BEAR
BIRMINGHAM ENVIRONMENT
FOR ACADEMIC RESEARCH

Advanced Research Computing
Training strategy

Executive Summary

Advanced Research Computing (ARC) provides training to allow researchers to use BEAR systems and manipulate their research data. By offering a range of courses, we are giving researchers the skills and ability to carry out "Better Software, Better Research"[1].

Through an understanding of the skills required to manipulate research data effectively, we will offer a variety of courses, including online content and bespoke courses.

Introduction

An increasing number of researchers need to use BEAR systems and services to store and process their data. As this demand grows, we need to review our training provision to ensure that it is fit for purpose and meets the needs of our users. *Birmingham 2026* has ambitious targets to increase awards by 10% per annum to £350m and to recruit 1,400 additional academic and research-focused staff, so we will need to be prepared to support and train these new recruits.[2]

It is important for ARC to be aware of the skills required by researchers to undertake their work, and how they can benefit from using HPC and appropriate software knowledge. There is recognition that what we do is complex, outside the comfort zone of many researchers and not what they're used to, so a level of support is needed to reflect that. By providing training, we are supporting the university's goal "to do more and better research", as outlined in the 2015-2020 Strategic Framework.[3]

ARC must be responsive to the needs of our users, but also take into account other factors such as the learning materials available to us, the resource required to deliver training and associated cost, changes in technology, and the level of demand and expected take-up from across the university. Our delivery needs to be flexible, utilising new methods of teaching and learning, including online courses and face-to-face.

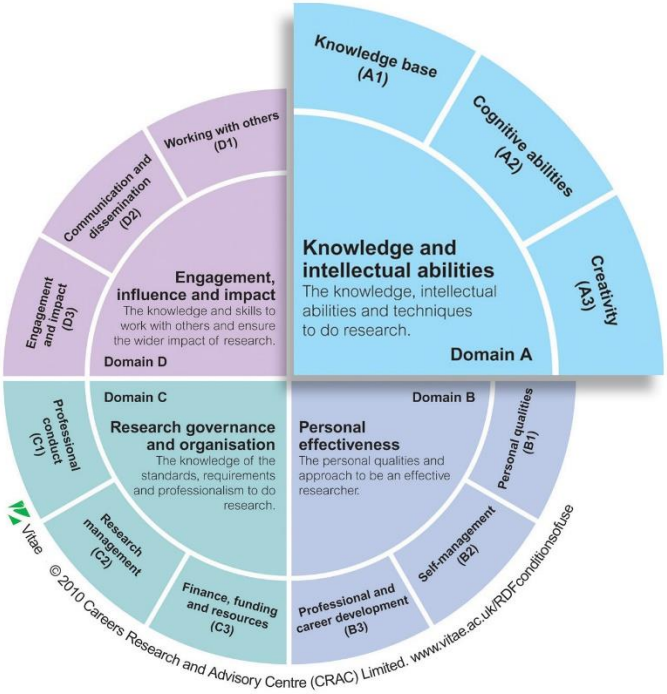
It is important that we look at the skills gaps we are trying to address. Looking to the future, our training needs to keep abreast of new technologies that will support researchers best with their work, including areas such as Artificial Intelligence (AI).

[1] Software Sustainability Institute - http://www.software.ac.uk/
[2] https://www.birmingham.ac.uk/Documents/strategic-framework/birmingham-2026-brochure.pdf
[3] https://www.birmingham.ac.uk/Documents/strategic-framework/strategic-framework-2015-2020.pdf

Our training strategy directly supports the *ARC Strategy and Objectives 2018*; including 'Growing our Partnerships with Researchers' and facilitating use of BlueBEAR as the infrastructure develops. Training is regarded as "good investment both to empower researchers and to reduce the number of the most basic 'how to' support calls".

We also need to collaborate and co-ordinate with other departments in the university to tie in with what they are doing, consider how our work fits together, and how we can collectively support researchers, including the Graduate School, POD and Library Services.

Our future aim is to enable ARC to facilitate training where possible within the financial and resources boundaries, and to utilise new teaching methods and technologies.



The Vitae Researcher Development Framework[4] is widely used within the Higher Education research community and describes the knowledge, behaviour and attributes of successful researchers. ARC is keen to address issues raised by external agencies such as this. By providing training to utilise BEAR services and research software, ARC is particularly supporting the Domain A area of knowledge, intellectual abilities and techniques to do research. This is a key foundation for researchers to acquire sufficient practical knowledge of how to manage and manipulate their data.

Objective

To deliver training courses relevant to support our users to make the best use of research software and BEAR systems.

[4] https://www.vitae.ac.uk/researchers-professional-development/about-the-vitae-researcher-development-framework

We offer training to a wide audience from across campus, particularly as there are some common languages that are relevant to a large proportion of researchers, including Python. We will also explore the delivery of subject specific courses, such as for bioinformatics.

Basic Linux knowledge is required to use ARC systems, so a key objective is to ensure that users have sufficient skill to log in and utilise BlueBEAR. Many of our attendees are complete novices, so we need to take this into account and deliver courses at a relevant level so that we do not alienate them from what can be a challenging subject. This also recognises that courses will be seen as too basic for some people, but can be used to reinforce what they need to know in order to access BEAR systems. More advanced courses are being considered for researchers who would like to progress to the next level.

How will we do this?

Course delivery
The ARC team will continue to deliver a number of training courses as listed below. This involves the Research Engagement Group (REG) and Research Software Group (RSG). For Software Carpentries we have a number of trained instructors, covering at least one person per college. Their time is given on a voluntary basis. So the RSG are involved in some, but not all, course delivery. We have also utilised our mailing list to source helpers who have some basic software knowledge but have not completed the Carpentries instructor training. We typically have two instructors and two helpers per course, with bookings limited to 40 people.

List of current courses:

- Software Carpentry - Python, R, MATLAB, Genomics. These courses also cover Unix Shell and version control with Git (RSG and helpers)
- NVIDIA DLI (RSG)
- BlueBEAR training - Introduction to Linux, BEAR Necessities (REG and RSG)
- SIGs support, including CFD and Abaqus (colleagues from colleges)

C++ is being considered as there has been demand for this from across the university.

The structure of Software Carpentry courses is being revised for 2019/20 following discussion and feedback from the Carpentry instructors. It will include the use of an integrated development environment (IDE) for software development and use of a ‘story’ rather than disjointed programming concepts. This approach cannot be branded as Carpentries as it does not follow their curriculum, but if it proves successful for us, we will ask if they will allow our change of format to retain the branding. The change will be reviewed again later in the year to evaluate if the new format is more effective. The existing Carpentries format will also be delivered and regarded as more of a ‘next steps’ rather than an introductory course. Carpentries ++ are being proposed as a series of more advanced software engineering courses, including testing, licences and project management with GitLab.

We also need to consider discipline-specific training – how can we do that better? BEAR Champions/super users could have a role in supporting training, taking ownership of it and therefore carrying more weight within the subject area; we recognise that peer knowledge and understanding is valued by researchers.

The development of future courses will take into account changes in technology, user needs and demand. We are already working on a Data Science course, potentially tailored to specific subject

areas. The possibility of delivering Data and Library Carpentries courses will also be explored, although they are currently available in a very limited number of subject areas.

We are committed to enhancing the skills of trainers where appropriate, whether through peer review and feedback, participation in POD courses, mentoring, or shadowing others to broaden knowledge.

No-shows policy

There has been an ongoing issue with a significant number of no-shows at our training courses, sometimes as high as 50%. When courses are in high demand and waitlists are created, this is very frustrating for people who are not able to book a place. We have also had repeat no-shows from individuals. As a result of this, a policy has been implemented requesting users to inform us if they are unable to attend a course and if they do not, we will not allow them to book for the next 2 dates of that particular course (see Appendix). Since that policy has been implemented, we have experienced an increase in the number of cancellations.

Frequency of courses

It is important to recognise the patterns of demand throughout the year and take into account factors such as term time, exam periods etc. as some of our audience will be affected by this. Researchers can start at different times of the year, but there is more likely to be a peak in the autumn term, so our schedule must reflect this. We must also take into account the availability of our trainers and other demands on their time at key points in the year that affect their ability to deliver training, whilst aiming to maximise the resource within the ARC team.

Availability of rooms for training is also a factor, particularly during term time when we need 2 days for Software Carpentry. Alternative formats are to be trialled, including delivery over 4 consecutive Wednesday afternoons. Another consideration is making alternative methods of delivery available to suit as many potential users as possible, and being flexible in our approach to this.

Bespoke courses

We are able to offer bespoke courses on demand and discipline-specific requests where the tailoring of material is beneficial and there is a need for a group to be trained. This matter should be discussed with the RSG/REG teams. We are also able to facilitate courses on behalf of our SIGs, such as Abaqus and CFD, so that we can meet demand from users.

Online courses

To support our face-to-face training courses, we also offer an online course in Canvas for Introduction to Linux. This is designed to support people who have attended the online course and want a refresher, and also those who are unable to attend the standard training course. It contains the basic course content, and a quiz to test knowledge and understanding. The course is self-registration, so users can opt in to join it. There is scope for ARC to create additional online courses as required.

The university is purchasing a site licence for Linkedin Learning[5] from October 2019. This contains a wide variety of programming languages, e.g. Python, R etc., so there is the potential for us to create a playlist of relevant videos and resources to support the training we provide.

We now have a licence for Powtoon (video creation software), so can explore the creation of bitesize videos covering topics such as mapping to the RDS and logging in to BlueBEAR. This provides an alternative, visual style of training and can be incorporated into the website and Canvas course. Reusability of content is important, so we can utilise it in multiple places and ways.

It has also been suggested that we provide a list of useful websites, books and other resources for further reading and development beyond our training courses.

Code of conduct

We have developed a Code of Conduct outlining the expectations and behaviours required of both attendees and trainers/helpers. This will help to ensure that our courses take place in an environment of mutual respect and understanding of others. If behaviour does not meet expectations, we will refer to the code and ultimately any disputes will be handled by the ARC training lead. The Code of Conduct is available on our website and participants will be referred to this when they sign up to a course.

https://intranet.birmingham.ac.uk/it/teams/infrastructure/research/bear/bear-training/Code-of-Conduct.aspx

Feedback

We value the feedback given by our participants and use this information to improve the content and delivery of our courses. It is also important to revisit our participants 6 months after a course has taken place to see what the impact of the training has been and how relevant to their research.

We have a feedback form for Introduction to Linux and BEAR Necessities, with a follow-up questionnaire. Software Carpentry uses a post-it note system where participants indicate positive and negative aspects of the course.

Administration

Most ARC courses are currently booked via Eventbrite, including the sending of reminder emails and collection of user data. There is an administrative overhead to transfer the attendance/cancellation data to a spreadsheet, so that we can monitor persistent no-shows and enforce our non-attendance policy (see Appendix). Courses are advertised via bear-updates emails and the University of Birmingham RSEs Slack channel.

Environmental factors

There are a number of ways that we aim to minimise the impact of environmental factors for each training course:

- not printing certificates unless asked

[5] https://www.linkedin.com/learning/

- making the slides available online
- minimising paper used in handouts (more slides on a page)

Appendix

Current text for no-shows (sent in email reminder from Eventbrite) –

> Please let us know if you are unable to attend the course, by cancelling your order in Eventbrite or emailing bearinfo@contacts.bham.ac.uk. There is a significant cost in staff time to provide training and there are generally people on a waiting list looking to attend, so we can offer your place to someone else. If you don't turn up to a course and don't let us know, you will be unable to book the next 2 dates of that particular course.