

# Pioneering the Exascale

*“SURF is the collaborative organisation for ICT in Dutch Education & Research”*



- National Supercomputing & Networking center
- High-end IT solutions & expertise for research
- Facilitate NL (IT) participation in Global projects

=> Driving innovation together !

*Raymond Oonk (Sr. Advisor @SURF)*

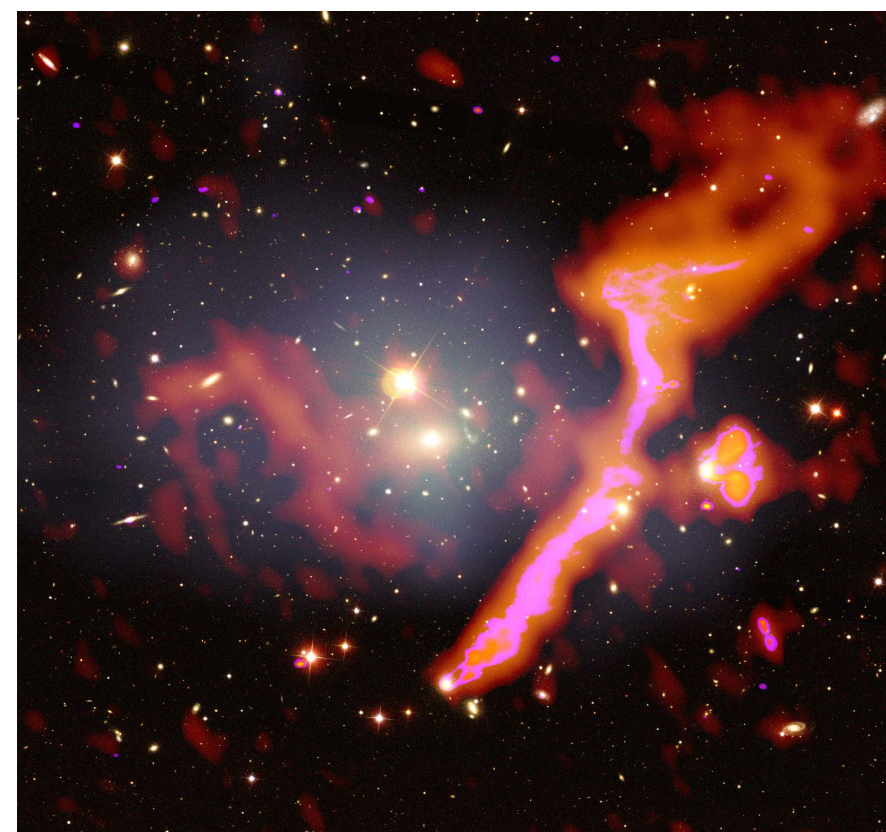


# Pioneering the Exascale

#P6.1

Poster shows some of our services for research

## LOFAR + SURF High Throughput Data Processing



**LOFAR Surveys  
LoTSS DR1  
(Shimwell+2019)**



**>25 PB stored  
>10 PB processed**

2

( **A. Mechev: Thursday 09:45** )

**SURF**

Pioneering the Exascale Era

driving innovation together


SURFsara supports individual researchers and large collaborations with their research & education needs as a service & infrastructure provider

### Compute solutions

#### High Performance Computing

- *Cartesius*: the Dutch national supercomputer with CPUs, GPUs and infiniband interconnects suited for large scale, demanding, parallel applications and Machine Learning.
- *Lisa*: general purpose compute cluster with CPUs and GPUs

#### High Throughput Computing

- *Grid*: transnational, distributed infrastructure of CPU compute clusters and storage systems for processing very large datasets
- *Spider (2020)*: interactive & interoperable platform for large data
- *MS4 (2020)*: co-creation and service hosting platform 

#### Cloud Computing

- *HPC Cloud*: dynamically scalable & fully configurable compute and storage resources with both CPUs and GPUs



**> 80,000 compute cores**  
see: [surf.nl](https://surf.nl)

(image: Dutch national supercomputer: Cartesius)

### Data storage & management

#### Data Archive

Safely archive up to PB's of valuable research data

#### Grid storage

Extremely scalable disk & tape storage for TB - PB size data

#### Research Drive

Cloud-based, sync & share, collaborative storage for TB size data

#### High speed network

Internal compute-storage: 1200 Gbit/s, External: >100 Gbit/s

#### Data management

Solutions & training to help you manage your research data

**> 60 PB of science data**  
see: [surf.nl](https://surf.nl)

(image: SURF tape robots - 2 libraries @ 2 locations)



Support

Optimization

Visualization

Training

Collaboration

### SURF ACCESS & INFO

[HTTPS://WWW.SURF.NL/  
EN/APPLYING-FOR-ACCESS-  
TO-COMPUTE-SERVICES](https://www.surf.nl/en/applying-for-access-to-compute-services)

-> SURF booth @ ADASS2019



SURF is ISO 27001 certified and meets the high requirements for information security.

### SURF & Astronomy

- **LOFAR - SURF** provides >25 PB of storage, HPC and Grid compute for breakthrough science (Shimwell et al. 2019, A&A 622)



- **Exoplanets - SURF** provides HPC, GPU compute & support to study the survivability of planets (Cai et al. 2019, MNRAS 489)



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SURF offers students and scientists in the Netherlands access to the best possible ICT facilities. More info at [surf.nl](https://surf.nl) and via [helpdesk@surfsara.nl](mailto:helpdesk@surfsara.nl)



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# Pioneering the Exascale

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Poster does not show, e.g.

- Innovation
  - ML / AI
  - Cloud technology (Spider/MS4 - 2020)
  - Hardware acceleration
  - Technology assessment
- Collaboration
  - co-creation (MS4 - 2020)
  - consultancy
- International partnerships



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# Infrastructure - 400 PB / year

- Data processing services move hardware **from physical to Virtual Data Center (VDC)**
- Flexible deployment & shift of resources for the DPS services
- VDC backbone:
  - **Openstack**: tuned for data processing
  - Powerful data processing nodes (incl. GPU)
  - **Ceph**: distributed highly scalable storage
  - High Bandwidth Network (internal & external)

} **PaaS & IaaS**





- **Booth @ ADASS ( incl. network demo )**
- **BoF - Accelerators ( Today 17.20 1&2 )**
- **A. Mechev - Thursday 09:45 ( LOFAR )**

**Driving innovation together**

**SURF**