

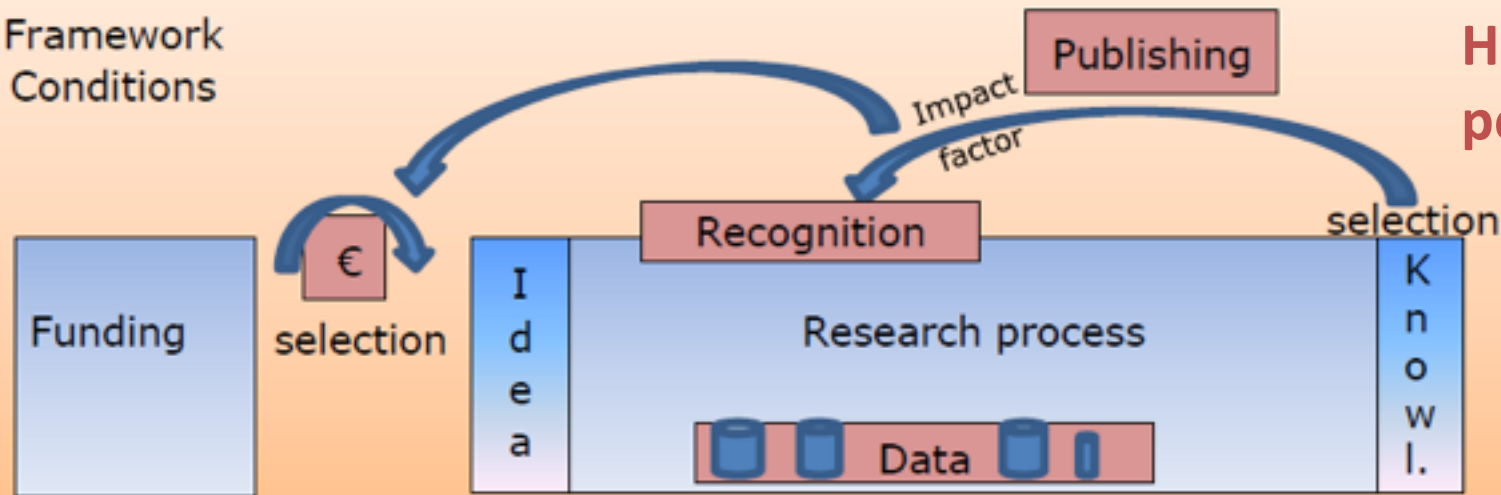
# The Dutch National e-Infrastructure

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Jan Bot, SURFsara

# A long road went before this

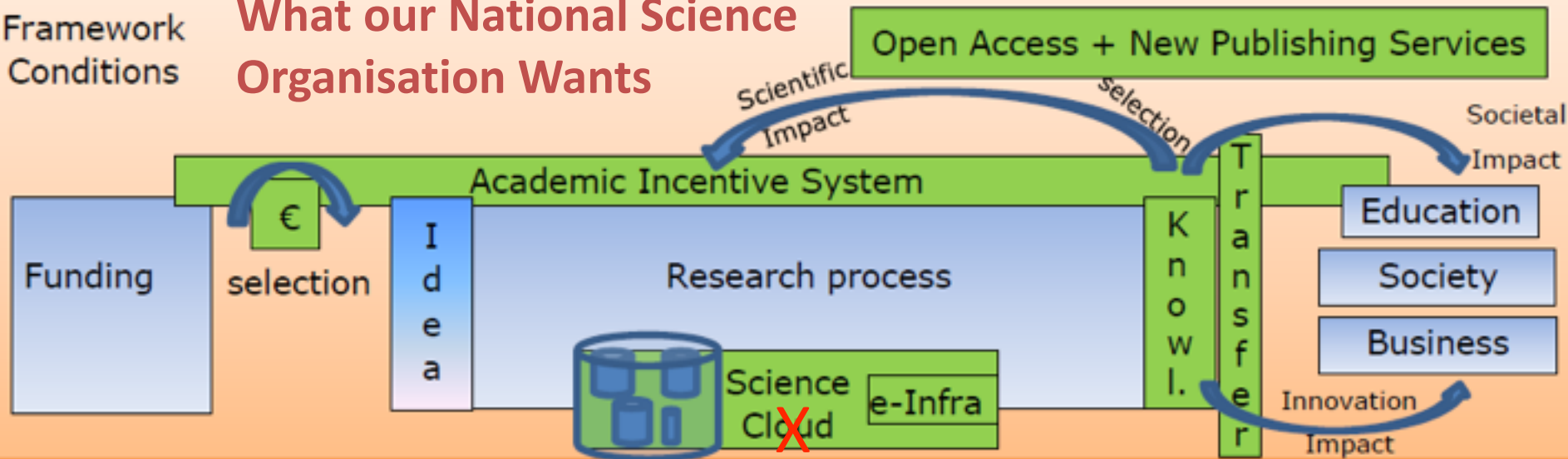
- I skip most of the history; not so interesting outside of NL, except:
- It took a long time (even in a small country) ... ~ 15 years.

Framework  
Conditions



Framework  
Conditions

**What our National Science  
Organisation Wants**



**HOW DO WE MAKE SUCH A THING WORK FOR EVERYBODY?**

# **OUR SCIENCE FOUNDATION WANTS A COHERENT INFRASTRUCTURE**

# who is “everybody”?

- Anyone eligible for grant from our National Science Organisation (NWO)
- examples:
  - astronomy, life sciences, quantum chemistry, particle physics, theoretical physics, more life sciences, “omics”, climate, water management/morphodynamics, astrophysics, life sciences, modelling ...
  - “everybody”
- lots of variation in: support needs, ‘savvy’, and research group sizes
- last 10 requests (since 25 feb):
  - 3 morphodynamics, 2 structural biology, complexity, social media, deep learning, theoretical high-energy physics

- storage
  - various types ... collaborative space vs platform for data-driven science
- cloud: easy scale out to medium scales
- “big data”
  - various flavours supported
- grid: savvy users and/or large collaborations
  - large data component
- cluster: high performance, little collaboration
- super: niche for the toughest computations

2016

59 requests

46 Cloud

8 Grid

3 Hadoop

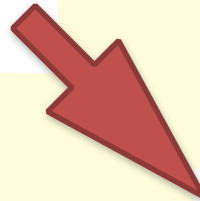
3 Visualization

2 Beehub

**ONE SIZE DOES NOT FIT ALL**



Head: “give us our own infrastructure”







Tail: We’d rather use “GAFA”





# Goals Support4Research (S4R)

- Gather e-infrastructure requirements from research institutes
  - Facilitate interaction, discussions, pilots
- Increase knowledge (at the institutes) on compute, data and network services
  - **Integrated catalog for SURF and partner institutes** 
- Strengthen bonds between research supporters
  - Community building & knowledge exchange 
  - Improved **support flow between SURF subsidiaries and institutes** 
- Increase knowledge about e-infrastructures
  - Knowledge exchange, seminars → Involve **local information managers** 
- SURF and the Dutch research institutes are taking a 'local first' approach
  - Scale to national facilities when local e-infra is not sufficient or when explicitly requested
  - Scale to European infrastructure when necessary or in context of European projects: great for cross border collaborations, Innovation & technology provider, Knowledge exchange partner, Part of the service portfolio of SURF

# Visit: [surf.nl/support4research](https://surf.nl/support4research)

## Services and support for research

## Services and support for research

Compute resources

Storage resources

Data transfer

Visualisation

Translation and integration support

Network infrastructure

Collaboration infrastructure

SURF's operating companies work together to offer a world-class communication and computing infrastructure to facilitate scientific and scholarly research. Learn about the high-end services we offer, that will power up your research. Whether you need solutions for data transfer, compute, collaboration or visualisation, we offer and support it all.

### Services overview

- **Compute resources:** high-end solutions thousands of times more powerful than your laptop
- **Storage resources:** easily accessible storage on disk or tape
- **Data transfer:** securely send very large files to other users
- **Visualisation:** advanced solutions and support to create visualisations
- **Translation and integration support:** dedicated support by experienced scientists
- **Network infrastructure:** fast end-to-end connections tailored to your research needs
- **Collaboration infrastructure:** single sign-on access to many commercial and non-commercial services

### Contact us for support

Choosing and using the right resources may be challenging. For that purpose partners within SURF initiated the SURF Outreach and Support Programme (SOS). The SURF SOS team can aid in deciding which infrastructure or solution to choose and can help to set up a research infrastructure that best fits your research



# Support4Research Team

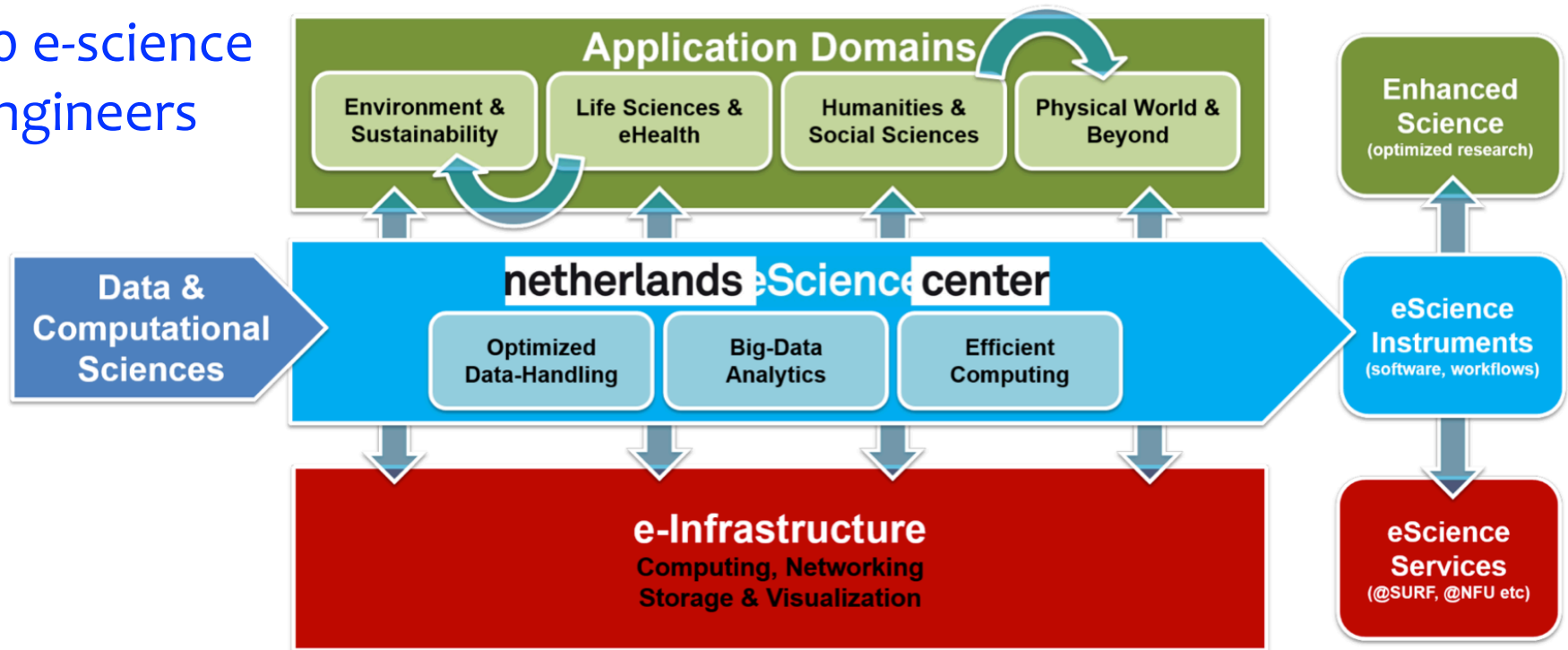


My Co-author





main asset:  
30 e-science  
engineers



State-of-the-art e-science → impact in discipline → excellence in science

**COHERENT INFRAS ALLOW BETTER SUPPORT  
(GAFA ARE COHERENT INFRAS!)**

# Dutch National e-Infrastructure today



operational partners

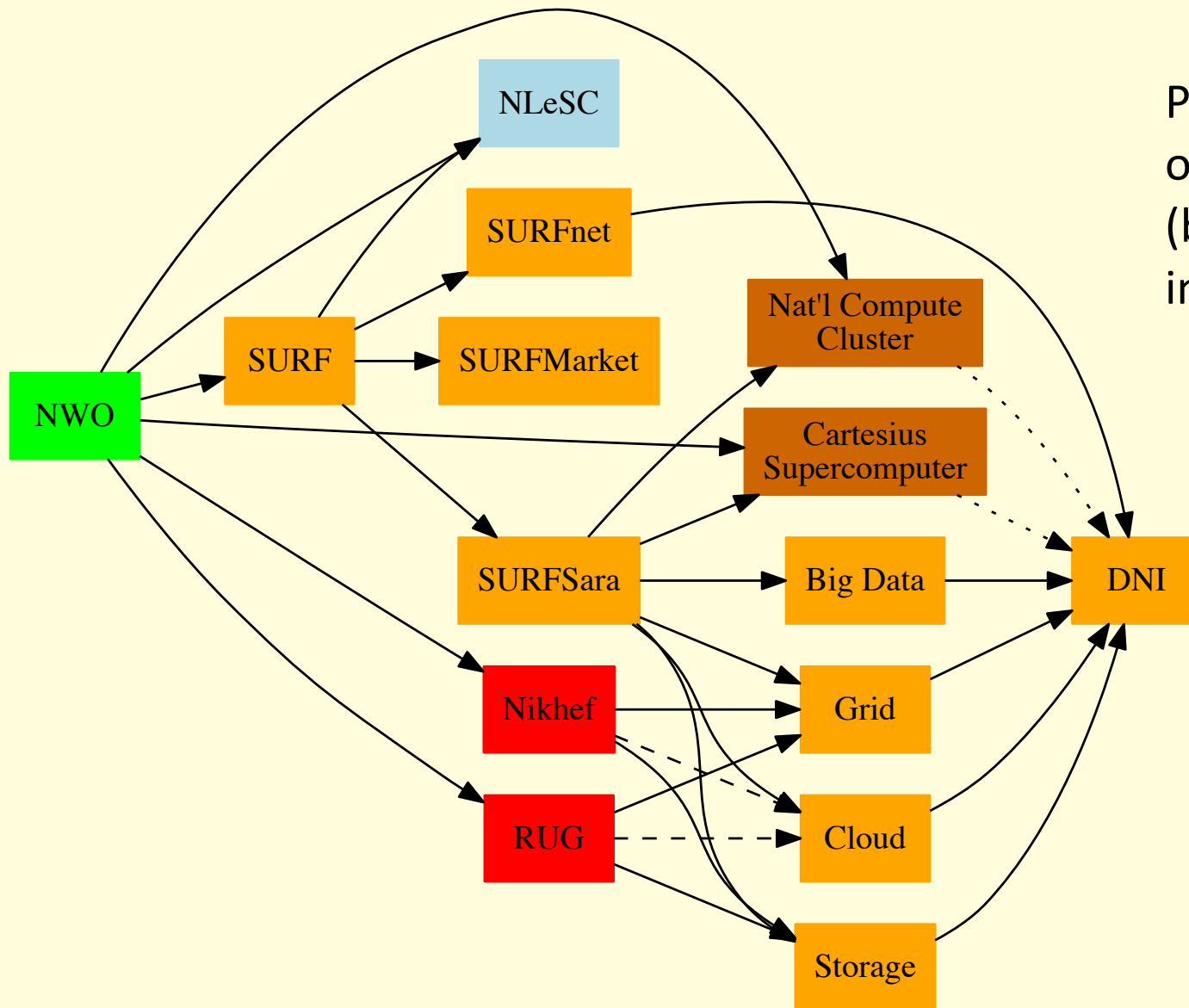


*coordinated by* **SURF**



David Groep  
Nikhef  
Amsterdam  
PDP & Grid

- central facilities located at SURFsara, Nikhef, and RUG; three locations / teams instead of tens
- Life Science Grid is distributed but centrally operated
- DNI can deploy all platforms; would be expensive for individual organisations!



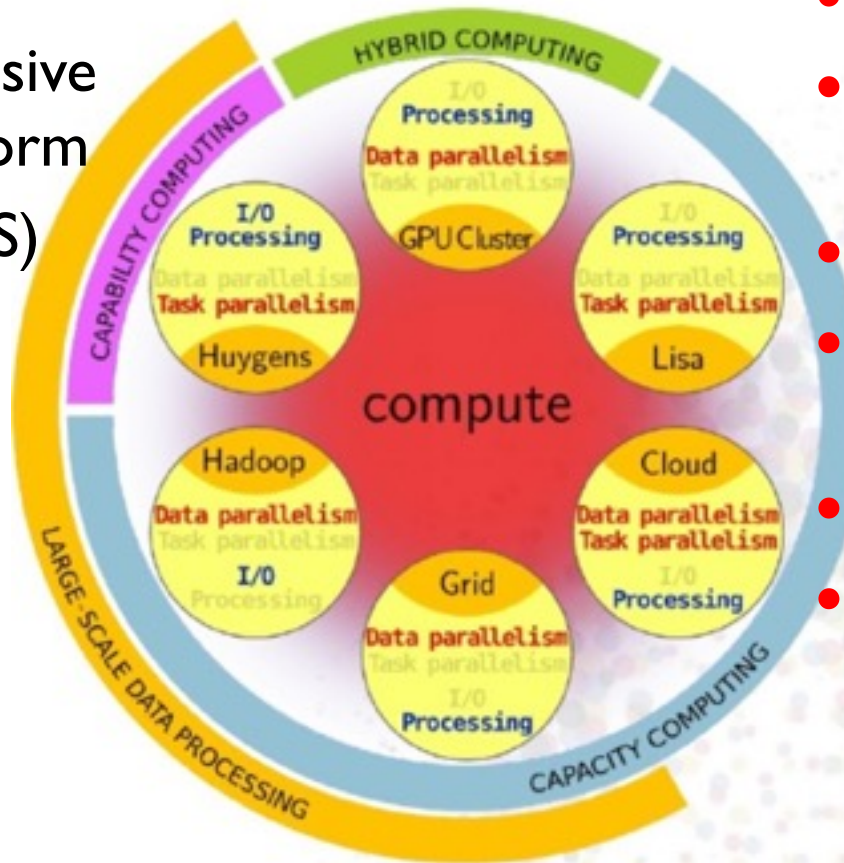
Pretty well organized  
(but room for improvement!)



# DNI data and compute services



- ‘Grid’ data intensive processing platform
- HPC Cloud (IaaS)
- Hadoop
- GPU
- BeeHub
- SURFdrive



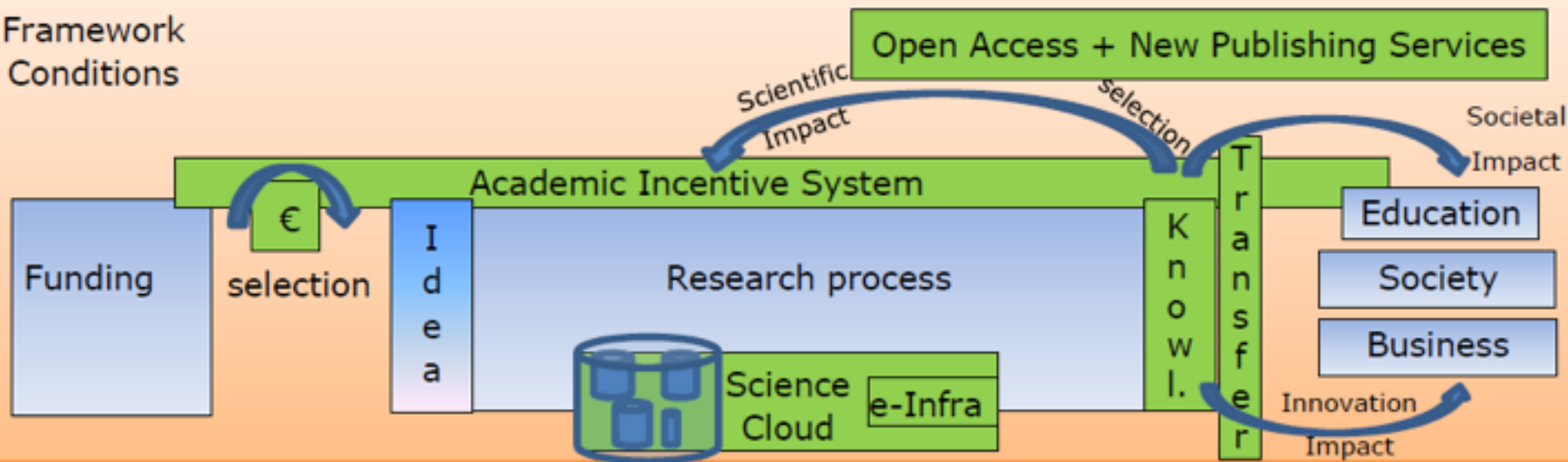
- Data Ingest Service
- High-throughput storage
- Long-term archival
- “Lisa” low-latency compute cluster
- Cartesius TI HPC
- HTC IaaS data processing Cloud (distributed, est: 2016)

David Groep  
Nikhef  
Amsterdam  
PDP & Grid

**NATIONAL INFRAS EXPLOIT ECONOMY OF SCALE  
ALLOWS OFFERING BROADER PALETTE**

## “DUTCH OPEN SCIENCE CLOUD”

Framework  
Conditions



- Policies, funding, knowledge-transfer incentives mostly national ... primarily national science cloud
- F.A.I.R. **does need** international harmonisation to be effective
- Other e-infra areas of secondary importance
- “open science cloud”: begins at national level

Findable

Accessible

Interoperable

Re-usable

- We contribute to many international collaborations
- But *always* via a national connection
  - do not follow the “donate resources to EU infra” model
  - funding is national, so allocation is too
- recent example: MoBrain Competence Center
  - NL participation through Bijvoet Center, Utrecht
  - contribute 40 M core-hours computing over coming year
- Netherlands LHC/Tier-1 Center
  - ALICE, ATLAS, LHCb
  - Allocation proceeds via Nikhef, and Nikhef co-funds the infrastructure hardware
- EUDAT, EGI, wLCG, PRACE, SKA, HNSciCloud, EU-To

# INTERNATIONAL FEDERATED INFRAS: BUILT BY FEDERATING STRONG NATIONAL INFRAS


Not Vice Versa!




Content of such *Commons*

## Complexity of the three elements

### 1. Coordination – Who is in charge of strategy, staffing and spending?

- 
- Researchers >< e-Infrastructure specialists
  - The elite (Head) >< the masses (Long tail)
  - National ministries >< European Commission
  - DG Research >< DG Connect

### 2. Provisioning of e-Infrastructures – Which ones? By whom, for whom?

- 
- Developed by e-infrastructure provider >< purchased by e-infrastructure providers
  - Developed by e-infrastructure provider >< Developed by researchers
  - Provisioning at local level >< Provisioning at national level >< Provisioning at European level

### 3. Innovation – Who knows how?

- e-Infrastructure provider innovation
- Researchers e-Infrastructure innovation
- Global commodity market (GAFA)

And funding?

- researcher pays per use?
- community pays?
- community co-pays?
- Science Foundation funds?

- Increase Coherence
  - SURFConext (nat'l) & AARC (international)
- Data Infrastructure
  - National Coordination Data Management
  - participate in EUDAT
  - Research Data Netherlands
    - together with 3TU Datacentrum & Royal Academy (DANS)
- Engaging researchers & higher education (S4R)
- Enabling new science through e-science



- Our Science Foundation wants a Coherent Infrastructure
- One Size Does Not Fit All
- Coherent Infrass Allow Better Support (GAFA are Coherent Infrass)
- National Infrass Exploit Economy of Scale Allows Offering Broader Palette
- International Federated Infrass:  
Built by Federating Strong National Infrass