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DRI-focussed training for research facilitators and teams (DRIFT)

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Abstract: Digital Research Infrastructure (DRI) has become an increasingly important part of the research lifecycle over recent years, transforming the ways in which we conduct research for the better. Across disciplines, from highly technical and specialised computational work to administrative record keeping for sustainable and reproducible research, DRI is now critical for the modern research team. It has thus become important to train researchers and people in related roles in these new DRI skills and to form different types of research collaboration, especially as we look to the future of even larger-scale research and greater interdisciplinary connections. This paper summarises the work of the DRI-focussed training for research facilitators and teams (DRIFT) project which aims to address the lack of DRI training for research support roles, to improve visibility of DRI outside of physical sciences and engineering, and to make the DRI landscape more accessible. This has been achieved by defining the role of research facilitators, surveying existing resources and using these to identify gaps and develop training curricula, building hardware demonstrators to engage a wider audience, and producing an open-source teaching platform that allows trainers to manage learner pathways. Even with the rapidly shifting digital landscape, having a firm grounding in key competencies and experience will continue to be valuable to enable the use of DRI to produce high quality research, and the benefits and impacts that it brings.

Keywords: Digital Research Infrastructure, Research Technical Professional, research software engineering, research facilitation, project management, training, teaching platform.

1 Introduction

Digital Research Infrastructure (DRI) has revolutionised how we conduct all aspects of research and has become ubiquitous throughout all stages of the research lifecycle. This pervasiveness necessitates new skills and types of research collaboration, as research supported by DRI aims at ever larger scales and broader interdisciplinary collaboration. DRI encompasses the compute, data, software and network infrastructure, and the associated people, skills, tools and techniques, that underpins most research. Digital Research Technical Professionals (dRTPs) [STE25], the people who provide vital technical contributions to modern research, include Research Software Engineers (RSEs) but also a wide set of other roles and skills associated with DRI. This can cover areas across the research data and research computing infrastructure, such as research data management and data stewardship, Research Operations (ResOps), HPC infrastructure engineering,

and research infrastructure cybersecurity.

DRIFT (DRI-focussed training for research facilitators and teams)[1] is a project that aims to develop and deliver training for two main audiences: research facilitators, and research teams. This is complemented by community engagement work in domains and institutions where visibility of DRI is low. It is particularly important to develop support for research facilitators as they play a vital and trusted role in nurturing links between technical professionals and the research community, thus enhancing the impact of the skills development activities undertaken by the project.

The DRIFT project has three main objectives:

- To support research facilitators working within communities that could benefit from DRI offerings so that they can efficiently assist researchers understand its advantages.
- To train research teams in skills that benefit collaboration, team science, and inter- or multi-disciplinary working.
- To connect with a wide range of research institutions and disciplines, with a special focus on those without existing direct access to institutional HPC services, that draws on the predecessor UNIVERSE-HPC project.

These objectives are closely related to other initiatives in the area. The *DIgital REsearch CompeTencies (DIRECT) Framework* helps classify and describe a wide range of technical and non-technical skills used across various digital research roles. These include digital Research Technical Professionals across domains (such as RSEs, data managers, stewards, specialists and archivists, community managers, research software group leads, lab technicians), researchers, principal investigators (PIs), and many more [NRH+].

The *teachingRSE Project* has provided a straightforward definition of RSEs, exploring their different types of work, and defined a list of competencies and values that frame their general identity that further research and training can build upon [GTP25].

The Turing Way has produced a handbook to reproducible, ethical and collaborative data science aiming to provide all the information that researchers and data scientists in academia, industry and the public sector need at the start of their projects to ensure that they are easy to reproduce at the end. This has included guides on project design and collaboration [The25].

In the UK, several *Digital Research Technical Professional Skills NetworkPlus* projects[2] have been funded, to address cross-cutting challenges to digital RTP skills and careers. This includes DRIFT's sibling project, *CHARTED – The Connecting Hub for Advancing the RTP Talent Enabling DRI*, which is providing a platform and community funding to make the process of discovery and development of skills and careers easier for current and prospective RTPs by providing tools and resources necessary to create self-directed learning pathways and making training content more FAIR (findable, accessible, interoperable and reusable).

DRIFT and CHARTED are successors to the *UNIVERSE-HPC (Understanding and Nurturing an Integrated Vision for Education in RSE and HPC)* project which identified the lack of

[1] DRIFT website: https://drtp-skills.ac.uk/about/drift/

[2] As described on the Computational Abilities Knowledge Exchange site: https://www.cake.ac.uk/landscape/skills

defined entry points and pathways that made it harder for RSEs to develop their careers through training and education [FCC+25]. DRIFT builds on the framework for RSE Education and Training developed in UNIVERSE-HPC, extending it to cover DRI more generally rather than concentrating on software. It also extends various approaches and outputs initially conceived in UNIVERSE-HPC, such as the Gutenberg platform for hosting and managing training and community engagement mechanisms, to identify more ways of providing information about DRI in innovative, accessible and integrated formats.

The DRIFT project is funded by the UKRI Digital Research Infrastructure "New Approaches to Skills" programme, which aims to: train DRI professional staff with new skills, including training in new techniques or other aspects relevant to career development; train non-expert users in the use of DRI, across all the domains and disciplines of UKRI so that non-expert users can understand how DRI can enable their work, and how to use it, thus making FDRI more accessible; and broaden engagement to new users and communities, by providing skills to internal staff or to external users. DRIFT is a collaborative project between the universities of Edinburgh, Oxford and Imperial College London.

At the core of the DRIFT project is the belief that, to enable access to DRI from the widest possible section of the research community, there must be a widespread understanding of DRI by the various research facilitators who will be helping researchers use it. Their understanding of DRI will vary, which is why DRIFT takes a multi-faceted approach to supporting them.

Starting in Section 2, the definition and role of research facilitators is explored to provide a summary of the range and scope of their activities and experience, and a working definition of the four key types of research facilitation activities performed by DRTPs. Section 3 discusses the current state of training in project management that can be applied to research software projects, an increasingly common task for research facilitators working within teams, and introduces a curriculum for training in this area. Section 4 examines different mechanisms to improve visibility of DRI outside of physical sciences and engineering and how research facilitators / DRTPs can be helped to do this, and provides suggestions on how this can be improved based on DRIFT's experience. Section 5 summarises the improvements to the Gutenberg teaching platform originally developed in UNIVERSE-HPC which is being extended in DRIFT to be more useful for research facilitators to use, providing an open-source platform that is designed to support personalised learning pathways. Finally, in Section 6, we discuss where the field of DRI is going, and what training and resources might be needed in the future to support research facilitators and dRTPs.

2 Understanding the role of research facilitation for DRI

The computational, multi-disciplinary and team-based nature of research increasingly relies on research facilitation roles, serving as a bridge between the computing infrastructure professionals, and the scholars and researchers from a wide range of different domains who are using the infrastructure.

The DRIFT project examined the different facets of the research facilitation role as it applies to Digital Research Infrastructure, primarily through literature review of online resources (team webpages, job descriptions, policies, training) supplemented with some interviews to test the

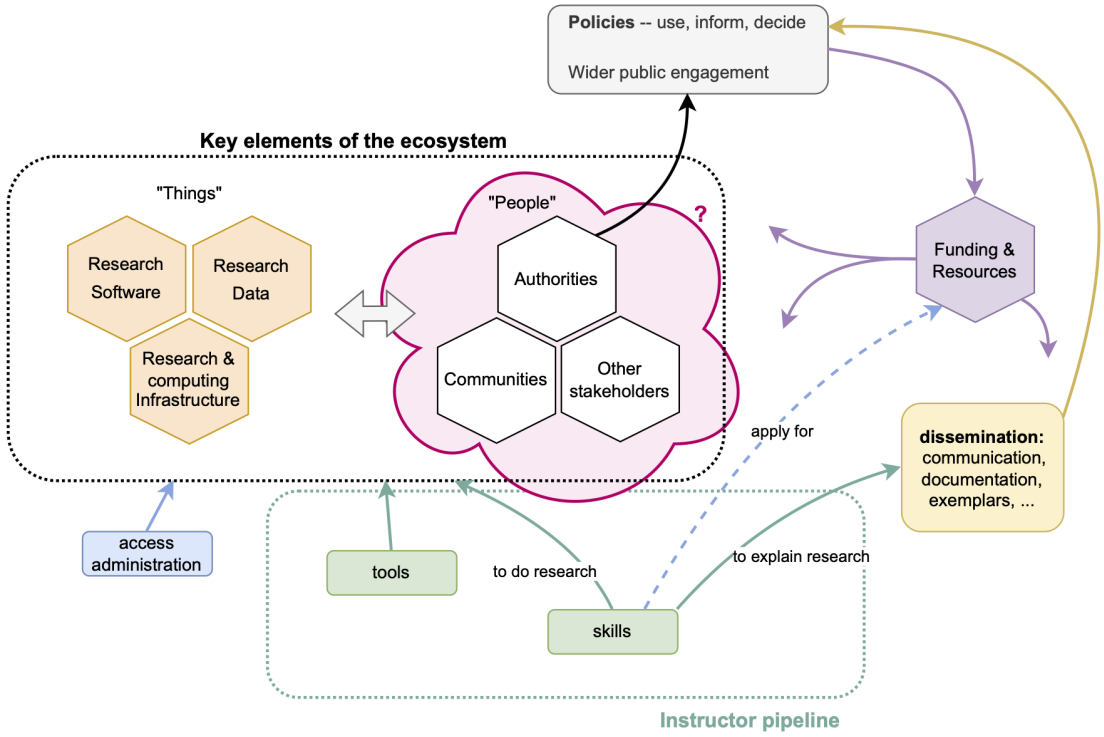


Figure 1: Simplified and non-exhaustive view of the Research Facilitation Ecosystem. Every element may be relevant to one or more stages of a digital research life cycle.

initial conceptualisation. This has led to a definition of digital research facilitation as *any activity engaging the research community to enable, improve or extend the use of digital research tools, methods, objects and infrastructures*. Despite how essential it is in ensuring DRI is visible, accessible and usable, it tends to be embedded into many roles, often without proper recognition or resources.

Many academic institutions have some sort of centralized digital research or research data support services, with competence centres such as the bwHPC Competence Centers in Germany and, in the UK, the various Advanced Research Computing teams and centres of excellence such as N8CIR and EPCC. Larger domain consortia have been supported through initiatives such as the EuroHPC Centres of Excellence, German National Federated Data Infrastructures, Netherlands eScience Center, and the UK's Collaborative Computational Projects and High End Consortia.

But – still – in many research organisations, those teams are often small, under-resourced, have limited visibility across their institutions, and may not have the required technical or domain knowledge, especially in the context of advanced research computing. As a result, many of the research facilitation activities (especially those relying on specialised domain knowledge) are embedded in an ad-hoc manner across many roles, including a wide range of Research Software Engineer and related dRTP roles, such as data stewards.

Figure 1 attempts to capture a view of the research facilitation ecosystem that involves multiple perspectives. The key elements are split into two main groups: (1) "things" used to carry out digital research, and (2) "people" who do, enable or influence things. The things — not necessarily physical objects — that enable research are Research Software (and related tools), Research Data, and Research and Computing Infrastructure. The People interacting with these research "things" are the research Communities, Authorities (including funders and policy makers), and other stakeholders (developers of tools, members of financial and legal departments and so on). Under the UKRI definition, Digital Research Infrastructure comprises all of the "things" alongside the "People" who are specifically supporting the "things".

There are many blockers that may prevent researchers from using tools and resources efficiently, and the aim of research facilitation is to support researchers in overcoming these. In fact, many aspects of research facilitation fall into the design, creation, and delivery of training aimed at skills and tools used by various communities - alluded to at the bottom of Figure 1 in the green dashed box labeled as the instructor pipeline. However, research facilitation (even narrowed down to the DRI context only) covers a lot more than just training — in the broadest sense, research facilitation also may include service provision and related support, signposting and outreach, community building, and individual on-demand interactions.

While Figure 1 shows a wider set of elements that are an integral part of the ecosystem (and hints at activities such as applying for funding, outcome dissemination or policy making), Figure 2 focuses on those that require technical expertise. Those activities can be broadly divided into the following categories: community engagement, creation and delivery of training, technical facilitation, and on-demand interactions. Many of those activities are seen in these roles as "part of the job" to be done as needed, and are often done without much training or institutional support. At the same time, a wealth of related resources already exists in the wider community (e.g. instructor training, community building resources, and so on) but those materials and opportunities are not necessarily easy to find unless one knows where to look for them. This is especially true for people offering facilitation to specific research communities - often they are not aware of materials used in other communities.

There is a need to better understand different forms that research facilitation takes across different roles and throughout a digital research life cycle, followed by a more structured approach to supporting the DRTPs working to enable efficient and responsible use of research software, tools, data, and computing infrastructures. An example of such an approach is the work done by the Campus Research Computing Consortium (CaRCC) in the USA. The Consortium defines its missions as "*CaRCC advances the frontiers of research by improving the effectiveness of research computing and data (RCD) professionals, including their career development and visibility, and their ability to deliver services and resources for researchers. CaRCC connects RCD professionals and organizations around common objectives to increase knowledge sharing and enable continuous innovation in research computing and data capabilities.*"[3] The Capabilities Model developed by CaRCC [SMH+20] allows institutions to assess their support for computationally- and data-intensive research, to identify potential areas for improvement, and to understand how the broader community views Research Computing and Data support. They also have many community resources for staff on-boarding, career progression pathways, and

[3] What is CaRCC? https://carcc.org/about/

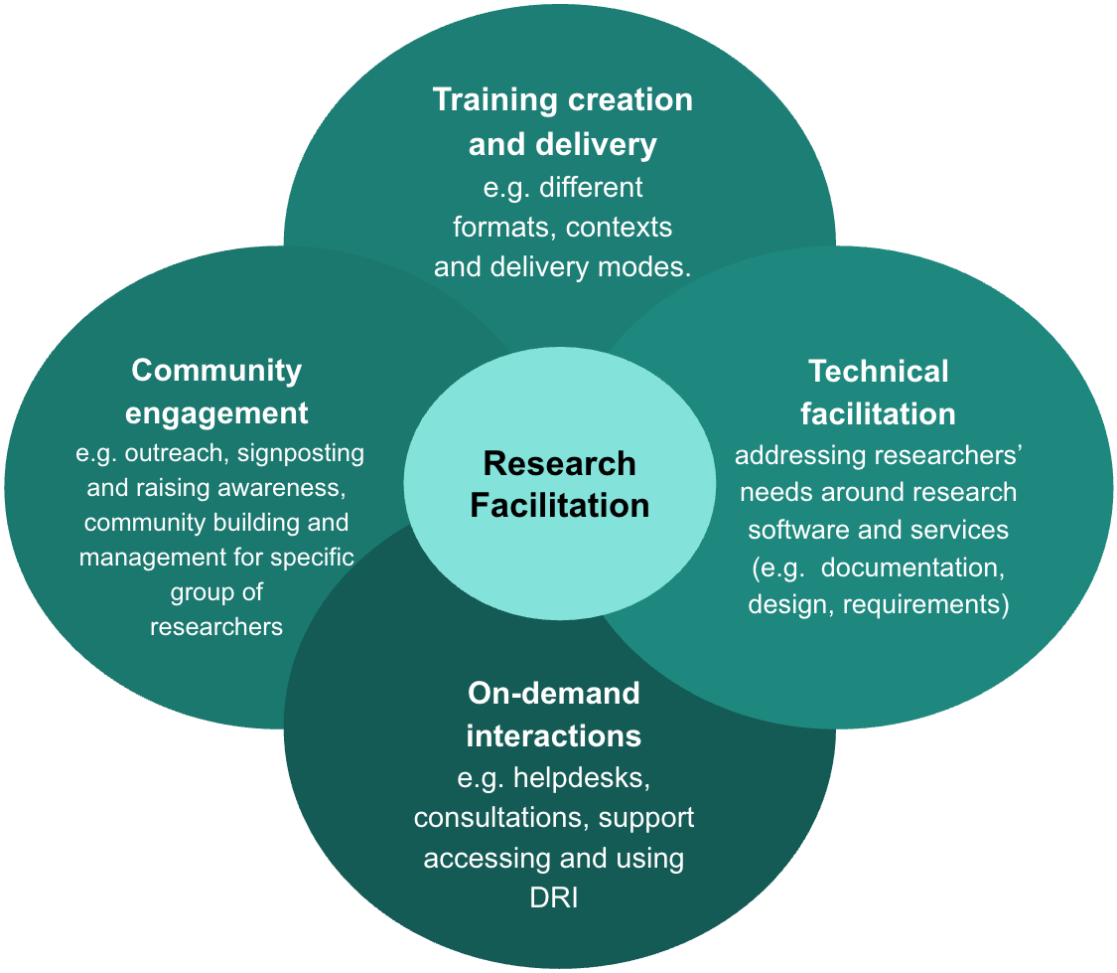


Figure 2: The different research facilitation activities that are often performed under RSE and other research technical professional roles, as a small percentage of effort.

support for emerging computing centers.

DRIFT is working to understand the different forms that research facilitation takes across the UK institutions, collating a list of useful resources [RFC+26], and identifying gaps that may benefit from more training materials. We are also developing a simple model that will help identify research facilitation capabilities within units and institutions, along with the resources required to better support both the research communities and research facilitators. The goal is to highlight the importance and impact of research facilitation and share useful practices and resources to make it more effective for all stakeholders.

3 Project Management Skills

A notable gap in the many available DRI training resources is around project management. This is not because project management training resources do not exist – indeed there are so many it can be hard to understand which are the most appropriate ones – but that most are not focussed on applying project management to the research software projects and research software teams that research facilitators will be working with.

The DRIFT project has developed a draft curriculum [PC25] in consultation with members from the Research Software Engineering community and after examining available open source and closed source training content, in particular Managing Research Software Projects [SW17], the Turing Way's Guide for Project Design [The25], CodeRefinery[4], the Linux Foundation's Open Source 101 resources[5], Producing Open Source Software [Fog17], and the Managing an Open Source Project workshop [Tea23].

In aiming to identify effective project management strategies for RSEs, develop a curriculum teaching them, and highlight factors contributing to successful and poor software development outcomes, DRIFT has developed the following learning objectives:

- Understand distinct characteristics and challenges of research software projects.
- Apply fundamental project management concepts to Research Software Development
- How to build and sustain effective research software teams
- Understand when to apply Agile Project Management methods
- When to use and participate in Open-Source research software projects
- Plan and track project progress and resources
- Communicate and collaborate across roles and institutions
- Address common risks and quality concerns in research software
- Address sustainability, reproducibility and required documentation of research software

These are implemented by an eight module course, which is currently being implemented and piloted, reusing openly licensed material where appropriate.

[4] CodeRefinery Lessons: https://coderefinery.org/lessons/
[5] Learn Open Source Best Practices With These Free Resources:
https://lfenergy.org/learn-open-source-best-practices-with-these-free-resources/

1. Introduction to Research Software Project Management
2. Initiation, Planning and Scoping Research Software Projects
3. Agile and Iterative Methodologies
4. Team building, Trust and Onboarding
5. Open-Source Development for Research Software
6. Project Execution and Monitoring
7. Risk Management and Quality Assurance
8. Project Closure and Sustainability

The DRIFT project has also reviewed and assessed what existing material is available to support each module, and how well tailored it is to research software. Some topics, such as "Introduction to Research Software Project Management" or "Risk Management and Quality Assurance" have plentiful generic material, but little that has been tailored for research software. Other topics, such as "Agile and Iterative Methodologies", have material in development but focussed on particular institutions processes or not available openly. Finally, topics such as "Team building, Trust and Onboarding" and "Project Closure and Sustainability" are very specific to the culture and incentives of research, and training resources are still nascent.

By helping to bring together the different trainers working on materials in this curriculum, DRIFT hopes to ensure that there will be high-quality, reusable resources for instructors, potentially including research facilitators, to ensure that collaborative software developments by research teams including dRTPs and RSEs can be done more effectively and sustainably. The new training being developed builds on the existing training developed by the previous UNIVERSE-HPC project, and maintained by DRIFT[6].

4 Community Engagement

Community engagement is a key aspect of the DRIFT project and enables two of its main objectives: supporting research facilitators and connecting with research institutions and disciplines that do not have direct access to, or have not traditionally used, specialist Digital Research Infrastructure such as High Performance Computing (HPC) platforms.

Support for the second of these two objectives is important in promoting the benefits of DRI as a key element of the modern research lifecycle. Research facilitators represent a bridge between the users of Digital Research Infrastructure and the providers of this infrastructure, such as university research computing teams. Effective digital research team structures also help to ensure that knowledge can be successfully shared, team members are aware of the infrastructure available to them and that this infrastructure is used effectively.

Building, sustaining and engaging with the growing DRI community is therefore vital to ensure that we can grow awareness beyond individual teams and resources. In this context, the aim of our community engagement activities is to reach a wide range of UK universities to share

[6] UNIVERSE-HPC / DRIFT course material repository: https://github.com/UNIVERSE-HPC/course-material

knowledge about DRI and to grow and strengthen the adoption of HPC and other DRI offerings at UK universities.

Activity so far has been along three streams:

- understanding which institutions and domains lack access to HPC infrastructure or have limited local provision of HPC for their researchers and dRTPs
- establishing connections with Research Facilitators who act as intermediaries between DRI and researchers
- creating resources (both materials and hardware) to run HPC-related training for research facilitators and teams

To support these activities, work started out with exploring what DRI resources different UK universities have access to. This search was initially limited to the 142 universities that are members of Universities UK, since this provided a clear list of institutions and a concrete starting point. Using publicly available information, for each university, the team looked at what (if any) local/regional High Performance Computing resources researchers and technical professionals have access to and whether institutions employ research facilitators within their Research IT (or similar) teams. Where contact details for research facilitators are also published, this information is helpful to tailor outreach to institutions that we believe will benefit the most from the work being undertaken by DRIFT. This initial dataset was then used to select a representative set of universities to perform a landscape review which took into account the data captured in this dataset, as well as ranking tables on the subjects of Physical Sciences, Life Sciences, Computer Science, Engineering, Medical and Health and, to a lesser extent, Business and Economics and Psychology on the World University Rankings by Times Higher Education. As a result, additional UK universities were identified that were not part of Universities UK, and the same information collection approach used, taking the total in this list to 155 universities in this dataset [ZCC+25].

This enabled the DRIFT project to identify an initial set of universities to engage in outreach as the next step of the plan for community engagement, specifically connecting with research facilitators who provide support to researchers wanting to access and use HPC resources. This aspect of work is closely aligned with the the need to better understand the role of DRI research facilitators as described in Section 2 of this paper. Existing contacts were used to connect with a small group of facilitators working in the areas of community engagement and technical facilitation and work is ongoing to engage with people in this group to understand what support and resources would help them in their roles. In time, working together with the facilitators, this group will be expanded to build a supportive community for current and future research facilitators.

4.1 Showcasing computing infrastructure

A particular challenge observed by members of the DRIFT team as part of related work is that with much institutional research computing infrastructure now being hosted remotely, researchers have far less opportunity to see large-scale computing infrastructure. This issue also

affects research facilitators, who face additional challenges relating to understanding and advocating for "physical" DRI.

Research facilitators often come from non-technical backgrounds. This can make it more difficult to understand key technical concepts without having a visual reference to relate these concepts to. In an ideal environment, facilitators would have the opportunity to look at physical research computing infrastructure and receive training on the basics of how such infrastructure is designed and operates. However, as highlighted in more detail below, much large-scale research computing infrastructure is now hosted remotely in secure data centres making it increasingly impractical to see or get hands-on experience with this hardware. In a role that involves trying to bridge the requirements of researchers with the capabilities of departmental or institutional research computing infrastructure, this can present a challenge.

To help address this issue, a portable cluster (a mini-HPC cluster) has been built at Imperial College London. A second mini cluster, based on a different model, using a range of heterogeneous hardware, is in development at University of Edinburgh. These clusters also represent the core of a wider Visible HPC initiative [Vis26] including other DRI projects that members of the DRIFT team are involved in.

The Visible HPC initiative aims to address the aforementioned challenge of modern research computing infrastructure being largely remotely-hosted: in the past, universities often housed servers and HPC resources on-site, giving researchers and technical staff opportunities to view and even get hands-on experience with this hardware. With resources now increasingly hosted off-site in secure data centres, the opportunities to see and get hands-on experience with HPC hardware are often limited. This affects not only researchers and technical professionals but also people in related roles such as research facilitators.

The opportunity to visit on-site data centres at universities is something that was often popular with researchers, students and visitors alike. Anecdotal evidence suggests that it has been responsible for providing the inspiration for many current research computing staff at universities to pursue their role as a technical professional working with research computing infrastructure. The Visible HPC initiative aims to help demystify HPC infrastructure for researchers, students and others interested in this domain. In the context of the DRIFT project, our mini-HPC clusters provide a chance to visit institutions to run demonstrations and training courses, bringing the hardware with us.

The design of the Imperial DRIFT cluster (see Figure 3) specifically aims to showcase a number of properties of large-scale, data centre hardware, while at the same time being relatively practical to transport to training courses and events. The cluster is housed in a 10U (a unit of measurement for data centre computer racks), portable, 19-inch rack case. It consists of 32 Raspberry Pi 5 nodes which act as computing nodes. A further four additional Raspberry Pi 5 nodes provide a cluster head node (the management node for the cluster and the place that users connect to) and a 3-node distributed storage infrastructure. With the exception of the compute nodes, much of the equipment used is standard to data centres, enabling people to experience the physical challenges of HPC up-close, such as power distribution and use, heat dissipation and noise.

The original aim for the cluster was to use an OpenHPC-based[7] software stack. However,

[7] OpenHPC website: https://openhpc.community/



Figure 3: The Imperial DRIFT mini-HPC cluster on display at the Computing Insight UK 2025 conference in Manchester, UK in December 2025.

OpenHPC only supports Red Hat-based Linux distributions. At the time of developing the cluster, the Debian-based Raspberry Pi OS (formerly Raspbian) Linux distribution was the most practical operating system choice for the Raspberry Pi 5 boards in terms of robustness and reliability. As a result, using OpenHPC was not a practical option.

Compute nodes are diskless and rely on booting via the cluster "head" node. For initial setup, the cluster head node was designed to be used as both an interactive login node for cluster users, but also as the main storage node, with a 2TB NVMe solid state disk on board to support this. The head node runs the open source Warewulf[8] cluster management and provisioning system. Warewulf manages a set of system services including TFTP, DHCP and DNS that enable the process of cluster nodes booting over the network from an image that has been set up for the compute nodes. This has the benefit that to change the compute node software stack, the base image can be modified and then compute nodes restarted to re-provision them with the updated image. The way that network booting operates on the Raspberry Pi required some additional work to enable the nodes to request the kernel/boot image and boot successfully via Warewulf.

The compute node image includes a SLURM[9] installation alongside a set of other required system services to enable SLURM to operate and run jobs. The head node acts as the SLURM controller as well as providing a range of other services and supporting the routing of network traffic between compute nodes and an external network.

To demonstrate the range of potential uses for the Imperial mini-HPC cluster: the hardware has been used at a DRIFT project hackathon that was held at the University of Cambridge, in collaboration with the RSEEE regional research software community for the East of England; the cluster was displayed at the Computing Insight UK 2025 conference in Manchester, UK in December 2025 where it had significant interest from attendees; the cluster was showcased at a

[8] Warewulf website: https://warewulf.org/
[9] SLURM website: https://slurm.schedmd.com/

mini-HPC hackathon event held at the University of Newcastle[10] in April 2026.

The Edinburgh heterogeneous mini cluster takes a different approach and is designed to showcase the different types of processors used in HPC (CPUs, GPUs, TPUs) as well as different types of modular single-board computers. It consists of a head node with 5 Raspberry Pi 5s, and then modular boxes containing alternative boards: Google Coral TPUs, Beaglebones, BananaPi. The head node will eventually be able to recognise which boxes are plugged in and there will be software applications appropriate for the different boards available to run and show the strengths of the alternative boards.

An objective of DRIFT is to understand how to help the community to build different types mini-HPC clusters for use in demonstration and training. A buildathon hosted at EPCC at the University of Edinburgh focused on the assembly of the Edinburgh cluster and provided several valuable lessons in running this type of event:

- Preparation before the event is important: unboxing and checking all the boards to ensure that there are no failed components or missing parts;
- The number of cables required for the mini-cluster when operational might be fewer than the cables required for set-up as many boards need to be powered and connected in order to install or update software before integration into the cluster - always have extra cables on hand;
- Network connectivity can often be a challenge, especially when using temporary venues where wired networks are not available. Ensure that a plan to connect the head node(s) to the internet has been made and security credentials tested;
- Sourcing as many volunteers as possible to help with the building is beneficial. This allowed for effective knowledge sharing at the event, creating more people capable of continuing to work on smaller solo tasks after the event

Moving forward, these mini-HPC clusters will be used to run demonstrations showcasing the value and capabilities of High Performance Computing and to provide training to research facilitators or researchers who would like to learn about HPC. Having a real (if small) HPC-like cluster in the room where people are learning about it could make a significant difference to their ability to understand what HPC is and how it works. The DRIFT clusters will help to create an interest in hardware and HPC that inspires training course participants to develop HPC skills that are currently in demand within the research and dRTP communities.

5 Gutenberg Platform

Gutenberg [Wil26] is an open-source teaching platform originally developed through the UNIVERSE-HPC project and now taken forward in DRIFT with support from Oxford RSE.

Gutenberg is designed to be flexible and adaptable to different teaching contexts, with a focus on simplicity and ease of use for both instructors and learners. It is built on a modern tech stack

[10] mini-HPC hackathon event page. Archived at: https://web.archive.org/web/20251210075326/https://indico.researchcomputing.ncl.ac.uk/event/1/

and can be deployed quickly in various environments, making it accessible for a wide range of educational settings. It supports self-paced courses built from curated groups of sections, and scheduled events for live teaching, workshops, and cohort delivery.

Its structured, pathway-based environment provides a visual interface for materials. Course management tools allow trainers to build syllabi, track student progress, and access exercise / challenge results. Interactive features enable student–instructor / peer discussion.

As part of DRIFT, a major new release of Gutenberg was developed which included new *Courses* functionality. Courses are a new way to organise material for self-paced learning, alongside the existing event model for scheduled, instructor-led delivery. Previously, Gutenberg could act as a static repository for a variety of teaching material but organised this taught material mainly through events. Gutenberg v2.0[11] introduces courses as a separate self-paced model. Courses now have their own catalogue, detail pages, enrolment flow, progress tracking, completion state, filtering, and grouped editing model. Learners can browse what is available, enrol in the courses they want, and work through material at their own pace.

Hackathons have been used to ensure that potential users are engaged, and to enhance and extend the Gutenberg platform. This has included expanding the documentation to make it easier to deploy Gutenberg at a user's own institution, and improving accessibility of the platform.

The Gutenberg platform was also used as the basis of a series of training pilots (starting in the UNIVERSE-HPC project and continuing in DRIFT) that have been used to compile a guide on how to effectively pilot training for Digital Research Infrastructure [CB24]. While this guide is aimed at those involved in training pilots, many aspects also apply to training in general, so may also be helpful for those running established training events.

The Project Management course described in Section 3 is being developed and hosted on Gutenburg, and it is intended that the resources on research facilitation and supporting the mini-HPC clusters will also be hosted there.

6 Conclusions

The Digital Research Infrastructure landscape is changing rapidly. The increasing prominence of research software engineers and research technical professionals have helped to increase the capacity and capability of research enabled by DRI. More recently, the popularity of AI coding assistants means that there is another shift, with RSEs undertaking more of the verification and validation work, rather than the initial generation of code. People who had not previously been HPC users may feel more confident in using them, because of the support provided by AI tools, but this is not yet a replacement for true HPC experience and the ability to translate the problem seen by a novice user (e.g. around dependencies or configuration issues) into a workable solution. However, there is still much to be done in terms of understanding the best way to support research that utilises DRI given the rapid development of AI-based methods, particularly agentic AI which also raises questions of security and research integrity.

This means that it will be even more important to support the research facilitators who bridge between the researchers and the research tools and infrastructures. They are the people who notice the cross-cutting issues first. They will have a key role in helping to understand the most

[11] Gutenberg v2.0 release: https://github.com/OxfordRSE/gutenberg/releases/tag/v2.0.0

effective way to use DRI in research, and this will require them to understand how DRI can be exploited for research, as well as the key barriers and enablers. This will enable those who are not current users of HPC, but who would benefit, to be provided with trusted support to gain them access to these resources.

It will also be important to understand how to support project management of research software, taking into account new risks around collaboration, quality assurance and sustainability.

While the way we code may be changing, it is still important to teach people how to understand and use DRI. The DRIFT project addresses this by helping to support a key element of the ecosystem – research facilitators – working with and in research teams.

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