



# From Iron to Service,

*a glimpse at the Nikhef computing and  
Data Processing infrastructure*

David Groep,  
October 2024

# Starting with the basics ...



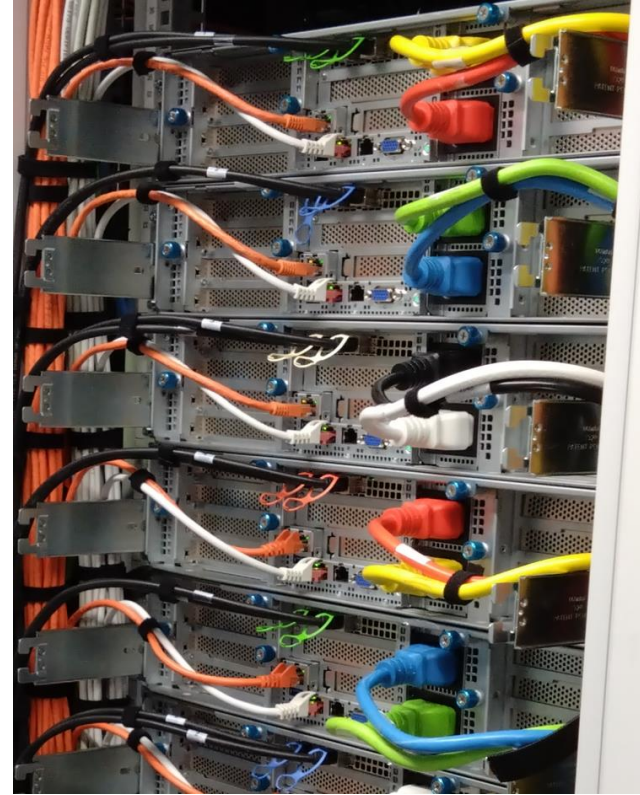
# DC infrastructure: power, cooling, racks, and organisation



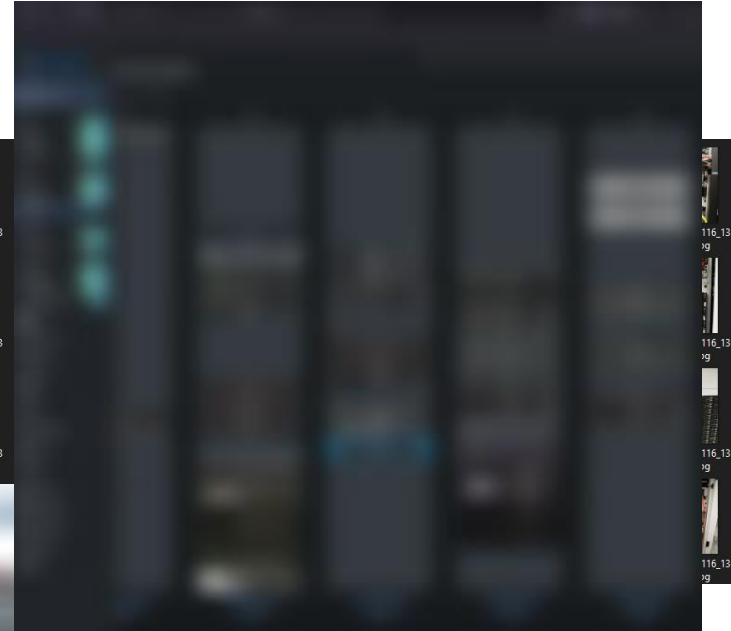
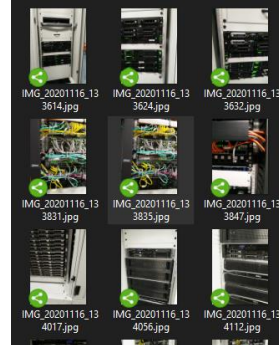
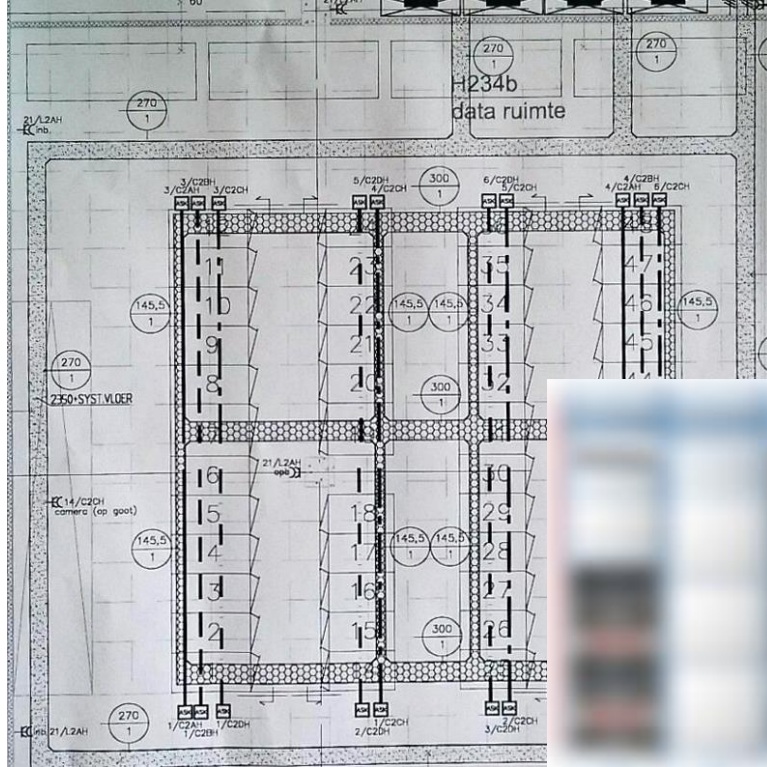
Left-side image: frame from a movie by Anton Mors, people replaced by ... Adobe Firefly (and this was its best result ☺)



# the art of infrastructure construction: beyond spaghetti



# Data Centre: layout and floor plans



# Systems physical grouping by functional & security zone

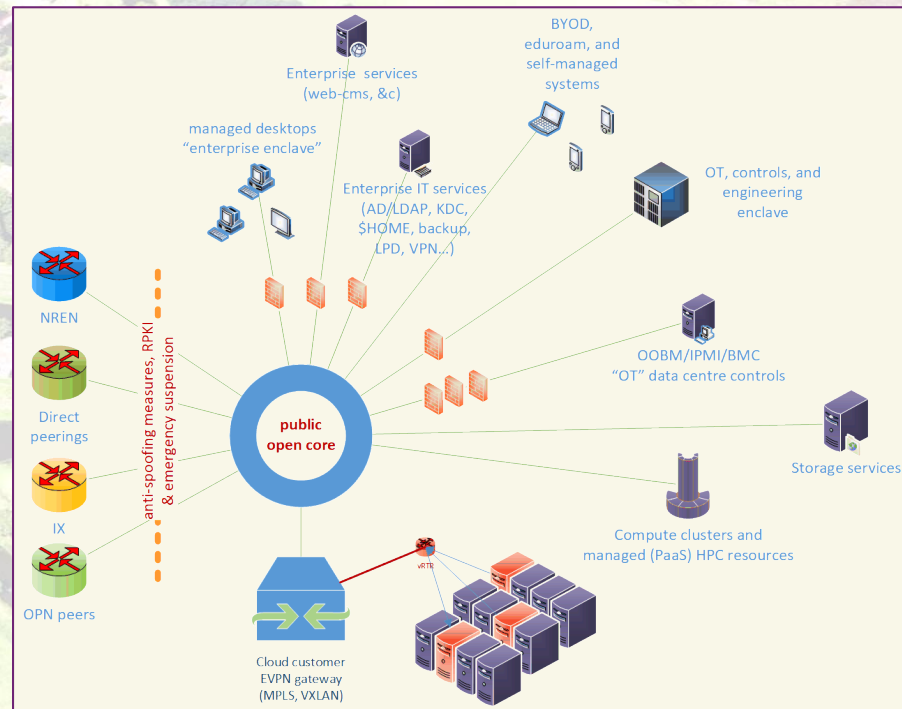




# Network structure design: logical and topological view *segmentation: a research network with office enclaves*



achtergrondbeeld: Vesting Bourtange



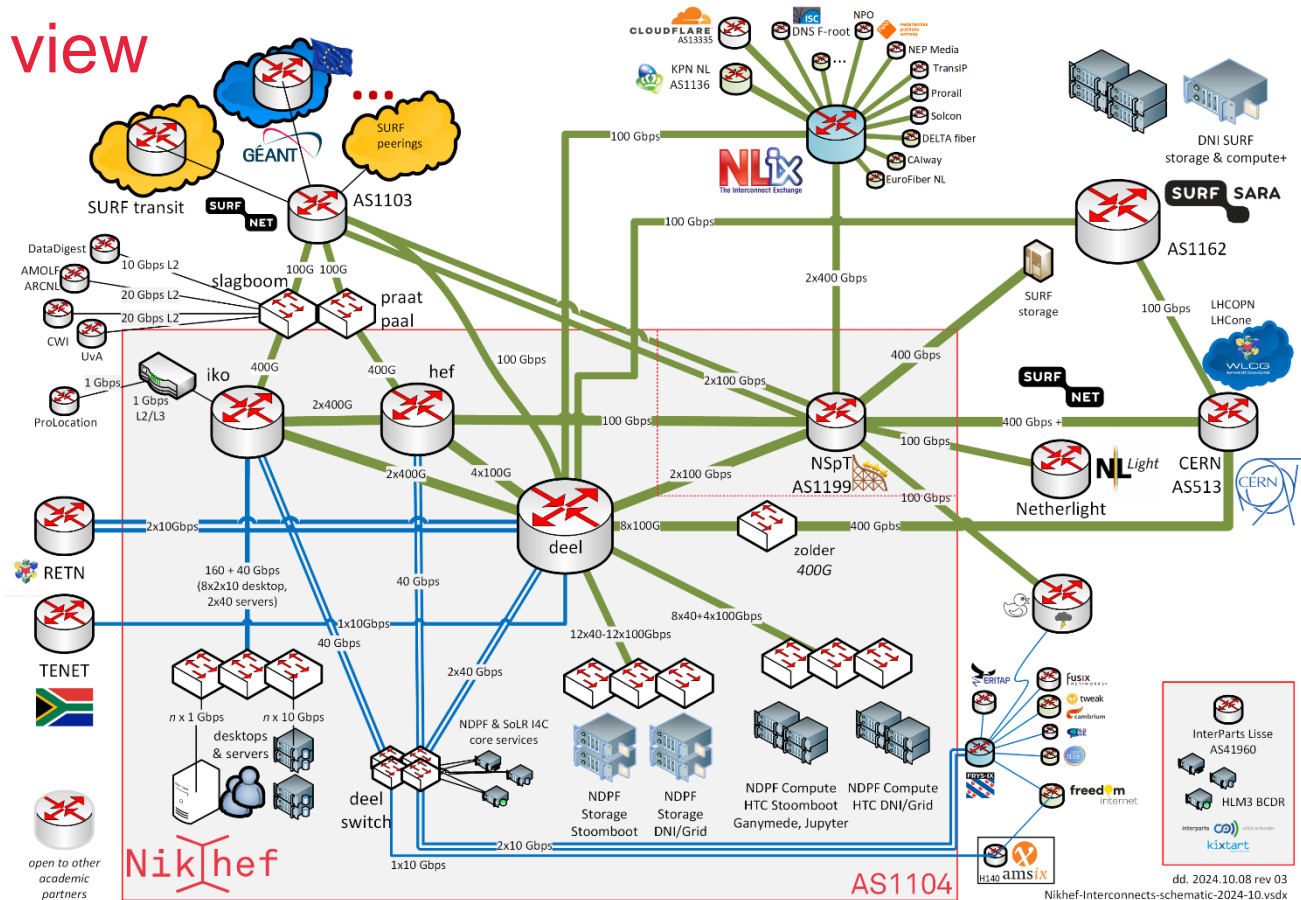
# Segmentation by access class and function



Assignments from RIPE LIRs nl-fom and SN-LIR and their subclassing in AS1104



## Connectivity view



## AS1104 and adjacent systems in October 2024

# Capirca – vendor agnostic rule expression

```
term block-csirt-denied-hosts-emergency-suspension {
  destination-address::
    net-nik-oexp-blocked
  logging:: local
  counter:: ndpf-oexp-csirt-block-dest
  action:: deny
}

term pxeboot-bootps-client {
  source-address::
    net-ndpf-fabman-installservers
    net-local-ifaddr
  protocol:: udp
  source-port:: dhcp4-client dhcp4-server
  destination-port:: dhcp4-client dhcp4-server
  action:: accept
}

term pxeboot-tftp-client {
  source-address::
    net-ndpf-fabman-installservers
  protocol:: udp
  source-port:: unprivileged-ports
  destination-port:: unprivileged-ports
  action:: accept
}

term specific-deny-dangerous-ports-for-nik-xo-services {
  protocol:: tcp udp
  destination-port:: nfs smb-udp-tcp portmap
  action:: deny
}

term allow-localnets-access-to-most-nik-xo-services {
  source-address::
    nikhef-private
    net-nik-ournets
    net-ndpf-ournets
  protocol:: tcp udp
  destination-port:: openvpn-proxy-bypass ssh-both web-services unprivileged
  action:: accept
}

term rsync-bckup {
  source-address::
    net-ndpf-rsyncbackup
```

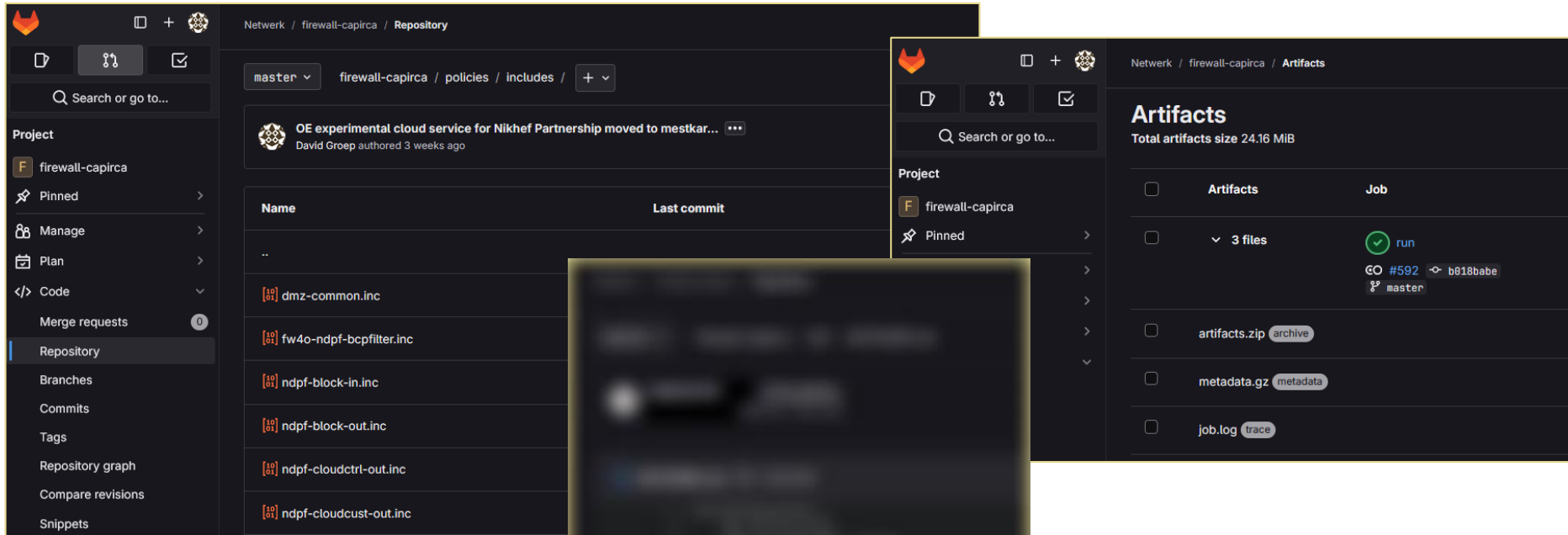
```
dmz-common.inc
fw4o-ndpf-bcpfilter.inc
ndpf-block-in.inc
ndpf-block-out.inc
ndpf-cloudctrl-out.inc
ndpf-cloudcust-out.inc
ndpf-clouddataplane-out.inc
ndpf-cloudinstall-out.inc

ndpf-gridsrv-out.inc
ndpf-installnet-out.inc
ndpf-ipmi-out.inc
ndpf-iscsi-out.inc
ndpf-nik-xo-la-in.inc
ndpf-nik-xo-la-out.inc
ndpf-oexp-in.inc
ndpf-oexp-out.inc

ndpf-p4ctb-out.inc
ndpf-pubgrid-out.inc
ndpf-secmon-out.inc
ndpf-stud-1-in.inc
ndpf-stud-1-out.inc
ndpf-surfsoil-out.inc
ndpf-wn-out.inc
system-out.inc
```

Capirca extended for SROS by synnack (<https://github.com/synnack/capirca>), forked from <https://github.com/google/capirca>

# Managed systems ... managed networks



Network / firewall-capirca / Repository

master firewall-capirca / policies / includes / +

OE experimental cloud service for Nikhef Partnership moved to mestkar...  
David Groep authored 3 weeks ago

Name	Last commit
dmz-common.inc	[61]
fw4o-ndpf-bcpfilter.inc	[60]
ndpf-block-in.inc	[61]
ndpf-block-out.inc	[61]
ndpf-cloudctrl-out.inc	[61]
ndpf-cloudcust-out.inc	[61]

Project

firewall-capirca

Pinned

Artifacts

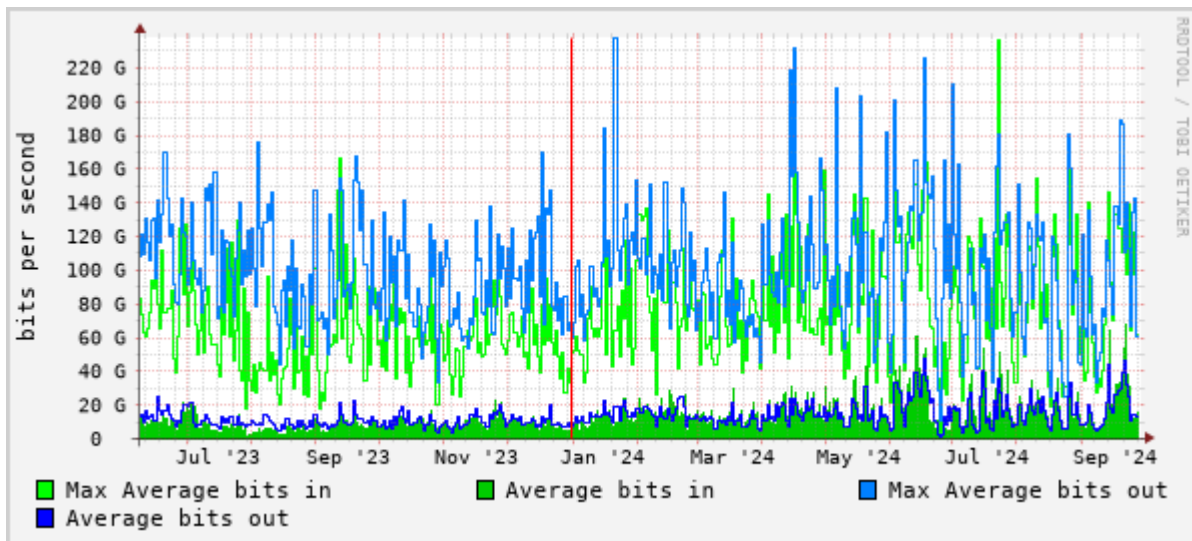
Total artifacts size 24.16 MiB

Artifacts	Job
3 files	run
artifacts.zip	archive
metadata.gz	metadata
job.log	trace

Capirca ACL generation for most network vendor languages (JunOS, Cisco, &c)  
<https://github.com/google/capirca>  
Nokia SROS support by WilcoBH (synnack):  
<https://github.com/synnack/capirca>



# Networks at scale: bandwidth to compute and storage



Compute-storage-transit traffic DeelQFX aggregate (data volume as measured by harbours)

# Basic infrastructure: 'every rack should have one'

Each rack comes with a couple of  
'standard' elements

- remotely monitored PDUs
- temperature sensor(s)
- VGA+HID+RS232 switch access
- 1x OOBM GigE 'dumb' switch
- 1x GigE installnet (managed)
- 1-2x 10/25/100G  
data + storage networks

Shown: H234b C06 'SOC' cabinet, C08 rKVM



# Service clusters: 'minimally redundant operations basis'



'Typical' node has some CPU and limited local system disk, plus:

2x 10/25G

VM data net

802.3ad LACP config

2x 10/25G

storage network

iSCSI with 2 independent fabrics

3x 1000BASE-T

install/management

1x for initial install, 2x in 802.3ad

1x

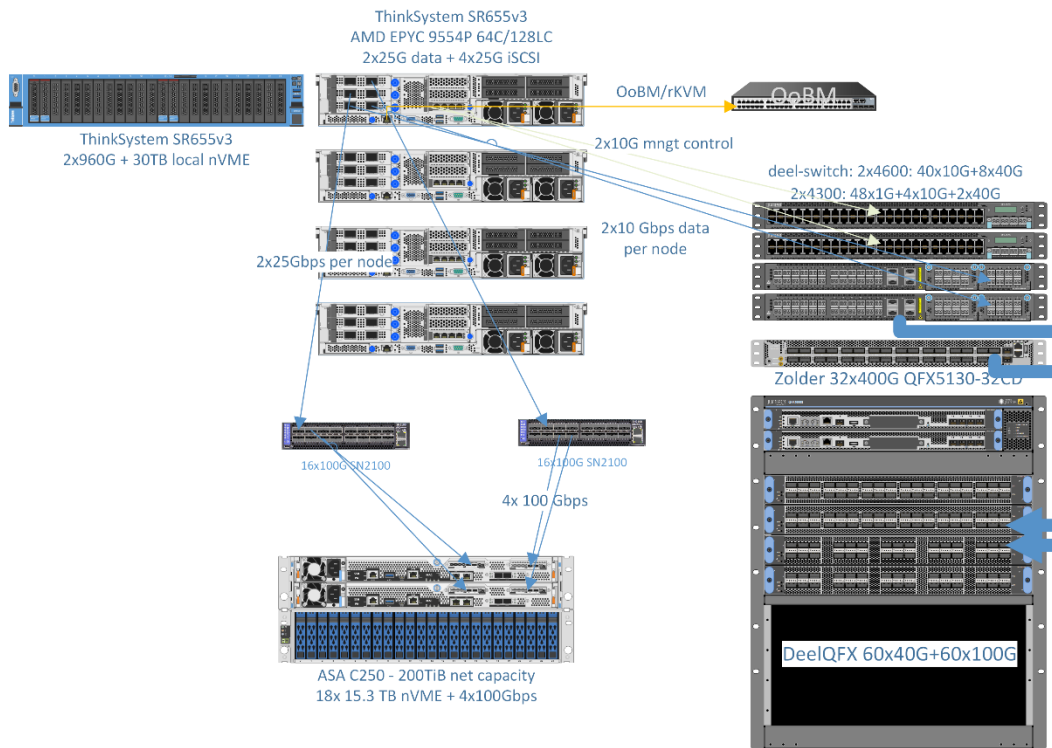
OOBM

IPMI & Redfish, rKVM and remote media

Nikhef H234bC08: orkestbak OEXP VM service pair. Other service clusters (GSP) are similar. FabMan and PMASec may have local-store only.



# Example: GSP 'Koning' en 'Prinsjes' (2024 edition) ...



NetApp ASA C250 200TB all-flash 4x100Gbps iSCSI, 4x (Lenovo SR655 EPYC 9554P 128 logical + 30TB local 'ephemeral' NVME storage + 1100GiB DDR5 4800MHz)

# Managing the NDPF and SoLR inventory



# But more importantly ... (re)creating and managing them

The screenshot shows the 'Repository' view of the 'SoLR - Systems of Last Resort' project. The left sidebar contains navigation links for Project, Manage, Plan, Code, Merge requests, Repository (selected), Branches, Commits, Tags, Repository graph, Compare revisions, Snippets, Build, Secure, Deploy, Operate, Monitor, Analyze, and Settings. The main content area displays a commit titled 'new XO servers failed to start redis by default on reboot' by David Groep. Below this, a table lists repository files and their commit messages.

Name	Last commit
..	
filter_plugins	ntables full configuration control implemented (E
group_vars	Consolidate MPM apache server settings to preve
host_vars	Add Daniel as CSIRT member to central NDPF and
hosts	refactor network definitions
inventory	Add orkestbak VM hosts for reference as well
lookup_plugins	cleanup of the sysadd structure, refactor data col
roles	new XO servers failed to start redis by default on
tasks/adhoc	provide for cleaning superfluous agent accounts
vars	add ACME certificate management to new XO OE
bcd_r_site.yml	cleanup host definitions for netfilter ntables contr
dump.yml	removed non-functional tags and constraints on s
site.yml	add ACME certificate management to new XO OE

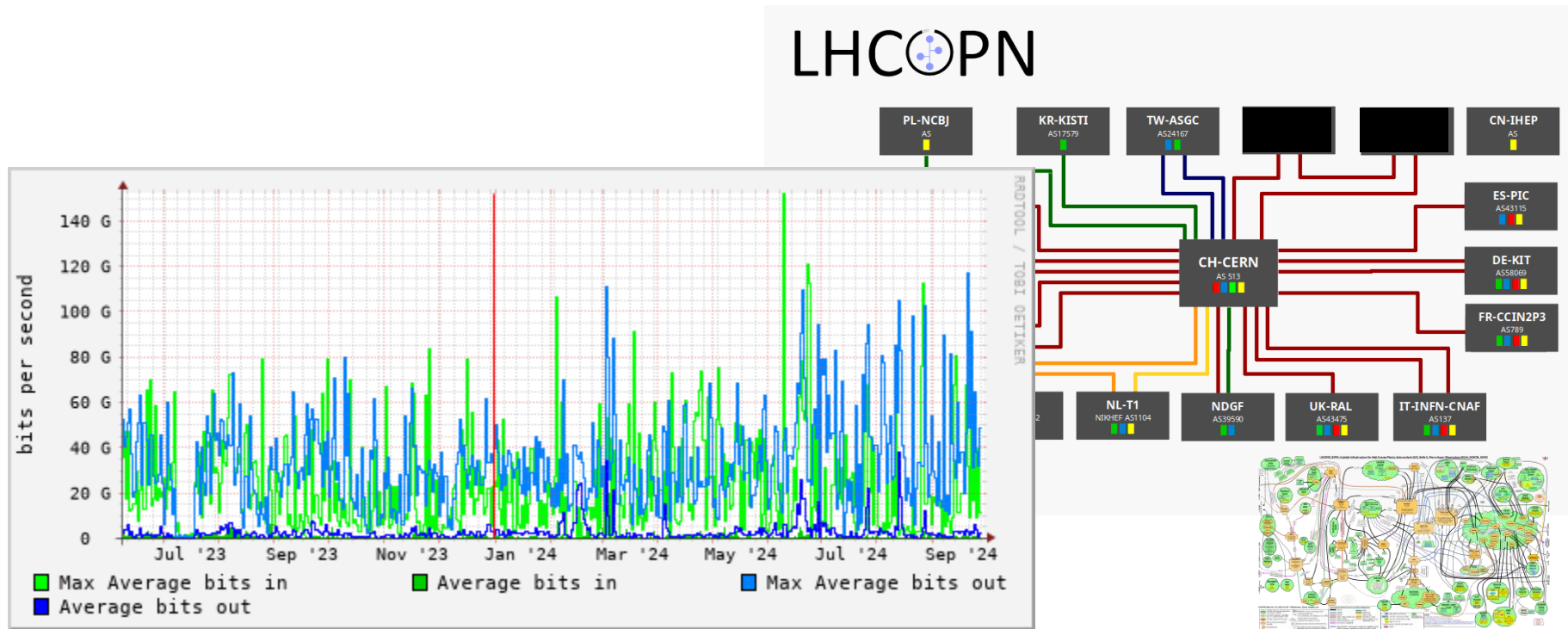
SoLR systems inventory and site definition (Ansible)  
and the NDPF SaltStackj

The screenshot shows the 'Salt' configuration management interface. It displays the 'Subgroups and projects' section with a search bar and a list of subgroups. The subgroups listed are:

- saltstack-formula-kerberos
- salt-formula-zookeeper
- salt-formula-tftpd-hpa
- salt-formula-squid
- salt-formula-salt
- salt-formula-rsyslog
- salt-formula-rsync
- salt-formula-reclass



# Zolder: 400G access LHCOPN/LHCOne CERN link



ae10: CERN via asd001b-a96-08-6-3 – daily averages; <https://cricket.nikhef.nl/target/zolder.ipmi.nikhef.nl/ae10>

# Physical view ... QFX5130 400G switch 'zolder' top-up



Nikhef H234bC07 – foto's Tristan Suerink

# Clusters: high throughput compute and storage service

Data-driven workloads (like WLCG, SKA, WeNMR) need more than ‘just’ compute:

- **balanced features** for node throughput: CPU, storage, memory bandwidth & latency, NIC & network speed
- **single-socket** multicore systems are fine, typical: 64-128 cores per system
- **network**: 2x25Gbps (+ ‘out of band’ management)
- **memory**: 8 GiB/core (so ~ 1 TiB/node)
- **local disk**: 16TB+ NVME PCIe Gen4 x4
- add **GPUs** depending on use case
- favour inference-optimized **APUs** in future

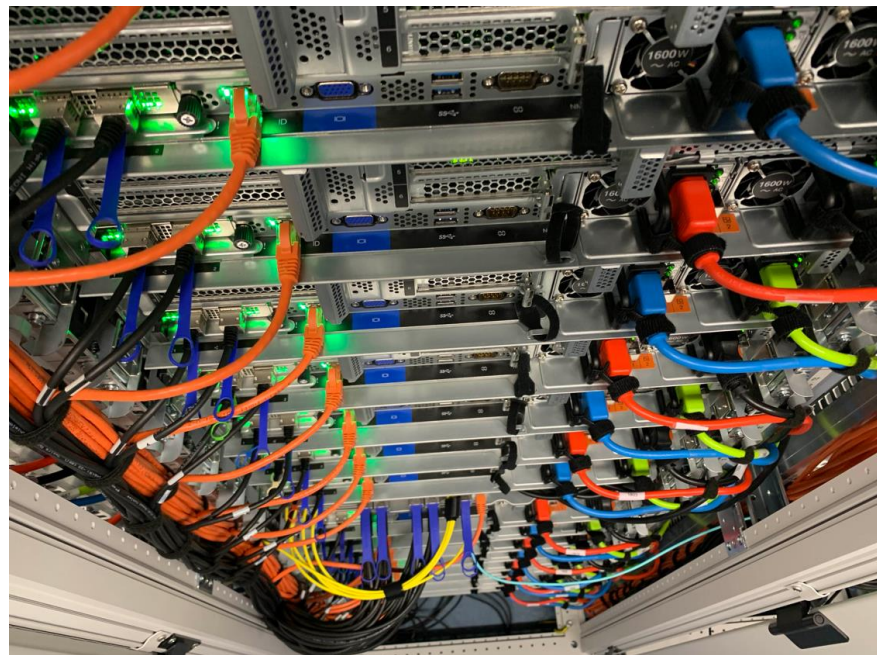
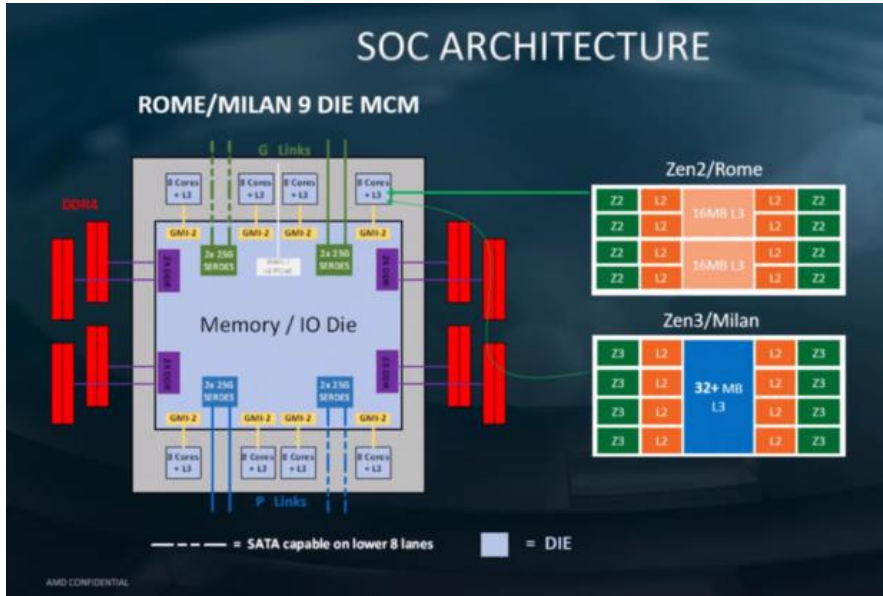


Image: Cluster ‘Lotenfeest’ at the Nikhef NDPF, acquired March 2020. Lenovo SR655 with AMD EPYC 7702P 64-Core single-socket



# Balanced systems design: from global to local performance

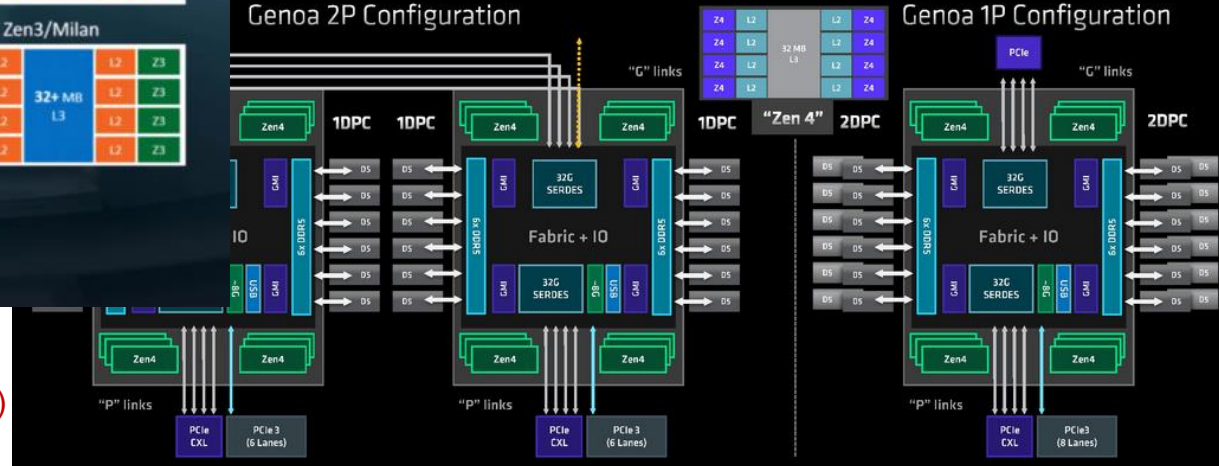


Example: AMD EPYC CPUs  
and their influence on systems design

## 4<sup>th</sup> Gen EPYC™ SOC Platform Overview

Genoa 2P Configuration

Genoa 1P Configuration



!! not all 'upgrades' relevant to all applications  
(Rome>Milan hardly improved HTC throughput)

AMD, retrieved from <https://m.hexus.net/tech/news/cpu/135479-amd-shares-details-zen-3-zen-4-architectures/> and <https://www.semianalysis.com/p/amd-genoa-detailed-architecture-makes>

# More than one system: Fabric Management

https://ndpfgit.nikhef.nl/non\_archived=true&page=3&sort=latest\_activity\_desc

Your work / Projects

- Salt / nikhef-formula-salt-local (Maintainer)
- Salt / nikhef-formula-repo-mirrors (Maintainer)
- Salt / nikhef-formula-php (Maintainer)
- Salt / nikhef-formula-pakiti (Maintainer)
- Salt / nikhef-formula-pacemaker (Maintainer)
- Salt / nikhef-formula-nodeclass (Maintainer)
- Salt

formula-munge / Repository

```
{%- from "munge/map.jinja" import munge as munge_map %}
{% if munge.enabled %}
```

munge\_packages:

- pkg.installed:
- names: {{ munge.pkgs }}

munge\_key:

- file.decode:
- name: {{ munge.config\_file }}
- encoding\_type: base64
- contents\_pillar: munge:key
- require:
- pkg: munge\_packages

munge\_key\_owner:

- file.managed:
- name: {{ munge.config\_file }}
- user: munge
- group: munge
- mode: 400
- replace: false

ICINGA2

Current Incidents

- yum\_update on nikhef.nl - Theorie Rekenserver is CRITICAL YUM CRITICAL: Kernel security update is available
- openvpn-server-cert on nikhef.nl - VPN server voor telefooncentrale is CRITICAL SSL\_CERT\_EXPIRATION: Certificate for openvpn-server-cert is expiring
- reboot\_required on nikhef.nl - FPGA Development (ET) is WARNING Core libraries or services have been updated
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- reboot\_required on nikhef.nl - ET development server is WARNING Core libraries or services have been updated
- reboot\_required on nikhef.nl - ET development server is WARNING Core libraries or services have been updated
- reboot\_required on nikhef.nl - Theorie Rekenserver is WARNING Core libraries or services have been updated

Recently Recovered Services

- lntp process on nikhef.nl - IMAP is OK PROCES OK: 1 process with command name 'lntp'
- yum\_update on nikhef.nl - DETRO Rekenserver is OK YUM OK: 0 Security Updates Available.
- DEV is OK YUM OK: 0 Security Updates Available. 0 Non-Security Updates Available.

fabman\_centraalsyslog Refactored sshd config for all types of hosts and consolidated BCDR indepe...

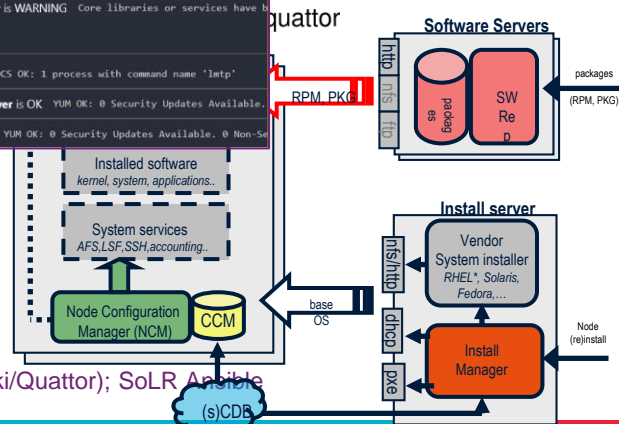
fabman\_control\_hosts remove non-functional (duplicate) sshd\_centralidm\_authkeys boolean

fabman\_core Add management of cricket website (cricket.nikhef.nl) - not cricket itself yet

fabman\_install\_pxse remove non-functional (duplicate) sshd\_centralidm\_authkeys boolean

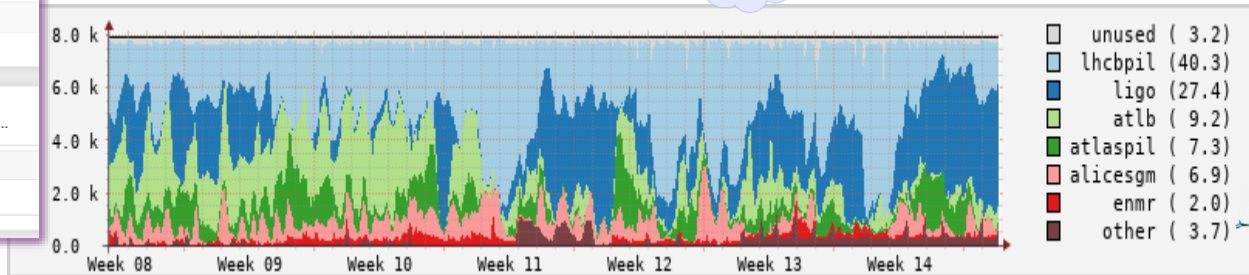
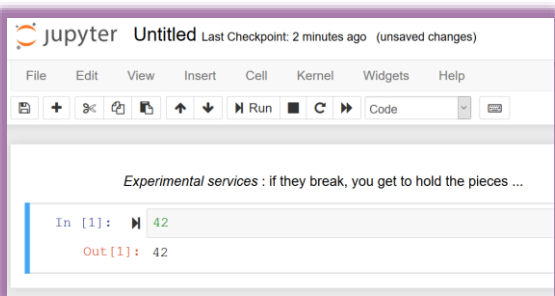
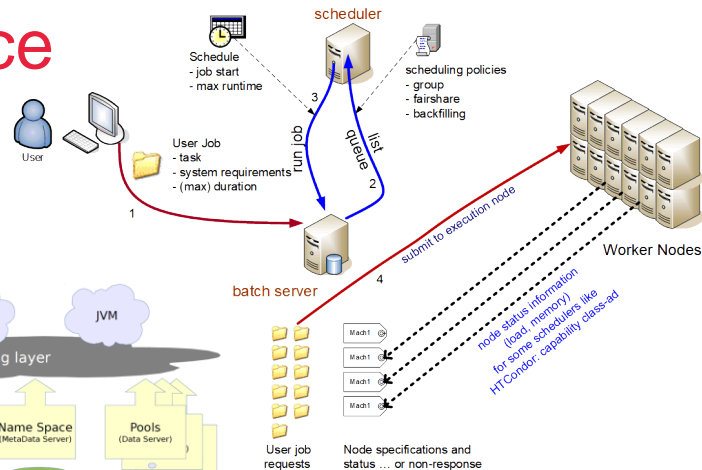
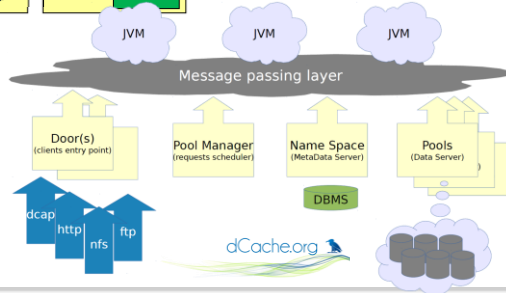
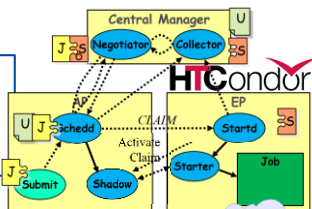
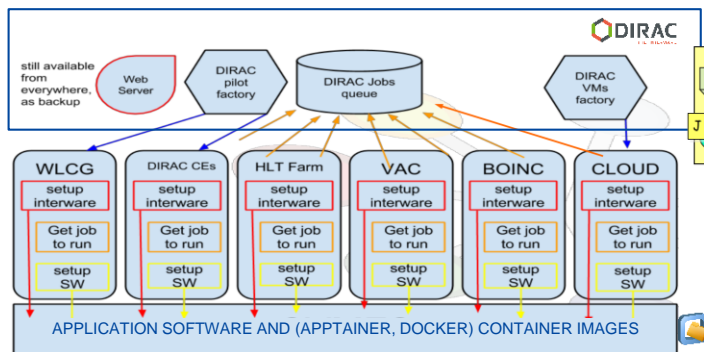
fabman\_pxservers remove non-functional (duplicate) sshd\_centralidm\_authkeys boolean

Different modalities are fine as long as all 'production' systems are managed and monitored (yet this does not apply – for a reason - to the experimental technologies platform and Nationale Speeltoernooi)



Nikhef NDPF Salt & Reclass (Dennis van Dok, Andrew Pickford, Mary Hester); Quattor: <https://en.wikipedia.org/wiki/Quattor>; SoLR Available

# From a bunch of systems to a service



Occupancy: NDPF (DNI allocation), early 2023; other graphics: DIRAC Interware, HTCondor (UWMadison), Jupyter notebook: Nikhef Callisto service; dCache (DESY, dCache.org)

# Services and service management

## Infrastructure and services for research

- driven by the strategy requirements
- appropriate service levels and impact
- balancing stability, innovation, and engagement

## Service classes

- 'enterprise' services
- research computing services (local & DNI)
- experimental services

## Our Principles of Digitalisation

Mission, values, and strategy  
as the basis for research and organisational ICT at Nikhef

'Shorten the time-to-research-results through digitalisation, by processing data faster, more effectively, and more efficiently'. A lofty strategic statement, but how does digitalisation – the use of ICT systems and services in our research-driven organisation – enable our mission and strategic vision? How shall digitalisation be structured to ensure it achieves these goals, and does not inadvertently impose constraints, hindrance, and unnecessary complications on our research, innovation, and development?

Traditional ICT architecture approaches emphasise that the 'IT landscape' is defined by structures that put ICT managers 'in control' of the digitalisation strategy. It emphasises service portfolios, contract management, maintenance of services, and compliance, while – maybe – enabling or stimulating service innovation as a supplementary goal. However, the role that ICT has to accelerate collaborative research in its role as a 'research instrument', placing itself at the heart of the research process and as part of the research methodology, is much less prominent. In its research role, ICT should be seen much more like an (experimental) apparatus. 'IT Infrastructure for Research' is not only an enabler for research but also in itself part of the research process and is a research infrastructure.

### Foundational Principles for Digitalisation at Nikhef

#### Institutional strategy and mission directs ICT decision making

ICT decisions are assessed based on the Nikhef strategic themes: expanding knowledge, providing technologies, preparing the future, and fostering healthy partnerships

#### Collaboration as a core value

Nikhef stands for the whole of the Dutch community in (astro)particle physics and its European and global collaborations, and its digitalisation builds on, and contributes to, our global scientific digital ecosystem

#### Shared public values and responsible technology

Nikhef employs, develops, and shapes technologies that preserve autonomy, justice and humanity, and opts for open and transparent digitalisation that builds on our academic sovereignty and integrity

#### Digitalisation choices reflect the continuity in our research programmes

With research horizons measured in decades, ICT reflect this continuity in its choice of infrastructure, services, and information management, and in its human expertise

This role of ICT as a research instrument is also not limited to 'research software', or to 'experimental control systems'. The research lifecycle includes the full scope of research, from employee and guest on-boarding, forging collaborations, the ability to partake in global research and use global infrastructures, capacity and capability to run research software and process data, to the inclusion of every means that

# Our Principles of Digitalisation

‘If they are many, they are not principles’, so we set only four:

- 1. Institutional strategy and mission directs ICT decision making**  
ICT decisions are assessed based on the Nikhef strategic themes
- 2. Collaboration as a core value**  
Nikhef stands for the whole of the Dutch community in (astro)particle physics and its European and global collaborations
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With research horizons measured in decades, ICT reflect this continuity in its choice of infrastructure, services, and information management, and in its human expertise



# FitSM – Federated IT Service Management

Structuring service management with <https://www.fitsm.eu/>  
(collaboration and federation-focused light-weight ISO20k/ITILv3 rendering)

- production systems of  
High Throughput Compute (HTC) and on-line Storage (HTS) services
- system & network components supporting provisioning of public services
- pre-production and systems for service portfolio development

*Scope excludes by design experimental and research systems,  
apart from Supplier Relationship Management and procurement*

# Coordinated service management

- Single source of truth
- Inventory and support contract insight
- Configuration Management
  - for systems management several used in parallel, which is not per-se an issue: Saltstack, Ansible
- Facilitates our ISM  
Technical and Organisational Measures

Methodological alignment with SURF DNI

## Contents [hide]

- 1 Configuration Management and Release and Deployment Management
  - 1.1 configuration items: by fabric management system
  - 1.2 configuration items: systems overview by segmentation
  - 1.3 configuration items: network configuration items
- 2 Supplier Relationship Management
  - 2.1 Equipment procurement document, warranties, and maintenance contracts
  - 2.2 Framework agreements and tenders
- 3 Incident and Service Request Management, Problem Management, and Change Management
- 4 Customer relationship, capacity management, and service portfolio management
  - 4.1 Service portfolio definition (SPM) and costing
  - 4.2 Customer relationship (CRM) and customer properties
  - 4.3 Capacity Management (CAPM)
- 5 Service Level Management, Service Reporting Management
- 6 Information Security Management
  - 6.1 Policies
  - 6.2 Processes
  - 6.3 Procedures
  - 6.4 Risk Assessment
- 7 Experimental and research services

# And ... we live in a federated global world



# Collaboration: an inherently-cross-domain issue ..



AUTHN & AUTHZ, **ARCHITECTURE AND TRUST** SHOULD ALIGN WITH **COLLABORATION STRUCTURES**, AND BE **OUTWARD FACING**: OPEN, SCALABLE, & MULTI-DOMAIN

EXAMPLE FROM THE LHC COMPUTING INFRASTRUCTURE WLCG

**170 SITES**

**~50 COUNTRIES & REGIONS**

**~20000 USERS**



JUST *HOW* MANY INTERACTIONS ??



people photo: a small part of the CMS collaboration in 2017, Credit: CMS-PHO-PUBLIC-2017-004-3; site map: WLCG sites from Maarten Litmaath (CERN) 2021



# IdM: 'AARC' & REFEDS compliant Trust & Identity AAI

## Central identity management

- designed to allow innovation based on REFEDS & AARC models
- 'our users are the validation'
- production-quality  
*with* rapid innovation cycle

## Basis for all AAI (identity & access)

- OpenLDAP as core
- bespoke integration suite
- SimpleSAMLphp IdP and SP proxy
- Support SAML, OIDC, OIDfed, and REFEDS MFA & RAF natively



# Research Computing Services

## Services and software

About the NDPF
News and events
<b>Services and Resources</b>
Computing course
Service documentation ▼
Research Data Management ▼
Other services ▼
Systems ▼
Software and Tools ▼

## Services and resources for users



### *Stoomboot compute*

The Stoomboot cluster is the local batch computing facility at Nikhef. It is accessible for users from scientific groups ...



### *Consulting & co-design*

Enabling experiments and programmes to effectively and efficiently use local and federated computing infrastructure ...



### *JupyterHub 'Callysto'*

Jupyter notebook service for Nikhef local users. Includes both python as well as shell kernels by default. Root can be used ...



### *Authentication and identity*

Identity management and certificates ...



### *Grid and federated compute*

High throughput compute platform for the Dutch National e-Infrastructure, EGI, and WLCG. Conditionally accessible to local users via a dedicated Tunnel ...



### *Authorisation and AAI*

Federated trust and access management ...



### *Storage services*

Storage services for Nikhef users. Data storage comes with several options, and where to store which files requires some thought and care ...



### *Research Data Management*

FAIR, reproducible and re-usable research data, writing data management plans, and identifying open repositories ...

# Analysis cluster

Nikhef

CT User Documentation

CT User Documentation

Accounts

Calendar & Mail

Printing

Laptops & Hardware

Network (WiFi/VPN)

Phones

Meeting Rooms

Remote Access Desktops & Servers

Computing & Data Analysis

Interactive CPU nodes

Interactive GPU nodes

Stoomboot cluster

Stoomboot NG HTCondor Cluster

CPU batch jobs

GPU batch jobs

Qsub tunnel

Nikhef Grid Computing Cluster (NDPF)

Grid jobs

Ganymede cluster

Conda environments

pyenv for managing python versions

Containers

Stoomboot cluster

Aim: Describe how to access and use Nikhef's Stoomboot cluster.

Target audience: Users of the Stoomboot cluster.

Prerequisites

To access Stoomboot, you will need:

- A Nikhef account
- A working SSH client setup

Introduction

The Stoomboot cluster is the local computing facility at Nikhef. It is accessible for users from scientific groups to perform, for

The Stoomboot cluster is comprised of

- 85 batch nodes with a total
- 3 interactive CPU nodes
- 2 interactive GPU nodes
- 7 GPU batch nodes

<https://kb.nikhef.nl/ct/>

/ dCache Grid ☆ ↗

Last 3 hours 🔍 ↺ 5m 🗑

### Space Allocated

	current	percentage
atlas-data-pools	3 PiB	57%
atlas-localgroup-pools	253 TiB	4%
atlas-scratch-pools	51 TiB	1%
atlic-pools	5 TiB	0%
auger-pools	51 TiB	1%
biomed-user-pools	51 TiB	1%
common	5 TiB	0%
default	0 B	0%
dune-generic-pools	1 PiB	17%
km3net-pools	51 TiB	1%
lofar-pools	0 B	0%
ops-pools	5 TiB	0%
pvier-pools	5 TiB	0%
testing	5 TiB	0%
unused	674 TiB	11%
virgo-pegasus-pools	51 TiB	1%
xenon-generic-pools	455 TiB	7%

PROTOCOL / TOBI DETIMER

Week 34 Week 35 Week 36 Week 37 Week 38 Week 39 Week 40

■ capacity  
□ unused (35.6)  
■ cosmics (31.1)  
■ theorie (22.4)  
■ gravwav ( 8.2)  
■ datagrid ( 0.9)  
■ atlas ( 0.8)  
■ smefit ( 0.6)  
■ other ( 0.5)

32

Nikhef

# Can can analyze small things in an executable Jupyter paper

## Services and resources for users



### Stoomboot compute

The Stoomboot cluster is the local batch computing facility at Nikhef. It is accessible for users from scientific groups ...



### JupyterHub 'Callysto'

Jupyter notebook service for Nikhef local users. Includes both python as well as shell kernels by default. Root can be used ...



### Consulting

Enabling ex  
effectively a  
computing



### Authenticating

Identity ma



### Authorizing

## Stoomboot 2021 statistics for the Nikhef Jamboree

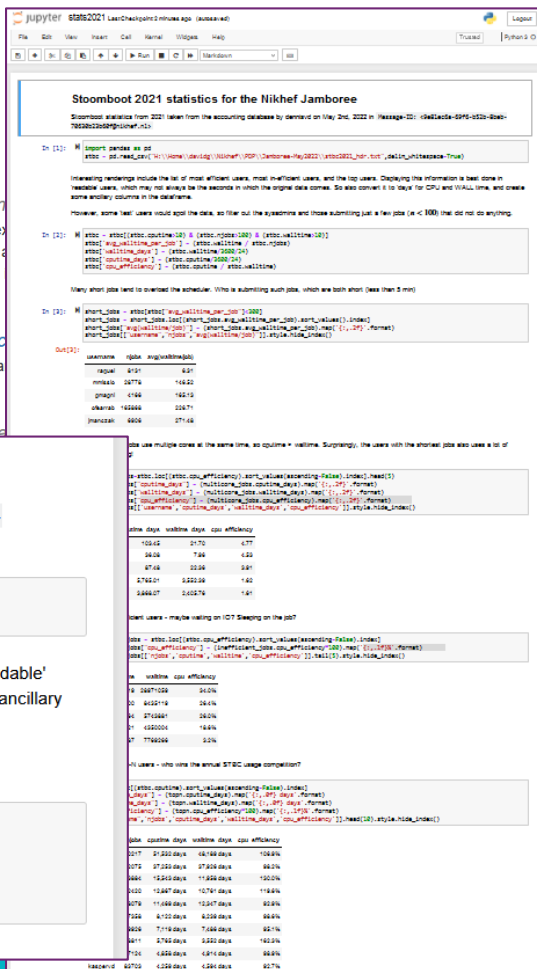
Stoomboot statistics from 2021 taken from the accounting database by dennisvd on May 2nd, 2022 in Message-ID: <9e81ec6a-69f6-b52b-8beb-70630b23b60f@nikhef.nl>

```
In [1]: import pandas as pd
stbc = pd.read_csv("H:\\Home\\davidg\\Nikhef\\PDP\\Jamboree-May2022\\stbc2021_hdr.txt",delim_whitespace=True)
```

Interesting renderings include the list of most efficient users, most in-efficient users, and the top users. Displaying this information is best done in 'readable' users, which may not always be the seconds in which the original data comes. So also convert it to 'days' for CPU and WALL time, and create some ancillary columns in the dataframe.

However, some 'test' users would spoil the data, so filter out the sysadmins and those submitting just a few jobs ( $n < 100$ ) that did not do anything.

```
In [2]: stbc = stbc[(stbc.cputime>10) & (stbc.njobs>100) & (stbc.walltime>10)]
stbc['avg_walltime_per_job'] = (stbc.walltime / stbc.njobs)
stbc['walltime_days'] = (stbc.walltime/3600/24)
stbc['cputime_days'] = (stbc.cputime/3600/24)
stbc['cpu_efficiency'] = (stbc.cputime / stbc.walltime)
```





## Including analyzing the infrastructure itself ...

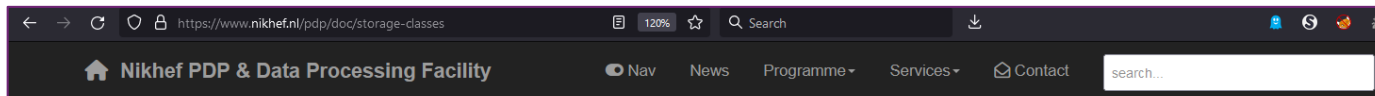
There are also inefficient users - maybe waiting on I/O? Or just sleeping on the job?!

```
In [5]: ► inefficient_jobs = stbc.loc[(stbc.cpu_efficiency).sort_values(ascending=False)]
inefficient_jobs["cpu_efficiency"] = (inefficient_jobs.cpu_efficiency*100).map
inefficient_jobs[['njobs', 'cputime_days', 'walltime_days', 'cpu_efficiency']].ta
```

Out[5]:

njobs	cputime_days	walltime_days	cpu_efficiency
27799	114.010637	335.313183	34.0%
1595	25.818287	97.628692	26.4%
4551	17.312083	66.480104	26.0%
11299	9.377558	50.347269	18.6%
1117	2.877164	89.922060	3.2%

# Research Engineering support and engagement



## Services and software

About the NDPF
News and events
Services and Resources
Computing course
<b>Service documentation</b>
User Grid wiki
Credentials and certificates
Stoomboot Analysis cluster
Storage services and types
Grid User Interface 'bosui'
Submitting to ARC CEs
Submitting to HTcondor CEs
Usage graphs and statistics
NL-Tier1 Alarms
Research Data Management
Other services
Systems
Software and Tools

## Storage classes for the Nikhef analysis facilities

**Summary:** Data storage at Nikhef comes with several options, and where to store what is a matter of choice and care. For example, your home directory should not be used for bulk data, and files should be backed up. Read about which type of files should go where.

### Table of Contents

- Home directory
- Data in /data
- dCache
- Project
- Local cache storage
- SURFdrive
- FileSender

## Home directory

Your home directory is for personal files and code (login.nikhef.nl, the stoomboot interactive nodes).

- intended use:** your ".dot" files, personal and work, hobby projects, personal mails, communication with your supervisor or colleagues, things that will not be preserved after you leave Nikhef.
- examples of data types that are better put elsewhere:** your ntuples (put those in dCache or /data), scripts and frameworks used by a group of colleagues (that's put in /project), log output you want to look at later (best put this alongside the results in /data), intermediate files (use \$TMPDIR, or /localstore), your final thesis (submit it to the library, and package the plots, publications, tabular data, and histograms for submission to Zenodo).

computing courses  
and 'Office Hours' concept



Although users may send some rather confused questions ...

```
From [redacted]@nikhef.nl> ☆  
Subject [Stbc-admin] (no subject)  
To that@nikhef.nl ☆ matters@nikhef.nl ☆ for@nikhef.nl ☆ stbc-admin@nikhef.nl ★  
  
.q  
exit()  
cd ..  
  
-----  
Stbc-admin mailing list  
Stbc-admin@nikhef.nl  
https://mailman.nikhef.nl/mailman/listinfo/stbc-admin
```

# A coherent collection of emergent services

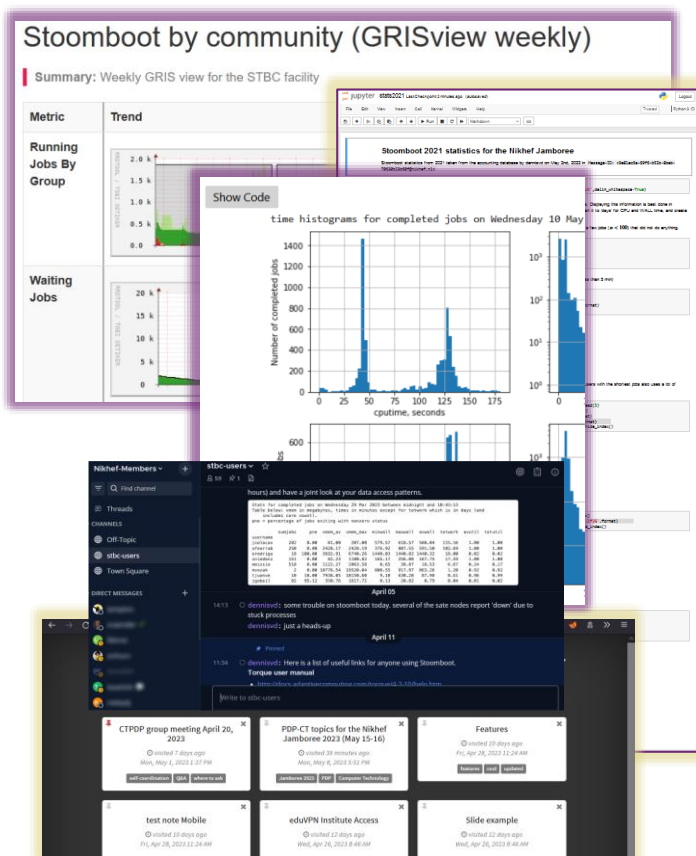
## Nikhef Partnership facilities

- **Stoomboot:** ~2000 cores and ~4 PByte dCache
- **Callysto:** JupyterHub with \$HOME and SSO login
- **eduVPN:** securely access Callysto and your home
- Mattermost's '**STBC-users**' channel to talk & ask
- **eVA**, **SURFdrive**, and **FileSender** to collaborate

## Global Services

- WLCG, SURF DNI, and EGI: **HTC compute**, **CVMFS**, ...

**Experimental services:** ShareMD, Commute, ...



But do read <https://www.nikhef.nl/pdp/doc/experimental-services> before using experimental services ...

Stoomboot statistics: <https://www.nikhef.nl/pdp/doc/stats/stbc-grisview-week>, [https://www.nikhef.nl/pdp/stats/stbc/intern/stbc\\_summ\\_plots](https://www.nikhef.nl/pdp/stats/stbc/intern/stbc_summ_plots)



# Experimental services

- Service documentation ▼
- Research Data Management ▼
- Other services ▲
- ObjectID Registry
- URN Registry
- SSO Identity Management 🔗
- What is my IP 🔗
- Livestreaming at Nikhef 🧪 🔗
- NikhefTV 🧪
- ShareMD HedgeDoc notes 🧪 🔗
- Audioconferencing PBX 🧪 🔗
- Orchestra Experimental Cloud 🧪 🔗
- NWO-I Commute Tool 🧪 🔗
- About Experimental Services

<https://www.nikhef.nl/pdp/doc/experimental-services>

## PDP-CT Experimental Services

Summary: If they break, you get to hold the pieces!

You came here because you were curious about an *Experimental Service*, and what that means in the Nikhef context.

- if it's broken, tell us ... and we might even fix it.
- if it works: also tell us, so we may change it beyond recognition!
- ... 'if it breaks, you get to hold the pieces'.

We do not offer any service guarantee, neither expressed nor implied, about purpose, in particular not for getting work done. The service is operated by the

es: highly important ones that support our [primary mission](#). Highly available going on and (at least attempt to) provide reasonably quick resolution in case of of course there's support for folk who use the services, on-demand or during the

it none of the above. None. They are vastly different and could do you more harm y may cause you to loose years of valuable work. They may make your pet walk

ice run by the Nikhef Physics Data Processing group - and that one is subject to

n fix it.

ie it beyond recognition!

%:

Xen Orchestra

Create a new VM on Maastricht University FSE

Info

Performance

Install settings

Interfaces

Template AlmaLinux 9.4 (CloudReady Nikh... Name AlmaLinux 9.4 (CloudRead Description Test

vCPUs 2 RAM 4 GIB Topology Default behavior

No config drive

SSH key + davidg-ikonet-nikhef-nl

Custom config

User config

```
#cloud-config
#hostname: (name)%
#ssh_authorized_keys:
# - ssh-rsa <myKey>
#packages:
# - htop
```

Network config

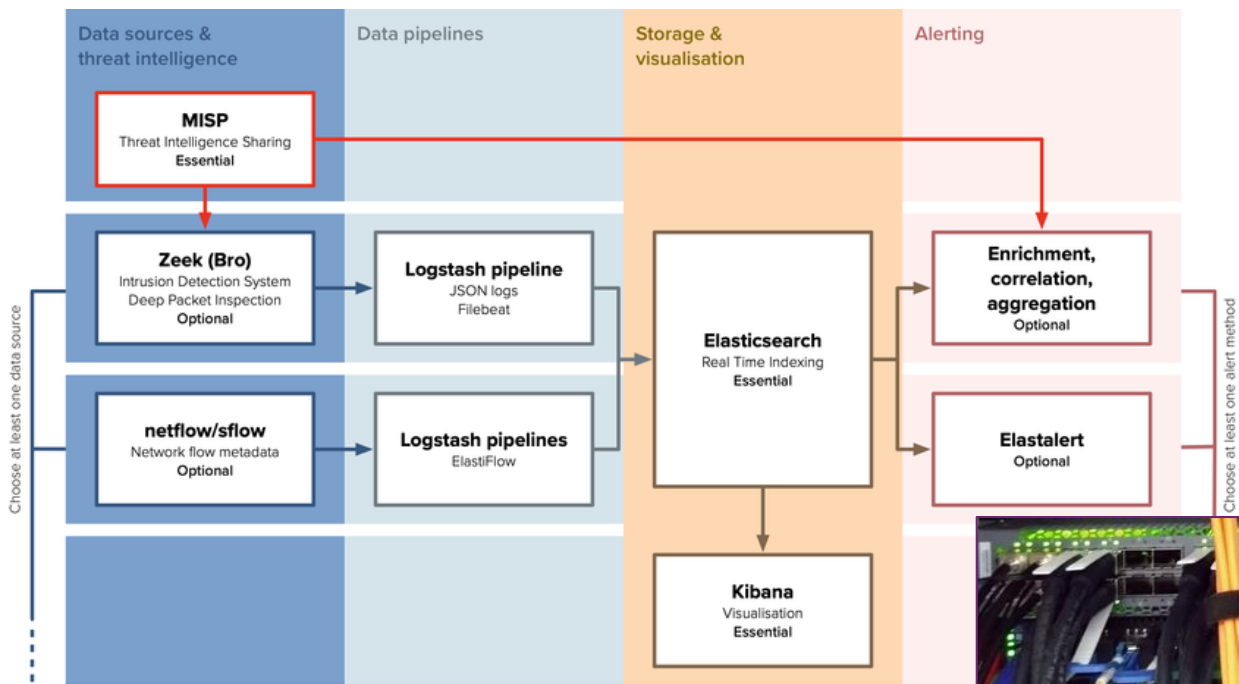
```
#network:
# version: 1
# config:
# - type: physical
# name: eth0
# subnets:
# - type: dhcp
```

ISO/DVD Select disk(s)...

MAC Auto-generated if empty Network oe-dynamic (139)

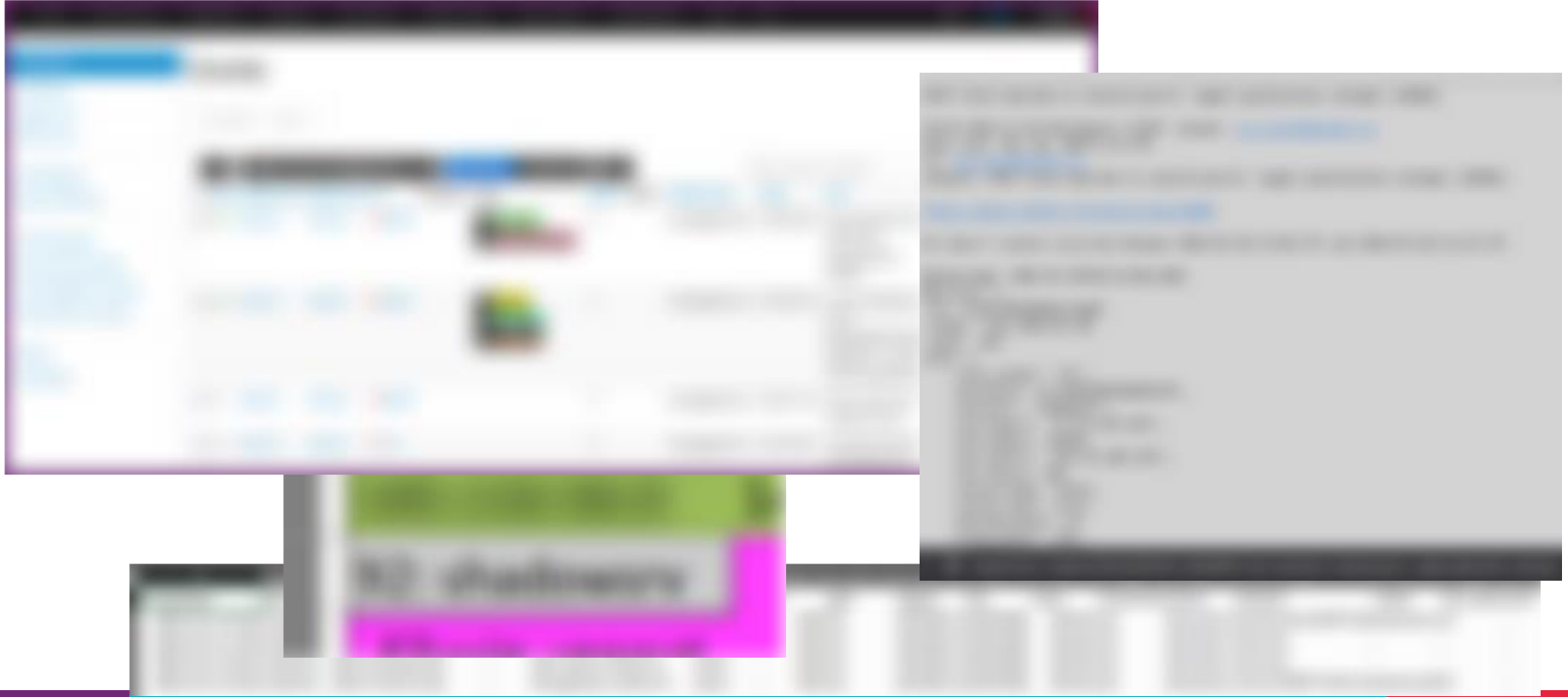
Add interface

# Network monitoring: the SOC, MISP and WLCG SOC-WG



Nikhef SOC, H234b C06  
WLCG SOC: David Crooks and Liviu Valsan, ISGC2019 proceedings,  
PoS(ISGC2019)010

# MISP Threat intel sharing (plus Shodan & ShadowServer)

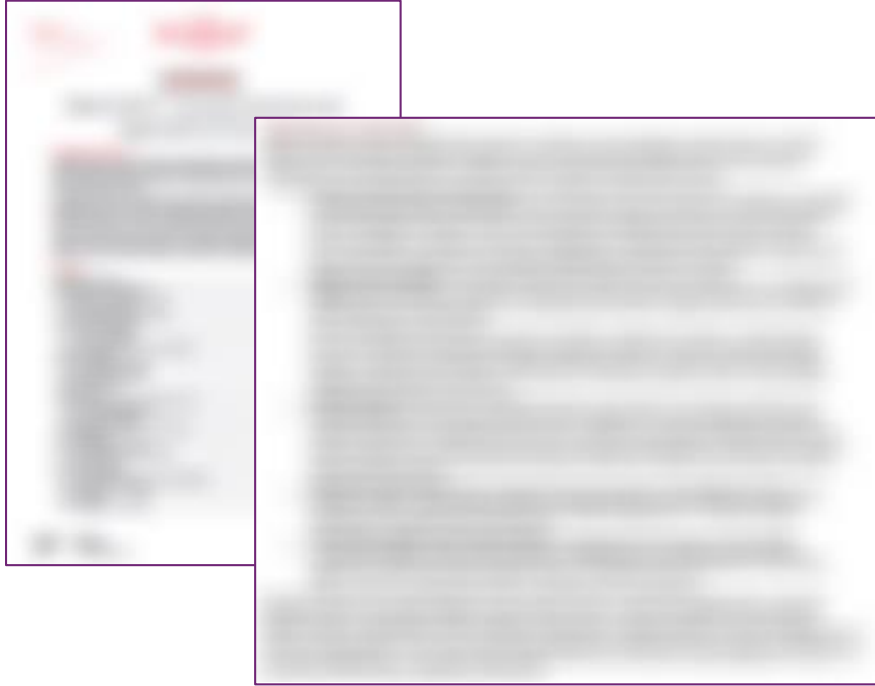




Backup and BC/DR

# When things go south ...

But if something does go belly-up  
*we should know what to do*





# BCDR



The Nikhef XXXXXXXXXXXXXXXXXXXX BCDR setup – foundational service capability more than 30km away from the primary site ...



Nikhef

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 <https://orcid.org/0000-0003-1026-6606>

