RSEs together

Building careers, collaborations, groups and communities

Alys Brett

@alysbrett

My role in research software

Head of Software Engineering Group

Chair of trustees

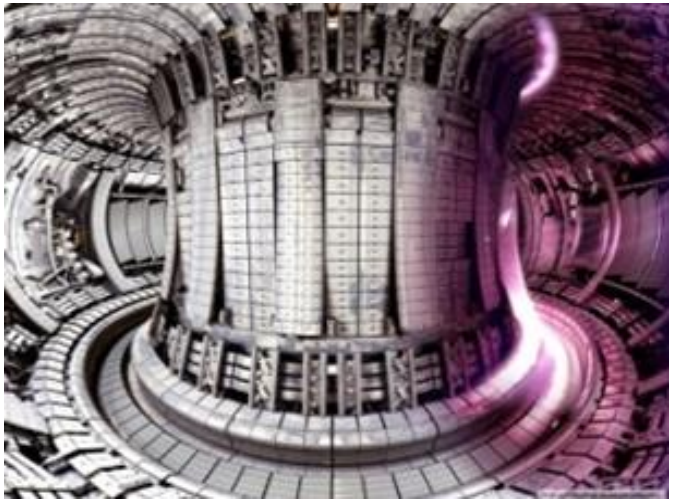
The UK's national fusion lab

UK Atomic Energy Authority

Fusion energy research and related technology

Fusion energy research at UKAEA

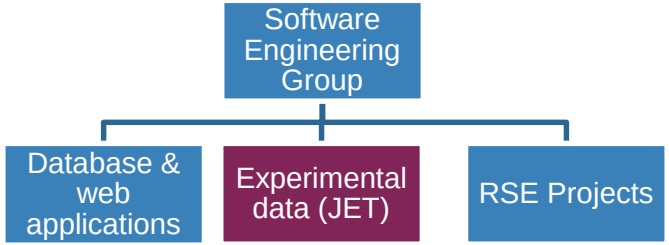
Two Tokamak experiments



Joint European Torus - JET

UK experiment - MAST-U

UKAEA Software Engineering Group

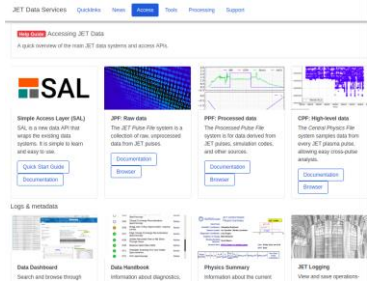


12 members, 2 teams of RSEs

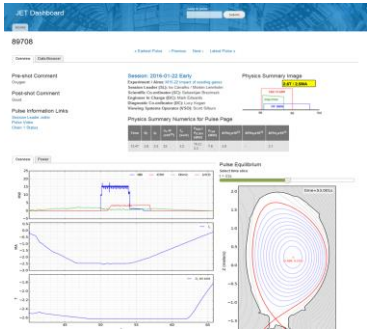
Growing fast (expect 16 or 17 during 2019)

"RSEs for JET data"

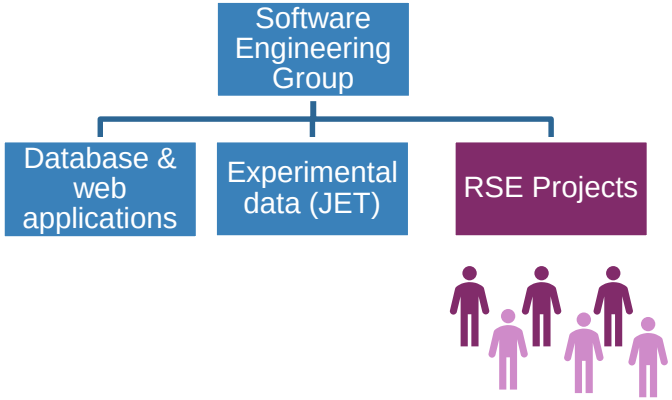
Store → Process → Discover → Access → Analyse → Visualise




```
# try this in ipython
from jet.data import sal

# obtain list of magnetics signals
sal.list('/pulse/87737/ppf/signal/j

# quickly plot plasma current signa
sal.show('/pulse/87737/ppf/signal/j

# read plasma current signal
s = sal.get('/pulse/87737/ppf/signa
```



UKAEA RSE projects team



6 members by October

2/3 Funded projects : 1/3 Free at point of use activities

The case for RSEs

What are RSEs and why do we need them?

SOFTWARE IS ESSENTIAL FOR RESEARCH

BUT WE NEED

Need access to Research Software Experts

Software is essential – convincing others

Stories

- Successes
- Cautionary tales
- Case studies
  - High profile
  - Locally-relevant

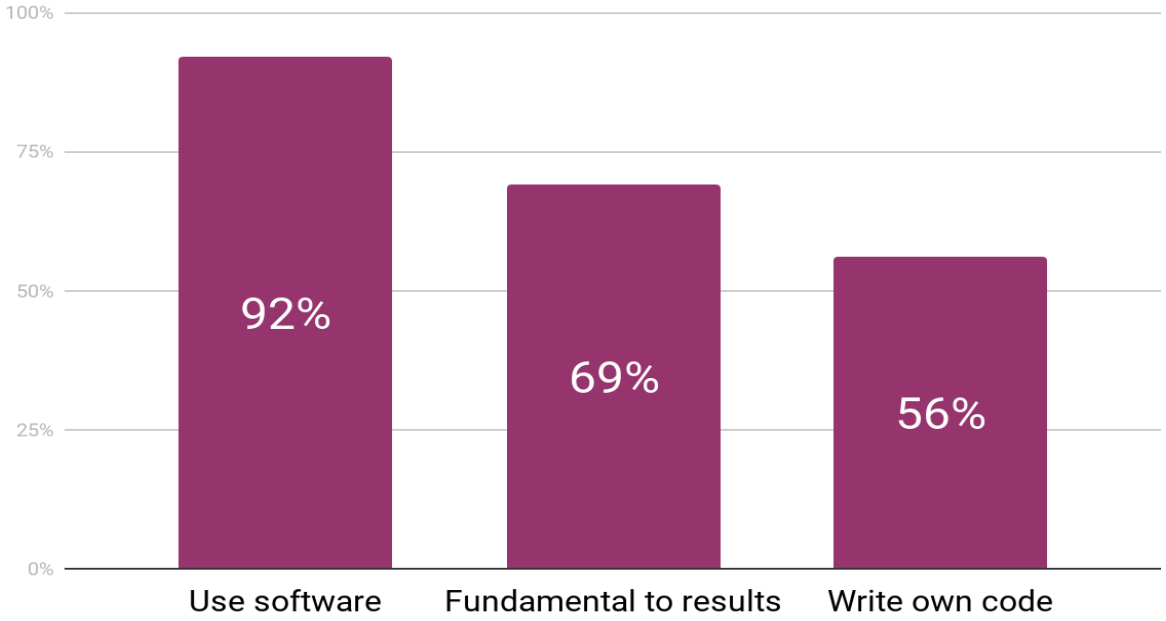
Numbers

Headline statistics from SSI research

Led by Simon Hettrick
- find out more from him (he's here)
+ www.software.ac.uk

Software Sustainability Institute

Researcher survey

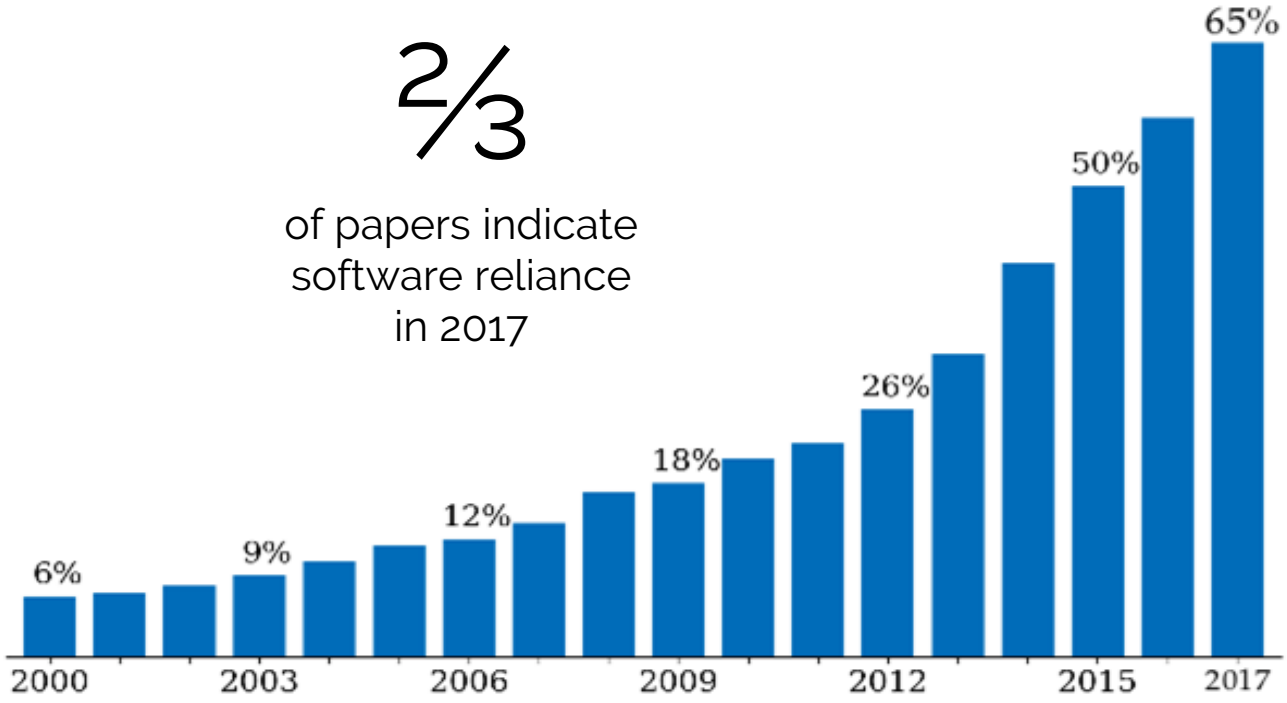


https://goo.gl/gmHwGm

Text analysis of papers

2/3

of papers indicate software reliance in 2017



Who writes research software?

Analyst Developer Analyst Programmer Analyst Programmer - SITS (x 3) Analyst/Programmer Applications Developer Applied Scientist Architectural Robotics Developer Assistant Data Programmer Assistant Project Manager Atmospheric Correction and Radiative Transfer Model Scientist Audio Software Developer - KTP Associate Bioinformatician Bioinformatician In Potato Genomics and Genetics Bioinformatician/Computational Bioscientist in Microbiology Bioinformaticians Bioinformatics Analyst Bioinformatics Postdoctoral Researcher Bioinformatics scientist Biometric Software Systems Developer Biorespository Software Developer C++ / 3D Graphics Software Engineer Casebooks Project Editor (Research Assistant/Associate) Climate Researcher (Research Associate) Clinical Study Programmer CoMPLEX Research Associate Computational Biologist / Bioinformatician Computational Scientist Computational Scientist in Computational Fluid Dynamics & Industrial Applications Computational Scientist in Structural Mechanics and Industrial Applications Computer Scientist Computer Vision Researcher Content Developer/Programmer Control Engineer-IMG - 3 posts CREATe Data Specialist Data Analyst Data Integration Coordinator Data Manager x3 Database and Software Engineer Database Manager/Researcher Database Programmer Digital Media Technician E-Learning Portal Manager (KTP Associate) e-Learning Systems Development Analyst e-Learning Systems Development Analyst (Moodle, SQL) E-Learning Web Developer E-Portfolio Learning Technologist Embedded Systems Engineer Engineering Technician Environmental Scientist EPSRC Studentship on Algorithmic Construction of Finsler-Lyapunov Functions Experimental Officer in Bioinformatics Experimental Psychologist Finance Assistant Gaia Alerts Software Developer Gaia Software Developer (Gaia UK Team) GIS Applications Specialist Graduate Programmer / Software Developer Graphics Programmer Health Data Manager / Scientist High Throughput Bioinformatician High Throughput Sequencing Bioinformatician (Two posts) HIVE Manager/ HIVE Co-ordinator HIVE Senior Researcher and Technical Lead Hydro-informatics Scientific Software Developer Image Analysis Manager for Cancer Imaging Information Systems Developer Instrumentation Engineer Investigator Statistician IT Developer IT Services Manager IT Services Specialist (e-Learning Systems) IT Support Technician (Unix / Windows Systems) Knowledge Transfer Partnership (KTP) Associate: Innovent Technologies LTD Knowledge Transfer Partnerships (KTP) Associate - Software Developer K[illegible] Associate [illegible] Research Fellow KTP Associate (Fixed Term Contract for 24 months) KTP Associate (Precision Agriculture) [illegible] KTP Associate [illegible] KTP Associate: Electronics / Robotics Engineer Learning Technologist Leicester Respiratory BRC IT [illegible] Marie Curie Early Stage Researcher Marie Curie Early Stage Researcher in Radar Rainfall for Integrated Water Quality Modelling Marine Earth Observation Scientists Medical Statistician Medical Statistician/Senior Medical Statistician Metrology Engineer Mobile Application Developer NASC IT Support - Programmer and Systems Administrator (Fixed-term) NIHR Research Methods Fellow PDRA on EU Project on Automated Multisensor Surveillance Planning Officer Policy Modeller 2014 Post - Doctoral Research Assistant INSTRON Post Doctoral Research Worker Post Doctoral Researcher in the application of Digital Technology Post-Doctoral Research Assistant in Simulation and Visualization Post-Doctoral [illegible] Associate (Pathogen Genomics) Post-Doctoral Research Fellow Postdoctoral Fellow - population genetics / evolu[illegible] Postdoctoral Fellow in Cancer Therapeutics Postdoctoral Research Assistant Postdoctoral Research [illegible] Postdoctoral Research Scientist Postdoctoral Researcher in Declarative (Logic and Functional) Programming Postdoctoral Researcher Postdoctoral Scientist Postdoctoral statistician Postdoctoral Training Fellow - Statistical and Computational Genetics of Autism Principal / Senior Bioinformatician Principal Bioinformatician Product Development Engineer (Rail) Publishing Portal Web Developer Radio Frequency Engineer Reader in Computer Science Reporting Analyst Research (Software) Engineer Research Assistant Research Associate Research Fellow Research Image Data Manager, Biomedical Engineering Research Officer Research Officer â€“ Social Protection Research postgraduate Research Programmer Research Scientist Research Scientist / Senior Research Scientist Research Scientist in Machine Learning and Computer Vision Research Software Developer Research Software Developer for the Herchel Smith Professor of Organic Chemistry Research Software Engineer Research Studentship Research Worker Researcher SAP Trainee Technical Analyst Scientific Officer with Michela Garofalo Scientist SEAHA Studentship: Extracting epidemiological data from collections SEEG Data Archive Manager Senior / Research Associate in Clinical Integration and Image Analysis for Fetal Surgery Senior Analyst Programmer (Business Analysis) Senior Analyst/Programmer Senior Bioinformatician Senior Bioinformatician / Bioinformatician Senior Computational Statistician - Spatial Models Senior Data Acquisition Scientist / Data Acquisition Scientist Senior Data Manager Senior Database Administrator Senior IT Developer Analyst Senior Mathematical Modeller Senior Media Developer Senior Postdoctoral Researcher - Evolutionary and Computational Analysis of Infectious Disease (Phylodynamics) Senior Research Assistant Senior Research Associate Senior Research Associate â€“ Molecular Modelling & Simmulation Senior Research Associate in Quantitative Clinical MRI Senior Research Fellow Senior Research Fellow/Research Fellow in Vibration Diagnostics and Prognostics/Digital Signal Processing Senior Research Laboratory Technician Senior Research Technician Senior Software Developer in Bioinformatics Senior Software Engineer / Software Engineer Senior Statistical Epidemiologist Senior Systems Administrator Senior Technician / Demonstrator (UCMK) Senior Web Developer SharePoint Developer Software Developer Software Developer (Bioinformatics) Software Developer (KTP Associate) Software Developer x 2 Software Developer/Programmer Software Developers in e-Learning Software Engineer Software/ Database Developer (KTP Associate) Sports Programme Manager Statistical Geneticist Statistical Programmer/Data Scientist Statistician Statistician/Epidemiologist Student and Enrolment Services Manager SWCAR Information Assistant System Administrator Systems Developer Systems, Data and Applications Team Leader Teaching Fellow in Computational Methods UTRCI Research Scientist, Control Systems Web Application Programmer Web Developer

Need for software experts – convincing others

We need research software to be:

- **Correct** tested, testable
- **Understandable** transparency, sustainability
- **Reproducible** research methods & ethics
- (Re)**Usable** (unlocking knowledge)
- **Easy to change** (new knowledge!)

Why is this so hard?

Missing role

Researcher career structures don't reward software focus

The “Research Software Engineer”

Software engineering skills + understanding of research

What do RSEs do?

- Build **quality** software - as **part of** research projects
- Help researchers:
  - Learn computing skills
  - Establish good practices
  - Navigate computing infrastructure

A note about names and categories

- Pre-existing roles and teams
- Job titles and group names vary
- Not everyone can use “engineer”

Community is inclusive

But, for recognition & improving career structures

A common name and vision is powerful

The story of the UK RSE movement

2012: Origins

Term RSE Coined

First RSE Group

2012

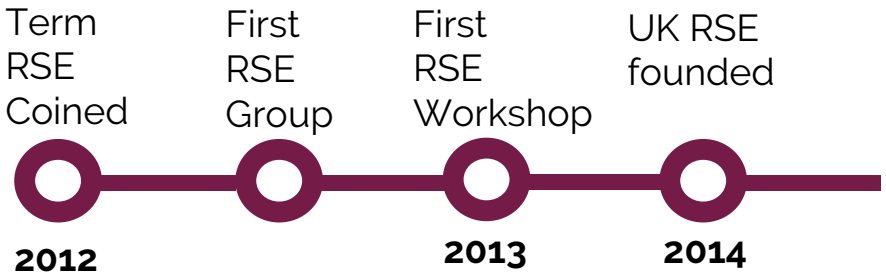
SSI Collaborations Workshop - early 2012

Term "**Research Software Engineer**" adopted

First RSE Group - late 2012
University College London

New model of organising software expertise in a University

2014: UK RSE Association founded



RSE Workshop - Sep 2013

"Should we create a community to represent RSEs?"

UK RSE Association founded early 2014

160 members in first 3 months

First elected committee - late 2014

2014/15: Early recognition

Term RSE Coined — 2012

First RSE Group

First RSE Workshop — 2013

UK RSE founded — 2014

Gaining recognition — 2015

Institutions

Funding body creates dedicated **RSE fellowships**
+ supports RSE network

More groups established

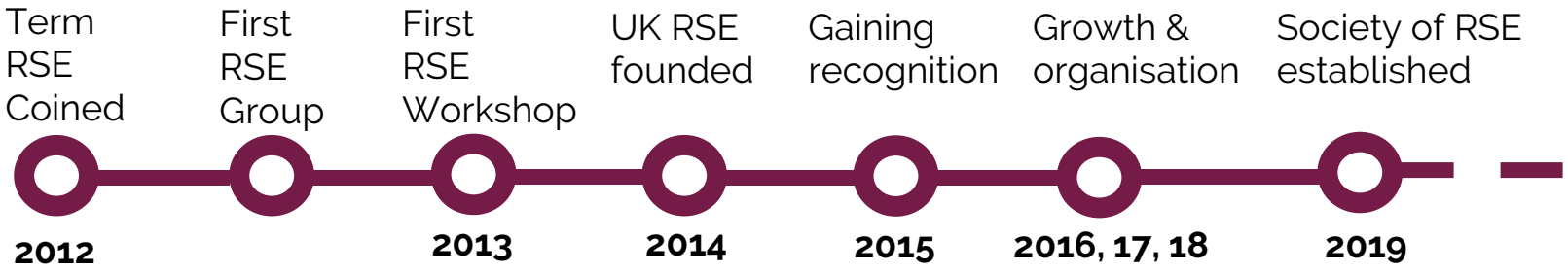
Individuals

2016 - 18: Growth and organisation

Annual RSE conferences

Growth of RSE groups

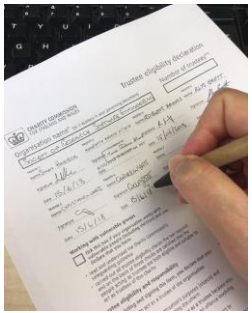
2018-19: Establishing a professional society



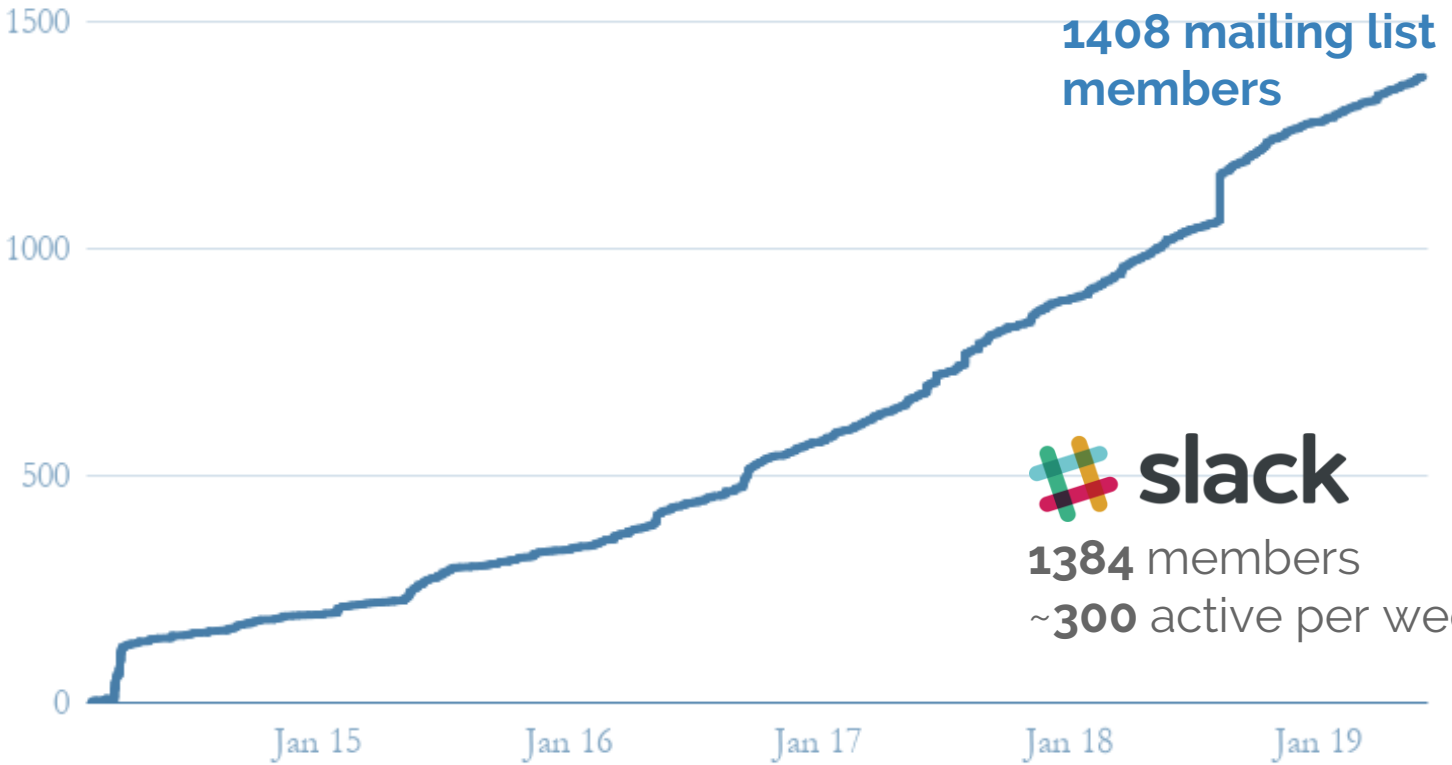
Establishing a professional society

RSE

SOCIETY OF RESEARCH SOFTWARE ENGINEERING



Growth of the community



June 2019:
1408 mailing list members

slack

1384 members
~**300** active per week

The Society of Research Software Engineering

Now registered as a charity!

To further research software engineering for the good of society

- Legal entity
- Independent of any individual, university
- Elected trustees

Gearing up to accept members

RSE19

17th – 19th September
University of Birmingham, UK

Even bigger, even better!

http://rse.ac.uk/conf2019

Registration opens soon…

Influencing research structures, policy, funding

Senior University leaders

Consortium of leading UK universities

Initiative driven from the top to recognise importance of people who create software in research

Launching with panel at RSE19
Importance of RSEs and how Universities can support their careers

Significant win for the RSE community

- Brings RSEs into the mainstream of University concerns
- Where these universities lead, others follow

Influencing research structures, policy, funding

Funding bodies

UK Research & Innovation

Software and data experts now included in their expert advisory group

Direct input on e-infrastructure roadmap for directing funding over the coming decade

Whitepaper on software strategy to be published along with roadmap

Some models that have worked

RSE groups

"A formal team or group of RSEs within an organisation"

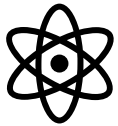
Benefits of RSE groups

For RSEs

- ✓ Stable careers
- ✓ Peer group
- ✓ Recognition & development

For research projects

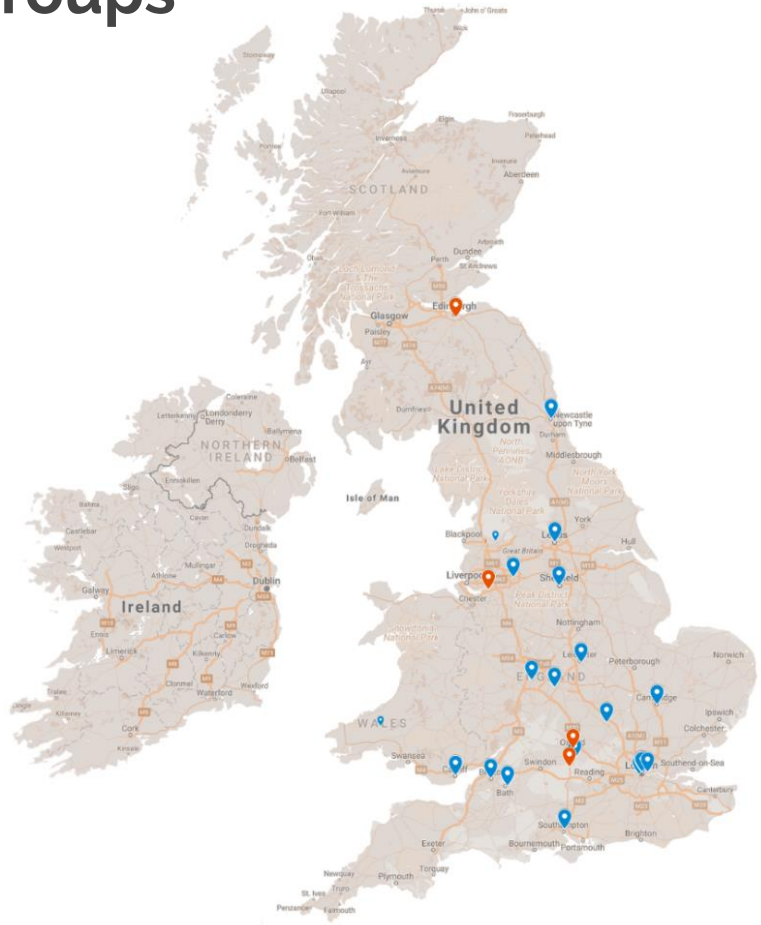
- ✓ Flexible access to expertise
- ✓ Sharing between projects
- ✓ Access to niche skills

For researchers 

- ✓ Help & advice
- ✓ Training
- ✓ Infrastructure
- ✓ Focus for wider network

Research software groups in UK

- Alan Turing Institute
- University of Bath
- University of Birmingham
- University of Bristol
- University of Cambridge
- University of Cardiff
- UKAEA
- Imperial College London
- Francis Crick Institute
- Kings College London
- University of Leeds
- University of Leicester
- The University of Manchester
- Newcastle University
- Open University
- The University of Sheffield
- University of Southampton
- University College London
- University of Warwick
- Queen Mary University
- EPCC
- Daresbury Laboratory
- Oxford eResearch Centre
- Software Engineering Suppo...



Support for RSE leaders (current and aspiring)

Changing roles and structures in long-established institutions is hard

RSE Leaders peer-support
For people running or trying to start RSE groups or networks

- Slack channel
- Twice-yearly meet-ups for UK RSE leaders

Learning from experience of others:
https://www.software.ac.uk/blog/2018-04-11-secret-behind-growth-rse-groups-uk

International RSE leaders workshop (Jan 2018)

Bringing together RSE leaders from around the world to help each other improve access to software expertise in research by pooling knowledge, coordinating efforts and establishing collaboration.

Read more at **researchsoftware.org**

EPSRC
Engineering and Physical Sciences Research Council

The Alan Turing Institute

Aspiring RSE Leaders Workshop (May 2019)

Providing new and aspiring RSE leaders in the UK with the knowledge and network needed to drive the expansion of RSE groups

Slides:
https://drive.google.com/drive/folders/1U9KdDB3MLDGEkpWpKmHAELdUYDKrB_iy

RSE Communities

"Networks of RSEs that are not from a single team in an organisation"

Communities within organisations

Networking Knowledge sharing Self-help

Raising the profile & status of research software work

“Research software community”

“Research Programming Hub”

“Research Software Developer Network”

“Computing seminar days”

“Software Expo”

Communities for a region, domain or specialism

Examples:

London and South East region – RSE London

speak to Jeremy Cohen (he's here)

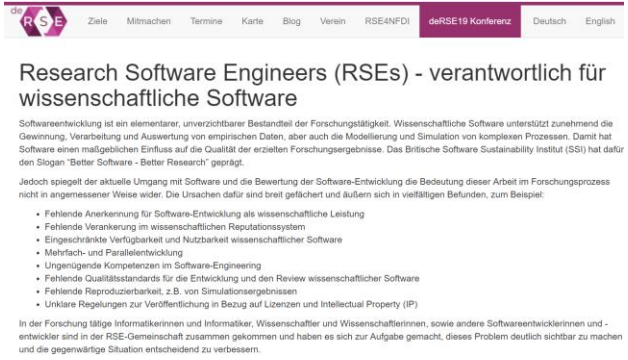
HPC Wales – uniting RSEs involved in the Welsh HPC facility

Digital Humanities - DH-RSE

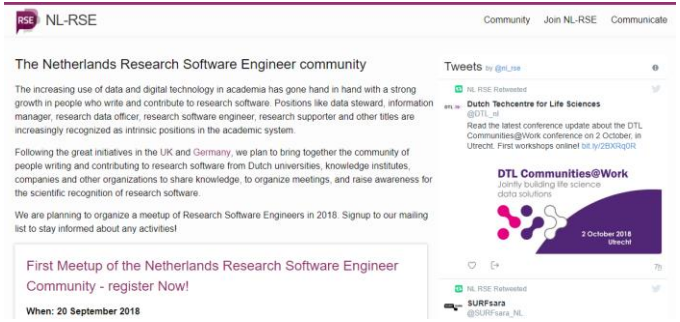
National RSE Organisations

National RSE Associations

Germany: www.de-rse.org



Netherlands: nl-rse.org



Nordic Countries: www.nordic-rse.org

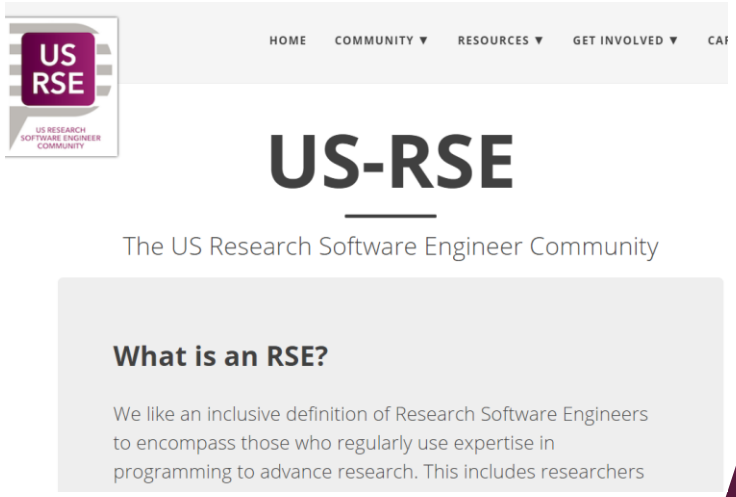
National RSE Associations

Australia & New Zealand:

https://rse-aunz.github.io

USA:

www.us-rse.org



Research Software Conferences

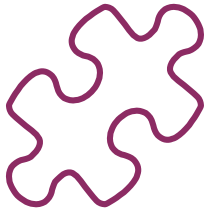
RSE18:
314 people from 12 countries

Getting involved

German RSE community

What's next?

How can you help?



PICK WHAT FITS

You know your context
Action is needed at all scales

CHANGE IS HARD

COMMUNITIES ARE POWERFUL

BIG GOAL
SMALL STEPS

Keep going and small changes add up

MAKE IT HAPPEN!

Read more

RSE State of the Nation Report
doi.org/10.5281/zenodo.495360

A not-so-brief history of Research Software Engineers
bit.ly/NotSoBriefRSE

SSI research and articles
https://www.software.ac.uk/tags/analysis

Contact

alys.brett@ukaea.uk
@alysbrett

info@rse.ac.uk
@ResearchSoftEng

Acknowledgements

The RSE community is the result of the combined efforts of many people including current and past RSE committee members and conference organisers

Thanks to Simon Hettrick and the SSI for slide content and the essential research and support that have made so much of this possible

My contribution to UK & international RSE activities is supported by UKAEA.

The fusion software described is funded by Euratom under the JET operating contract.