urn:doi:10.60953/bf3e2015-85a9-41cd-8819-e1f7fd4a1711 R8/18/1748

Nikhef

Maastricht University

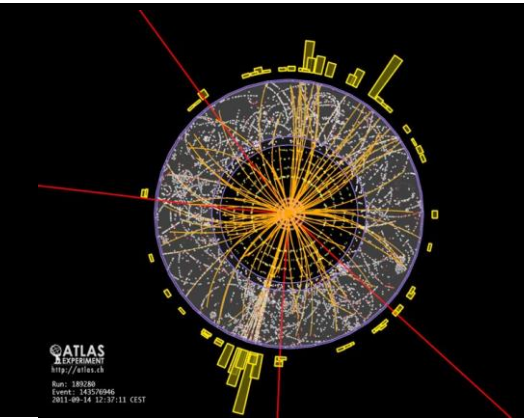
computing and networks for research
crossing country borders with ease

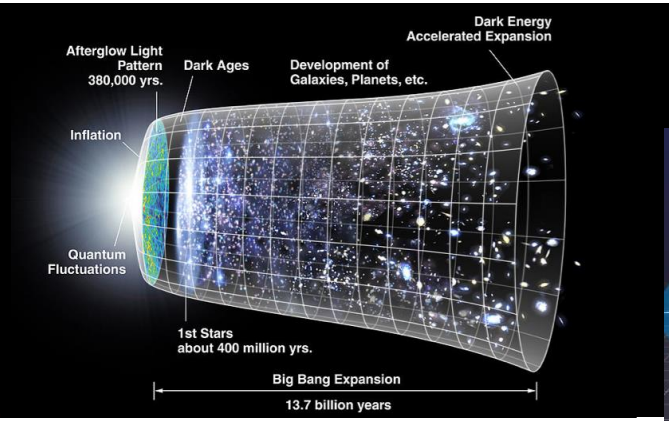
Collaborative e-infrastructures

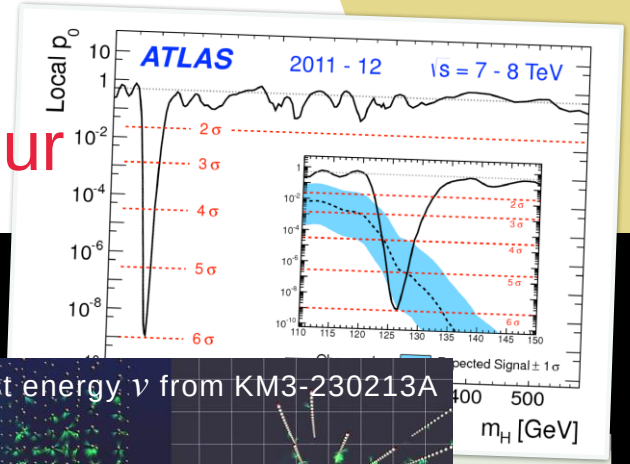
David Groep

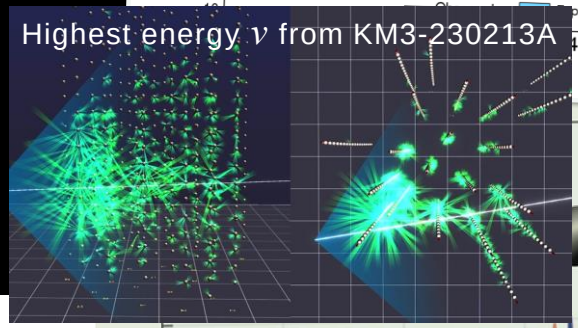
Italian Cultural Institute
Amsterdam
May 2025

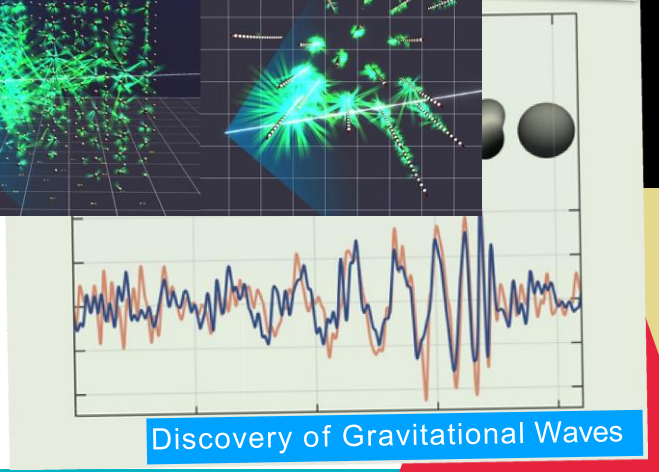
A few words on Nikhef and sub-atomic physics as a global endeavour









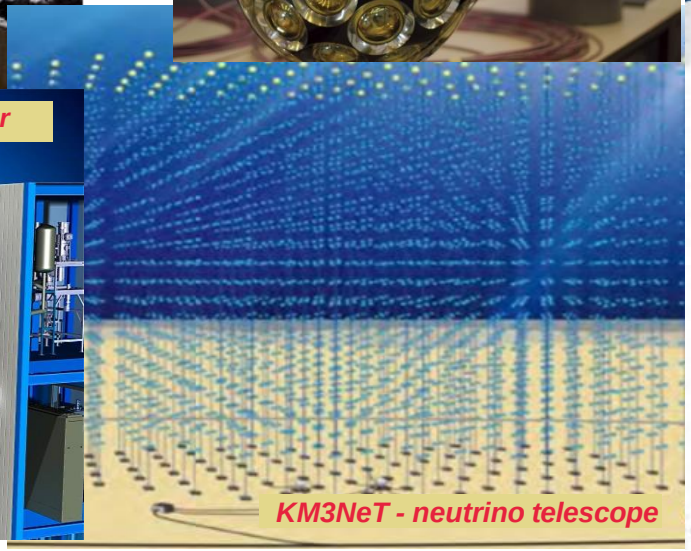


We probe our world, made of particles and fields,

- with collider physics, primarily at CERN
- astroparticle physics:
  particles, radiation, and ripples coming from the universe

images: atlas.cern.ch, CERN, LIGO-Virgo Collaboration

… and almost all beyond the Netherlands



images: Pierre Auger collaboration, Virgo collaboration, Xenon-nT collaboration, KM3NeT collaboration, INFN, LNGS, Nikhef

ICT Infrastructure research for Research Infrastructure at Nikhef

Algorithmic design patterns and software

- scientific software (GPU) acceleration, ML tracking, application architecture
- software design patterns for workflow & data orchestration, and (energy) efficiency

Infrastructure for trusted collaboration

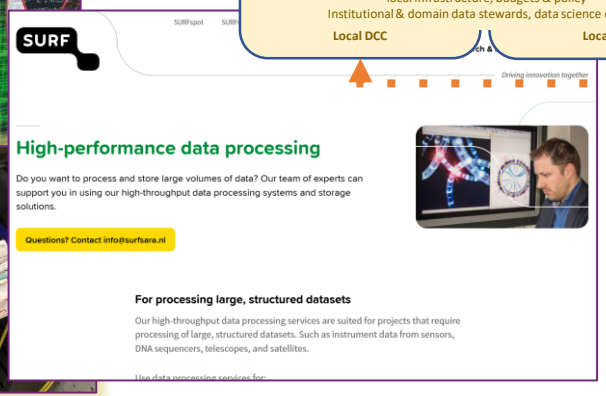
- trust and identity for enabling communities
- managing complexity of collaboration mechanisms
- securing the infrastructure of our open science cloud

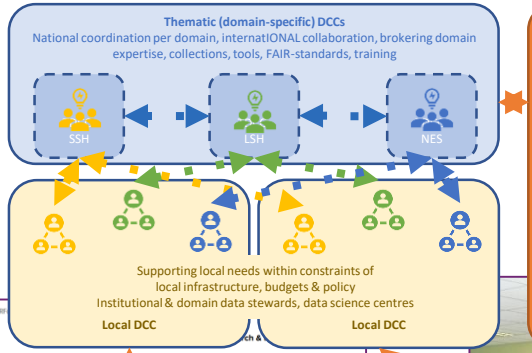
Infrastructure, network and systems R&D

- building ‘research IT facilities’
- co-design & development
- data throughput innovation
- research *on* IT infrastructure

ICT infrastructure for research as research infrastructure

hardware, software, services, competences and people



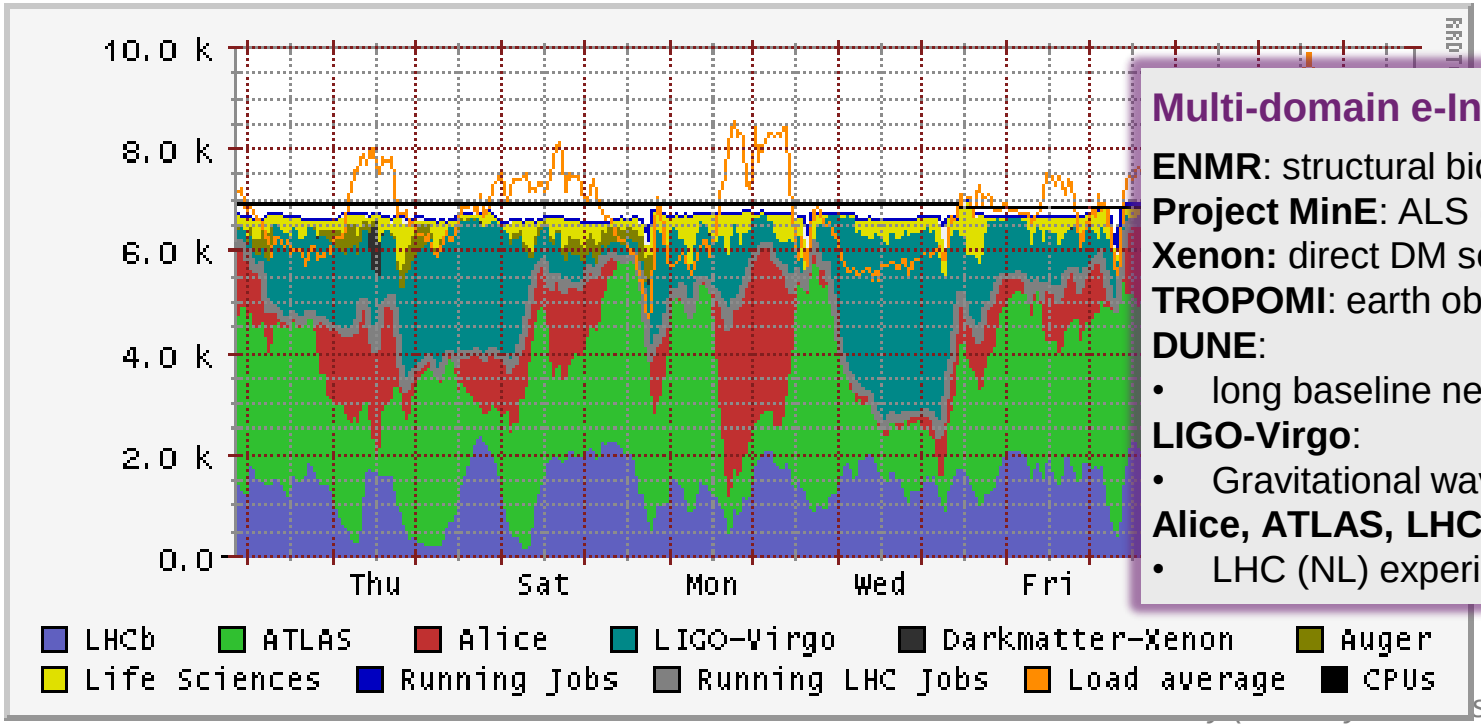


Images: ATLAS Rucio volume, (from rucio.cern.ch); optical network: NDPF ‘deel’; User meeting Stoomboot Office Hours (both Nikhef)); Snellius opening visit; HPDC service page (both SURF); TDCC image by Ruben Kok, LSH TDCC and DTL

HTC/HPC infrastructure: federated joint processing in NL

One of the processing sites of the joint federated infrastructure

Cumulative cores per community on the Nikhef NDPF part of the DNI federated HTC Tier-1 infra



Multi-domain e-Infrastructure

ENMR: structural biochemistry
Project MinE: ALS (health)
Xenon: direct DM searches
TROPOMI: earth observation
DUNE:

- long baseline neutrinos

LIGO-Virgo:

- Gravitational waves

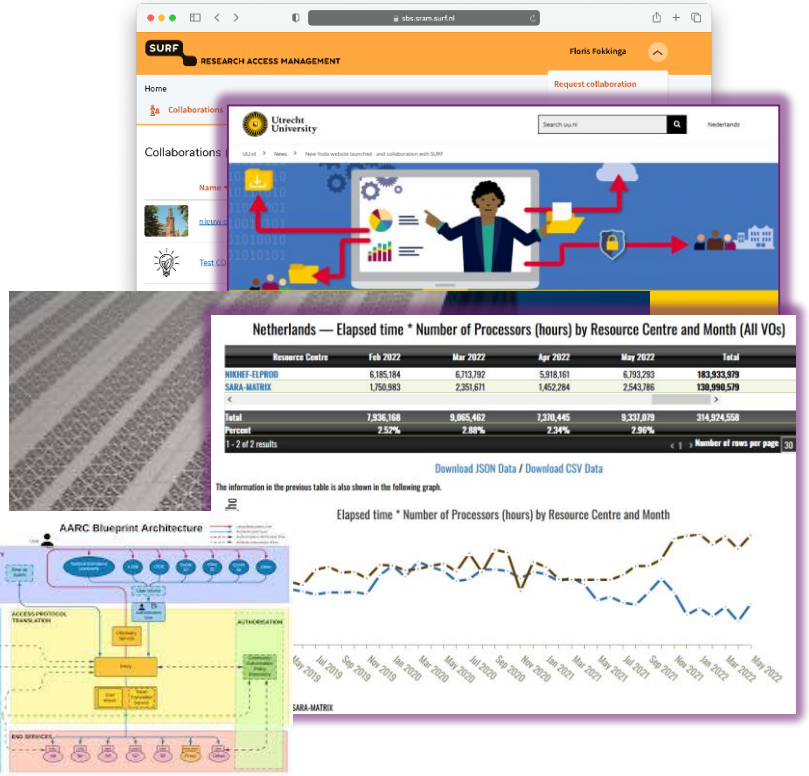
Alice, ATLAS, LHCb

- LHC (NL) experiments

SURF as linking pin between research and e-infrastructure

- **National ‘Tier-1’** federated computing with heterogeneous HTC/HPC, Quantum, AI/ML capacity
- **Secure Supercomputing** for (social) sciences
- **Federating** institutional HPC facilities
- **Data archiving** and large FAIR repository services
- Stimulating - with NWO - ‘**digital competences**’ for researchers via the NL eScienceCenter
- **trust, identity, and AAI** research federation

as a transnational effort – like research itself

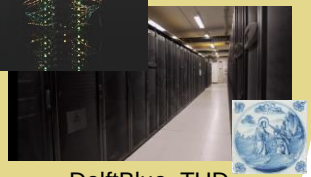


Images: EGI accounting (https://accounting.egi.eu/) for NL, all federated communities, 2020-2022, SURF: Amsterdam Data Tower Yoda: Utrecht University and SURF, https://www.uu.nl/en/news/new-yoda-website-launched-and-collaboration-with-surf; SRAM: SURF Wiki;

Scalable HPC: from local “Tier-2” to European “Tier-0”

Nikhef “Stoomboot”
Analysis Facility

ALICE, Leiden



DelftBlue, TUD

■ ■ ■

SURF National Infrastructure
foundation *as well as* stepping stone

PRACE

EuroHPC
Joint Undertaking

eosc

with **local expertise**
to enable exploitation
of European and
global resources

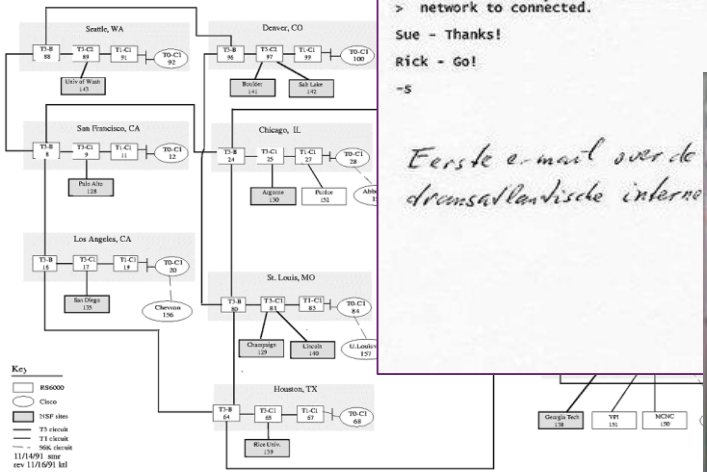
Collaboration has long since outgrown the one terminal

With one system using several racks

and with just a few people hunched over them

Nikhef room H1.37 – terminal stations on the raised data floor of the computer room (H1.40, behind the glass-panel walls)

Networking is the mainstay: be it for computers … or for people



From: Stephen Wolff
Sent: Thursday, November 17, 1988 8:28 AM
To: HOSTMASTER@SRI-NIC.ARPA; rick@seismo.CSS.GOV
Subject: Re: [HOSTMASTER@SRI-NIC.ARPA: Re: mcvax internet connection]

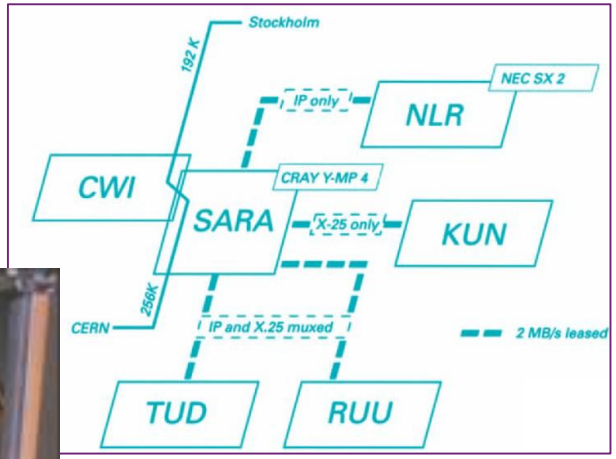
> Thanks for the additional information re: CWI-ETHER, net
> #192.16.184.
>
> This is to let you know that we have changed the status of this
> network to connected.

Sue - Thanks!

Rick - Go!

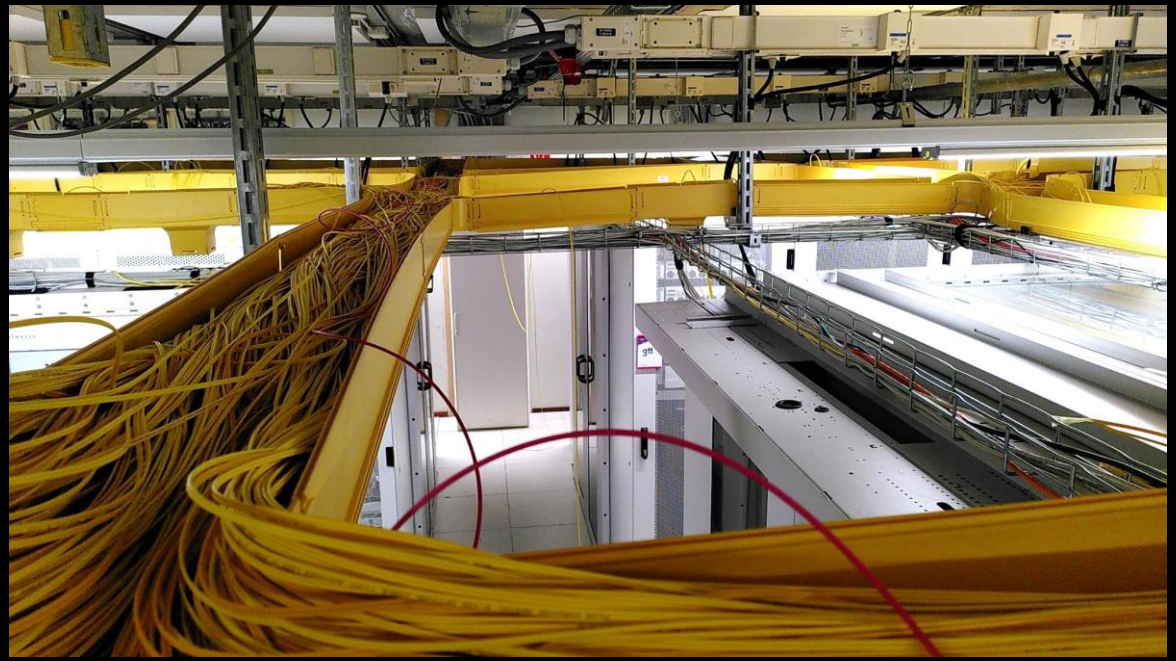
-S

Eerste e-mail over de
dramsatlantische interne



See https://personalpages.manchester.ac.uk/staff/m.dodge/cybergeography/atlas/historical.html for more historic maps ;
right-hand image: SURFnet2, 1990, first email to MCVAX at CWI from https://www.cwi.nl/en/news/cwi-celebrates-25-years-of-open-internet-in-europe-in-november/
(Piet Beertema, CWI, 1988); International Backbone Router Local Area Network “IBR-LAN” at Nikhef, room H1.40 as seen in 1996.

The only constant element is the yellow colour … and IP



Nikhef Housing has grown a bit since

- connectivity data centre focussing on global networking

PeeringDB

NIKHEF Amsterdam

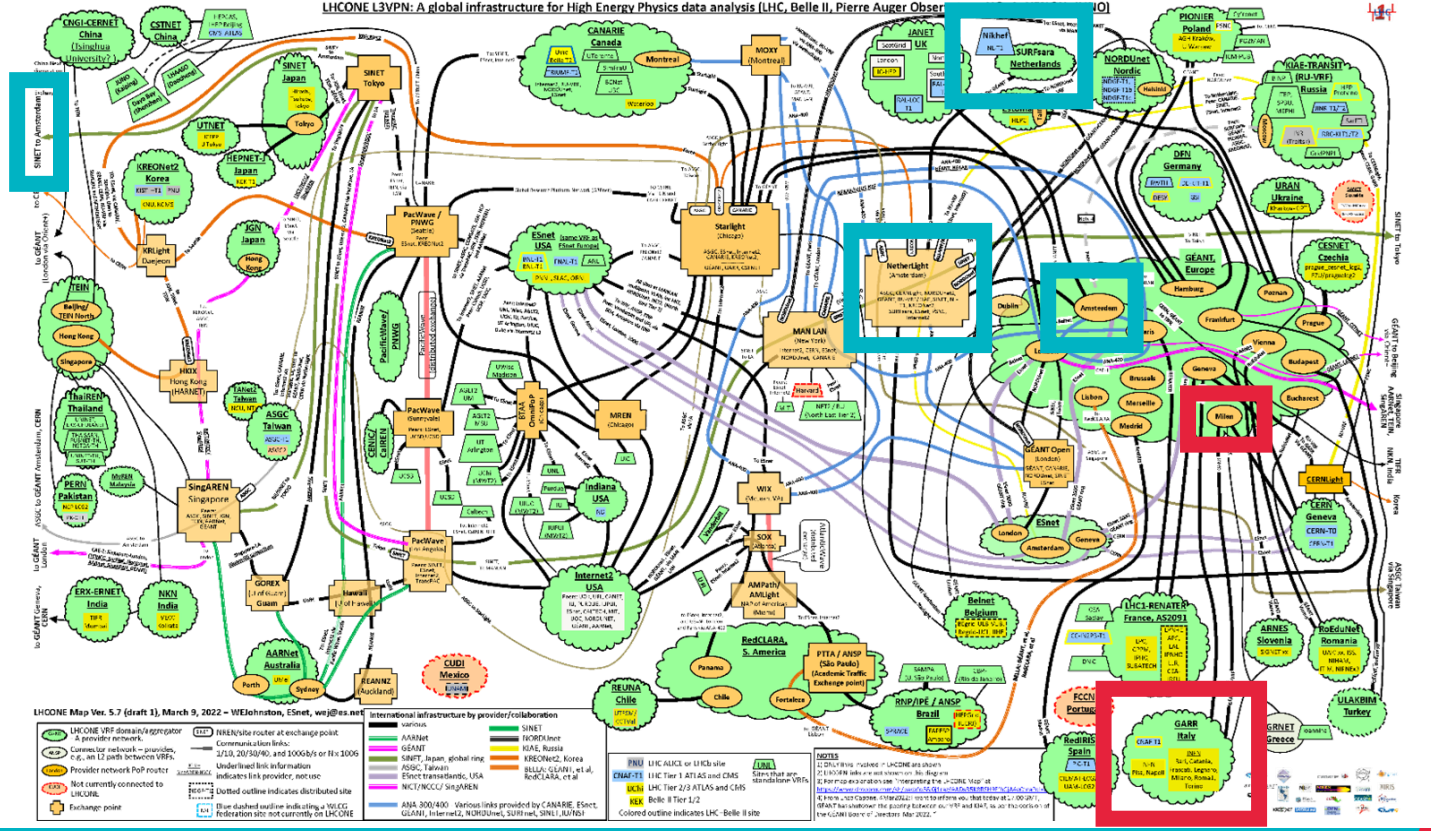
Networks	Local Exchanges
422	25

Nikhef *science* data centre

- federated in the SURF national Tier-1 facilities
- focus on throughput compute & storage

https://www.nikhefhousing.nl/ PeeringDB data: https://www.peeringdb.com/fac/18 (May 18, 2025)

Networking together – globally connected research

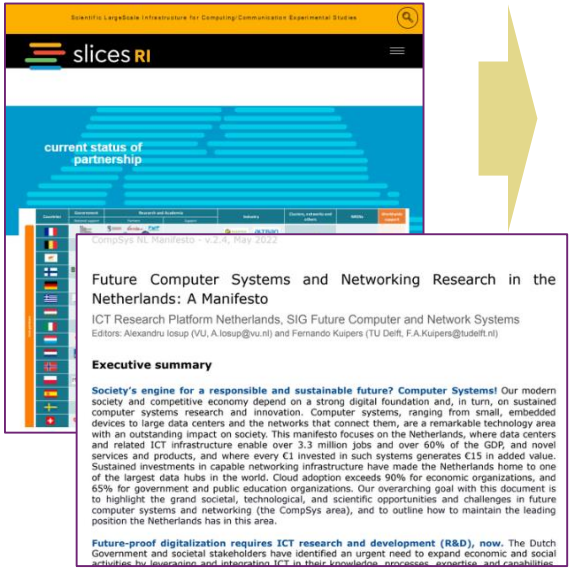


Computing and networks for research crossing borders with ease

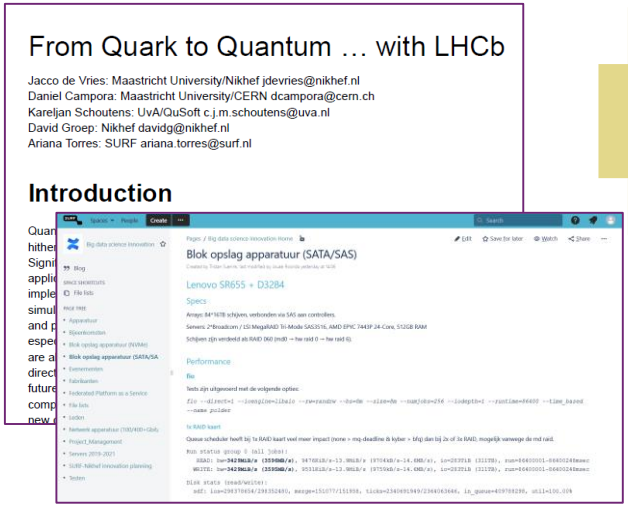
Graphic: Bill Johnston, ESnet, for LHCone

Riding the infrastructure innovation chain together

Computing Sciences Research



Operational Research (near-term, NextGen storage, 800G+ network, QC & simulators)

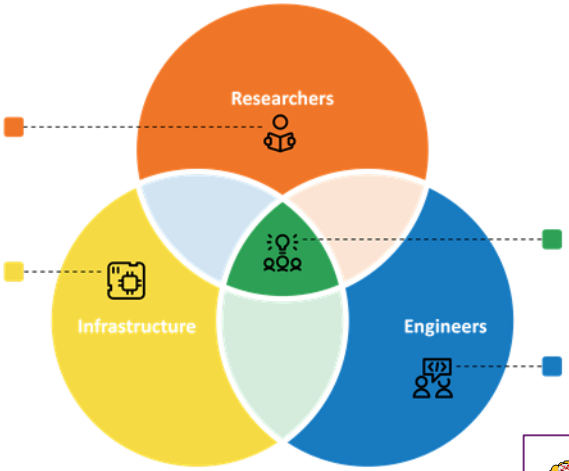


Operational innovation (procurement, systems vendor co-engineering)

scaling and validation with applications

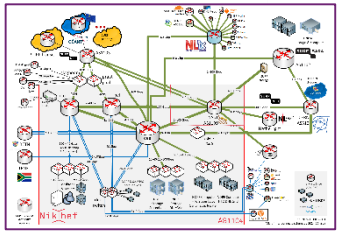
Images: SLICES-RI, CompSysNL, UM & SURF QC, SURF SOIL BDRI, NationaleSpeeltuin.nl @Nikhef

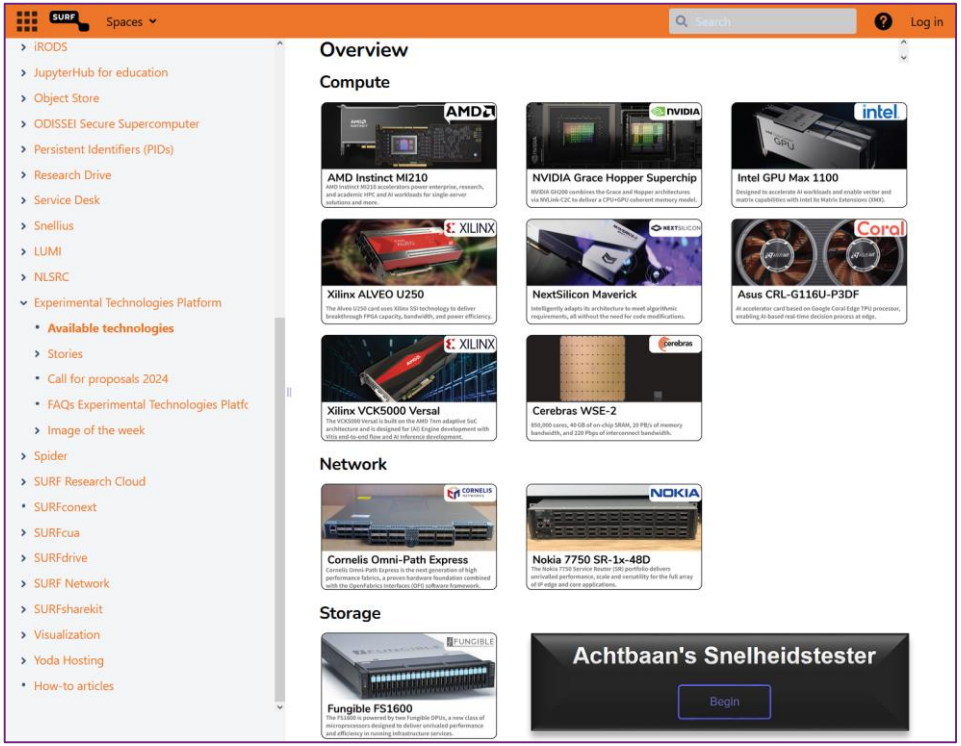
SURF Experimental Technologies Platform & Nikhef Nationale Speeltuin



SURF–ETP
Open and collaborative environment to foster the assessment of cutting-edge technologies and methodologies.

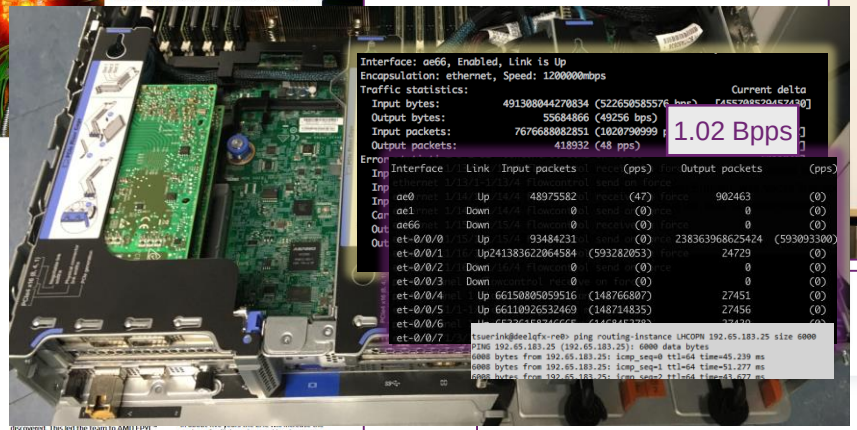
Engineers
Leverage their technical skills and motivation to surf the state-of-the-art.





https://servicedesk.surf.nl/wiki/display/WIKI/Experimental+Technologies+Platform and https://www.surf.nl/en/etp; https://nationalespeeltuin.nl; https://www.nikhef.nl/pdp/doc/facility

And since speed does matter …



Test with superfast 800 Gbit internet between Amsterdam and CERN successful

15 April 2024

Nokia and SURF have successfully tested an 800 Gbit/s data connection between Nikhef in Amsterdam and CERN in Geneva. Such a connection is needed to transmit data from the upcoming high-luminosity LHC accelerator.

The test used existing fiber-optic connections through Belgium and France toward Geneva in Switzerland over a total distance of 1,648 kilometers. An 800 Gbit/s connection is about a thousand times faster than the Internet connection in an average household.

Nokia's latest photonic technology, the sixth-generation super-coherent Photonic Service Engine (SPE-6s), was deployed in the tests, along with 16QUM-shaped modulation. The results of the tests will be announced in more detail next week at a Nokia expert conference in Athens.

Data hub

NIKHEF, SURF AND FUNGIBLE … BENCHMARK FOR THE WORLD'… STORAGE PERFORMANC…

Companies Double Current Performance R… the New Bar at 6.55 Million Read IOPS

Image: Minister of Economic Affairs M. Adriaansens launched the Innovation Hub with Nikhef, S… …estomgeving-voor-supersnelle-netwerktechnologie

Our science data flows are somebody else's DDoS attack

Belastingdienst

Home Menu Zoeken

Home > Actueel > ICT en informatievoorziening > De systemen testen dankzij een unieke samenwerking

Lees voor

De systemen testen dankzij een unieke samenwerking

Het begon in 2018. Een bijzondere samenwerking tussen overheden, internetproviders- en exchanges, academische instanties, non-profitorganisaties en banken. Nadat duidelijk w… simpele DD… n platgelegd, H… vapenen tegen… alitie. Onlangs…

Op dez…
Een goe…
Examen…
Wat gebeurde er die nacht?
Vragen over dit artikel?
Terug naar boven

Dinsdag 14 maart 2023 | Het laatste nieuws het eerst op NU.nl

Door Rutger Otto

12 feb 2023 om 05:02
Update: een maand geleden

202 reacties

Het 'red team' is verantwoordelijk voor de aanvallen, het 'blue team' voor de verdediging. Een van de partijen die aan de avond meedoet is Nikhef. Tristan, IT architect bij Nikhef, geeft aan "dat zij dit

Belastingdienst

Home

Home > Aanslagen > Ik heb een DDoS aanslag ontvangen - wat nu?

Ik heb een DDoS aanslag op mijn netwerk ontvangen - wat nu?

U ontvangt een DDoS aanslag op uw netwerk, bijvoorbeeld omdat u vergeten bent werkende tegenmaatregelen te nemen. Er staat dan een geschat aantal pakketten per seconde op uw monitoring.

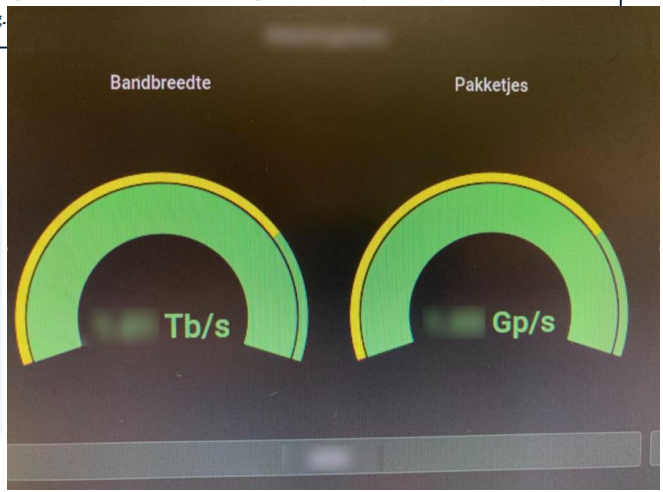
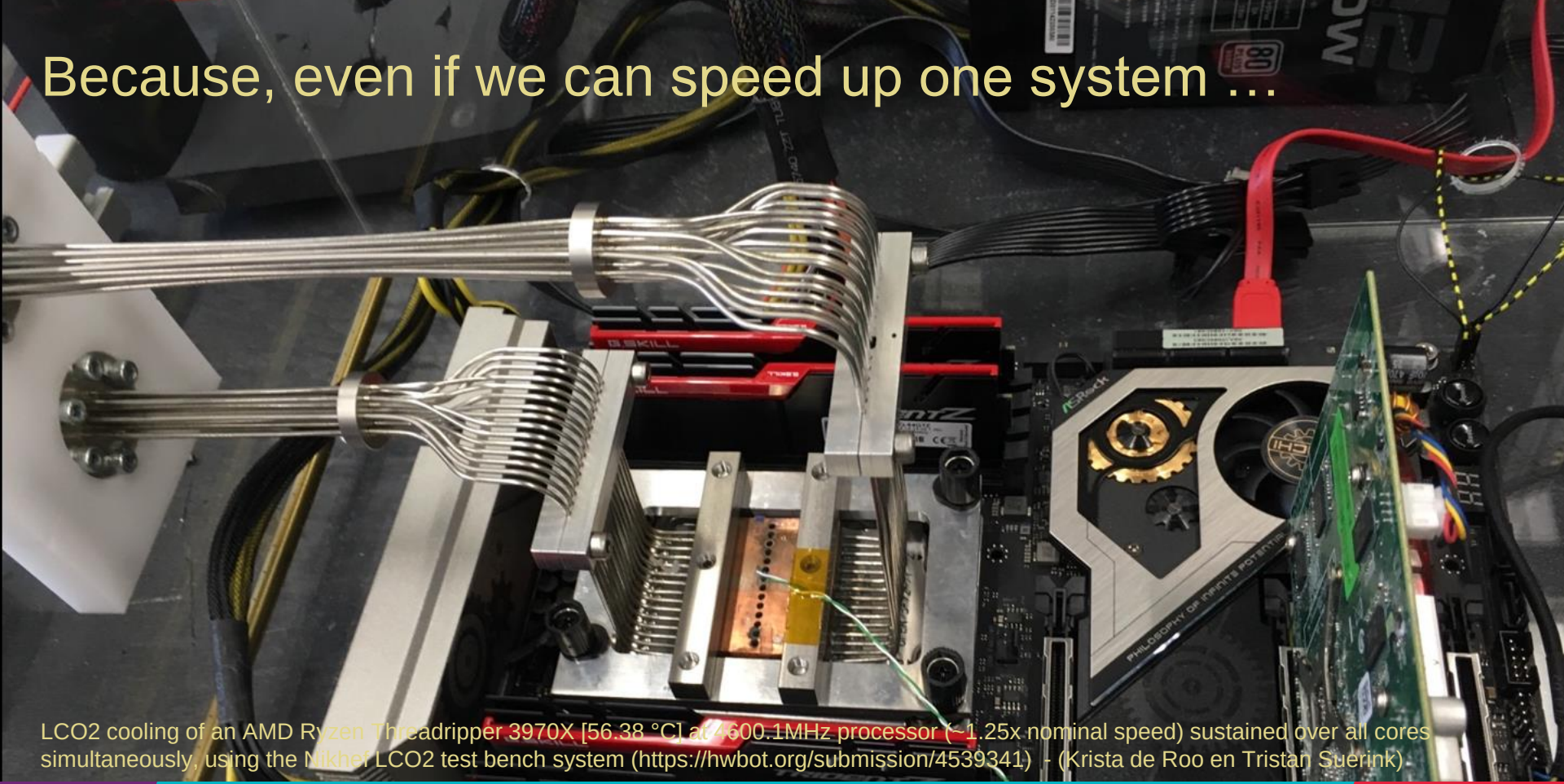


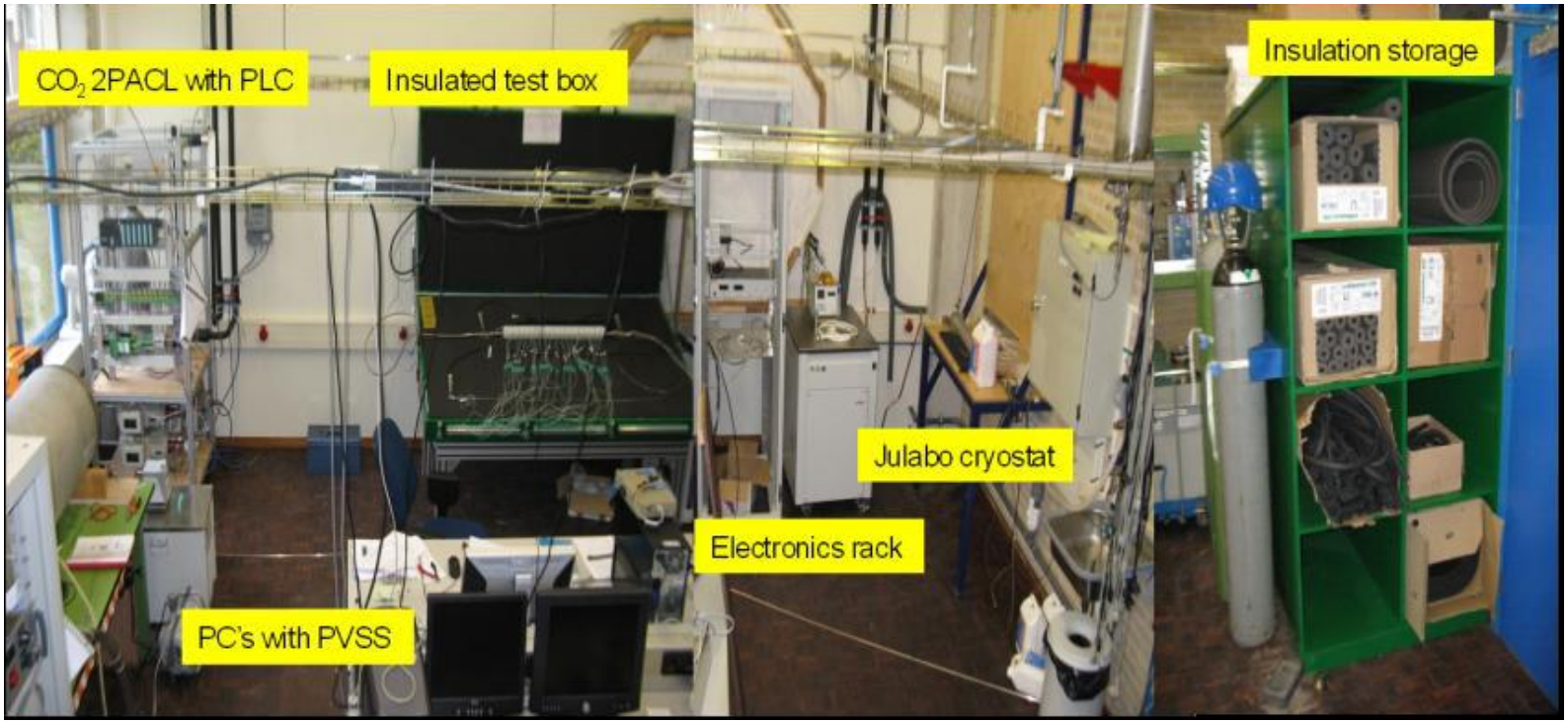
Image sources: belastingdienst.nl, rws.nl, nu.nl, werkentegennederland.nl

Because, even if we can speed up one system …



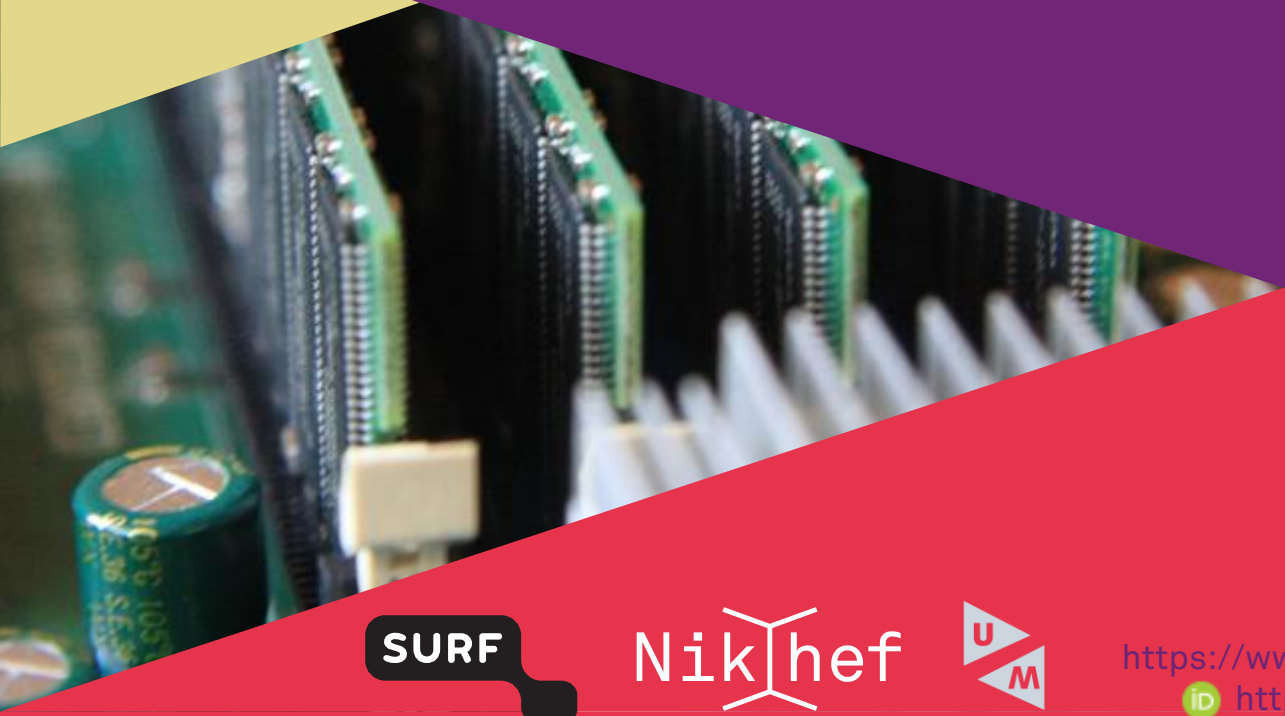
LCO2 cooling of an AMD Ryzen Threadripper 3970X [56.38 °C] at 4600.1MHz processor (~1.25x nominal speed) sustained over all cores simultaneously, using the Nikhef LCO2 test bench system (https://hwbot.org/submission/4539341) - (Krista de Roo en Tristan Suerink)

… it is not always the most scalable solution!



Nikhef 2PA LCO2 cooling setup. Image from Bart Verlaat, Auke-Pieter Colijn *CO2 Cooling Developments for HEP Detectors* https://doi.org/10.22323/1.095.0031

Molto grazie



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