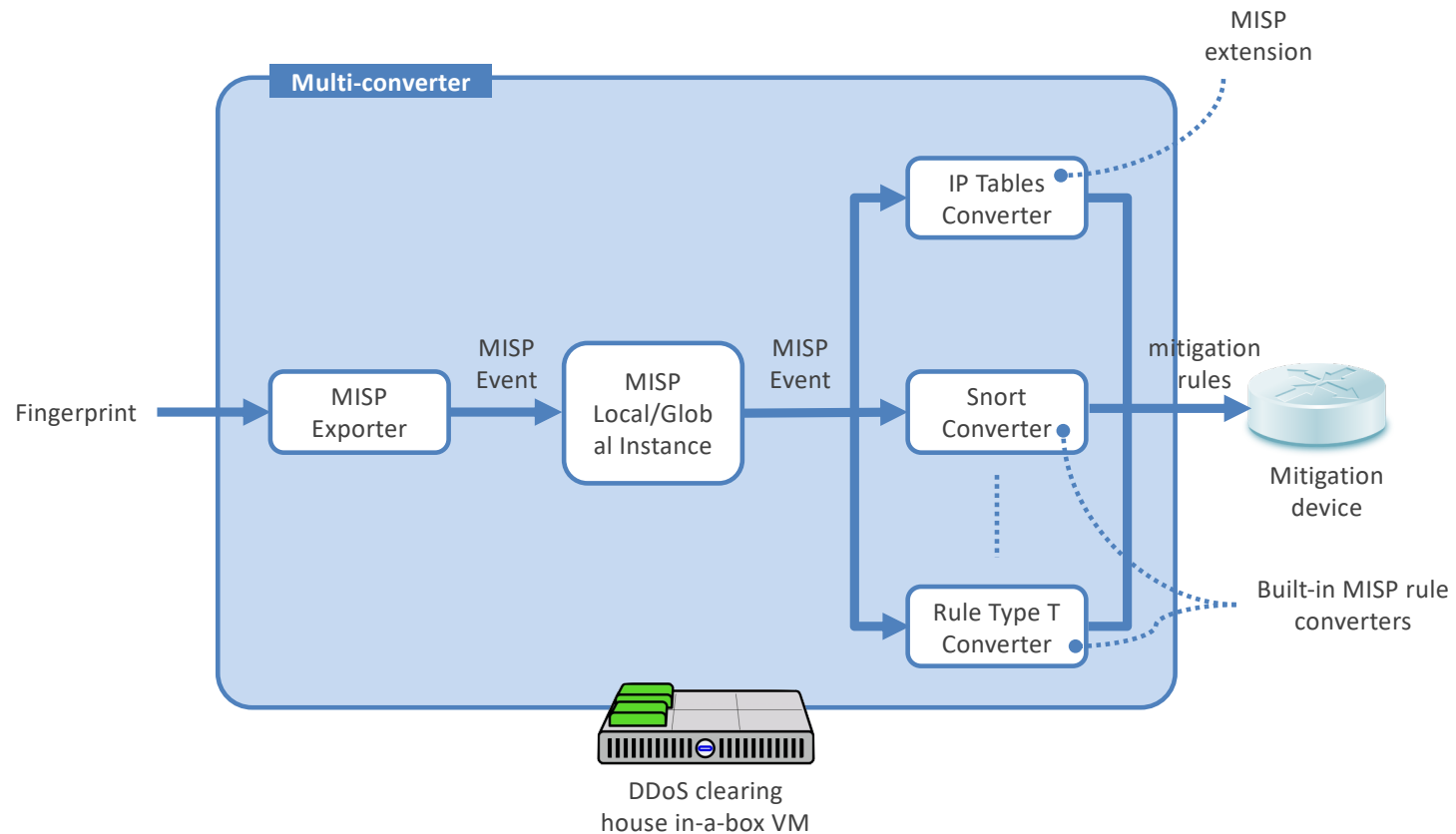


Main Components and Data Flows





Multi-converter





Advancements of components in Y2

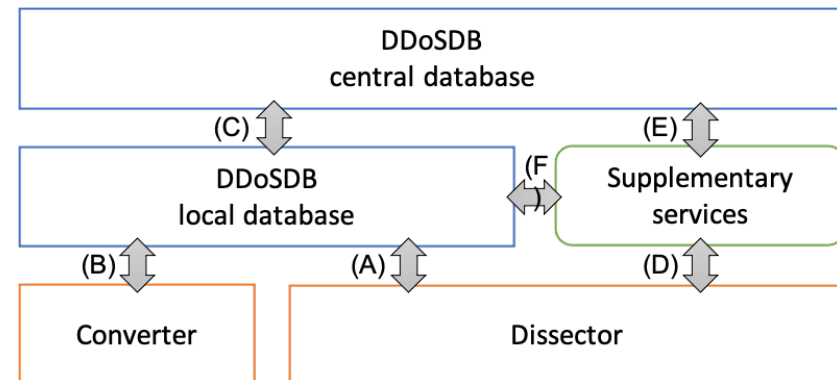
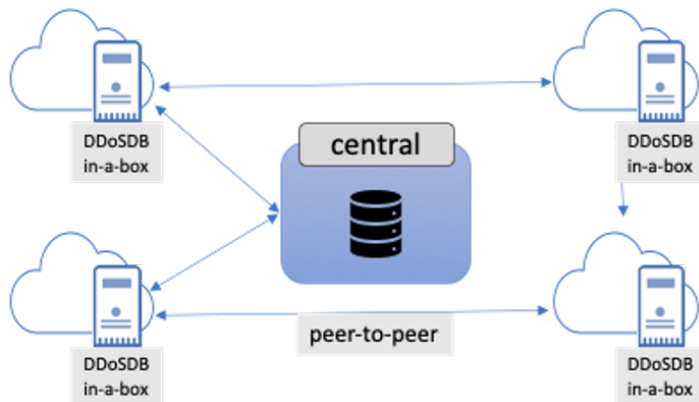
- Dissector: new fingerprint generation algorithms, support for netflow
- DDoSDB: added fingerprint synch between DBs, improved web interface
- Converter: investigating how to incorporate it into MISP
- MISP exporter: first version that maps fingerprints to MISP events
- Tool analyzer: fingerprints nmap, hping3, ddos_sim powered attacks
- DDoS grid: interactive analysis and generation of fingerprints
- IP address analyzer: first basic implementation

Details in D3.2, “2nd year report on community building and sustainability”, Dec 2020



Architecture advancements in Y2

- Refined clearing house overall architecture (components, interfaces)
- Introduced DDoS clearing house-in-a-box, including auto-update
- Coupled components through APIs



Details in D3.2, "2nd year report on community building and sustainability", Dec 2020



Dissemination in Y2

- 14 external and internal presentations
- External talks at the Dutch ADC, ICANN68, and ETNO, amongst others
- 6 blogs, 1 paper

Details in D3.2, “2nd year report on community building and sustainability”, Dec 2020



Lessons learned in Y2

- Modular design is key to decentralized architecture, our demo-driven way of working, and to compensate for Covid
- The Dissector needs to support multiple types of traffic capturing formats (PCAP, netflow) because of differences in operators' networks
- MISP might be a good candidate for sharing fingerprints (e.g., supports communities and DB-synch), but is also limited in filtering rules and for representing fingerprints

Details in D3.2, "2nd year report on community building and sustainability", Dec 2020



Outlook Y3

- Couple with **production systems** of partners in the Dutch ADC, initially at our partner NBIP (Dutch ADC)
- Further **mature the clearing house's components**, such as
 - Extend the Dissector with additional fingerprint generation modules
 - Develop a MISP extension for authoring and distributing DDoS filtering rules
- First published version of the DDoS clearing house **cookbook** (e.g., as a paper for the Journal on Internet Services and Applications)

Details in D3.2, "2nd year report on community building and sustainability", Dec 2020



Collaboration Y3

- T1.2 (Network-Centric Security): for research that might be required to develop new types of Dissectors or to measure attackers' infrastructure
- T2.1 (Telco Pilot) and T2.3 (Charging Pilot): study how the Clearing House can help mitigating DDoS attacks on these infrastructures
- T3.1 (Building a Threat Intelligence for Europe): to refine CONCORDIA Treat Intelligence Platform and interaction with the DDoS Clearing House
- T4.2 (Legal aspects): to develop a “code of engagement” document for organizations to join the DDoS Clearing House as it continues to evolve.

Details in D3.2, “2nd year report on community building and sustainability”, Dec 2020



Dutch National Anti-DDoS Coalition



CONCORDIA partner



CONCORDIA partner



UNIVERSITY
OF TWENTE.

CONCORDIA partner





Status Dutch Anti-DDoS Coalition

- Members committed to a more sustainable model (Dec 2020)
- Approved fee-based budget (EUR 114K total)
- Structure of WGs, **clearing house** operator and software developer
- Consortium agreement under development
- Core team governing the Dutch ADC





DDoS Clearing House Planning @Dutch ADC

- Phase 0: pilot, March through ~July 2021
 - Development by CONCORDIA T3.2 team
 - Operations with CONCORDIA and Dutch ADC partners
- Phase 1: basic production, July 2021 through ~Dec 2021
 - Development by CONCORDIA T3.2 team
 - Operations with Dutch ADC partners
- Phase 2: full production, Jan 2022 and onward
 - Development and operations with Dutch ADC partners



Phase 0 (Pilot)

- Operations

- 3+ partners use Dissector in their networks and share fingerprints ●●
- Initial set of fingerprints in ddosdb.nl ●
- SIDN Labs is the DDoS-DB operator ●●
- Data sharing based on existing agreement with SIDN ●

- Development

- Further improved clearing house software ●
- BCOP to connect ADC members and operate the clearing house ●●
- BCOP and other learnings captured in DDoS clearing house cookbook ●

● CONCORDIA T3.2 responsibility ● Dutch ADC responsibility



Phase 1 (Basic Production)

- Operations
 - NBIP is the DDoS-DB operator (to be OK'ed by Dutch ADC members) ●
 - Additional ADC members connected ●
- Development
 - CONCORDIA s/w updates regularly transitioned into production ●●
 - DDoS clearing house cookbook updated ●
 - Contracted software company to replace CONCORDIA T3.2 in phase 2 ●

● CONCORDIA T3.2 responsibility ● Dutch ADC responsibility





Phase 2 (Full Production)

- Operations
 - NBIP is the DDoS-DB operator (see Phase 1) ●
 - Additional ADC members connected (continued from Phase 1) ●
- Development
 - Software development company improves s/w (open source) ●
 - DDoS clearing house cookbook updated ●
 - CONCORDIA T3.2 focuses on development for pilot in Italy ●

● CONCORDIA T3.2 responsibility ● Dutch ADC responsibility



Outlook Y4 (project end)

- Pilot in the Netherlands: 3+ member organizations of the Dutch ADC sharing fingerprints (inter-organization)

- Pilot in Italy: 3+ TI departments sharing fingerprints (intra-organization)
 - Security Lab, internal SOC, anti-DDoS team
 - Optionally with other orgs in Italy (e.g., universities)
- Cookbook and tech report combined in a peer-reviewed paper



Further reading

POSTED APRIL 9, 2020 ADMIN CONCORDIA

Increasing the Netherlands' DDoS resilience together

First lessons learned from setting up a national anti-DDoS initiative, part I of III

The Dutch Anti-DDoS Coalition is a national consortium of seventeen organisations from various sectors (e.g. ISPs, banks, government agencies and law enforcement) committed to fighting DDoS attacks together. In this series of three blogs, we'll first discuss the rationale behind our initiative, then describe a technical facility called the DDoS clearing house that enables coalition members to automatically measure and share the properties of DDoS attacks (e.g. attack duration and source IP addresses), before finally reviewing our key challenges, the lessons learned and the way forward. Our lessons learned are an important input for a "cookbook" to set up anti-DDoS coalitions elsewhere in Europe.

Note: we're using two types of reference in this blog series: hyperlinks refer to information, while numbers between straight brackets [1] link to in-depth technical papers.

DDoS attack landscape

A Distributed Denial-of-Service (DDoS) attack overwhelms a network with traffic, thus denying the network the ability to service legitimate requests from their clients. The attacker typically simultaneously transmits traffic from a large number of machines distributed across the Internet, often by infecting those machines with malware that carries out the attack. Another type of attack is when attacking machines exhausts a server's resources (rather than swamping the network), for example by repeatedly starting a login session with the server, thus forcing it to make more connections than it can handle.

SDN LABS

New version of the DDoS Clearing House core components

The next round of improvements to get it deployed

Published on: dondag 17 september 2020

SDN LABS and SURF have released a new version of the DDoS Clearing House in a Box, a system that enables network operators to automatically share details of the DDoS attacks they handle, in the form of 'DDoS fingerprints'. In this blog, we briefly outline our improvements and how they contribute to the trials we'll be carrying out in the Netherlands and Italy.

Anti-DDoS Coalition and CONCORDIA

SDN LABS and SURF are proud to be part of the Dutch Anti-DDoS Coalition as well as of the CONCORDIA project, where we work on mechanisms and tools that enable service providers to handle DDoS attacks more proactively. Both projects involve numerous organisations including governments, internet providers, internet exchanges, academic institutions, non-profit organisations and banks.

An important building block in both projects is the DDoS Clearing House, a shared system that enables participating service providers to automatically share the characteristics of DDoS attacks they handle in the form of so-called 'DDoS fingerprints'. The tenet here is that to be forewarned is to be forearmed. Sharing DDoS fingerprints with other participants warns them that new attacks may be underway and extends the DDoS mitigation services that participants already have in place, such as scrubbing services like the [hubs](#). Comparing attacks currently in progress with attacks whose details are already recorded in the Clearing House can also provide pointers as to the best way to mitigate ongoing attacks.

Recent [developments](#) show that DDoS attacks are still very much an issue and - more worryingly - are increasing in size, making our work with the DDoS Clearing House all the more relevant and pressing.

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CONCORDIA

Work in Progress: the CONCORDIA Platform for Threat Intelligence

First steps to improve Europe's information position in cybersecurity

Present CONCORDIA's vision for a cross-sector, pan-European platform for collecting, analyzing, and sharing threat intelligence, which combines datasets built up in different parts of the project.

What is threat intelligence?

Threat intelligence can be defined as the process of acquiring knowledge from multiple sources about threats to an organisation. Threat intelligence supports informed decision-making on cybersecurity by providing information about threat actors, their techniques, indicators of compromises, and vulnerabilities. The process is essentially collaborative and based on shared datasets.

CONCORDIA's approach

The two cross-sector pilots in CONCORDIA ("Building a Threat Intelligence for Europe" and "Piloting a DDoS Clearing House for Europe") are developing the basic building blocks for a pan-European and cross-sector threat intelligence platform, which conceptually forms a central point of contact for all services within the CONCORDIA ecosystem that are related to threat intelligence.

We are developing the CONCORDIA threat intelligence platform based on three primary principles:

- Multi-source: the platform uses multiple datasets available through heterogeneous technologies and providing different data management services (e.g., two clearing houses and their specific services).
- Combine datasets: the platform uses algorithms to integrate datasets into new derived datasets (e.g., coupling reported hotspot infections and DDoS attacks, see the [scenario below](#)).



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Dutch Anti-DDoS Coalition:
<https://www.nomoreddos.org/en/>

Clearing house on GitHub:
<https://github.com/ddos-clearing-house/>

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