Nikhef

Maastricht University

Trust and Identity – the AARC way

Can I have eduGAIN without pain, please?

David Groep,
Nikhef Jamboree,
May 2024

Remember the times? …

Our state of DataGrid and the HEP LHC computing in ~ 2000

NIKHEF
NATIONAAL INSTITUUT VOOR KERNFYSICA EN HOGE-ENERGIEFYSICA

Guest / students form (pleas

1. This form is completed in connection with:

☐ work experien
☐ otherwise, via

CERN/User Registration

CERN COMPUTER CENTRE - US

http://cern.ch/it/documents/ComputerUsage/Comp

To be returned to the User Registration box at the en
completed by a user who requires a computer accou
Department, and is not yet registered in another gro

To be completed by the User :

It is **MANDATORY** to provide the following infor
treated confidentially and only be used for ensuring
Supply name as registered by the Users' Off
FAMILY NAME(S): ……
FIRST NAME(S) : ……
SEX [M] [F] BIRTHDATE: Day …..… Month …… Year ……
HOME INSTITUTE/FIRM: ……
NATIONALITY: ……..*CERN SUPERVISOR……
*CERN DEPARTMENT: . . . . . *CERN ID NUMBER (as on CERN card)……..

To be completed by the Group Administrator:

Fermilab

For Office Use Only

ID:	Action:	ID Exp:	
Insurance:	Medical:	Safety:	
Computer:	Stkrm:	Family:	
NON-473:	Sensitive:	Verifier:	Date:

Name:

Last	First	Middle
SWIETZER	JOHN	JAMES

University or Institution Name: Telephone:

FLORIDA STATE UNIVERSITY	850-644-XXXX

Experiment/Department:

Exp. / Dept.	Spokesperson	Home Institution Contact	Contact Telephone
D0	WOMERSLEY/WEERTS	SHARON HAGOPIAN	850-644-4777

eduGAIN without edupain, please

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Authentication – who are you

Authenticating to a single service is relatively simple

- per-service identity (username) and secrets (e.g. password or TOTP token)
- server-side: list of valid users and (hashed and hopefully salted) secrets

```
[root@kwark ~]# cat /etc/passwd
root:x:0:0:root:/root:/bin/bash
bin:x:1:1:bin:/bin:/sbin/nologin
daemon:x:2:2:daemon:/sbin:/sbin/nologin
adm:x:3:4:adm:/var/adm:/sbin/nologin
lp:x:4:7:lp:/var/spool/lpd:/sbin/nologin
sync:x:5:0:sync:/sbin:/bin/sync
shutdown:x:6:0:shutdown:/sbin:/sbin/shutdown
halt:x:7:0:halt:/sbin:/sbin/halt
```

```
root:$6$s8ciAG5gLuv2bPQS$6EcskgtKvQ.rHbif
davidg:$6$nDYcIez2Uaufbtlg$RlhS/Qjn0qYQZk
marianne:$6$p3CeevG6jfNDqZj1$HKHqUTnt2fEqQfkA/m5J3oAOA0zSvgLCKOSQhPS
```

Passport image: cropped from original by Jon Tyson on Unsplash https://unsplash.com/photos/Hid-yhommOg

But what can you do?

Since you're probably not Louis XIV … you need an *authorization statement*

- bound to an verifiable identity statement
  e.g. visa are strongly linked to a specific entity, and asserted by a trusted party (by the service)

- be a bearer token
  scoped to a relying party, a service, or an action

- self-asserted
  quite useless unless backed by *verifiable evidence*, like in self-sovereign identity schemes

visa image source: dcgreer on flickr, CC-BY-NC-ND, https://www.flickr.com/photos/dcgreer/6562844777; RATP bearer token, issued for the Paris public transport system; self-managed identity image: Windows Cardspace , Kim Cameron, Mike Jones, et al. image from WikiMedia, Used with permission from Microsoft.(https://en.wikipedia.org/wiki/File:Cardspace_identity_selector.png)

Access control in a single domain

Dedicated to each service
where you need access

Usually strongly linked to authorization:
at times even
different accounts for different roles

In a multi-organizational system becomes

$$\mathcal{O}(n_{sites} * n_{services}) * \mathcal{O}(n_{users})$$

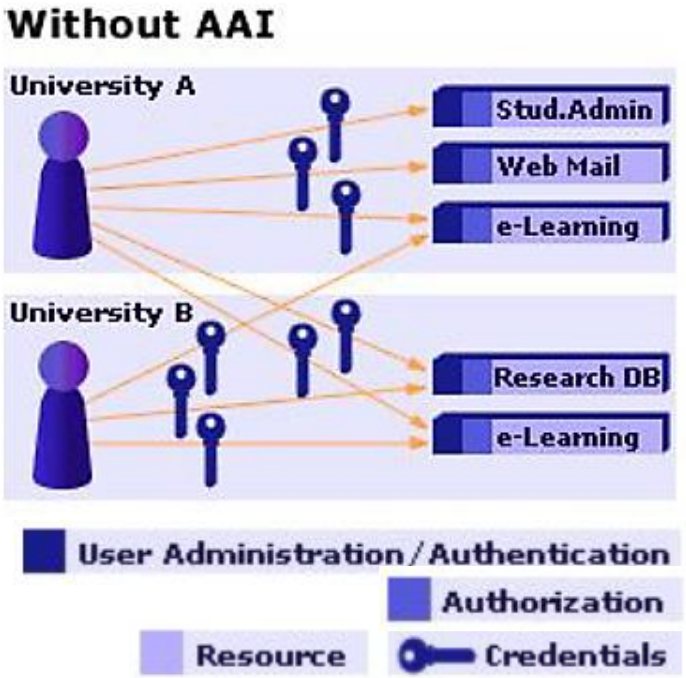


Image: AARC NA2 training module “Authentication and Authorisation 101” - https://aarc-community.org/training/aai-101/

Authentication and Authorization Infrastructure

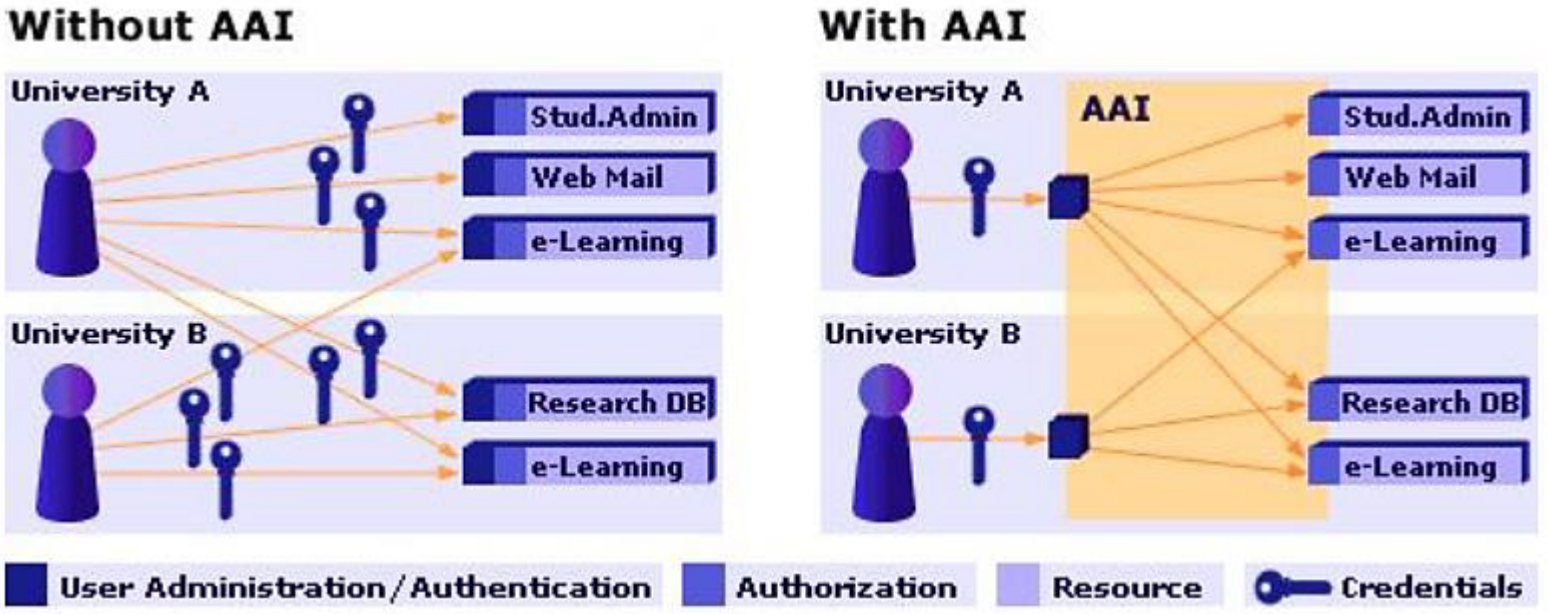
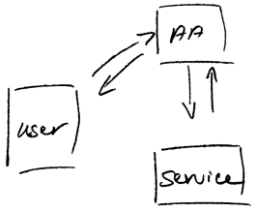


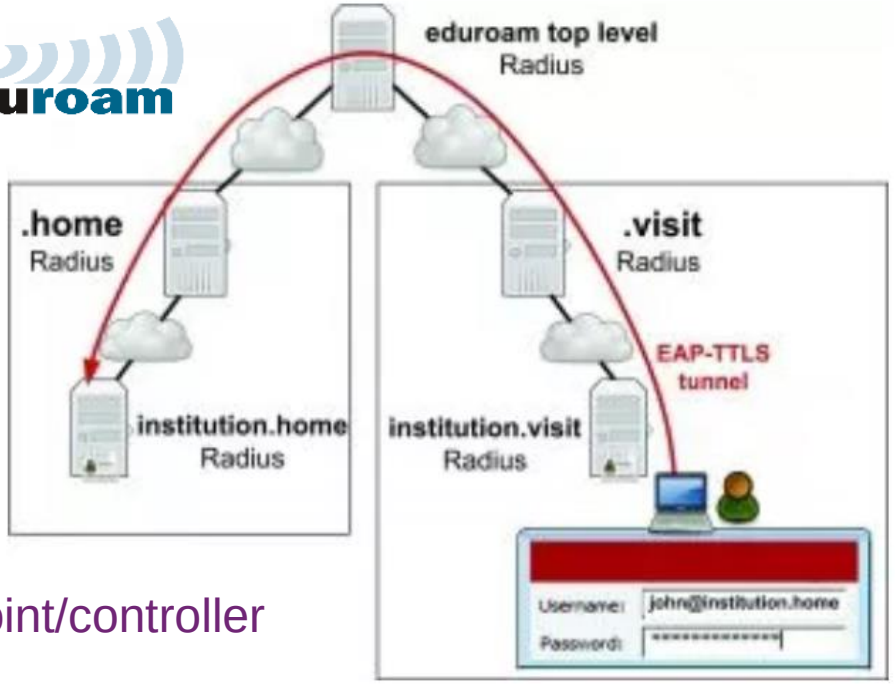
Image: AARC NA2 training module “Authentication and Authorisation 101” - https://aarc-community.org/training/aai-101/

One simple federation you know: eduroam

Service-specific “WiFi” trust
between organisations globally

- hierarchical RADIUS servers
- based on 802.1x secure exchange
- over TLS or EAP-TTLS
- tunneling your credentials
  back to your home institution

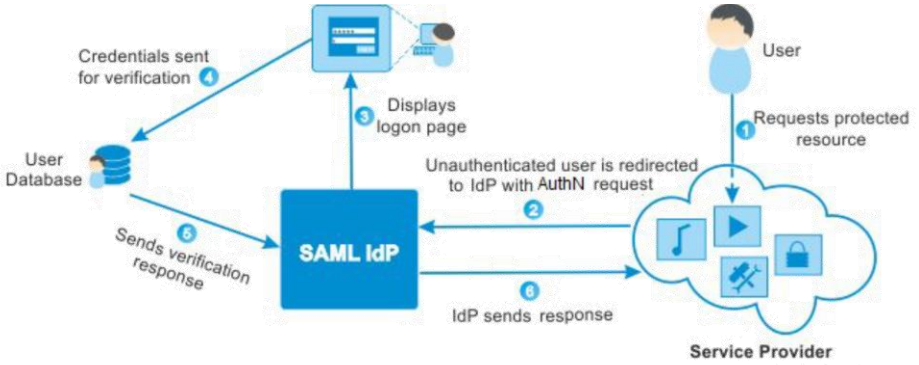




Radius server then instructs WiFi access point/controller

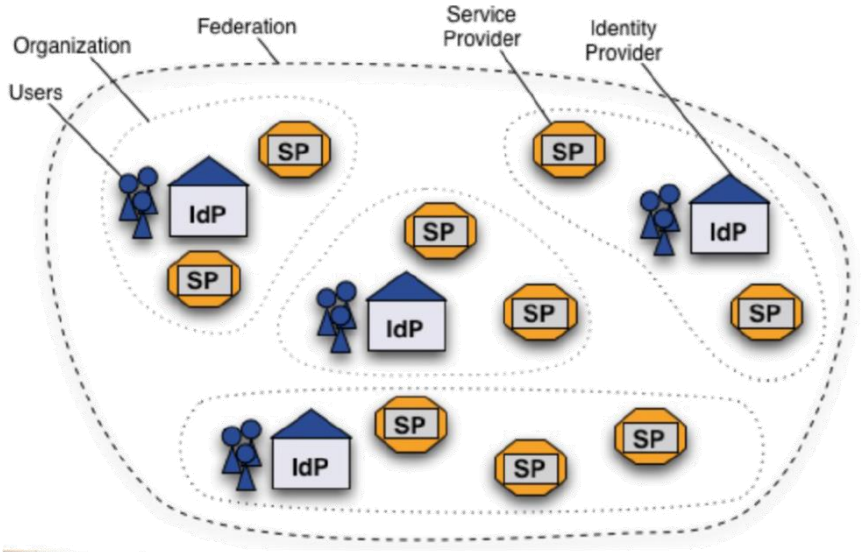
eduroam: Klaas Wieringa et al., image from https://eduroam.org/how/, GEANT ; RADIUS: RC2865 https://www.rfc-editor.org/rfc/rfc2865; see also freeradius.org

Federation and the SAML dance



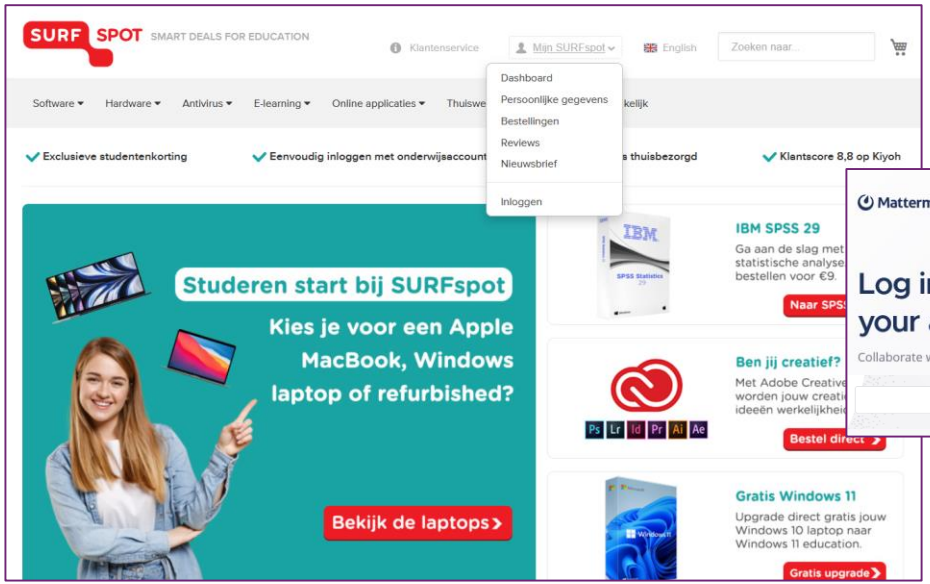
SAML2.0 auth flow

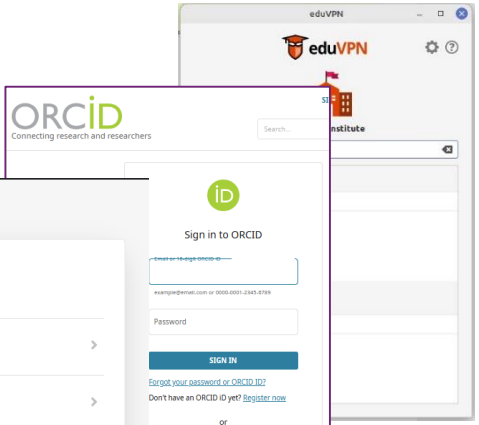
‘portability of identity across administrative domains’

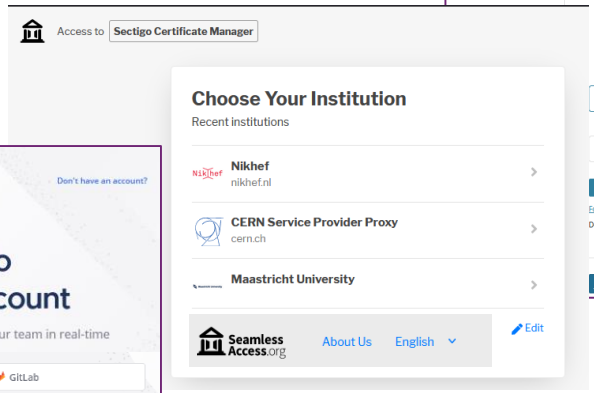


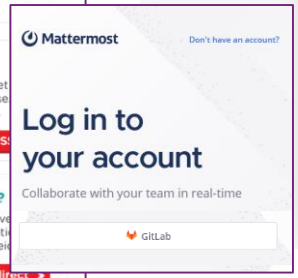
Shibboleth IdP image and SAML2 auth flow by SWITCH (CH) – see also https://refeds.org/ on federation structure and (assurance and security) guidelines

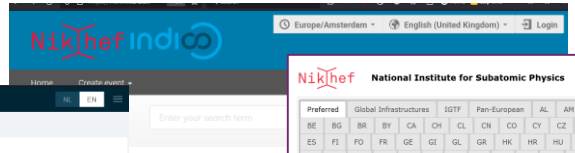
Your favourite federated service?

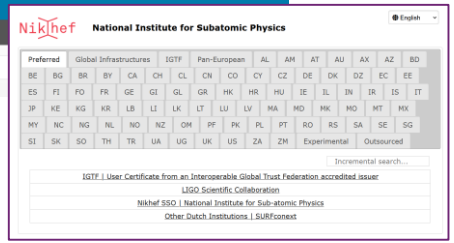






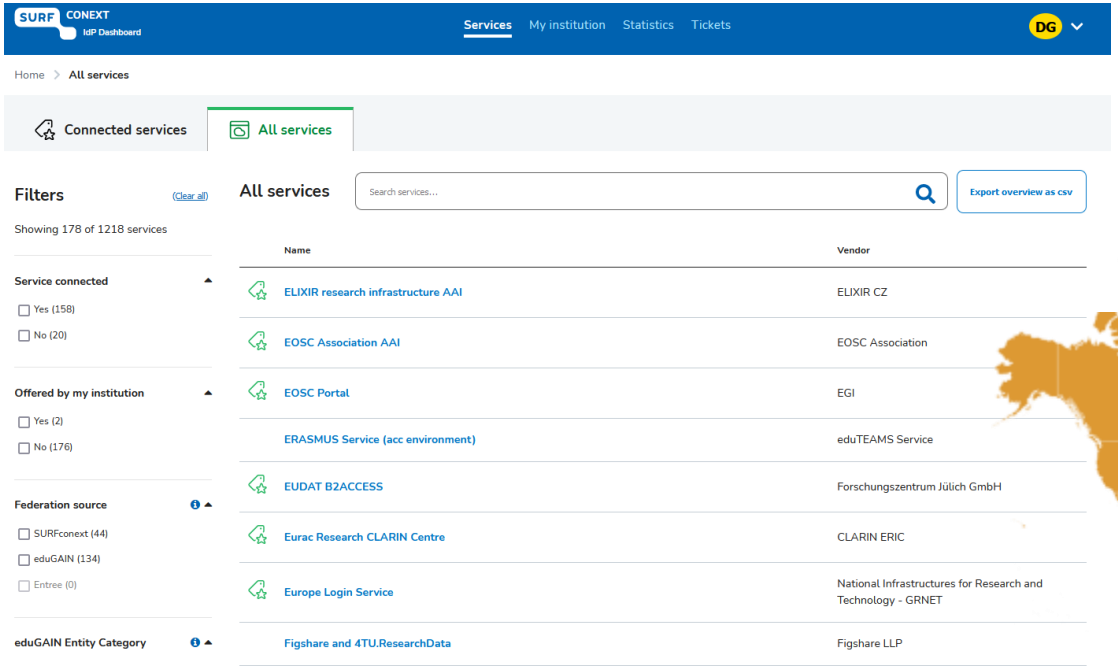


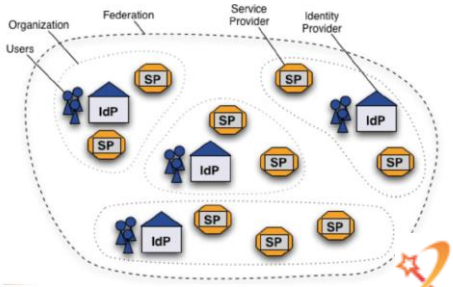




https://surfspot.nl/ - see also https://kb.nikhef.nl/ct for inspiration on more federated services available to you

Multipurpose federations: SURFconext & eduGAIN

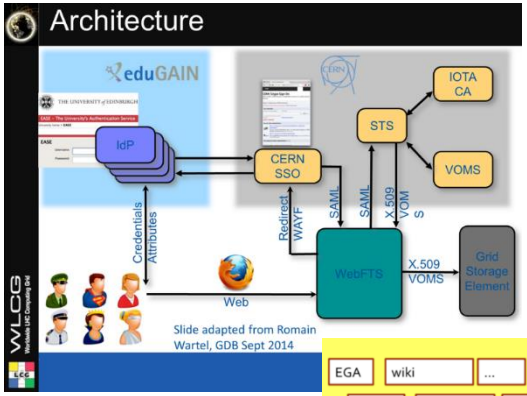




eduGAIN

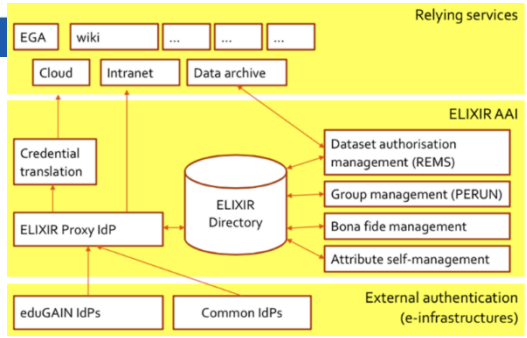
Images: SURFconext IdP dashboard by SURF, showing some services tagged with REFEDS R&S; eduGAIN map: GEANT, https://technical.edugain.org/status

AARC: managing complexities of federation & identity

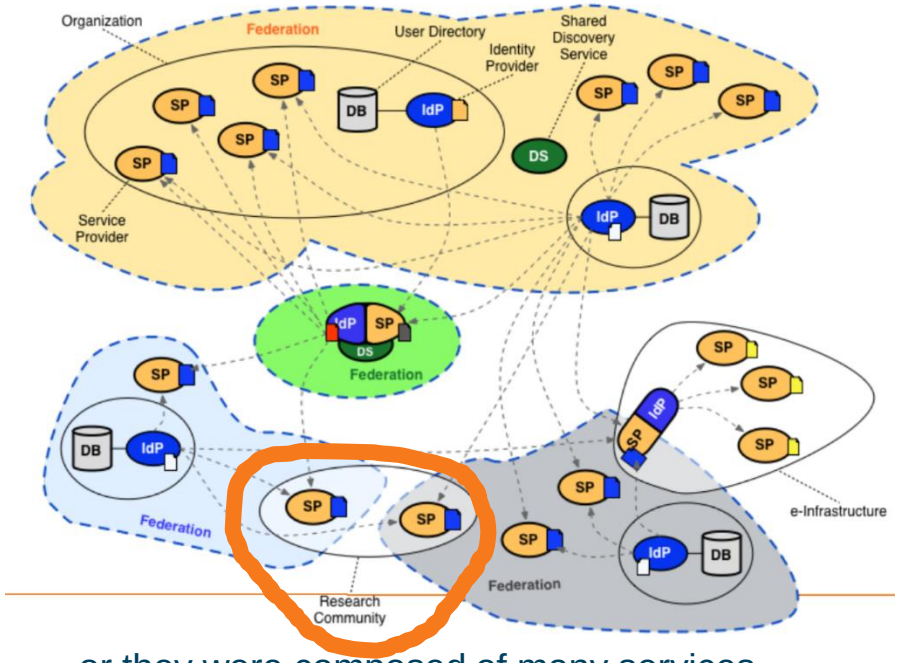


WebFTS prototype 'FIM4R' in wLCG Romain Wartel et al.

ELIXIR reference architecture 2016 Mikael Linden et al.



communities had either invented
their own 'proxy' model to abstract complexity



or they were composed of many services
each of which had to manage federation complexity

Community images: Romain Wartel, CERN;
Mikael Linden, CSC; Lukas Hammerle, SWITCH

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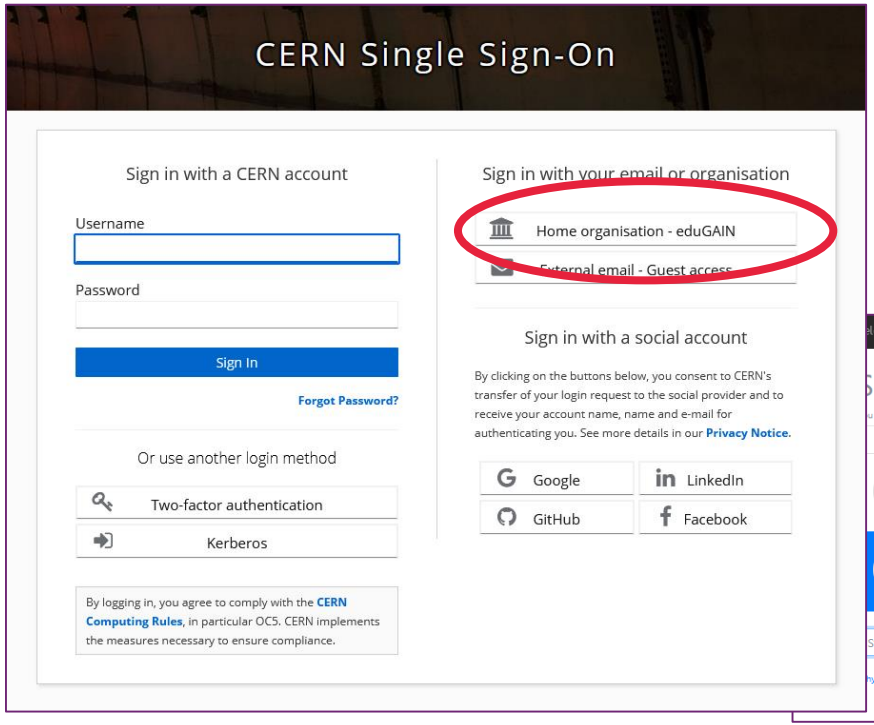
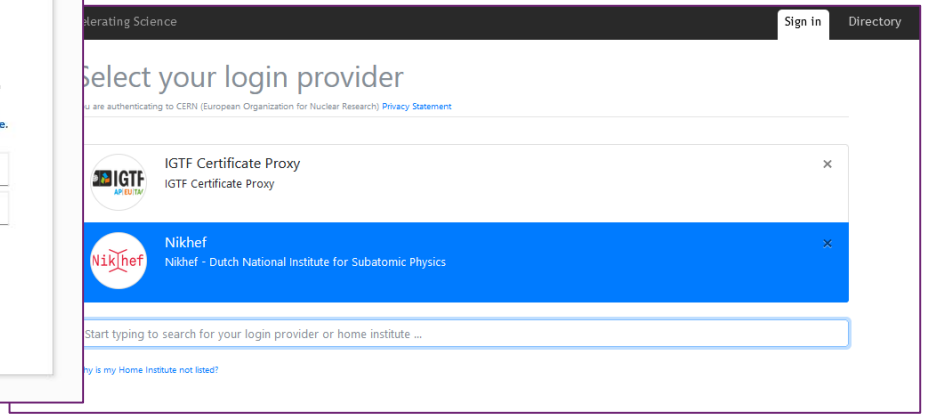
New CERN single sign-on



Having done *account linking* at CERN, you can use your Nikhef or university home identity without having to login again.

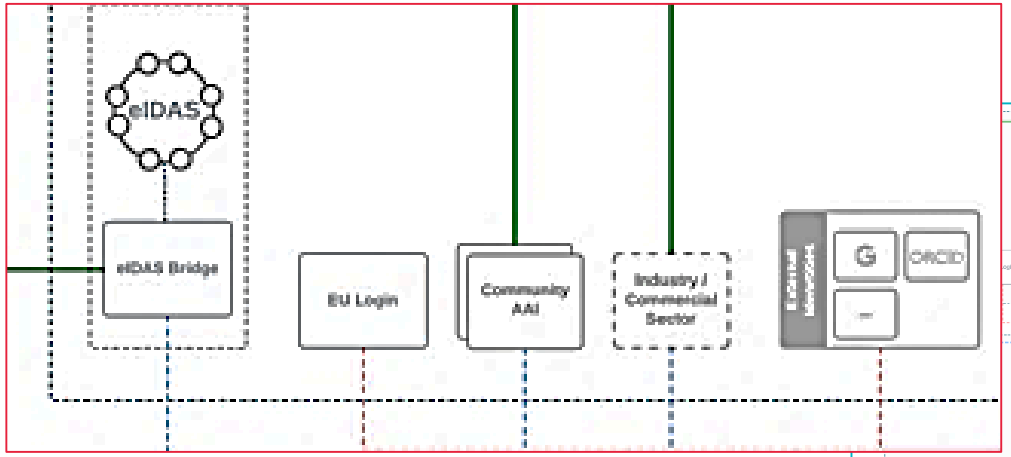
For up to ‘cappuccino’ (4/5) assurance level

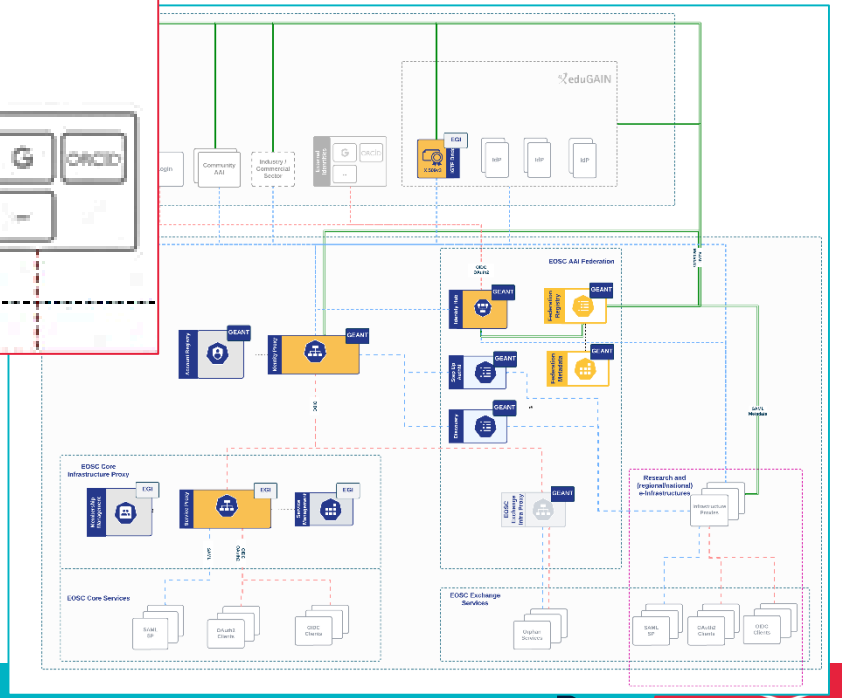


https://auth.cern.ch/auth/realms/cern/protocol/openid-connect/auth - CERN new SSO system design by Hannah Short *et al.*

EOSC AAI Federation

***Identity assurance** brings the true value:*
authenticators are aplenty, and 'MFA'
far less interesting than vetted identities.
But HEI home IdPs seem reluctant to provide it …

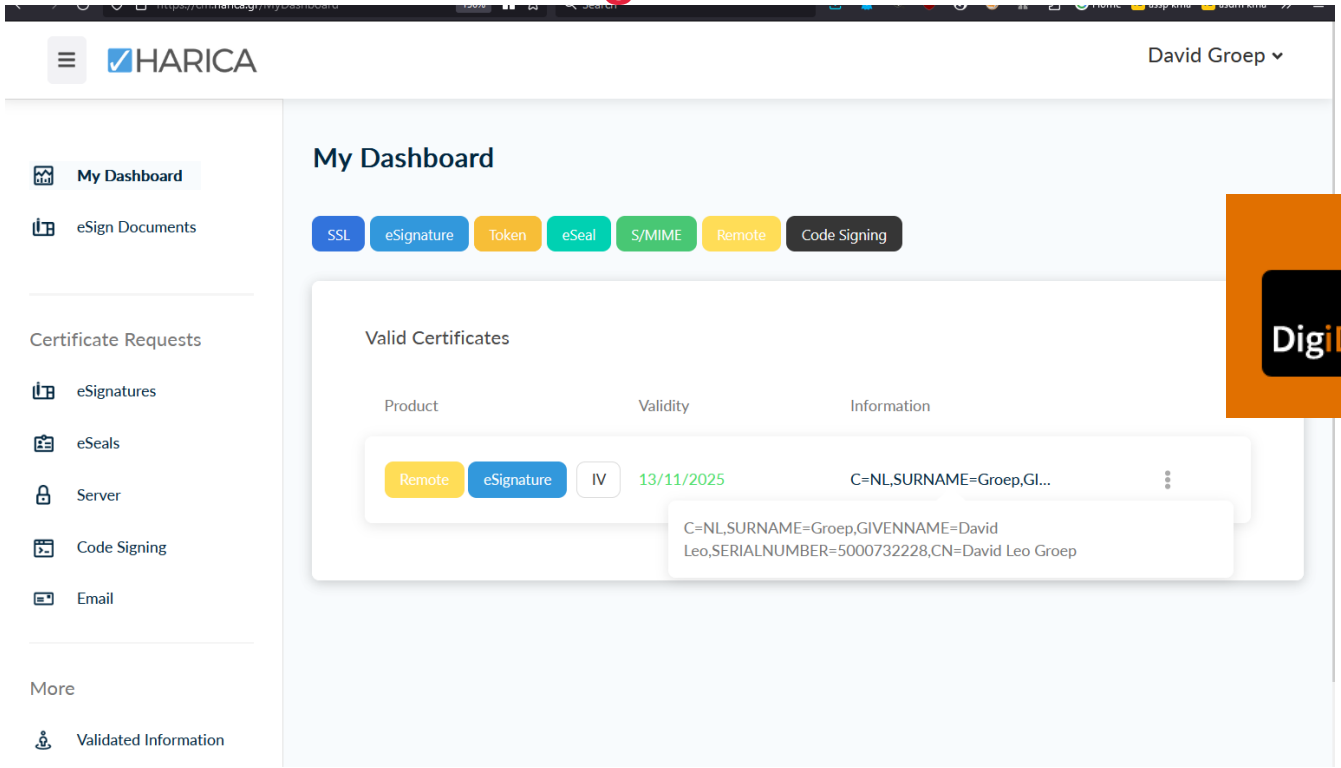




user identity comes 'with the user' from outside,
mediated by the research community, ORCID,
or from the home member state involved

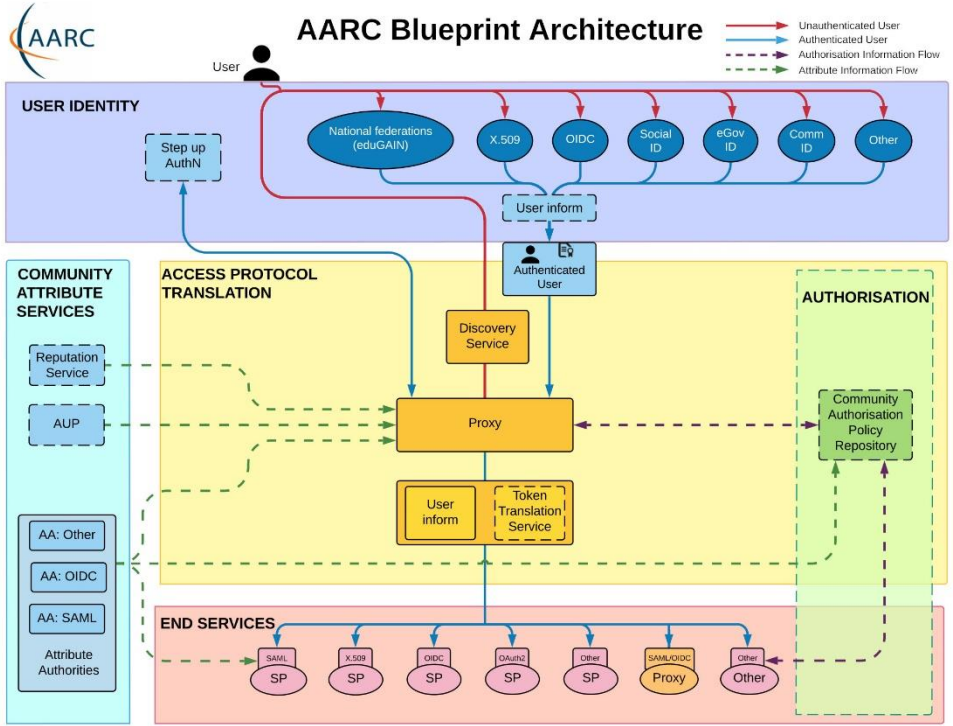
Image: EOSC AAI for the EOSC Core and Exchange Federation for the EOSC European Node by Christos Kanellopoulos, Nicolas Liampotis, David Groep (June 2023)

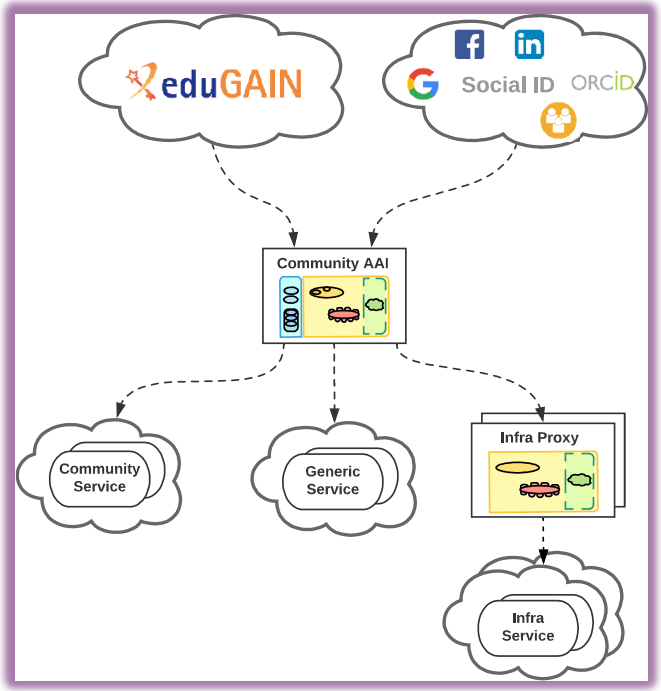
Better than a blue-ink signature, and assurance via DigID



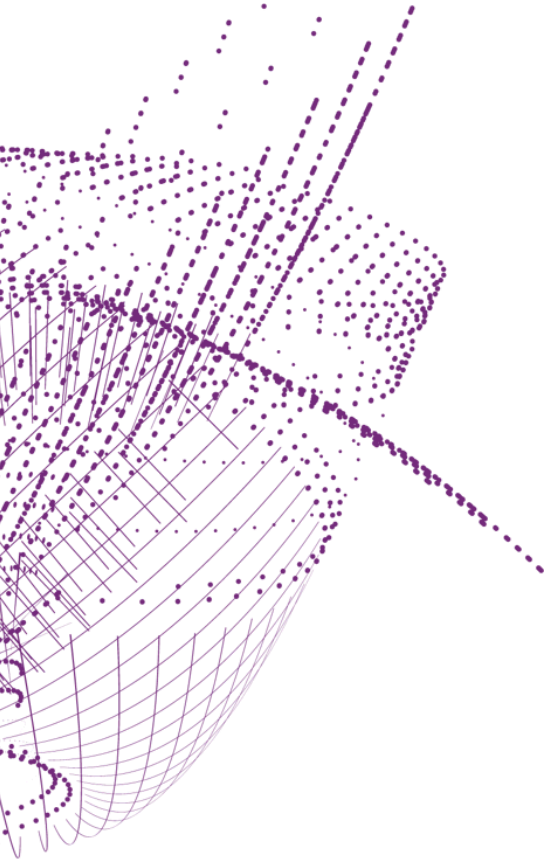
images: screenshot of the HARICA remote signing interface, cm.harica.gr. Dutch eIDAS for citizens: DigID, excerpt from www.digid.nl screen shot
Thanks to Dimitris Zacharopoulos (HARICA) for getting the authentication working. eIDAS connected enabled through GRNET and Logius

Most trust flows from the (research) community





AARC Blueprint Architecture (2019) AARC-G045 https://aarc-community.org/guidelines/aarc-g045/;
stacked proxies: EOSC AAI Architecture: EOSC Authentication and Authorization Infrastructure (AAI), ISBN 978-92-76-28113-9, http://doi.org/10.2777/8702



RCauth.eu
by Mischa Sallé et al.

Example service translating to certificates

Token translation example: RCauth

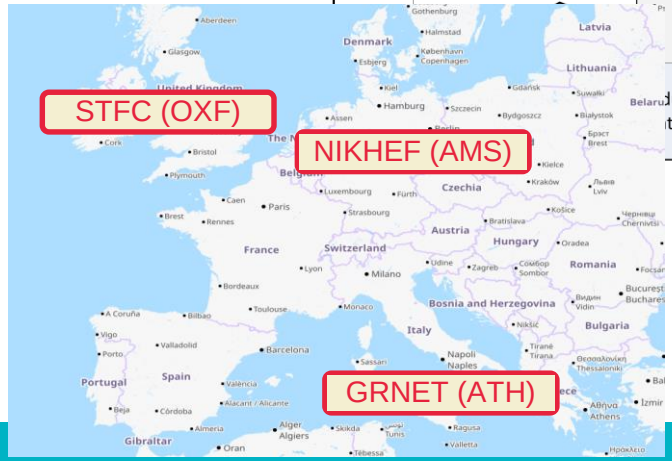
from Heath Robinson to anycasted HA infrastructure

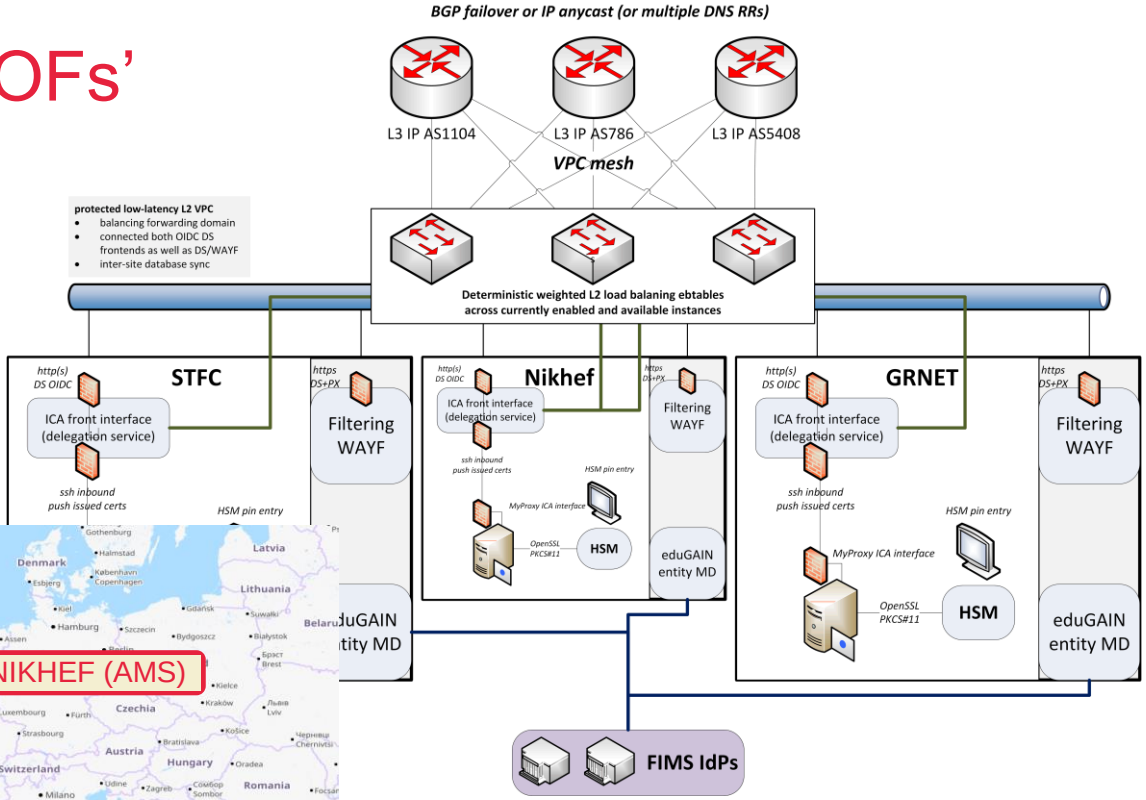
Nikhef RCauth prototype instance in 2019
Mischa Sallé

But we did not like ‘SPOFs’

Distributed High Availability setup
across the 3 sites
design for minimal effort
readily-available techniques

- L3 VPN (OpenVPN) or L2 VPC
- Linux HAProxy

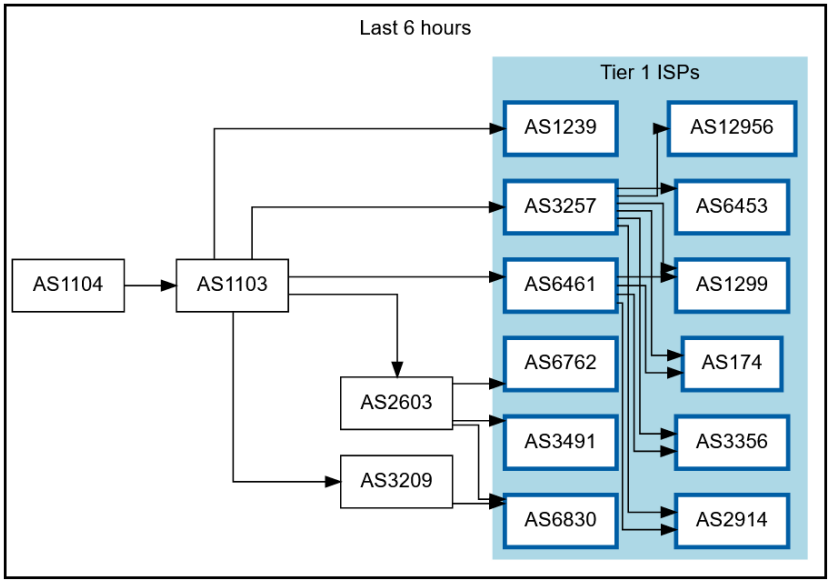


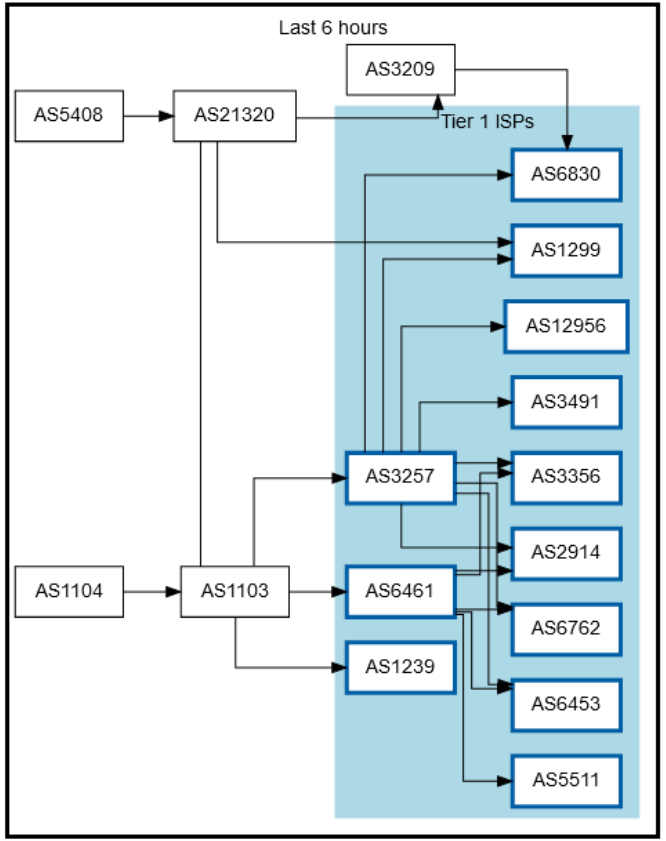


work supported by the EOSC Hub and EOSC Future projects
co-funded by the European Union

Design by Mischa Sallé, with Nicolas Liampotis and Kyriakos Gkynis

Getting 2a07:8504:1a0::/48 out there



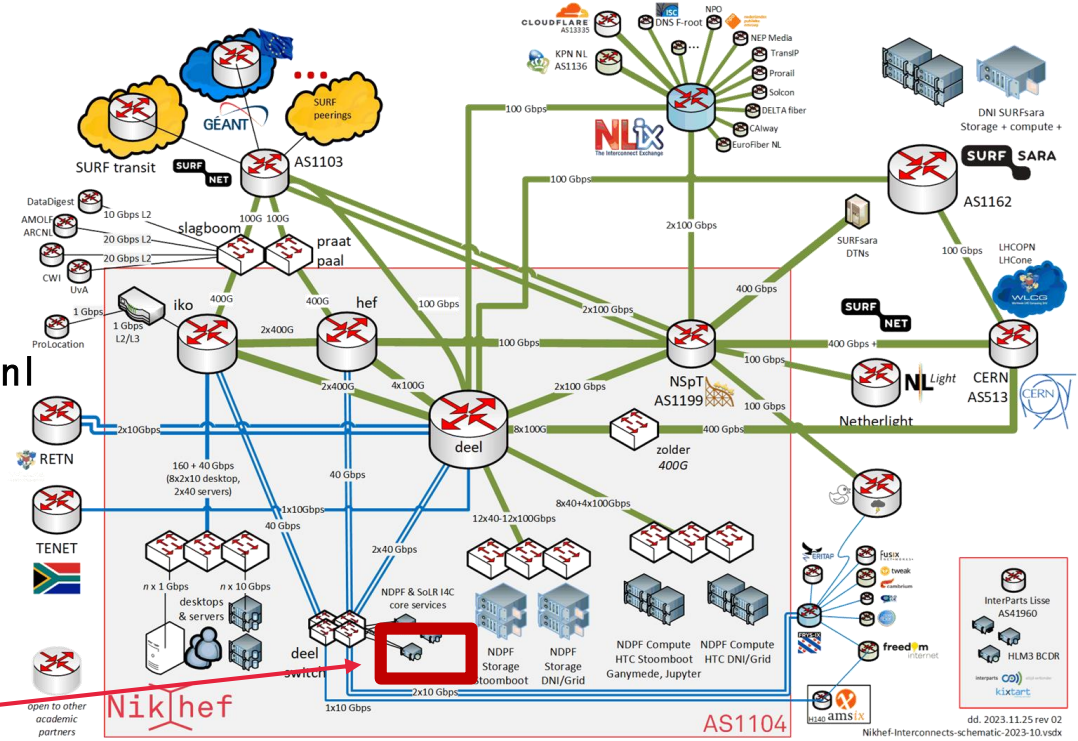


route maps: bgp.tools for 2a07:8504:1a0::/48 – IPv4 for 145.116.216.0/24 is similar – imagery from November 2022

Always the shortest path!

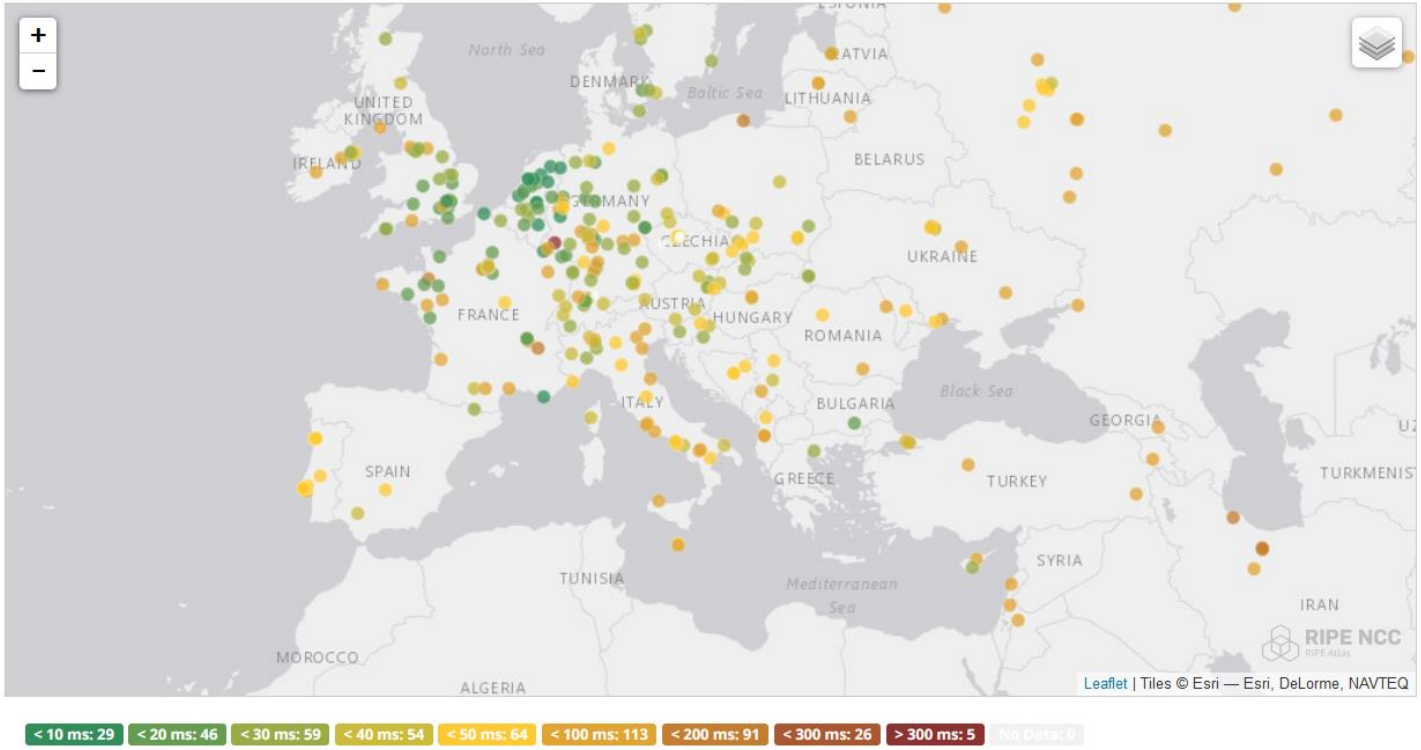
```
[root@kwark ~]# traceroute -IA 145.116.216.1
traceroute to 145.116.216.1 (145.116.216.1),
30 hops max, 60 byte packets
 1  cmbr.connected.by.freedominter.net
      (185.93.175.234) [AS206238]
 2  connected.by.freedom.nl
      (185.93.175.240) [AS206238]
 3  et-0-0-0-1002.core1.fi001.nl.freedomnet.nl
      (185.93.175.208) [AS206238]
 4  as1104.frys-ix.net (185.1.203.66) [*]
 5  parkwachter.nikhef.nl
      (192.16.186.141) [AS1104]
 6  gw-anyc-01.rcauth.eu
      (145.116.216.1) [AS786/AS5408/AS1104]
```

rcauth.eu HA proxy



Route from home to RCauth.eu, from my home ISP (Freedom Internet)

You get reasonable load balancing in Europe for free



map: RIPE NCC RIPE Atlas - 500 probes, distributed across Europe (https://atlas.ripe.net/measurements/50949024/)

Co-funded by the European Union

AARC TREE and GEANT 5-1 are co-funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union. Neither the European Union nor the granting authority can be held responsible for them.

Thanks to the AARC Community, including folk from whom I re-used graphics and material in this overview. In random order: Licia Florio, Nicolas Liampotis, Christos Kanellopoulos, Marina Adomeit, Janos Mohacsi, Ilaria Fava, Slavek Licehammer, Dave Kelsey, Ian Neilson, Marcus Hardt, Mischa Salle, Hannah Short, and Maarten Kremers.

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

Maastricht University
Nikhef

Under the hood, this is a (signed) XML document

```
<saml:Subject>
     <saml:NameID Format="urn:oasis:names:tc:SAML:2.0:nameid-format:persistent">xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx</saml:NameID>
     <saml:SubjectConfirmation Method="urn:oasis:names:tc:SAML:2.0:cm:bearer">
       <saml:SubjectConfirmationData NotOnOrAfter="2022-10-21T18:16:40Z"
         Recipient="https://attribute-viewer.aai.switch.ch/Shibboleth.sso/SAML2/POST"
         InResponseTo="_64c10a60c382bdaeb328653d9d25951c" /></saml:SubjectConfirmation>
   </saml:Subject>
   <saml:Conditions NotBefore="2022-10-21T18:11:39Z"
                    NotOnOrAfter="2022-10-21T18:16:40Z">
     <saml:AudienceRestriction>
       <saml:Audience>https://attribute-viewer.aai.switch.ch/shibboleth</saml:Audience>
     </saml:AudienceRestriction>
   </saml:Conditions>
   <saml:AuthnStatement AuthnInstant="2022-10-21T17:33:
                        SessionNotOnOrAfter="2022-10-22
                        SessionIndex="_90f745f18f712b6a
    <saml:AuthnContext>
        <saml:AuthnContextClassRef>urn:oasis:names:tc:S
        <saml:AuthenticatingAuthority>https://sso.nikhe
    </saml:AuthnContext>
   </saml:AuthnStatement>
```

```
<saml:AttributeStatement>
     <saml:Attribute Name="urn:mace:dir:attribute-def:cn"
                     NameFormat="urn:oasis:names:tc:SAML:2.0:attrname-format:uri">
       <saml:AttributeValue xsi:type="xs:string">David Groep</saml:AttributeValue>
     </saml:Attribute>
     <saml:Attribute Name="urn:oid:2.5.4.3"
                     NameFormat="urn:oasis:names:tc:SAML:2.0:attrname-format:uri">
       <saml:AttributeValue xsi:type="xs:string">David Groep</saml:AttributeValue>
     </saml:Attribute>
     <saml:Attribute Name="urn:mace:dir:attribute-def:eduPersonAffiliation"
                     NameFormat="urn:oasis:names:tc:SAML:2.0:attrname-format:uri">
       <saml:AttributeValue xsi:type="xs:string">employee</saml:AttributeValue>
       <saml:AttributeValue xsi:type="xs:string">member</saml:AttributeValue>
       <saml:AttributeValue xsi:type="xs:string">faculty</saml:AttributeValue>
     </saml:Attribute>
     <saml:Attribute Name="urn:oid:1.3.6.1.4.1.5923.1.1.1.1"
     ...
```