

# Accelerometer data processing with GGIR – a success story in Research Software

Dr. Vincent van Hees

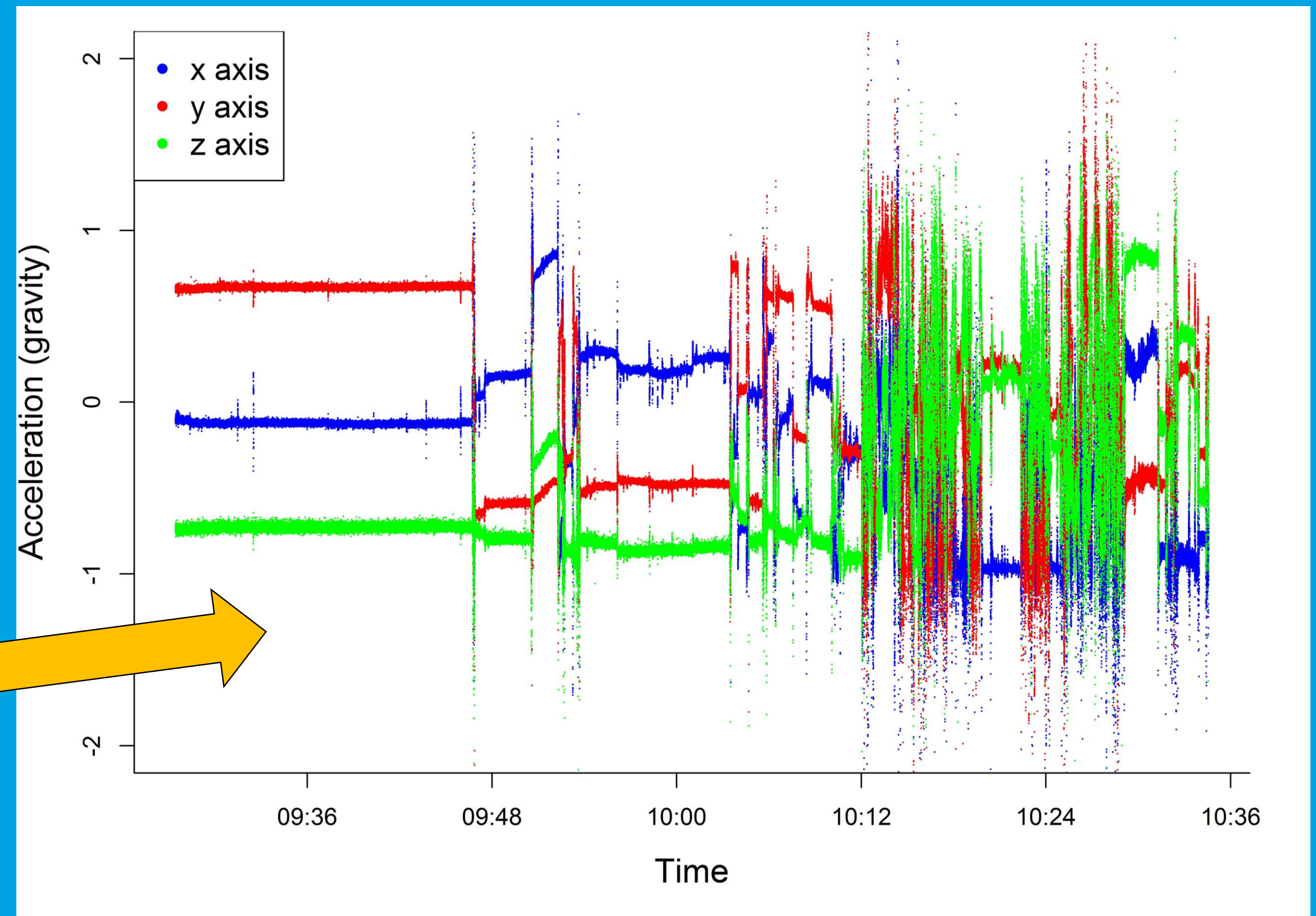
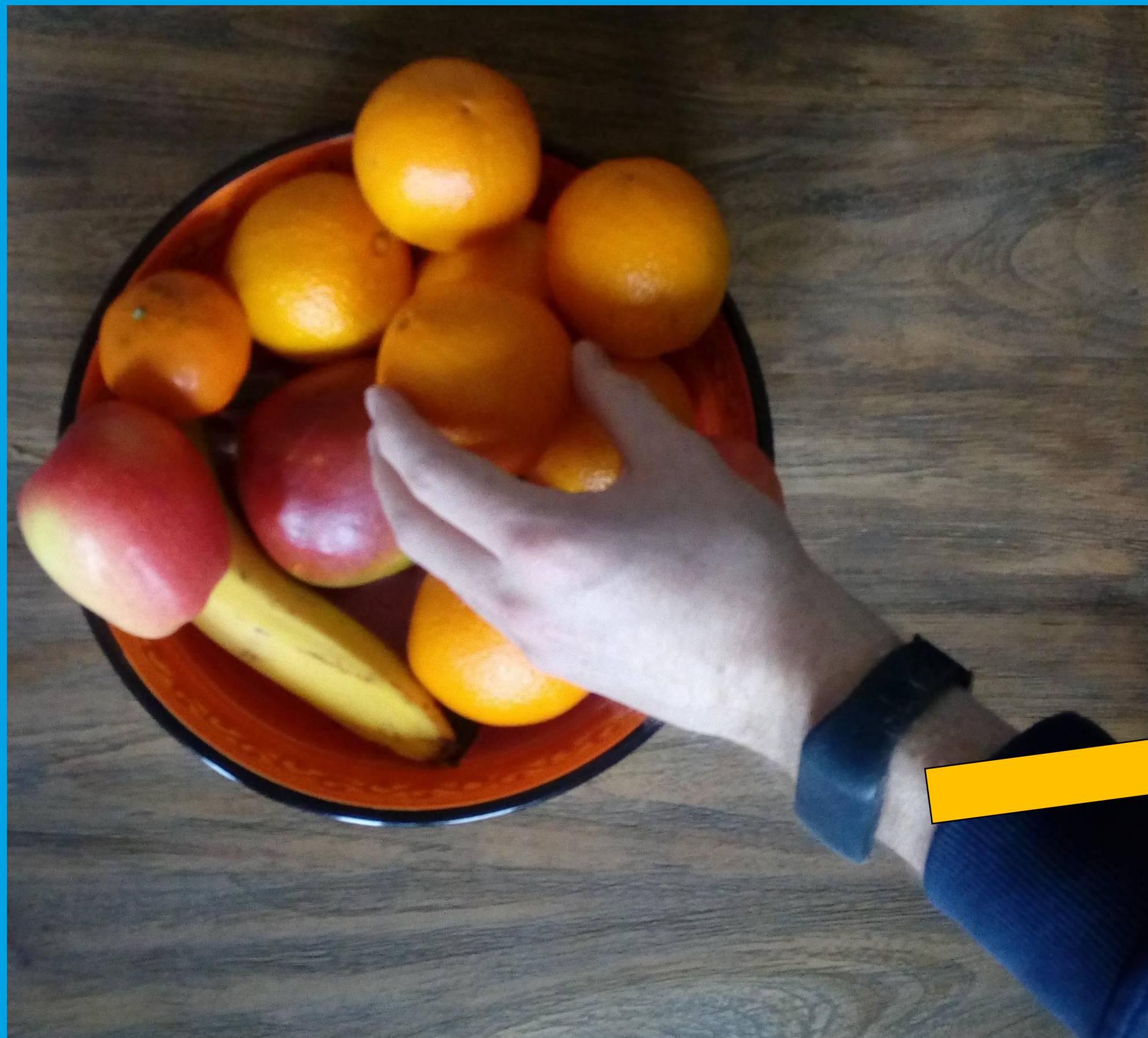
Senior eScience Research Engineer

Open Science Days, Berlin, 06/01/2019

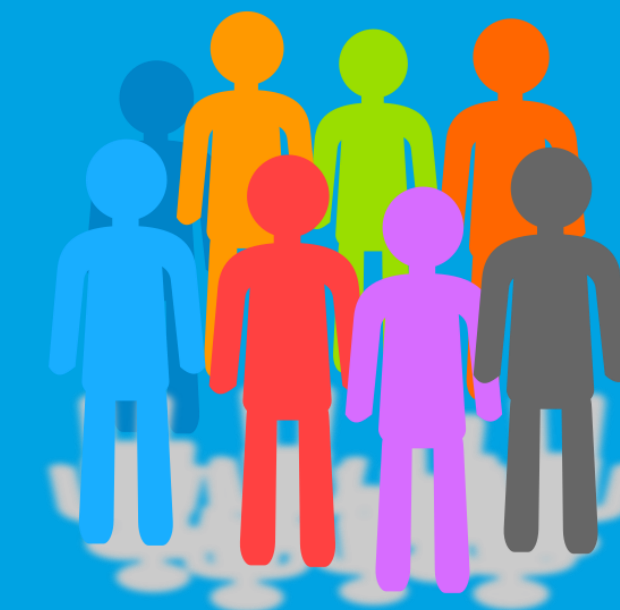


1. Lessons learnt from developing GGIR
2. Research software @ Netherlands eScience Center

## Introduction on Research-grade Accelerometers (= wearable movement sensors)



Studies with up to 100,000 individuals  
Typically multi-day recordings



# Hundreds of genes might decide whether you're an early bird or night owl

The New York Times

TRILOBITES

## Searching for the Genetic Underpinnings of Morning Persons and Night Owls


Researchers identified hundreds of gene variations that may be connected to when people go to bed.

nature > nature communications > articles > article

nature  
COMMUNICATIONS 

Article | [OPEN](#) | Published: 29 January 2019

### Genome-wide association analyses of chronotype in 697,828 individuals provides insights into circadian rhythms

Samuel E. Jones, Jacqueline M. Lane, Andrew R. Wood, Vincent T. van Hees, Jessica Tyrrell, Robin N. Beaumont, Aaron R. Jeffries, Hassan S. Dashti, Melvyn Hillsdon, Katherine S. Ruth, Marcus A. Tuke, Hanieh Yaghoobkar, Seth A. Sharp, Yingjie Jie, William D. Thompson, Jamie W. Harrison, Amy Dawes, Enda M. Byrne, Henning Tiemeier, Karla V. Allebrandt, Jack Bowden, David W. Ray, Rachel M. Freathy, Anna Murray, Diego R. Mazzotti, Philip R. Gehrman, Debbie A. Lawlor, Timothy M. Frayling, Martin K. Rutter, David A. Hinds, Richa Saxena & Michael N. Weedon  - [Show fewer authors](#)

Nature Communications **10**, Article number: 343 (2019) | [Download Citation](#) ↓



## Evolution of GGIR

	End-user publications per year	Technology	Time dedication	Focus	My employer
2011	<b>0</b>	Local R scripts	100 %	Methodological research	Universities
2012	<b>0</b>	More generic R scripts			
2013	<b>0</b>	First release on CRAN			
2014	<b>2</b>	Major new functionalities			
2015	<b>4</b>		5 %	Free maintenance in spare time	Netherlands eScience Center & Myself
2016	<b>5</b>	Started with version control (git) + GitHub			
2017	<b>24</b>	Started with tests + CI	20 %	Paid projects & Helping other developers	
2018	<b>48</b>	Major new functionalities			

# How to sustain GGIR?

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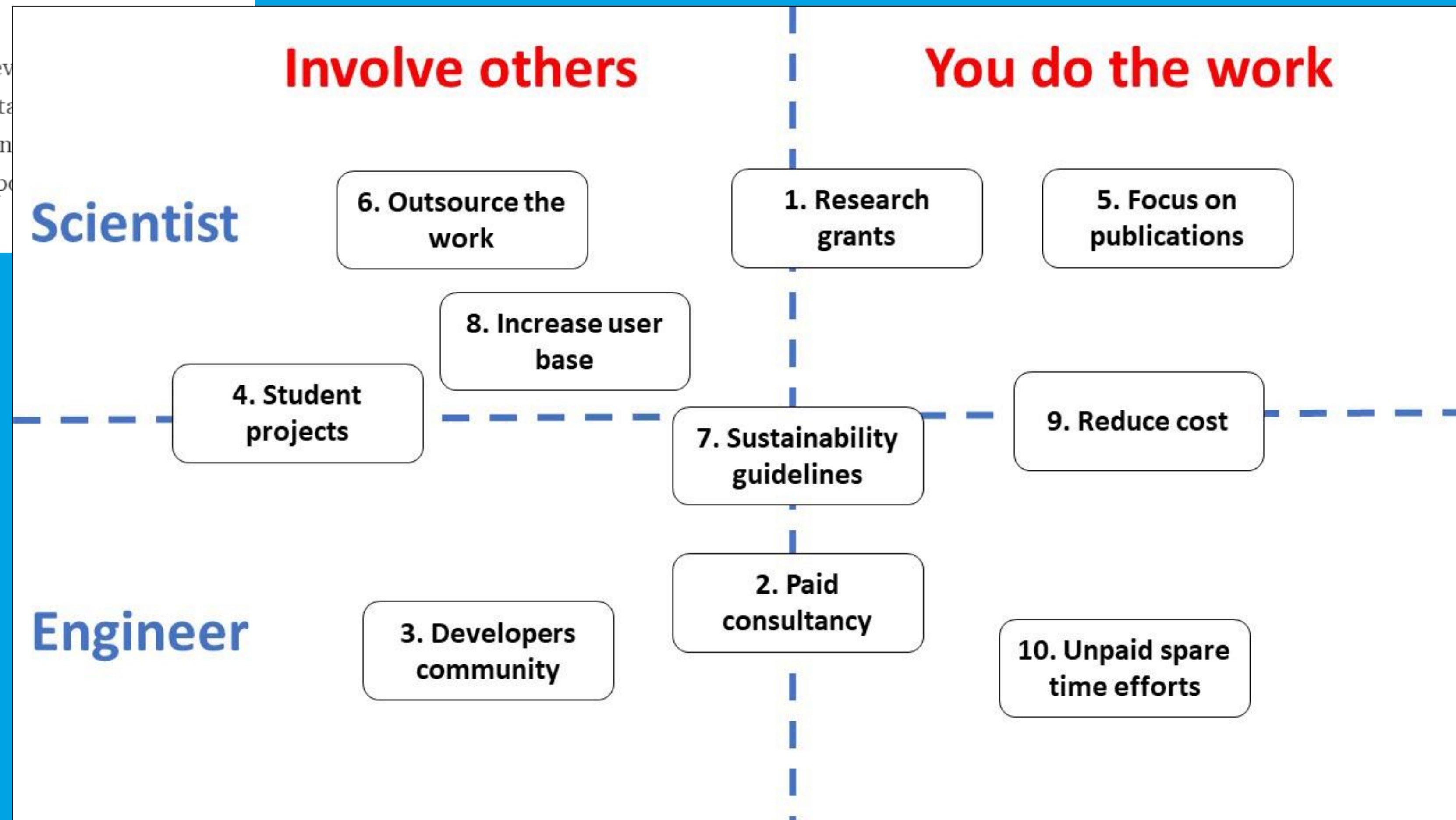
Vincent van Hees [Follow](#)  
eScience Research Engineer at The Netherlands eScience Center  
Sep 11, 2017 · 11 min read

## 10 Ways to keep your successful scientific software alive

Imagine, you invest a lot of time and energy in the development of scientific software. The work pays off and scientists start using it in their research. However, the growing user community creates a stream of help requests, feature requests, and bug reports. How do you keep it?

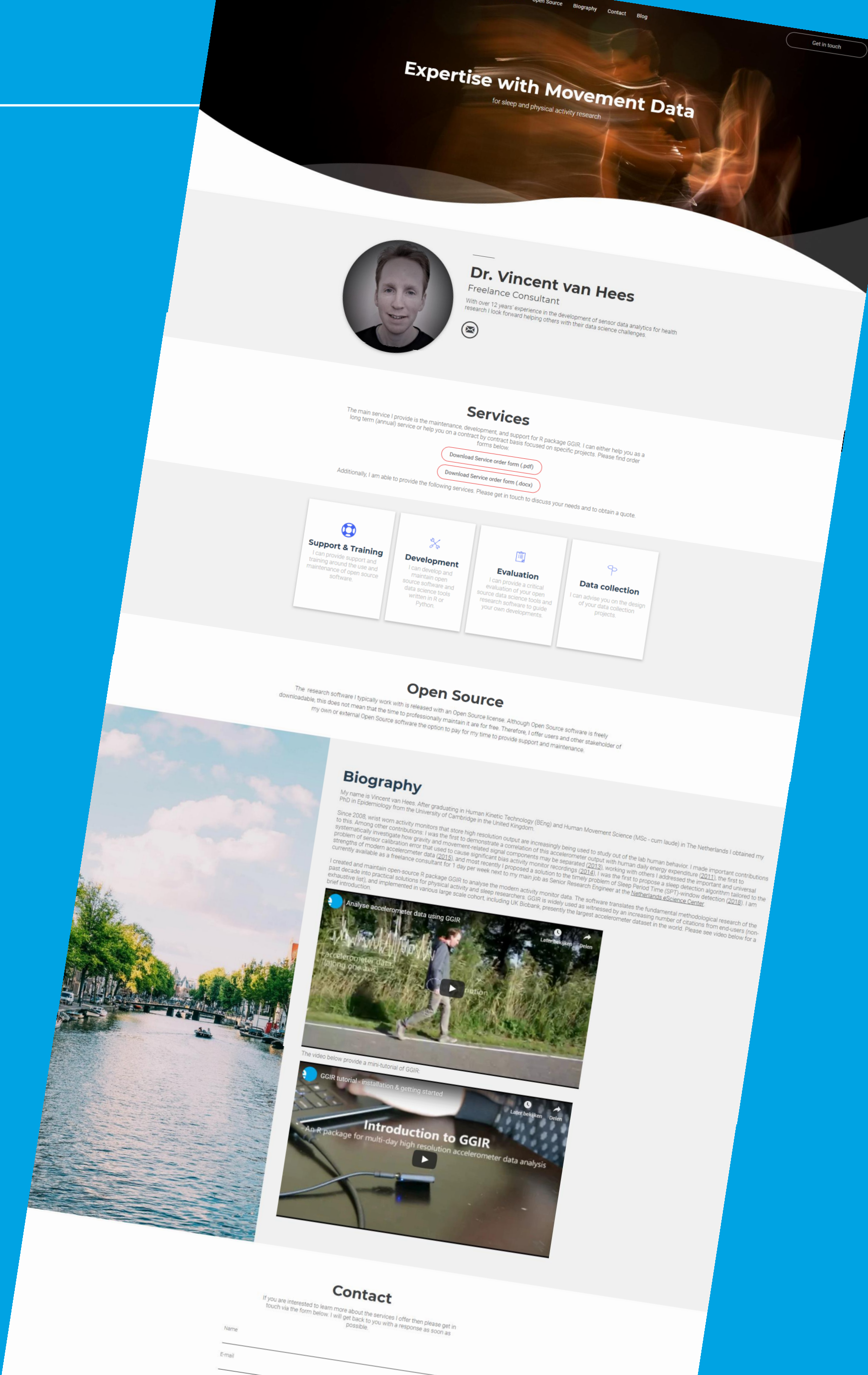
## Blog post September 2017

<https://blog.esciencecenter.nl/10-ways-to-keep-your-successful-scientific-software-alive-61ac81f36a87>



# Sustaining software as freelancer – Getting started

- Website: [www.movementdata.nl](http://www.movementdata.nl)
- 4-8 hours per week
- 12 clients in 2018
- Feeling acknowledged 😊
- Some financial reward 😊
- Skill development 😊
- Software stays alive 😊





- Generic & easy to use tool.
- Inter-disciplinary development.
- Used in prestigious datasets.
- Open source license, many other tools do not!
- Freedom to provide consultancy services @work.
- Niche in between research fields:

	Motivation	Tech Skills	Time
Health Researcher	High	Low	Low
Technology Researcher	Low	High	Low





Photography: Elodie Burrillon

# Our mission: Enabling digitally enhanced research

## How we work

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We fund collaborative research projects via open calls for proposals

We collaborate in externally funded projects, funded by NWO, H2020 and private parties



eScience Center

eScience expertise

Research software & Methods



Domain knowledge

Academic researchers

We are driven by challenges faced by academic researchers

## Our projects in 2017

Environment & Sustainability 10

Life Sciences & eHealth 12

Humanities & Social Sciences 7

Physics & Beyond 5

UNIVERSITY OF EXETER

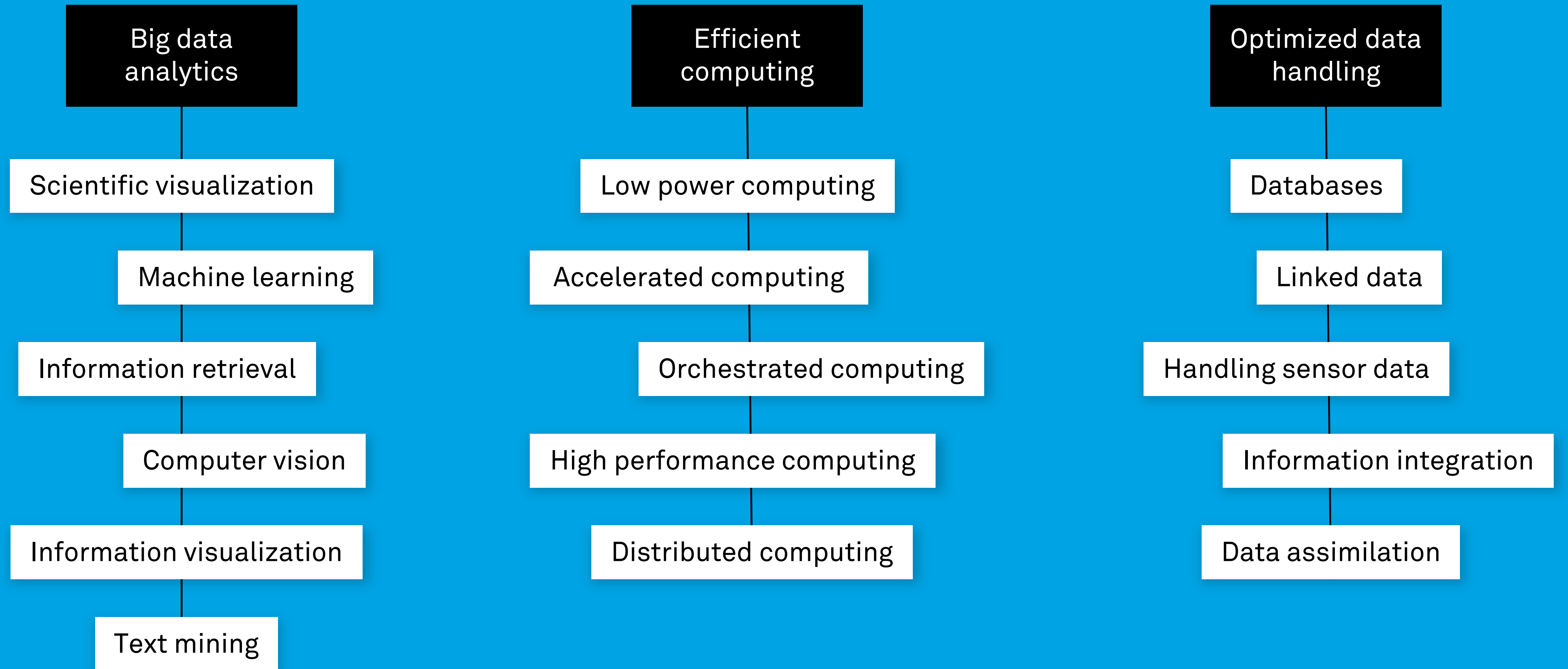
DANMARKS  
METEOROLOGISKE  
INSTITUT

CICERO NOORWEGEN

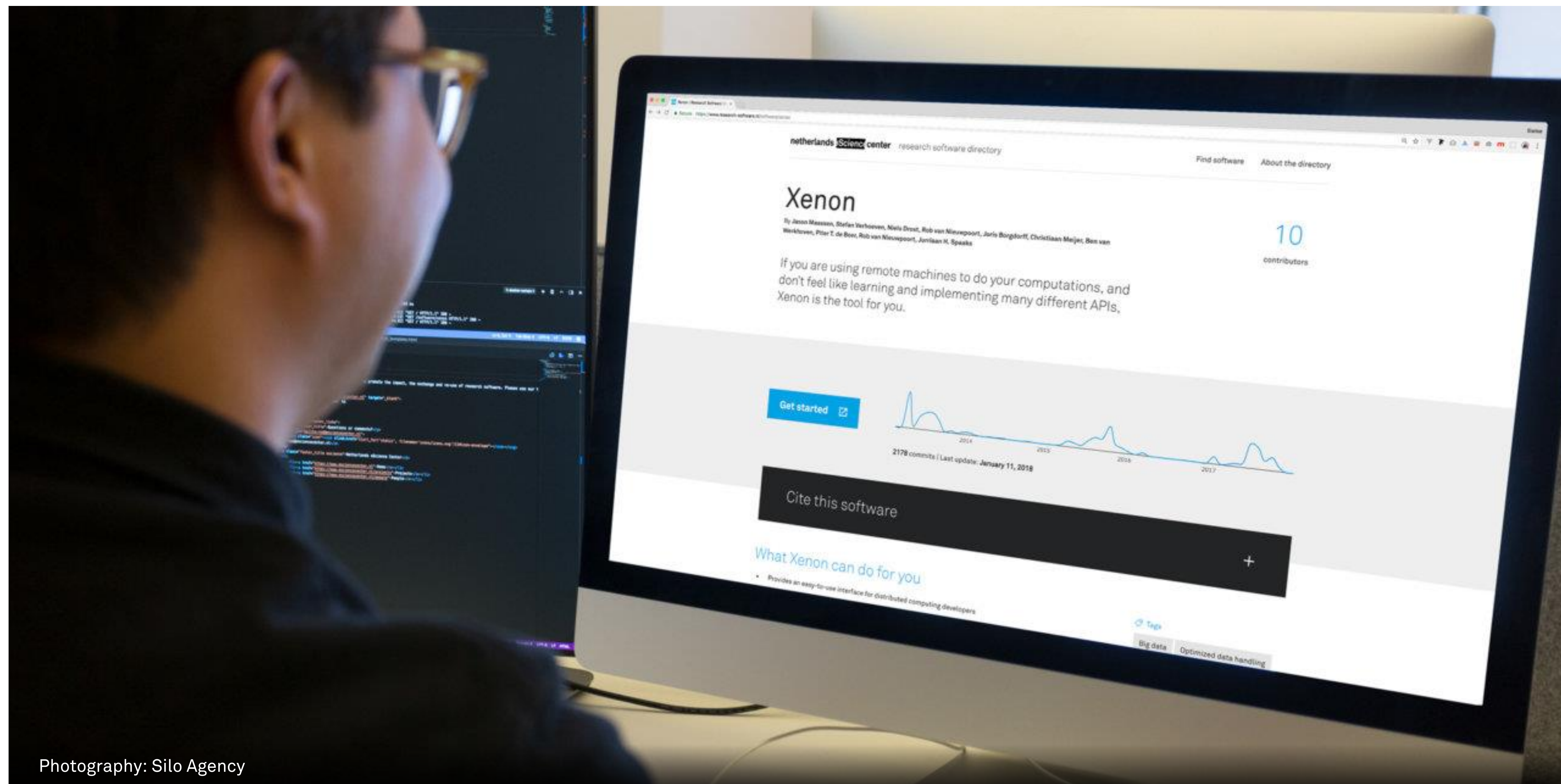


# Our team's technological expertise areas

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We believe that software and knowledge should be shared freely



Photography: Silo Agency

# 10 easy things to make your software FAIR!

- F** **1** Create a description of your software
- 2** Register your software in a software registry
- 3** Use a Unique and Persistent Identifier for your software
- A** **4** Make sure that people can download your software
- I** **5** Explain the functionality of your software
- 6** Use standard (community agreed) formats for inputs and outputs
- R** **7** Document your software
- 8** Give your software a licence
- 9** State how to cite your software
- 10** Follow best practices for software development



netherlands **Science** center

DUTCH  
TECHCENTRE  
FOR LIFE SCIENCES



Utrecht University

## What is FAIR for Software?

**Findable** Software with sufficiently rich metadata and unique persistent identifier.

**Accessible** Software metadata is in machine and human readable format.  
Software and metadata is deposited in trusted community approved repository.

**Interoperable** Software uses community accepted standards and platforms,  
making it possible for users to run the software.

**Reusable** Software has clear licence and documentation



# Research Software Directory

a unique resource for sharing research software

FAIR software:

- Finding software
- Making software accessible
- Quickly judge relevance and quality

Federated approach

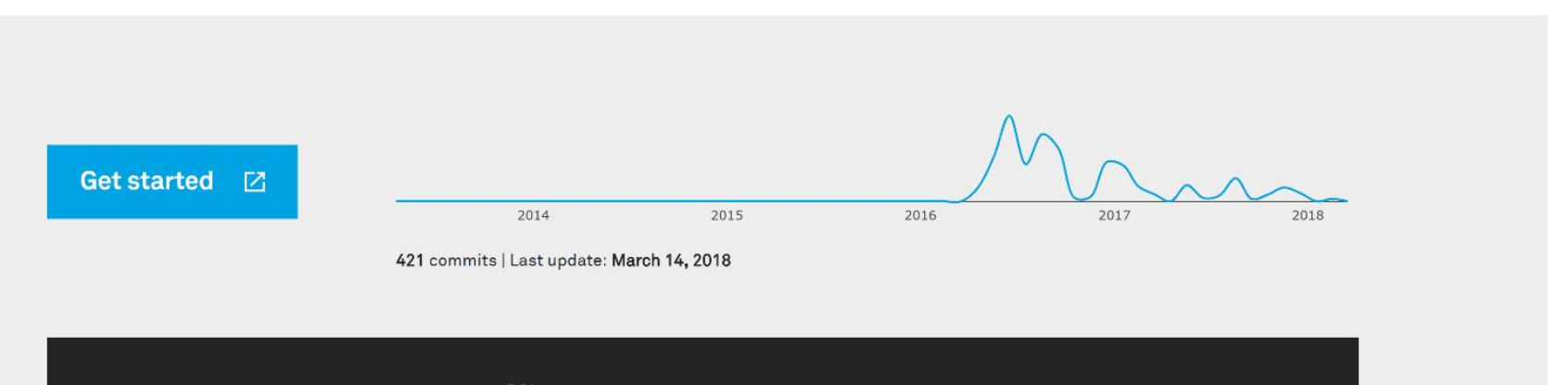
[www.research-software.nl](http://www.research-software.nl)

## mcfly

By Christiaan Meijer, Dafne van Kuppevelt, Vincent van Hees, Patrick Bos, Mateusz Kuzak, Atze van der Ploeg

5 mentions  
6 contributors

Do you want to use deep learning on your time series data, but don't know where to start? mcfly helps you find a suitable model, building upon state-of-the-art deep learning research.



Cite this software

DOI: 10.5281/zenodo.596127 [Copy to clipboard](#)

Choose a citation style: BibTeX [Download file](#)

### What mcfly can do for you

- Provides starting point for researchers to use deep learning
- Creates deep learning models to classify time series data
- Derives features automatically from raw data
- Helps with finding a suitable model architecture and hyperparameters
- Has a tutorial in Python to get you started!

[+ Read more](#)

- Tags
- Machine learning
  - Programming Language Python
  - License Apache-2.0

### Mentions

mcfly: time series classification made easy

By Dafne van Kuppevelt  
March 20, 2017

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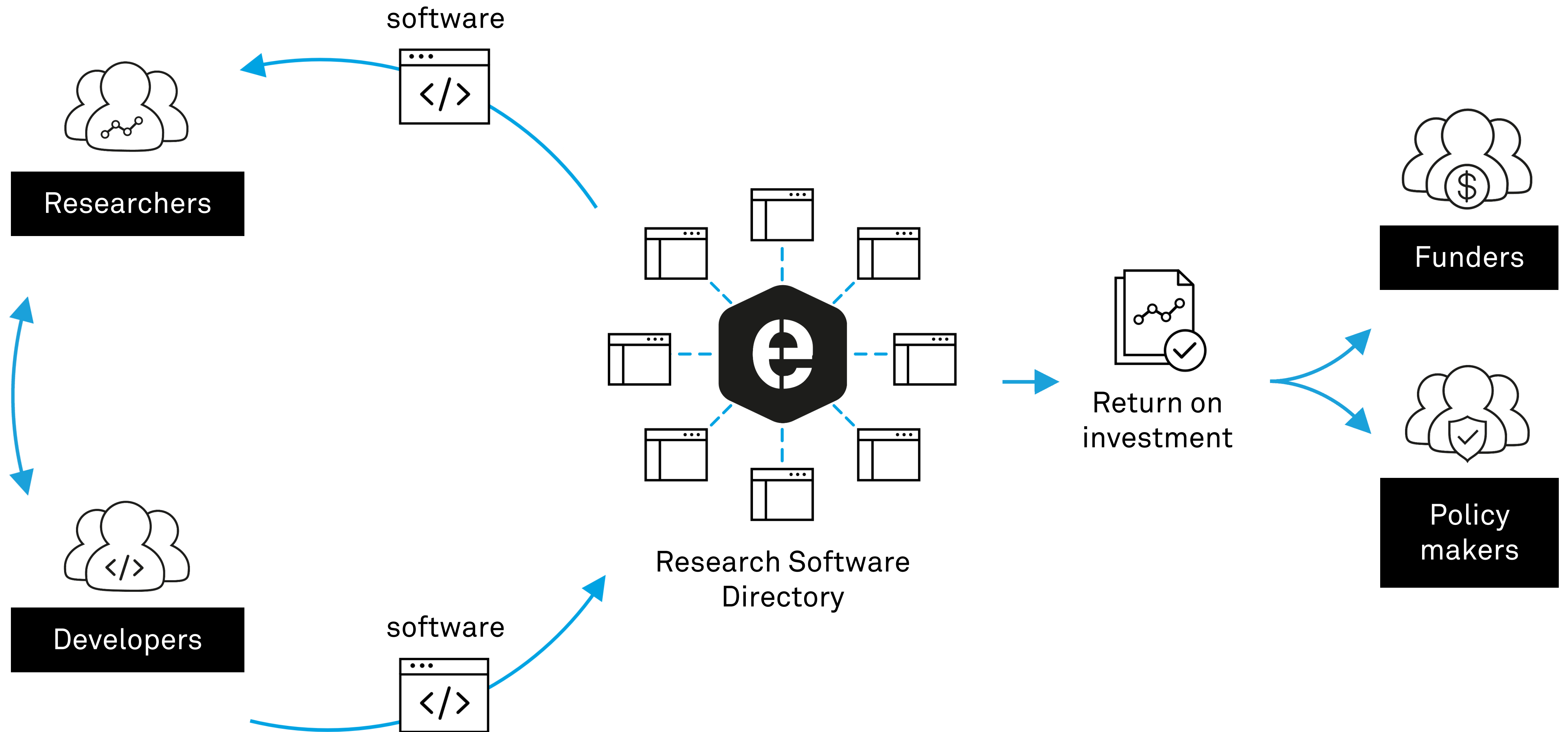
### Contributors

<a href="#">Christiaan Meijer</a> Netherlands eScience Center	<a href="#">Dafne van Kuppevelt</a> Netherlands eScience Center
<a href="#">Vincent van Hees</a> Netherlands eScience Center	<a href="#">Patrick Bos</a> Netherlands eScience Center
<a href="#">Mateusz Kuzak</a> Netherlands eScience Center	<a href="#">Atze van der Ploeg</a> Netherlands eScience Center

**CONTACT PERSON**

[Christiaan Meijer](#)  
Netherlands eScience Center  
[Mail Christiaan Meijer](#)

# We believe that software and knowledge should be shared freely



Get in touch if you are interested to learn more about contributing and/or implementing the RSD in your own organisation:

[rsd@sciencecenter.nl](mailto:rsd@sciencecenter.nl)

# Let's stay in touch

 +31 204604770

 v.vanhees@esciencecenter.nl

 [www.esciencecenter.nl](http://www.esciencecenter.nl)

 [blog.esciencecenter.nl](http://blog.esciencecenter.nl)

 @vtvanhees / @ScienceCenter

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 [linkd.in/1j2uS8S](https://linkd.in/1j2uS8S)