A (personal) journey through the Dutch e-Infrastructure landscape

Arjen van Rijn, Ron Augustus

21 June 2023
My institute: Nikhef

Nikhef: the Dutch National Institute for Subatomic Physics

1946: establishment of IKO (FOM i.e. the Physics Research Council, City of Amsterdam and Philips); institute for nuclear physics; legal predecessor of Nikhef

1975: formation of the Nikhef partnership (FOM and four Dutch universities) to coordinate Dutch activities in nuclear and particle physics;

1980: Nikhef main building concentrated on Amsterdam Science Park, adjacent to the Mathematical Center (MC – established 1946) and SARA (established 1971)
The (predecessors of the) Dutch e-infrastructure players

1971: establishment of SARA: compute centre for the two Amsterdam universities and the national Mathematical Center (‘CWI’)

1986: establishment Stichting SURF ‘Samenwerkende Universitaire RekenFaciliteiten’ by Hans Rosenberg, astrophysicist;

1988: establishment SURFnet: roll out of the first Dutch research and education network;

1988: establishment of Stichting NCF, tasked with providing supercomputing facilities in the Netherlands;
Meanwhile: internet really took of ...

1989: Tim Berners-Lee submits a proposal for an information management system to his boss, Mike Sendall.

1986 – 1999: emergence of

- RARE (TERENA)
- RIPE NCC
- AMS-IX (Amsterdam Internet Exchange)

.... all with their first offices at Nikhef;
The story continues ...

[1.1.1999: Arjen joins Nikhef]

1999: first discussions at CERN on distributed processing of LHC data: ‘datagrid’

2000 – 2005: first national projects on development of grid infrastructure, supported by various national funds;

2007 – 2012: BiG Grid: 28 M€ project for the roll-out of distributed data processing facilities in The Netherlands; consortium: NCF, NBIC (Bioinformatics) and Nikhef; SARA a prominent partner in this project. Project delivered a.o. the Dutch Tier-1 for WLCG;

2008: report of the national ‘ICT regie-orgaan’ on ICT facilities for research, advising the Ministry of Education Culture and Science to ‘bring all ICT facilities under one roof, preferably SURF’;
2009: Amsterdam Science Park wins competition for hosting head office EGI, first offices at Nikhef;

2012: Arjen joins e-IRG

2013: SURF and SARA merge into one organization; under SURF three separate business units: SURFnet, SURFsara and SURFmarket; Grid infrastructure incorporated in national e-infrastructure; NCF meanwhile dissolved;

2021 – 2025: Nikhef and SURF continue to work together in the Dutch national e-Infrastructure;

2021: merger of SURF business units in one entity (SURF B.V.)
My 20+ year take away

- Change takes time;
- You need a bit of luck now and then; and it helps being closely located together (such as Nikhef and SARA being colocated on the Amsterdam Science Park);
- e-Infrastructure innovation and development can profit from the dynamics of a demanding user community, that likes to work closely with technologies to serve their needs;
- Researchers and research communities are usually not interested in how the various (ICT) services (computing, data, networking) reach them; you better hide your organizational complexities from them ...
- SURF as the e-infrastructure service provider in NL really worked out.
- Hence my advocacy of the national node concept.
SURF Milestones

- 260 million unique logins with SURFconext in 2022
- 72,740 users on SURFdrive
- 11,000 km fiber connections within The Netherlands and neighbour countries
- 27,500 locations in 101 countries with Eduroam
- 14 petaflop/s peak performance of the National Supercomputer Snellius
- 100 million in purchasing contracts
6 Technologies, 29 trends!

**Artificial Intelligence**
→ Towards ‘Frankenmodels’
→ More efficient approaches towards AI systems
→ New ways to access data
→ Towards trustworthy AI
→ More accessible computing and models

**Advanced Computing**
→ Computing continuum
→ Energy sustainability in digital infrastructures
→ Protect sovereignty in digital infrastructure
→ Unconventional paradigms for computing
→ High-end computing in qualitative research fields

**Quantum**
→ Quantum Key Distribution (QKD) gaining momentum
→ Quantum Computing as a Service (QCaaS)
→ Hybrid quantum/classical computing
→ Error correction techniques
→ Quantum curiosity

**Edge**
→ Cloud-Edge Continuum
→ Digital Twins
→ Actual real-time data streams
→ Run code anywhere
→ Robotic Automation

**Network**
→ Big Tech and networking
→ Intelligent networks
→ Edge and campus architecture
→ Next generation networks

**eXtended Reality**
→ Enriching XR by combining technologies
→ Virtual social interactions are getting more advanced
→ New gear for new realities
→ An increasing number of ethical concerns
→ A fragmented ecosystem
Public Values!

The Value Compass provides a frame of reference for structuring digital transformation based on values. SURF and Kennisnet, the public IT organisations for education in the Netherlands, have developed the Value Compass to provide a common language to stimulate the dialogue about digital transformation in education and the importance of educational values.