National center of expertise for research software

netherlands eScience center

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National role

Projects

Strategy

Business model

Careers

...more?

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The Dutch academic landscape

- 14 universities, 8 University Medical Centers
- 25 national research institutes
- funder: Dutch research council (NWO + ZonMW)
- digital infrastructure: SURF (data, network, compute)

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“National center of expertise for research software”

- research organization founded in 2012 by SURF and NWO
- independent foundation
- for all Dutch universities, institutes, disciplines
- current budget: ca. €9M
- 100 employees, mainly “Research Software Engineers”

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Areas of expertise

- AI: machine learning, image processing
- Analytics: big data analytics, text analysis, visualization
- Data processing: databases, real-time data analysis, interoperability, linked data
- Computing: exploitation of hardware accelerators, high performance computing, cloud computing, combining simulations
- Software quality: developing workflow technologies, improving software practices, advancing software sustainability

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VISION

a robust research community, in which all investigators in all domains are able to exploit advanced digital technologies to answer curiosity-driven questions, keeping the Netherlands at the forefront of cutting-edge international research.

MISSION

empowering researchers across all disciplines through innovative research software.

AMBITION 1
collaboratively designing software for research

AMBITION 2
building digital expertise

STRATEGIC PRIORITIES

- ✔ institutional alignment
- ✔ software sustainability

- open calls for eScience domain research
- collaborations in advanced eScience technologies
- workshops & training
- community building & networking

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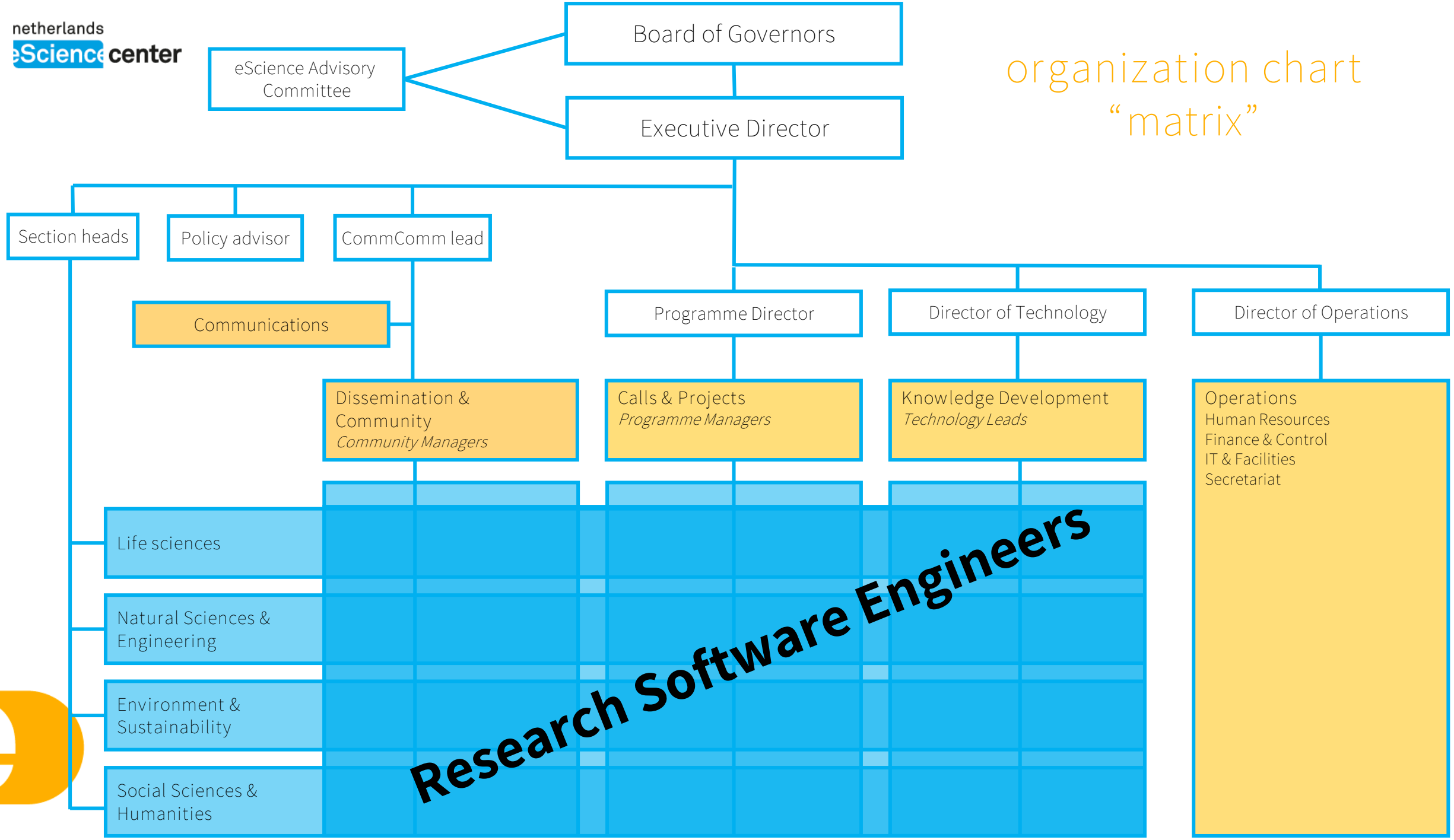
organization chart "matrix"



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Career paths of RSEs

- internal
  - RSE path: 6 salary scales, from (very) “junior” to (very) “senior”
  - other paths: line management, programme management, community management, technology lead
- external
  - academic sector (as assistant/associate professor)
  - infrastructural sector (as researcher or support staff)
  - commercial sector (as R&D researcher)

- eScience Center RSEs are academics (most have PhDs)
- large minority of RSEs come from computer science
- RSE salaries follow Collective Labour Agreement
- majority of RSEs have tenure

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Calls & projects

Objective: “to solve challenging research problems through advanced methods and technologies” (= pioneering or specialized research software)

- open calls, for all disciplines, clustered according to three ERC domains
- 15-20 ‘larger’ projects (1 to 2.5 years) awarded annually, plus various smaller ones
- our contribution: in-kind (Research Software Engineers), a little cash
- our approach: demand-driven, focus on software sustainability
  - ✓ mandatory workshops for relevant research communities
  - ✓ improve existing software rather than invent new software
- our conditions/requirements:
  - ✓ LoC from research institute w.r.t. sustainability (maintenance, adoption, further development) of the software, after the project
  - ✓ open science, FAIR data, reuse and replicability of project output, permissive software licenses, Software Management Plan (SMP)

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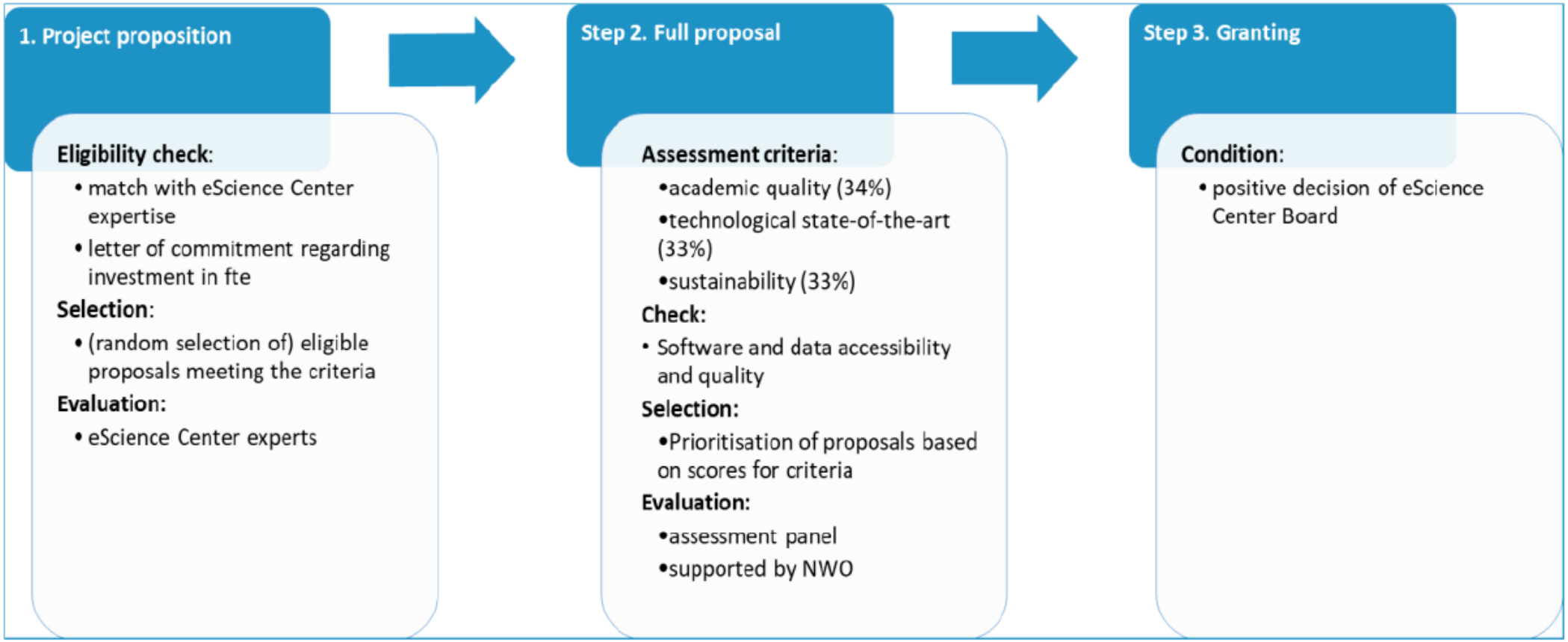
Evaluation procedure



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Project execution

- research group is set up around each project:
  - project partners: Lead Applicant + other researchers
  - eScience Center: research software engineers incl. lead RSE
  - research software engineers work in self-steering teams, accountability lies with programme manager
  - RSEs work at least 50% “on location”
- structured approach: kick-offs (content, technology), annual evaluations
- support: monitoring progress (hours), dedicated team for software generalization

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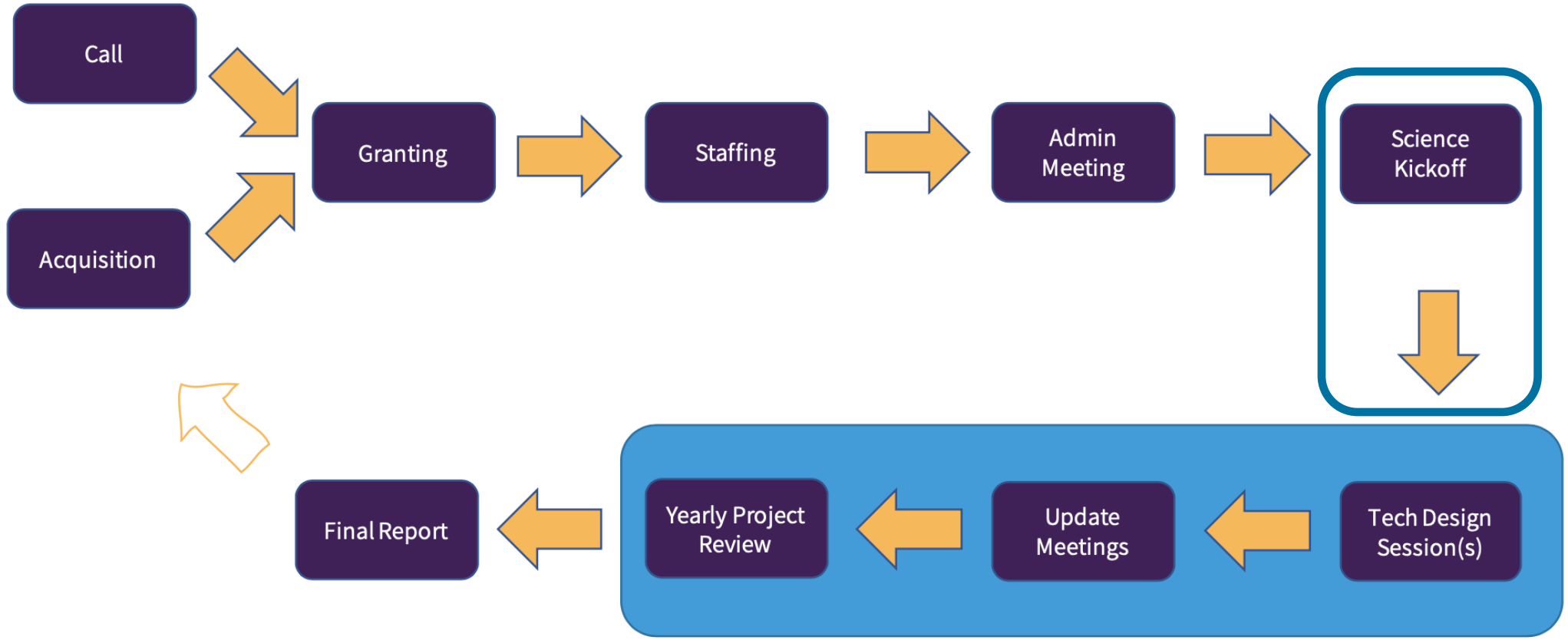
Project Life Cycle



WESTERBORK SYNTHESIS RADIO TELESCOPE

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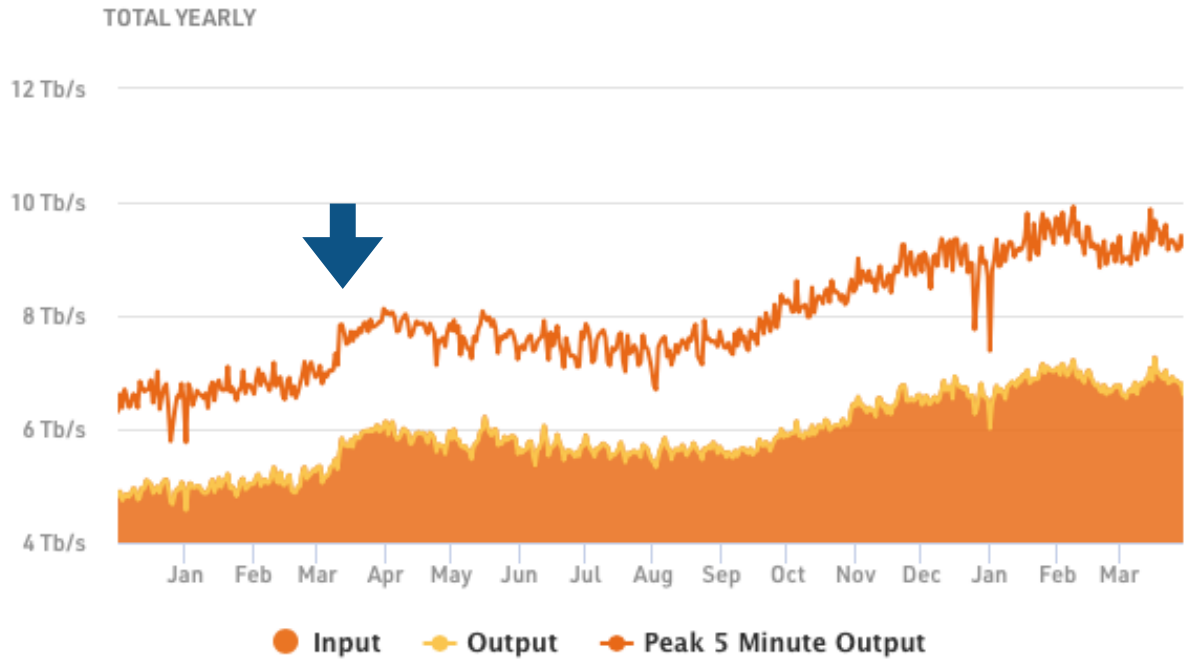
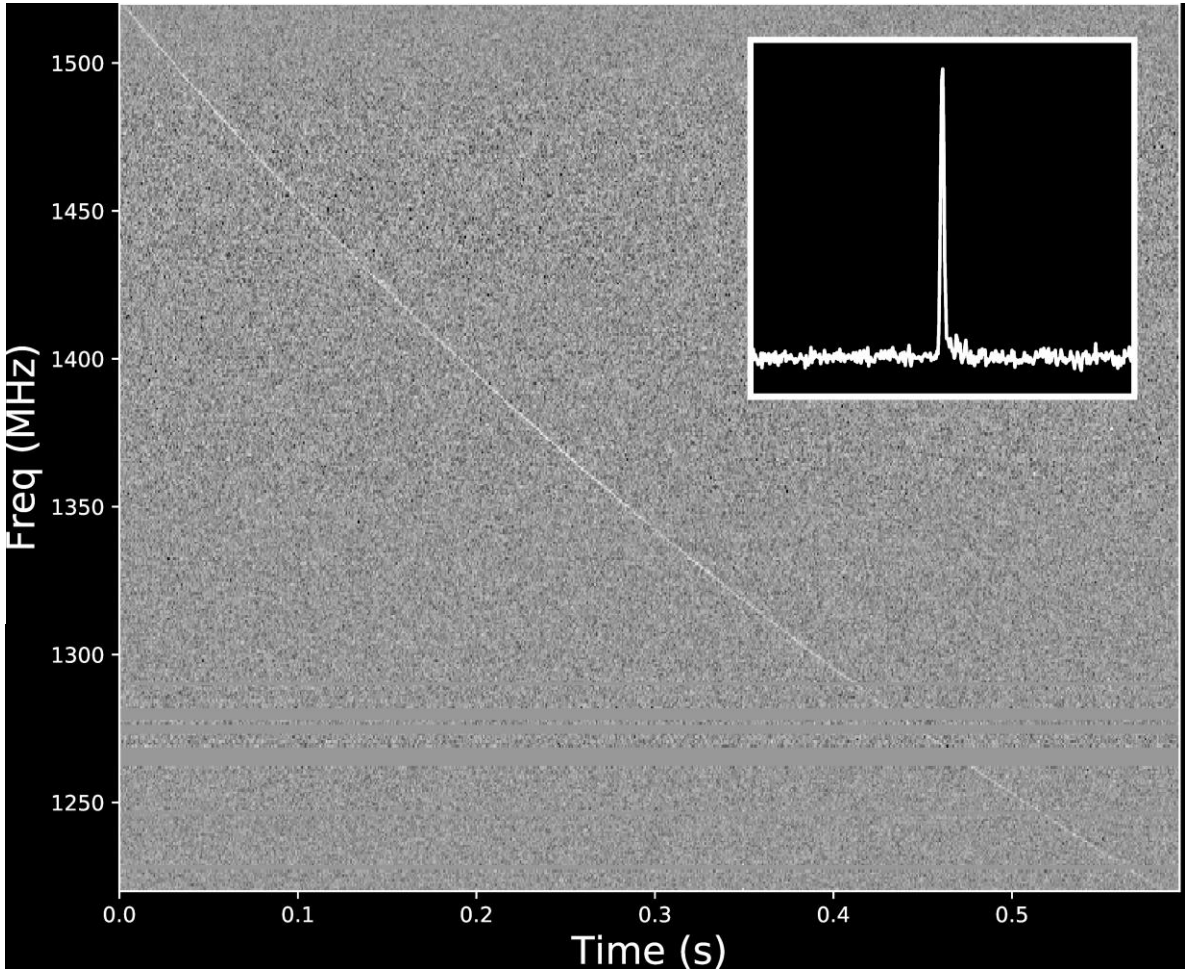
Fast radio bursts





1 PB data per 24 hours
ML determines relevance
astrophysicists determine what to keep

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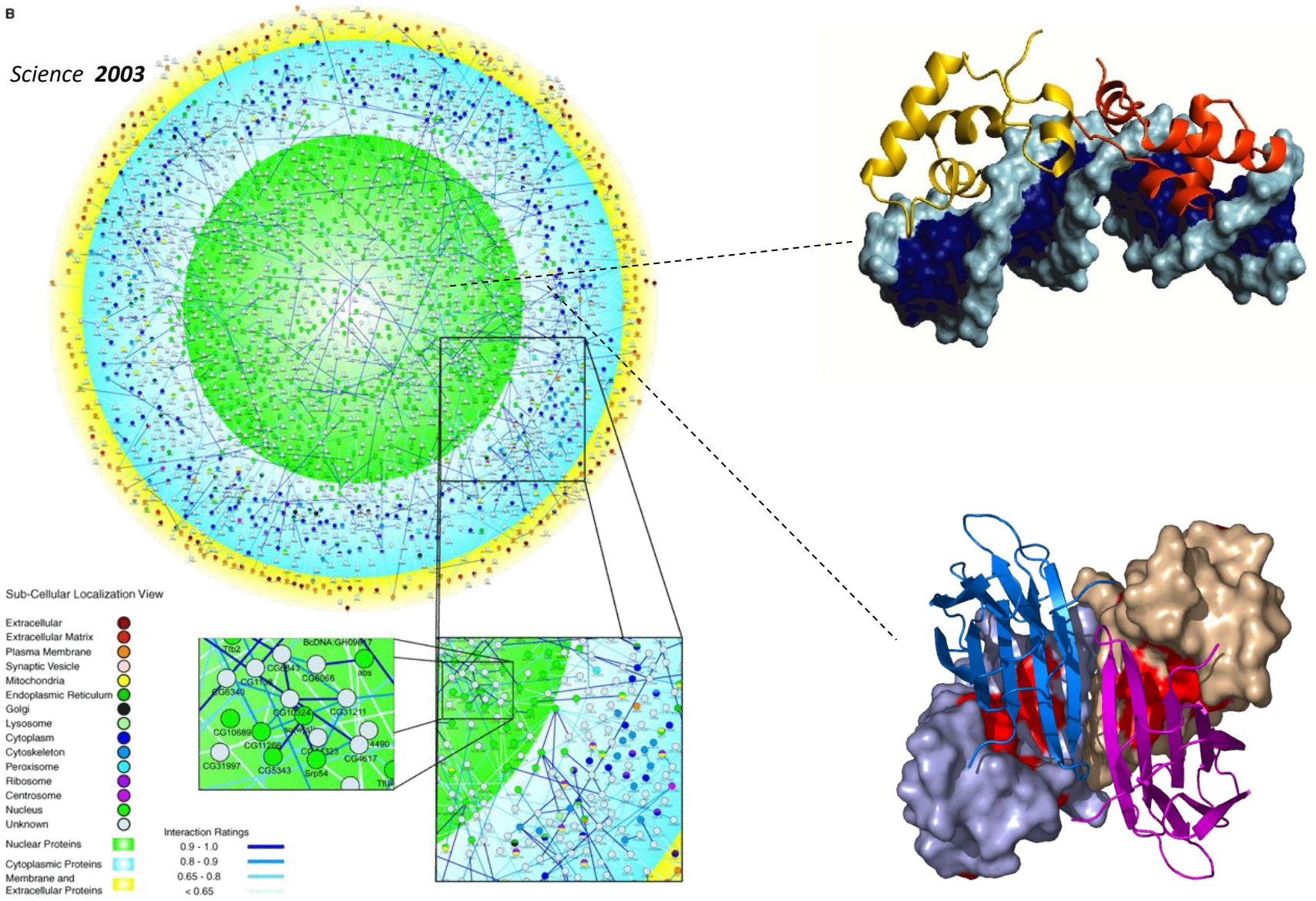
Protein interactions



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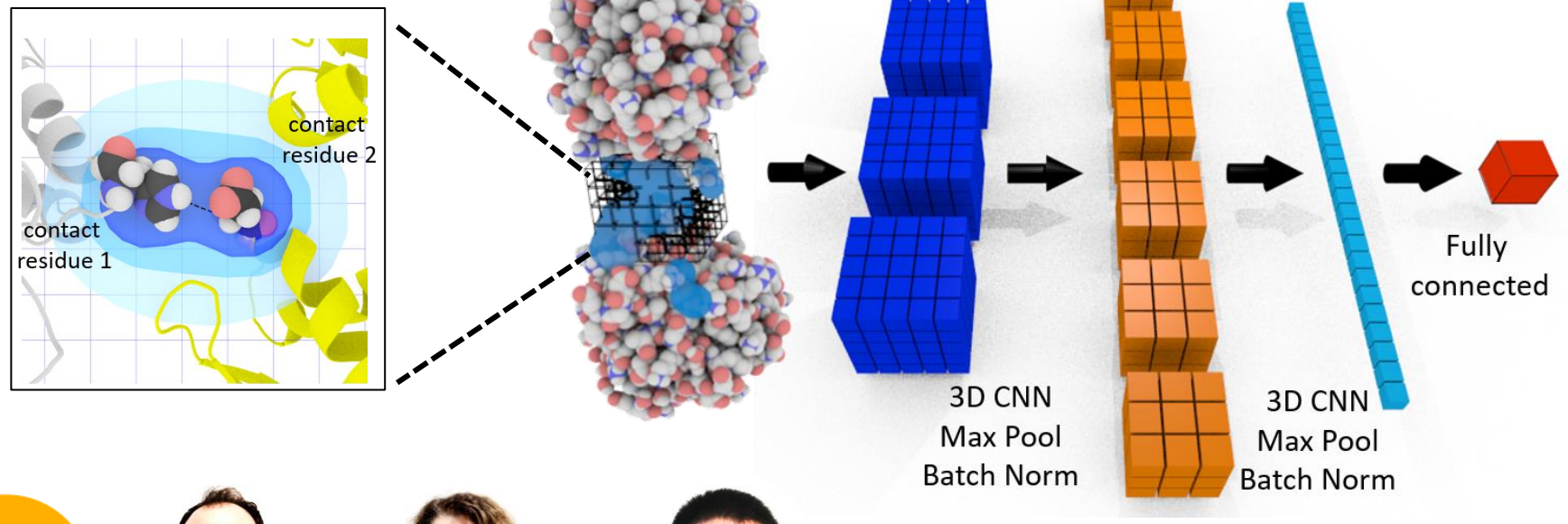
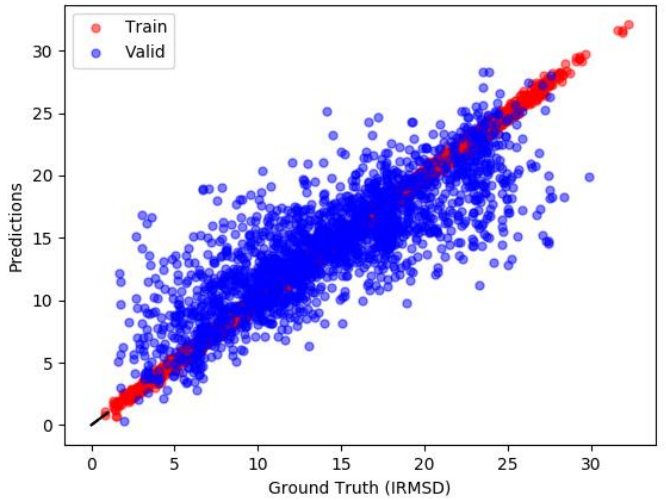
DeepRank

Interface features → 3D conv neural net → Prediction





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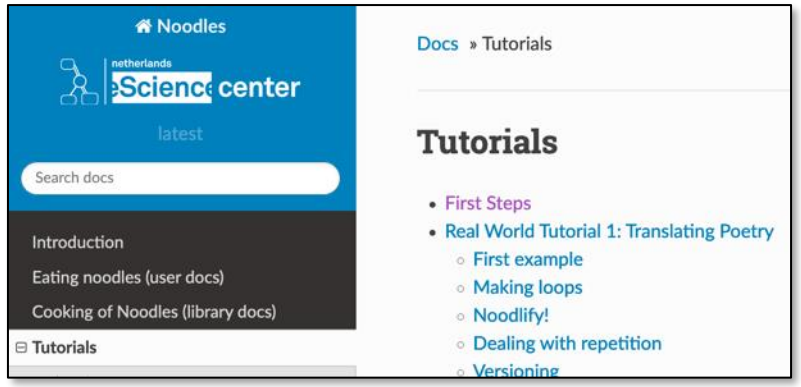
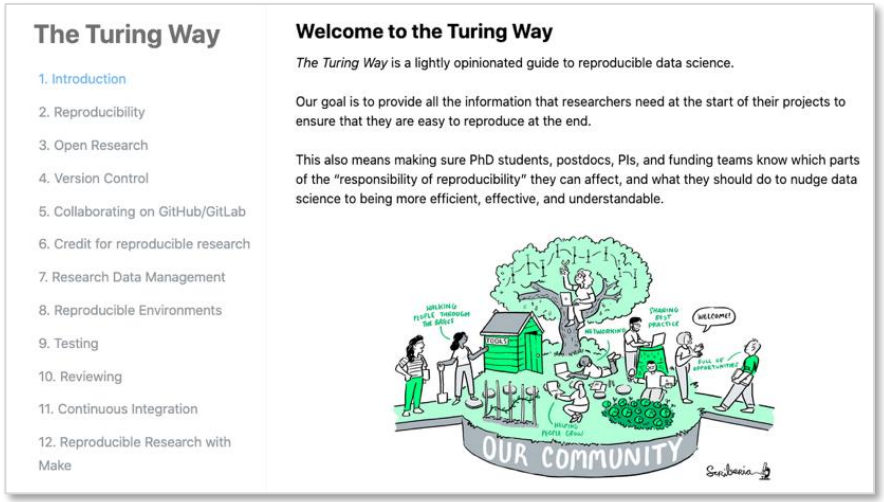
Building digital expertise

- Workshops
- Train-the-trainer
- On the web
- Networks & communities





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Workshops

Open & Reproducible Research Software

Software Carpentry

- Unix Shell
- Version Control with Git & Collaboration on GitHub
- Introduction to R
- Introduction to Python
- R Packages and Publishing

Domain specific courses

Data Carpentry

- Genomics
- Ecology
- Geospatial
- Social Sciences
- Introduction to R
- Introduction to Python
- FAIR Data for Climate Science

- ✓ Hands-on courses, 2-3 days
- ✓ Based on The Carpentries & CodeRefinery
- ✓ Overview and course materials:
- ✓ esciencecenter.nl/digital-skills

Skills – advanced level

CodeRefinery

- Collaboration in Teams with Git & GitHub or GitLab
- Documentation
- Testing
- Modular Code Development
- Reproducible Computational Environments Using Containers

Technologies - advanced level

- Introduction to Deep Learning
- Parallel Programming in Python
- GPU Programing

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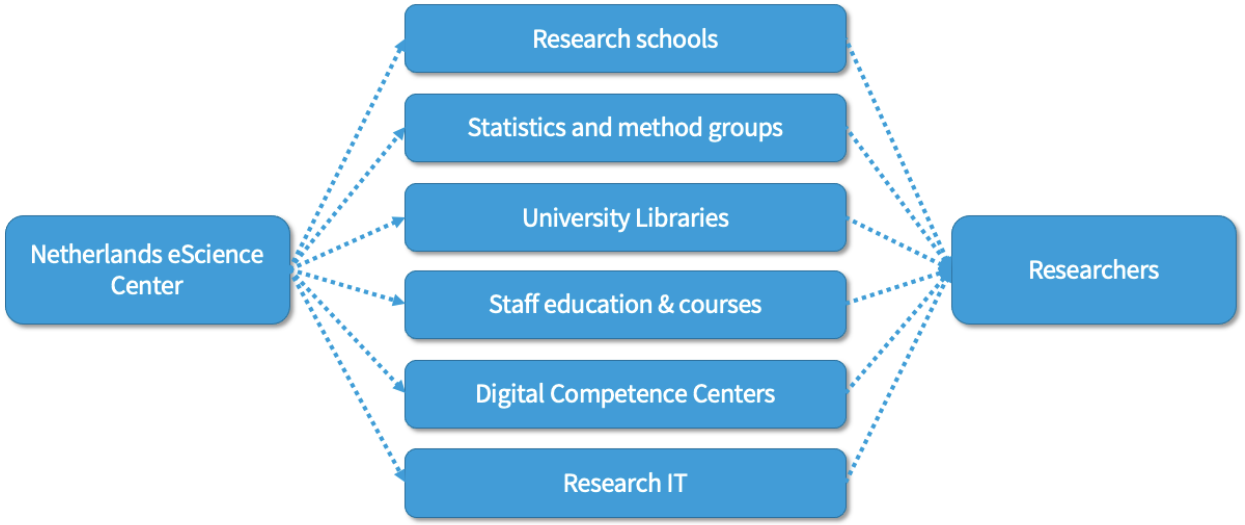
Train-the-trainer

- Strong growth in demand
- Increasing no. of other organizations that provide workshops
- Netherlands eScience: knowledge exchange and networking



THE CARPENTRIES

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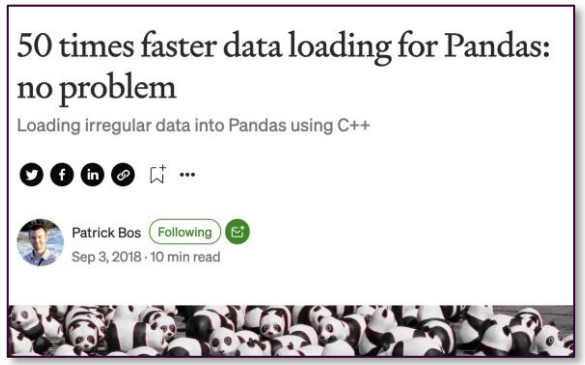
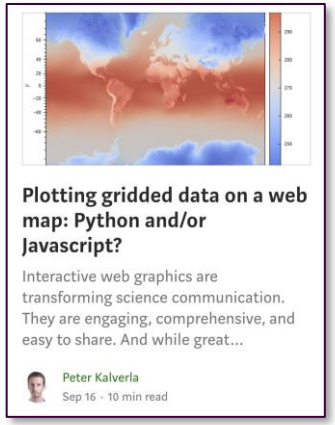
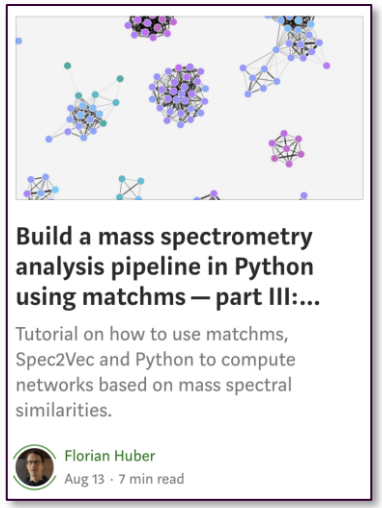
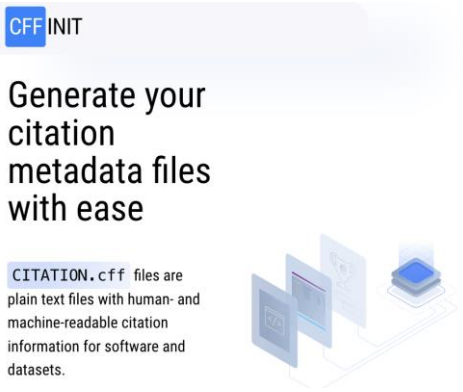
On the web

- 50 blog posts per year
- The Turing Way
- All workshop materials
- FAIR/open/sustainaible research software
  - FAIR4RS principles (working group RDA/FORCE11/ReSA)
  - Research Software Directory
  - Software Citation with CFF









GitHub

zenodo

zotero

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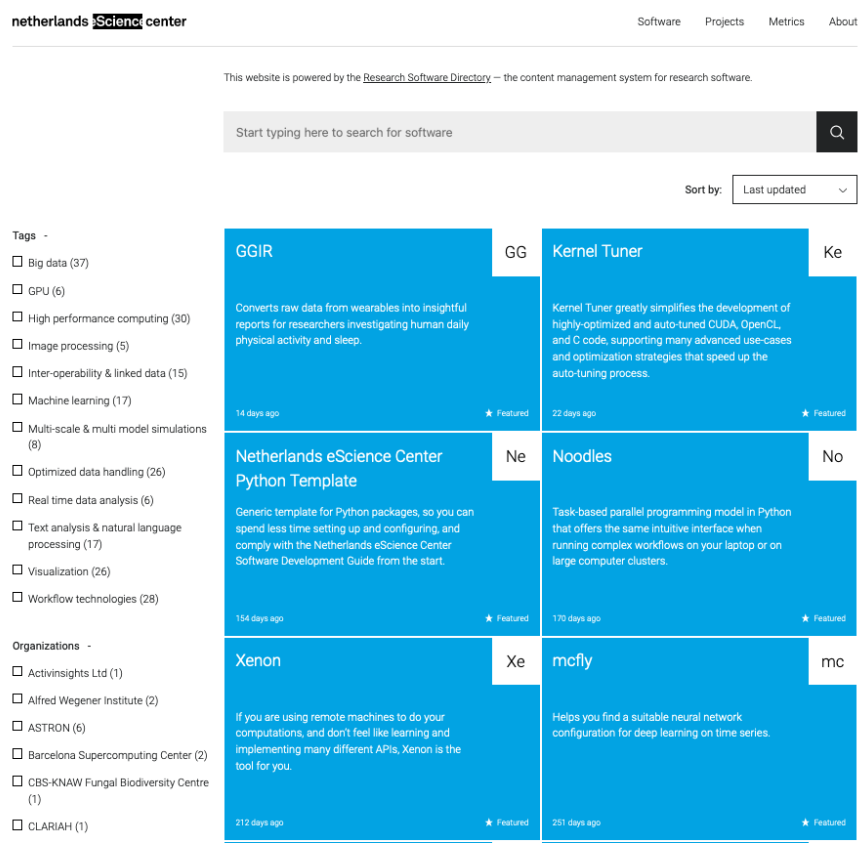
Research Software Directory

- Portfolio system for research software & tools
  - ✓Shows software visually on the web
  - ✓Findable for search engines
  - ✓Citation features
  - ✓Contextual data: publications, projects, authors, reuse
- Data from GitHub, Zenodo, NARCIS, Zotero, OpenAIRE, EndNote, BibTeX, GitLab, OKB, …
- In development:
  - “as-a-service”
  - customization
  - authentication (SURFconext, OAuth, ..)



software.esciencecenter.nl

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Networks & communities

- Fellowship Programme
  - Visiblity & recognition of Research Software
  - 20 researchers each year, €5000 p/F
- Software Management Plan
  - national guidelines and template
  - with NWO and research and DCC community
- NL-RSE
  - growth & independence
- NPOS: National Platform Open Science
- ReSA: Research Software Alliance

nationaal platform open science

<ReSA>
Research Software Alliance

Questions?

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