Who needs Research Software Engineers?

Alexander Pletzer, Wolfgang Hayek, Hilary Oliver, Nooriyah Lohani 10-12 Feb 2021 eResearch NZ

Who are RSE's?

- RSEs combine an intricate understanding of research (most hold a PhD) with expertise in programming and software engineering
- Name coined in 2012 in the UK after much deliberation

Recognition for researchers who code

RSE is growing globally

- There are seven national/regional associations*:
  5 in Europe; 1 in N. America; 1 in Australasia

- Early discussions have begun about establishing more associations

- International RSE survey 2018 -> another one coming up in March 2021

As of 15th Oct. 2020,
https://society-rse.org/international-rse-organisations/

International Activities & Events

Past
- RSE Conferences in UK (x4), Germany & Netherlands (2019)
- Intl. RSE Leaders Workshop
- International RSE Survey (x2)

2020
- SORSE
- 2nd Intl. RSE Leaders Workshop
- RSE Conference: NZ (2020)
- International RSE Survey (2020)

Future
- SORSE
- More national RSE Conferences
- Autralasian Webinar series

SORSE: International Series of Online Research Software Events, https://sorse.github.io/

NZ Research Software Engineers Conference

9 – 11 September 2020
OUR FIRST VIRTUAL EVENT

Event highlights:

- 181 attendees from 6 different countries
- 34 speakers from 14 different organisations
- Attendees included:
  - Software engineers & system admins working in the research domain
  - Generalists who bring together the research and technical domains
  - Developers, IT managers, coding enthusiasts, and big data analysts from CRIs, universities, and other public sector organisations

Recordings now live on NeSI's YouTube Channel!

NZ Research Software Engineering Conference 2020 ▶ PLAY ALL

The inaugural New Zealand Research Software Engineering (NZRSE) Conference took place online from 9-11 September 2020. Hosted by NeSI, and endorsed by the RSE Association of Australia and

NZRSE 2020
Session 1:
Reproducibility in Biomedical Model **49:35**

NZRSE 2020 presentation session 1: Reproducibility in...

NZRSE 2020
Keynote Day 1:
Hilary Oliver, NIWA **59:35**

Keynote: Scaling -- It's all (well, quite a lot!) about the...

NZRSE 2020
Session 2:
Parallel Computing and Dask (Part 1) **39:39**

NZRSE 2020 presentation session 2 part 1: Parallel...

RSE-AUNZ

Who needs RSEs?

- Conditions which will help RSEs succeed (and conditions where they won't)
- Experience from the consultancy service at NeSI
- What should be the optimal ratio of RSEs over scientists in an organisation?
- Am I a scientist or an RSE in disguise? Or both?

Conditions in which RSEs are expected to perform well

- Scientists often work on a single research project for many years. Scientists' career is **focused and linear**
- RSEs assist scientists, sometimes for short periods (~ months). They bring in rapidly involving computing skills to research. RSEs' careers is **broad and general**
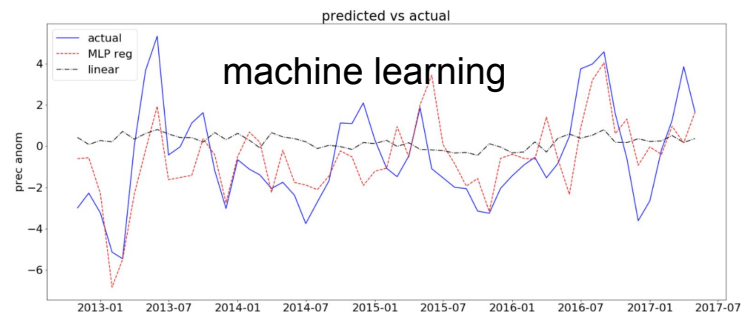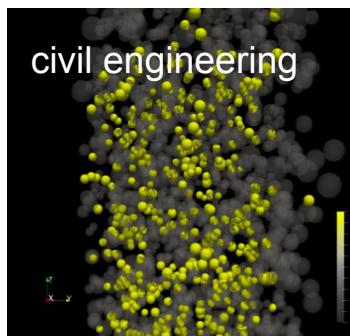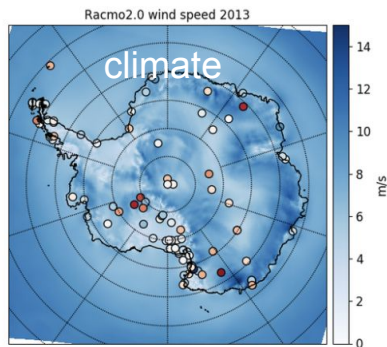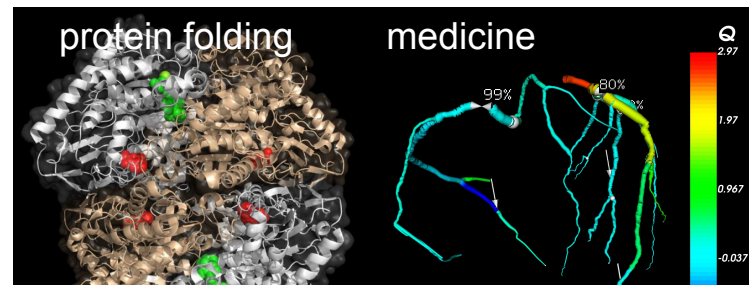
Scientist

RSE

"good"

No shared knowledge

RSE

Scientist

RSE does not bring in new skills
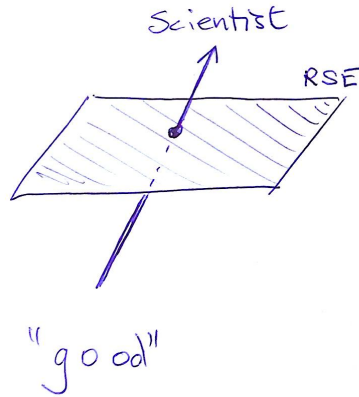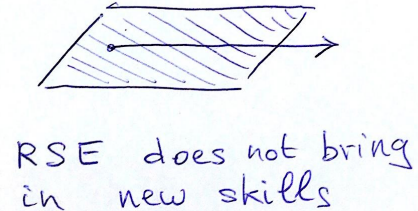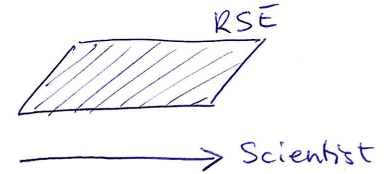
Experience from the consultancy service at NeSI

- Attaching an RSE to a research group for ~ 3 months
- RSE brings computing knowhow to the research
- Not enough time for the RSE to learn the intricacies of the research - scientist and RSE meet at half distance point
- Outcome with short term and long term benefits:
  - **Faster, more scalable code. New functionality**
  - **Maintainable/robust code**
 - Improved ability to **collaborate** with other researchers

Optimal ratio of RSEs/scientists?

- 0.1 - 1 seems plausible (?) - Not all scientists do computational work
- RSE to scientist ratio
  - ~ 10% at NIWA Greta Point (8 scientific programmers/76 scientists, modellers, geologists)
- More RSEs could work longer on each project and have greater impact
- Room to grow?

Am I an RSE in disguise?

- Are you...
    - spending a lot of time wrangling with computing issues?
    - following new developments software engineering practices, programming languages and algorithms?
    - often helping/training other researchers struggling with computing issues?
    - able to carry your skills to multiple research domains?
- If yes then
    - Consider changing your key performance indicators (KPIs) to better reflect your activities
        - fewer papers, more software
    - Consider changing your position description
   - Join our community and participate in RSE gatherings
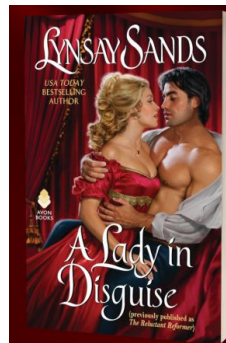
RSE Careers at NIWA

Hilary Oliver, NIWA

eResearch NZ Feb 2021

History 1: 1990s...

- A few computational physical scientists, embedded in science research teams and working with large science codes, numerical methods, number crunching
- Employed as scientists but by necessity spending much time on the software
    - Negative career impact noted
- 1998 Cray T3E: NZ's first supercomputer
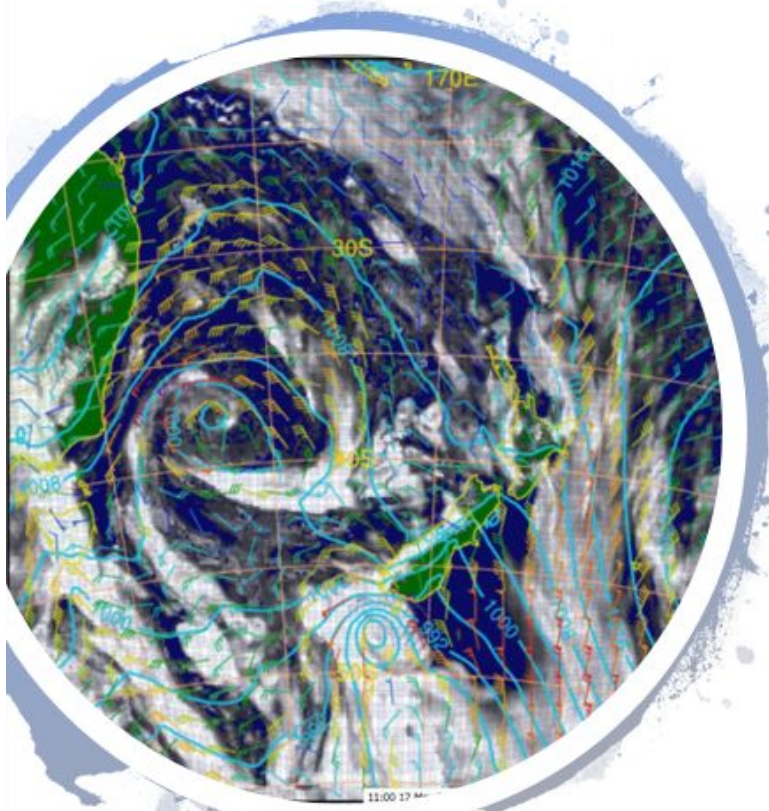
History 2: mid-2000s

- A few software engineers, employed into science teams to work on more obviously "software-y" problems
    - But still employed as "scientists" under the NIWA science job framework

- (Plus "NIWA SDT/ITSD" established at the software developer end of the spectrum)

History 3: HPC, NeSI

- HPC increasingly important to NIWA's science and strategic direction (e.g. environmental forecasting)

- Initially used only by scientists with computational physics backgrounds

- ~10 years ago we began employing more HPC specialists (numerical methods, parallel coding and optimization, etc.)

- These people were still employed "as scientists" in the scientist job framework

History 4: ~2016

- A diverse range of former scientists/HPC specialists/software engineers/developers employed as scientists, in science teams

- Enabling but usually not generating traditional science outputs (papers etc.)

- Diverse range of job titles and descriptions

- Skills not widely understood or officially recognized (KPIs)

- Value, methods, and modern software development requirements not widely understood

- **Scientific Programming Group established**

… and increasing awareness of the UK RSE movement
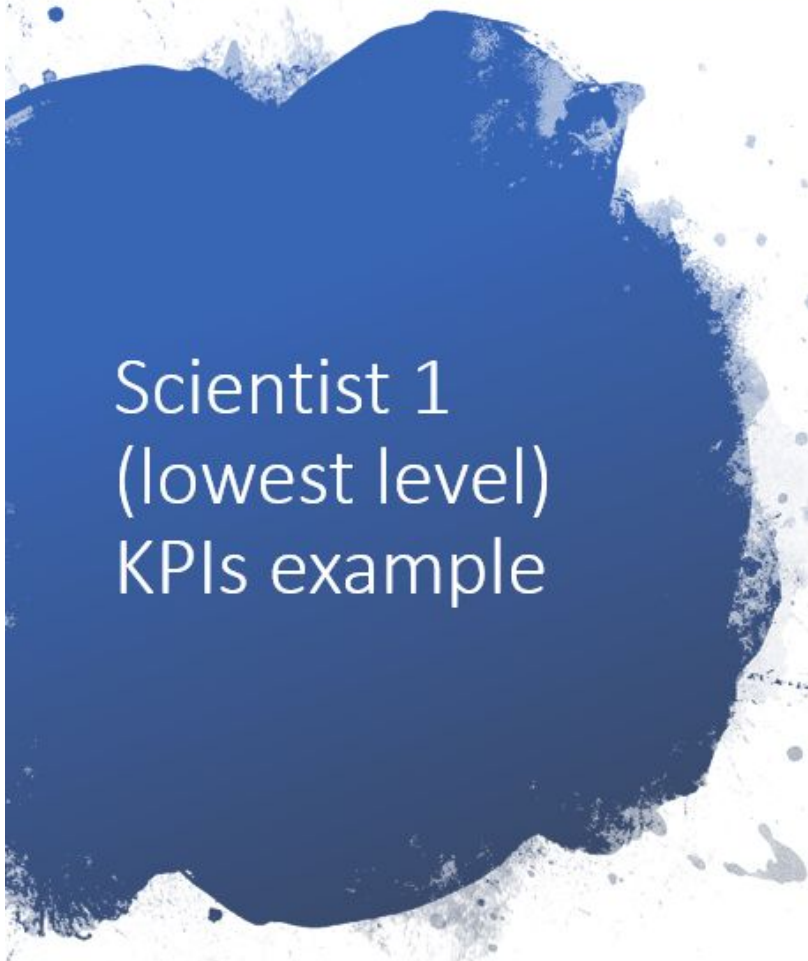
2016-18: Official Recognition of RSEs

- Positive engagement with management on the basis that "RSE concerns" need to be addressed as important to job satisfaction, recruitment, and retention
    - Job titles, position descriptions, KPIs

RESULT:

- Job titles officially changed to "Research Software Engineer"

- Job framework: reworked **NIWA Scientist KPIs** to be RSE-inclusive
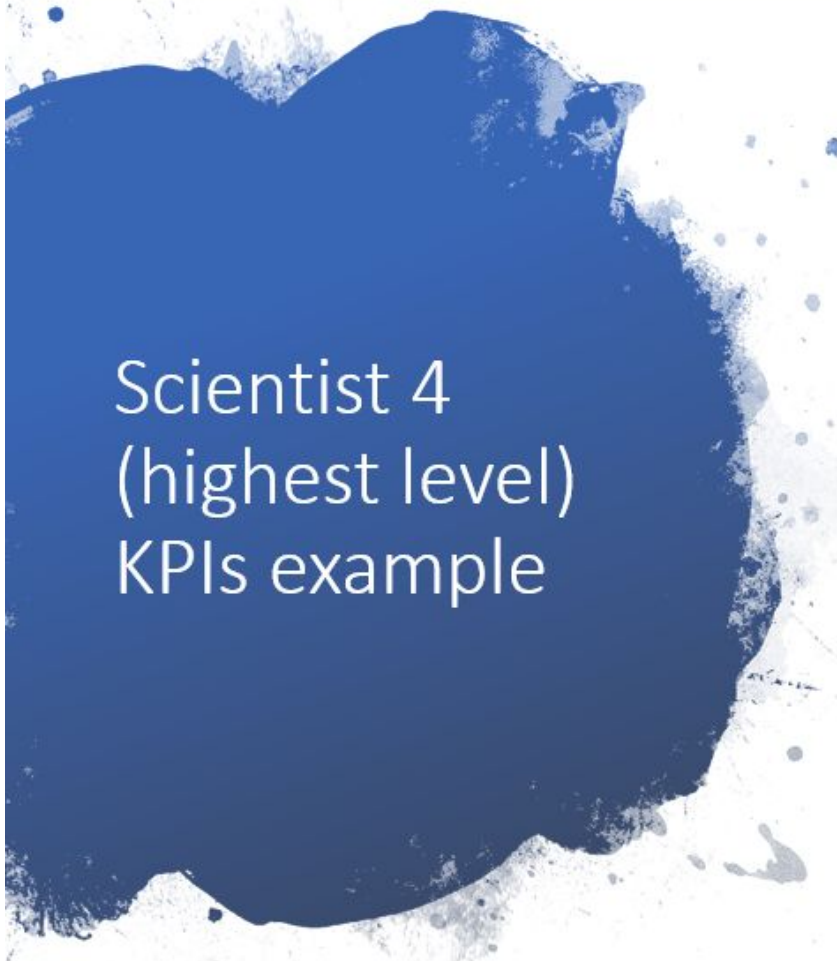   - (We don't get our own separate job framework for ... reasons).

NOTE:

- I want to emphasize that we did not fare badly at NIWA prior to this, but it's a matter of principle, and sometimes principles matter...

Scientist 1 (lowest level) KPIs example

- **Technical (b)**: Contribute to the development, optimization, porting and maintenance of scientific models, software, or database products

- **Research & Innovation (a)**: Communicate scientific research, technical innovation or scientific computing by authoring or co-authoring publications that contribute to new scientific knowledge

- (plus, many more categories and KPIs)

Scientist 4 (highest level) KPIs example

- **Technical (b)**: Consistently lead the design and development of highly complex and innovative scientific models, software systems or database products

- **Research & Innovation (a)**: Regularly lead author a significant number of key peer-reviewed publications or scientific software in an area of internationally significant science

- (plus, many more categories and KPIs)

Final comments

- We are a small group in a large science institute
  - Which has implications for career path
- Group membership is ~arbitrary (historical reasons)
  - Others at NIWA could/should be RSEs
- Comparison with scientists at performance review time remains difficult
- But: we have official recognition and a collective identity

Questions to guide BoF Discussion

- Does your institution/company employ RSEs?
  - In which disciplines do you employ them?
  - Which scientific disciplines would benefit the most from RSEs but don't currently employ any?
- Do you/your institution offer an RSE career pathway?
  - Do you think this should evolve further?
  - Are your RSEs satisfied with their situation?
- Do you think that employing RSEs or having the job the title "RSE" is not a good idea? Why?
- "It is beneficial to hire RSEs rather than only scientists, even if an RSE does not produce as many papers"
- "I would rather hire a project-bound scientist than an RSE"
- "I think RSEs are a good idea, but management is not convinced"
- "I would like advice for getting started with RSEs (recruitment, career management, …)"