





# IMAGING AND RADIOTHERAPY WORKFORCE, EDUCATION AND RESEARCH HUB

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# Introduction

The Imaging and Radiotherapy Workforce, Education and Research Hub (IRWERH) seeks to bring together various professional groups including the NHS, Industry and Charities. There is also the opportunity to address the education and development needs of our Clinical Scientists, Medical Physics Technologists and Healthcare Science Practitioners, plus a potential wider linkage through to the Long-Term Workforce Plan and skills development for the wider support workforce, including Imaging Support Workers.

There is an opportunity to collaborate through academia, research and practice-based environments and maximise the potential future workforce and technological advancements.

# Imaging Workforce Challenges

With the significant shortage of radiographers (11% vacancy rate – <u>NHS England, 2022</u>) and sonographers (<u>Professional Standards Authority, 2019</u>), and their potential to extend their roles more widely into areas currently being performed by radiologists, there is a requirement for specific practical training facilities for these professionals. An IRWERH which is physically located at UWE Bristol for a range of professional groups, provides the opportunity for collaboration and access to wider subject disciplines such as Robotics, Computer Science / AI, Healthcare Leadership and Doctoral training programmes.

This IRWERH would also extend to professional groups such as Nurses, Medical Physicists and Clinical Scientists, providing opportunities for training in areas such as interventional procedures and image interpretation. Nurses, Physiotherapists, Clinical Scientists, Clinical Engineers and Paramedics are moving into the imaging and radiotherapy spaces, but opportunities to collaborate as part of multi-professional and interprofessional teams are limited. There are also opportunities to connect with wider professional groups, such as Architects, business analysts and environmental science teams, to help design tomorrow's imaging and radiotherapy environments and enhance patient flow.

## IRWERH: Academic, Research and Innovation

The IRWERH is an academic entity within UWE Bristol and will be physically located at UWE, Bristol, where learning and research facilities are already in place, supporting our existing pre and post-registration education programmes and CPD activity. UWE Bristol has a significant track record of providing graduate Diagnostic and Therapeutic Radiographers across the region and beyond, with over 97% of all our healthcare graduates gaining employment at Band Five after their studies. UWE Bristol also provides several postregistration programmes in Ultrasound, Nuclear Medicine, Advanced Practice, Independent Prescribing, CT and an extensive list of CPD modules / Study days. All our education is approved by Professional Regulators, namely the Health and Care Professions Council and the Nursing and Midwifery Council and our post-registration education is approved by relevant professional bodies, such as the Society and College of Radiographers.

The IRWERH has a dedicated focus on advancing the education and professional development of healthcare staff such as Radiographers, Imaging support workers, Sonographers, Physiotherapists, Podiatrists, Midwives, Paramedics, Clinical Scientists and Nurses. There will be affiliations to other established Imaging Academies and Networks across the UK and support for all NHS E Imaging Academies. There is also scope for connectivity with other Higher Education Institutes and we already have strong partnerships with several Further Education Colleges across the Southwest.

The IRWERH incorporates comprehensive training programs across various imaging modalities, including Digital Planar Radiography, Sonography, MRI, CT, Nuclear Medicine and Hybrid Imaging. By integrating cutting-edge technologies such as Artificial Intelligence (AI), Virtual Reality (VR), Augmented Reality (AR) and Computer-Aided Detection (CAD), we will aim to enhance diagnostic accuracy and improve patient care throughout the region.

Providing opportunities for Doctoral training, through match funding approaches, employer sponsorship or external grant funding is also a key element of the IRWERH and we are committed to providing support to the emerging enhanced, advanced and consultant Diagnostic Radiographer and Therapeutic Radiographers.

## Partnerships

Providing an opportunity for a multi and interprofessional approach to develop practical skills in a simulated workplace setting would promote skills enhancement. The IRWERH is open to AHPs (Radiographers, Sonographers, Physiotherapists, Paramedics etc), Support worker roles, Diagnostic and Therapeutic Assistant Practitioners, Nurses and Midwives, Clinical Scientists, Medical Physicists and Clinical Engineers to provide opportunities for upskilling and accredited education in a variety of areas that include:

- Interventional skills
- Image interpretation
- Physical Assessment and Clinical Reasoning (PACR)
- Advanced Practice
- Independent Prescribing
- Theatre Imaging practice for Graduates / International recruited Radiographers
- Administration of Intravenous Injection
- Practice Simulation
- CT / MRI (PgCert)
- Ultrasound (PgCert / PgDip / MSc)

- Nuclear Medicine (PgCert / PgDip / MSc)
- Medical Ethics and Leadership
- Health Technology (MSc) and links with Robotics
- Patient safety in Radiotherapy (link with IPEM)
- Radiation safety and equipment management
- Preceptorship, coaching and mentorship
- Leadership Skills
- Robotics, AI and Data Science

Through our linkage with the <u>West of England Health Innovation Network</u>, there are opportunities to connect with industry partners and join the Innovate Healthier Together Fellowship Scheme, which provides access to a wide network of health and care leaders from across the region and beyond. Reaching out to wider organisations such as the Institute for Physics and Engineering in Medicine (IPEM) and the School of Healthcare Sciences will also create opportunities to become more inclusive and support wider education initiatives.

At UWE Bristol we are incredibly proud of our education, practice and applied research with impact and there is more we can and want to achieve with existing and new partners, with a focus on promoting innovation and creating expertise for the benefit of patients. An IRWERH physically located at UWE Bristol as part of the existing education set-up connects with our existing pre and post-registration education provision and there are opportunities to support the NHS England Imaging Academies and collaborate with partners across South Wales, through collaboration with Health Education and Innovation Wales (HEIW), providing the facilities and expertise to transform the NHS Imaging and Radiotherapy workforce. We are already working with our local Integrated Care Board (Bristol, North Somerset and South Gloucestershire) and collaborating with regional Integrated Care Systems (ICSs) to support the academic and research needs of various organisations.

Through feedback provided by our partners in practice and industry, there is support for the development and delivery of continuous professional education of Clinical Scientists, Medical Physics Technologists and Healthcare Science Practitioners within the region, plus wider linkage through to skills escalation across key professional groups. Having input from medical imaging/radiotherapy manufacturers is also key, promoting activity associated with research, innovation and test beds for future clinical practice.

## Partnership model for the IRWERH at UWE Bristol

With the launch of Skills England, which will be tasked with forecasting and coordinating skills and training provision the need to identify high-quality skills provision that employers could legitimately spend their Apprenticeship Levy on in addition to apprenticeships, will be key (Skills England 2024). The IRWERH at UWE Bristol would look to connect with the West

of England Combined Authority (WECA) and the local / surrounding ICSs to provide the required high-quality skills, accredited education and appropriate professional career framework. This approach fits with the regional growth strategy across the Southwest of England and promotes a collaborative model that could attract future funding.



# Simulation facilities

Work Integrated Learning is key to learner success within healthcare education and this needs to be sustainable and equitable to ensure effectiveness (Edwards *et al*, 2024). However, with challenges in providing these opportunities in the workplace, the use of simulation facilities in a classroom/laboratory setting is key to ensuring staff have access to appropriate training to develop new clinical skills.

The use of simulation in healthcare education has developed rapidly over the past decade. Simulators enable students to acquire essential skills through trial and error, in a safe, nonthreatening environment closely representing reality (Linder & Pulsipher, 2008). This allows students to develop skills whilst applying theoretical knowledge in a controlled setting away from the patient (Corner, 2005) and prepares students for real clinical scenarios. Over the last several years there has been significant investment in student-facing learning facilities through Office for Students funding and the Institute of Technology. This has resulted in a remapping of our pre and post-registration curricula for many of our programmes to ensure our graduates meet the required core competencies of the regulator. The undertaking of fundamental MRI competencies by a graduate Radiographer is a key example where such changes have been made and as a result, UWE have invested in investment in MRI simulation software.

The appropriate design and provision of simulated learning environments for students can help improve enhanced clinical skills and techniques that are now being performed in current practice, such as the insertion of catheters, joint injections, intravenous and intramuscular injections. This will help to ensure reduced patient complications and improve the confidence levels of staff and students (McGaghie *et al*, 2014).

Consideration of spaces that are inclusive through appropriate design models is also important, considering the diverse range of students and potential support requirements (Alrashidi *et al*, 2023). Simulated learning could also address apprenticeship learning limitations. Apprenticeship learning is often limited by the provision offered by employers, which may result in apprentice learners having varied skill competencies depending on the employer base. This model also created opportunities for learners to have exposure to other modalities such as CT and MRI, mapping to the requirements of Skills England; and the Health and Care Professions Council (HCPC)

## **IRWERH** objectives



1. Educational Excellence: Provide high-quality education and training tailored to the needs of healthcare professionals in the Southwest, from support workers through to consultant practitioners.

2. **Technological Integration**: Greater understanding of AI, reasoning models and CAD to improve diagnostic processes and outcomes.

**3. Continuous Professional Development**: Support continuous learning and career advancement for a range of healthcare staff, promoting interprofessional development and learning.

4. Research and Innovation: Foster a culture of research and innovation in diagnostic imaging technologies, healthcare leadership, development of emerging skills and future roles. This particular objective will link closely with the <u>College of Radiographers Research</u> <u>Strategy (2021-26)</u>, focusing specifically on developing research capacity across different communities of practice.

5. Community Engagement: Engage with local healthcare providers and communities to address regional healthcare needs. This links with the strategic ambitions of UWE Bristol, in terms of our community and civic presence, whether this is through local authorities, charities, special interest groups or commercial partners. Population health needs underpin our Health and Society Beacon at UWE Bristol, which is facilitated through effective community engagement.

# Our target audience

The IRWERH provides an innovative space for multi and inter-professional learning and networking, where healthcare professionals from a variety of professional backgrounds can learn together, and from each other. We are also looking to encourage colleagues from the independent and charity sectors, who play an important role in the design and delivery of imaging and radiotherapy services across the Southwest and beyond.

Creating an environment that supports new knowledge exchange and understanding the impact of emerging technologies and software is an important dimension of the IRWERH and connects to several aspects of the University, including expertise in Technology Transfer, Intellectual Property Management, Commercial Start-up support etc through our Enterprise Zone, based on the UWE Frenchay Campus.

#### Who are we reaching out to?

**Radiographers**: Training in advanced imaging techniques, patient positioning, interventional procedures and image acquisition specific to MRI, CT, and Hybrid Imaging.

**Sonographers**: Education in ultrasound technology, image interpretation, interventional procedures, and patient care, with a focus on regional healthcare challenges.

**Imaging support workers**: Developing competencies and frameworks for the provision of effective patient care in line with the <u>College of Radiographers guidelines</u>

**Nurses and Midwives**: Advanced training in diagnostic interpretation, report generation, and interventional procedures.

**Podiatrists**: Develop foot and ankle assessment and diagnosis skills, via the use of appropriate imaging and a range of clinical tests. This is a level 7 accredited module offered by <u>Huddersfield University</u>.

**Physiotherapists:** As part of the <u>First Contact Physiotherapy services</u> and offered to those working in Primary Care settings.

**Clinical Scientists:** Implementing novel imaging and radiotherapy technologies into clinical use.

**Clinical Technologists**: Playing a crucial role in the provision of imaging and radiotherapy services.

**Healthcare Professionals**: Cross-disciplinary learning opportunities and interprofessional simulation events for various healthcare professionals such as paramedics in the region.

**Post Graduation Medicine Education and Training**: Linking with the School of Radiology within the Severn PG ME (in collaboration with the Southwest Imaging and Training Academy (SWITA).

**NHS England Imaging Academies**: Ensuring collaboration and support through accredited education, simulation facilities, research and service improvement/innovation / Doctoral Training programmes.

## **Educational Programmes**

1. Certificate, Diploma and full Masters programmes (Level 7): Offering foundational and advanced courses in Diagnostic Radiography, Therapeutic Radiography, Sonography, MRI, CT, and Hybrid Imaging, which are accredited by the HCPC and Society and College of Radiographers, providing assurance and confidence to employers that learning has been validated and quality assured.

2. Accredited CPD modules: Acquired through a portfolio approach to shape an Integrated Professional Development award (Level 7).

3. Workshops and Seminars: Regular workshops on the latest imaging technologies and methodologies, addressing local healthcare issues.

4. Online Learning: Accessible online modules for remote learning, suitable for healthcare professionals across the Southwest.

5. Hands-on Training: Practical training sessions in state-of-the-art labs under the guidance of experienced practitioners and mentors, focusing on image interpretation, Radiotherapy Planning and virtual treatment (VERT), sonography, MRI, CT, and Hybrid Imaging.

# Technological integration

Collaborating with key subject experts across the University, such as the Centre for Machine Vision, Bristol Robotics Laboratory, Health Technology Hub and Centre for Print (3D printing), the possibilities of creating new and innovative approaches to Imaging and Radiotherapy practice is open to a host of professionals.

Artificial Intelligence (AI): Training in AI applications for image analysis, pattern recognition, and predictive analytics, customised for regional healthcare needs.

**Computer-Aided Detection (CAD):** Incorporating CAD systems to assist in early detection and diagnosis of abnormalities prevalent in the Southwest.

**Development of complex/automated algorithms:** for enhanced decision-making capabilities (linking with the LEAP Digital Health Hub).

# Modalities, facilities and resources

**Digital planar diagnostic imaging facilities:** Core and advanced training, digital manipulation and image interpretation.

**Sonography:** Training in advanced techniques such as musculoskeletal imaging, and interventional techniques under ultrasound control, such as biopsy and includes haptic feedback and AI-generated imaging scenarios (Intelligent Ultrasound).

MRI (Magnetic Resonance Imaging): Comprehensive training in MRI technology, safety protocols, and advanced imaging techniques (through simulation software)

**CT (Computed Tomography):** Education on CT technology, radiation safety, and highresolution image acquisition and interpretation (Siemens Somatom CT Scanner on campus together with simulation software)

**Hybrid Imaging**: Training in modalities combining multiple imaging techniques, such as PET-CT, SPECT-CT and PET-MRI, to provide comprehensive diagnostic information.

**Resource Library**: Comprehensive library with access to the latest research databases/journals.

Simulation Centres: High-fidelity simulation centres for practical, hands-on training within the region, including a state-of-the-art CT scanner (Siemens Somatom), MRI Simulator, Haptic feedback Ultrasound unit and clinical grade Ultrasound units, Virtual Radiotherapy Simulator, Varian RT planning suite, state-of-the-art digital film imaging suite, virtual radiography suite and various software analysis packages.

Utilisation of immersive learning environments (Gener8 labs) for adaptive scenario-based activities.

PACS Interface: System architecture, legal and data standards.



System architecture – Facilities based at Glenside Campus

# Academic and research professional development

**Continuous Professional Education:** Regular updates and enhanced advanced courses to keep professionals in the Southwest current with the latest developments.

**Certification Programmes:** Specialised certifications in emerging technologies and imaging techniques relevant to the region.

Assessment of clinical competencies: Experienced practitioners are used to verify competence, and certification is provided to provide clinical departments and Trusts with the confidence to set up new services using appropriately trained and competent staff.

Mentorship and Guidance: Access to experienced mentors and industry leaders for career guidance.

**Pre-training selection**: There is a potential role for using simulation facilities to determine whether course applicants have the appropriate spatial skills to take on advanced clinical roles

# Human factors

**Team Working**: Workshops and simulations to improve communication, coordination, and collaboration among healthcare teams.

Human Factors: Education on the impact of human factors on clinical practice, patient safety, and error prevention.

**Emotional Intelligence**: Courses designed to enhance self-awareness, empathy, and interpersonal skills, fostering a supportive and effective work environment.

### Research and innovation

**Research Opportunities:** Encouraging participation in research projects and clinical trials focusing on regional healthcare issues.

**Innovation Labs:** Dedicated spaces for developing and testing new imaging technologies and techniques.

**Collaborations**: Partnering with academic institutions, healthcare providers, and tech companies in the southwest to drive innovation. Promoting collaboration for joint funding calls, with organisations such as NIHR, IPEM and EPSRC.

**Research support**: Support for practitioners, researchers and academics who are undertaking any form of post-graduate study, including those undertaking their Doctorate, through the dedicated support of the Post Graduate Research Doctoral School.

### Community engagement

**Interdisciplinary Teams:** Promoting teamwork across different specialities to enhance learning and patient care in the Southwest.

**Knowledge Sharing:** Regular forums and discussion panels for exchanging ideas and experiences and engagement across diverse community groups.

**Networking Opportunities:** Building connections with peers, industry experts, and potential employers in the region. This is linked with the Health Innovation Network and the local Academic Health Science Centre (Bristol Health Partners), as well as connecting through with local and regional ICBs.

**Establish a Mentor Register:** develop a hub for mentors/mentees by providing opportunities for linking healthcare professionals who want to learn new skills or set up new services, to enable them to find / link with the appropriate mentor to take advantage of this powerful tool for learning (Burgess *et al* 2019).

### Conclusion

The IRWERH is committed to enhancing the education and professional development of a host of healthcare professionals. By integrating innovative technologies and focusing on key

modalities such as Radiography, Radiotherapy, Sonography, MRI, CT, and Hybrid Imaging, we will improve diagnostic and treatment accuracy, patient waiting times and patient outcomes, ultimately contributing to the betterment of healthcare in the Southwest and beyond.

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