NHS
Health Education England

Enhancing education, clinical practice and staff wellbeing. A national vision for the role of simulation and immersive learning technologies in health and care

Technology Enhanced Learning (TEL)

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Foreword – Dr Navina Evans, Chief Executive, Health Education England

The NHS is facing up to a period of significant change in terms of how it provides access to high quality health and care services, and has a workforce that is both capable and adaptable to meet these needs. Strategic leadership is fundamental to optimise access and use of resources equitably whilst enabling provision of care that is patient-centred and driven by local needs.

The digital transformation across the whole health and care service is one of the paramount drivers by which improvement can be made tangible, and this applies to how we design and deliver education and training for all of our people, alongside transforming the systems and processes of care that they will be able to offer.

The national vision for simulation and immersive learning technologies described within this document heralds a watershed moment in how we can bring together different technological and educational advances and innovations. It provides us with an opportunity to combine these developments with the motivation and expertise of different stakeholders, networks, and communities. This will help embed the voice and needs of patients and the public to help us sustain, if not enhance, the value of the NHS in our society and its global reputation as a leader in the field.

Health Education England is fully committed to playing its part in this vital agenda, alongside working closely with our system partners and wider stakeholders to create a health and care service that is fit for the future.

I recommend this document to you all and hope that it inspires and challenges everyone to consider new ways of learning as well as exploring how we can work together to support a culture of improvement in how we provide care in the future.

Executive summary – Patrick Mitchell, Director of Innovation and Transformation, Health Education England

Health Education England has a strong track record for supporting the role of simulation and immersive learning technologies in the education and training of our current and future workforce. This has focused previously on describing a quality framework that helps shape this approach using several key principles, with an aligned series of toolkits to underpin how these principles can be achieved in practice.

This document broadens this vision and considers how the same techniques and technologies can benefit wider policy and strategy goals in health and care by referring to key publications and engagement of stakeholders. The intention is to:

1. Promote and strengthen the dialogue between different system and stakeholder organisations, networks, and communities to enable and evaluate opportunities for sharing intelligence and innovation

2. To provide a platform for collaboration on common themes of work

3. To generate evidence of impact that will help support the transformation in health and care that is required for the future needs of patients and society.

A summary of the current state of play with simulation and immersive learning technologies is presented under the following key chapters:

- Improving patient safety

- Delivering a modern workforce

- Enhancing the quality and capacity of the learning environment

- Involving patients and the public

- Developing the simulation and immersive technology community

- Research and innovation

- Lessons from outside of health and care

- Reflections on the impact of COVID-19.

Each chapter has one or more case studies that help provide real world examples for the reader and describe the next steps that might be considered to help expand the offer in more depth or at scale.

Cross-cutting themes are presented that are helpful to consider, but which will add value when applied in the context of the outcomes being sought. These themes include the role and opportunities for patients and the public to help design and implement simulation and immersive technology-based interventions, ensuring that these endeavours benefit from their perspective from the outset.

A national vision for the role of simulation and immersive technologies in health and care

Looking further afield, the place of simulation in industry and commercial sectors outside of health and care is described, highlighting examples where this has led to improvements in safety, resilience and wellbeing, efficiency and productivity, and the opportunity to innovate and transform at scale.

The value of developing and strengthening research and evaluation in any such interventions is addressed, which may signpost new channels to seek funding and investment from academic and industry sectors, as well as enhancing the existing evidence base and potentially informing future commissioning arrangements.

The COVID-19 pandemic has had a significant impact on how health and care is accessed by patients as well as how existing programmes for workforce development and transformation need to adapt. Once again simulation and immersive learning technologies have an important place within this context by offering different approaches to help resolve the impact on education and training arising from the pandemic.

The broader remit of Health Education England Technology Enhanced Learning (HEE TEL) will continue to offer advice, guidance and support through innovation, transformation and reference to our quality framework, enhancing this support specifically through access to educational resources through e-Learning for Healthcare and greater opportunity for collaboration and sharing via the Learning Hub.

Looking across this horizon it is clear to see the links between this vision and our Blended Learning programme. This aims to exploit digital technologies to deliver fully interactive and integrated programmes, including immersive technologies within a framework that enables student-led provision, online communities of practice and the development of engaged and self-directed learners with strong digital capability.

The world of simulation and immersive learning technologies is developing rapidly and in parallel to the existing and predicted future requirements of health and care on a global scale. This document provides a picture of how the NHS and our patients and people can benefit from the existing expertise and experience that exists and considers ways in which HEE alongside system and stakeholder partners can help facilitate and lead in optimising these opportunities as part of our innovation and transformation plans.

A national vision for the role of simulation and immersive technologies in health and care

Contents

Introduction

Background

For the purpose of this document the term 'simulation' is defined as *'a technique to replace or amplify real experiences with guided experiences, often immersive in nature, that evoke or replicate substantial aspects of the real world in a fully safe, instructive and interactive fashion'*[1]. As such, the term is deliberately broad and intended to include a wide spectrum of modalities, inclusive of immersive learning technologies, and is described in more detail in the simulation and immersive technologies page on the HEE website.

In October 2018, HEE published its national Simulation-Based Education (SBE) Framework, which describes five key principles that underpin the design and implementation of effective high-quality simulation-based education. The vision for the framework addressed the role of simulation within the broader educational spectrum:

> **'Health Education England will ensure development of a well-trained and engaged multi-professional workforce that is able to deliver safe, effective care by utilising meaningful and cohesive simulation-based education.'**

This document develops HEE's position further by describing the potential value of applying effective simulation-based interventions to support key national policy and strategic developments that are influencing the current and future workforce requirements across the health and care system. These developments include, but are not limited to:

- The NHS Long-Term Plan
- The We are the NHS: People Plan 2020/21
- The Topol Report 'Preparing the healthcare workforce to deliver the digital future'
- The NHS National Patient Safety Strategy and its associated education syllabus

There are significant elements of each of these publications that HEE believes can benefit from using simulation as a form of intervention to help achieve specific goals or support broader programmes of work that are being described. By adopting a system-wide approach with input from key stakeholders, we believe this will help enhance the development of a capable, adaptable multi-professional workforce who will benefit from working in a health and care system that is designed to optimise their practice and wellbeing (Figure 1). It is proposed that much of this assistance will be realised by integrating the use of simulation and immersive technologies within the HEE national programmes at regional and local levels. This work has already begun, through a significant stakeholder engagement programme that has been underway to date. Opportunities for specific involvement within national programmes such as 'Re-start', focusing on increasing placement capacity since COVID-19, are also becoming more clearly visible.

[1] Gaba DM. (2007) The future vision of simulation in healthcare. Simulation in Healthcare; 2:126-135

A national vision for the role of simulation and immersive technologies in health and care

As a result, the TEL simulation and immersive technologies workstream is now actively engaged with various projects and programmes, at both national and local level, that will respond to the changing needs around education and training which have been accelerated because of the pandemic. These are highlighted in tables following the relevant chapters. This engagement plan aims to strengthen the relationships with the various regulatory and professional bodies, together with Higher Education Institutions, to achieve successful, impactful application of simulation and immersive learning technologies that will benefit the health and care system.

Wider engagement with NHS England and NHS Improvement (NHSE/I) and the various NHS Arm's Length Bodies (ALBs) – such as the Care Quality Commission (CQC), the National Institute for Health and Care Excellence (NICE), and NHS Digital – is necessary. For example, opportunities to work alongside the Health and Safety Investigations Board (HSIB) could explore how simulation data from in situ activity might help inform national safety investigations, as well as testing aspects of system change that are posed within subsequent recommendations. Another example focuses on working with the Practitioner Performance Advice (PPA) team at NHS Resolution to consider how specific simulation-based activities could enhance existing aspects of their practitioner assessment portfolio.

Figure 1: The potential impact of simulation in health and care.
Simulation can be applied to different strategic needs or policy programmes to help achieve key outcomes for patients, the workforce and the health and care system
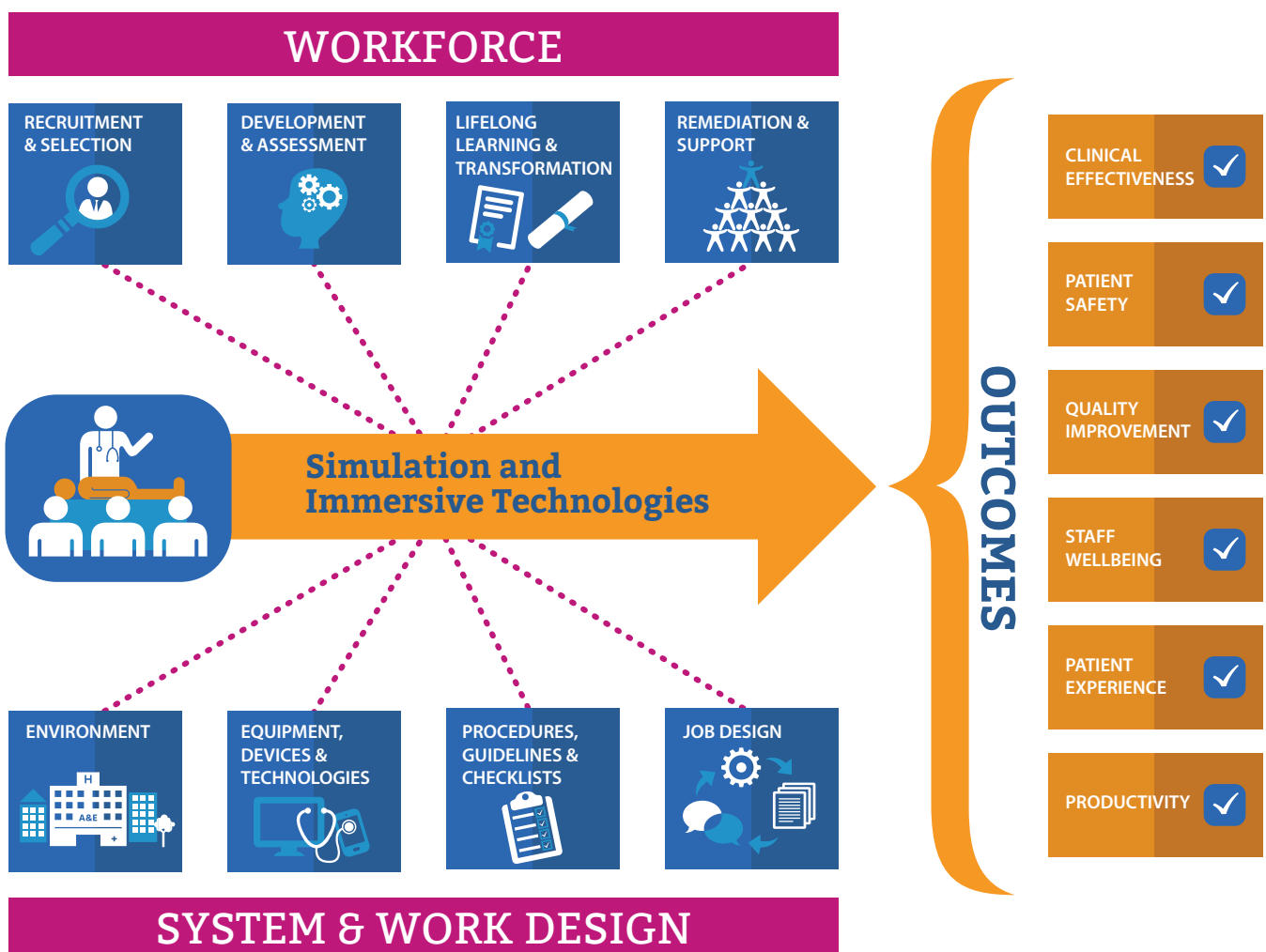
These aims and the associated policy and strategy statements will be under increased focus because of the COVID-19 pandemic, which has direct implications for the design and delivery of any future simulation-based interventions, outlined below. Some overarching considerations in this respect have been added as a separate chapter to complement the overall document.

Purpose of this document

HEE believes that simulation has a significant and broad offer for improving the quality of health and care within today's dynamic, but resource constrained world. This potential will be more achievable in implementation and meaningful in impact, if there is a system-wide commitment to coordination and collaboration that promotes equity of access to resource, rapid sharing and adoption of best practice, and robust evaluation of interventions at scale to demonstrate value-on-investment.

This document has four principle aims for the reader:

- To identify the key challenges in workforce development, transformation, and delivery of safe, effective care where simulation can enhance existing approaches or introduce innovative ways of meeting specific needs at a system level

- To inform system leaders when initiating, influencing, or advocating for system-level change. This will help:
  - create the conditions that encourage the practical application of simulation at scale
  - offer agility and adaptability to changing needs or local contexts and circumstances
  - define and analyse data to enhance evidence-based decisions around future resource allocation.

- To provide examples of good practice and innovation with clear illustrations, through case studies aligned to topic headings, of how simulation can offer a unique or synergistic approach to addressing specific system needs both at local and national levels

- To highlight alignment with existing HEE national programmes, describing how the HEE TEL Simulation and Immersive Technology Programme can provide direct support, guidance, and consultancy where appropriate

Who might use this document and how?

This document is aimed at system and organisational leaders, commissioners, regulators, professional bodies, public and patient representatives, and academic and industry partners. The intention is to help promote dialogue and develop the conditions that will support system-wide alignment and integration of simulation-based interventions to meet the workforce and care quality demands of health and care organisations and local partnerships.

A national vision for the role of simulation and immersive technologies in health and care

Specific organisational and system needs have been used as chapter headings to help stakeholders find guidance and examples relevant to their role or remit. Several cross-cutting themes are also discussed that will influence future design and delivery of simulation-based healthcare education and practice:

1. Improving patient safety

2. Delivering a modern workforce

3. Enhancing the quality and capacity of the learning environment

4. Involving patients and the public

5. Developing the simulation and immersive technology community

6. Simulation-based research and innovation

7. Learning from sectors outside of health and care

8. Reflections on the impact of COVID-19.

HEE TEL, mediated through the TEL strategy and close working relationships with HEE's regional offices (and consequently with the Integrated Care Systems, Sustainability and Transformation Partnerships and associated Local Workforce Action Boards), can offer unique support to promote discussion amongst a wide range of stakeholders and assist in generating opportunities for coordination and collaboration on the design and implementation of specific simulation-based interventions. HEE TEL has established networks and access to the national simulation community and a strong track record for supporting innovation in immersive learning technologies. This in turn offers a valuable resource for stakeholders seeking different perspectives, or potential solutions to challenges they are facing, by enabling tried and tested models of intervention to be utilised, that are aligned to the five guiding principles of the SBE framework.

This document and its associated links and resources will be updated to reflect future system challenges, providing further exemplars of good pract9ce, and expanding the evidence base of specific interventions over time. This will include a series of case studies drawn from different health and care settings to provide examples of how specific interventions have been used in those contexts. These case studies will be located here on the Learning Hub where they will be updated as further examples of good practice become available. Stakeholders are invited to be kept updated according to declared preferences, whilst feedback and comments on this document are welcomed by email to HEE TEL using this address: tel@hee.nhs.uk.

Any readers wishing to read more broadly about the definition and spectrum of simulation modalities available and the underpinning evidence base for simulation-based interventions are referred to on the TEL page on the HEE website in the first instance.

1. Improving patient safety

Effective simulation-based interventions can enhance the attainment of safety critical skills and behaviours in all staff, as well as help design and test the safety and resilience of the systems of care in which staff work. Similar approaches can benefit learning from harm through investigations and recommendations for change, but simulation can also enhance learning from excellence, based on examples of good practice.

The first NHS national patient safety strategy was published in July 2019. Patient safety is described as maximising the things that go right and minimising the things that go wrong. Alongside effectiveness and patient experience, safety is integral to the NHS' definition of quality in healthcare. The strategy emphasises the need to build and strengthen a patient safety culture in the NHS, as well as taking a more systems-based approach to understanding and improving patient safety.

One of the key components arising from this strategy is a new patient safety syllabus that is intended to strengthen existing curricula and lifelong learning guidance for all NHS staff. This will be achieved through widespread education and training in patient safety science, Human Factors2 and safety management.

Simulation will play a key role in underpinning both the patient safety strategy and syllabus. It will do this by enhancing the development of a capable workforce, and by providing the opportunity to examine or re-design systems and processes of care. In this respect, there is a strong synergy between the simulation community and the science and practice of Human Factors and Ergonomics, which is an emerging area of development, relevant to health and care transformation.

The use of simulation provides utility to all stakeholders who have a responsibility for improving patient safety. This includes professional bodies, regulators, commissioners, clinical service, support leads and individual practitioners; as well as patient groups, for whom it can provide an important opportunity to strengthen the patient and family perspective.

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[2] Human Factors, also called Ergonomics, is an evidence-based scientific discipline and profession that uses a design-driven systems approach to enhance system performance and people wellbeing. Human Factors applies elements of other disciplines such as psychology, anatomy and physiology, social sciences, engineering, design, and organisational management, and combines them to better understand the nature of human-technology-systems interactions. When considered at a macro (organisational) level it helps describe the conditions that promote system resilience.

There are several ways in which simulation can enhance the patient safety agenda, which are outlined below:

1.1 Rehearsal for performance

- Learning new skills and procedures to a level of competence prior to actual clinical practice with patients (for example, insertion of nasal gastric tube, venepuncture, intimate clinical examinations)

- Practising and maintaining skills that are used infrequently, but which may have harmful consequences if not performed effectively (for example, life support skills)

- Enhancing preparation for complex procedures or situations (for example, advanced surgical or interventional procedures, major incident plans)

- Enhancing induction and orientation to new environments and levels of responsibility for staff at key career transitions.

1.2 Promoting development of professional capabilities and multi-professional team-working

- Developing leadership, decision making and effective communications skills (for example, effective handover, speaking up/challenging situations, breaking bad news, presenting in a coroner's court)

- Learning and refining critical multi-professional team skills and behaviours (for example, trauma teams, primary care practice teams, multidisciplinary team decision-making, such as planning cancer treatment for complex cases).

1.3 Strengthening resilience in safety systems and processes

- Stress-testing new policies, guidelines, environments, and technologies prior to implementation (for example, sense-checking a new clinical guideline, safety-checking new clinical environment prior to use for patient care). This will often involve 'in situ' (workplace based) simulation interventions that are specifically designed to identify latent threats and test systems and processes with relevant multi-professional staff

- Developing simulation exercises based on analysis of serious harm incidents as part of the organisation's safety culture to disseminate safety learning (for example, medical equipment training following untoward incidents, safe restraint in patients with mental health issues)

- Exploring and testing new approaches, including the use of technology to improve medicines safety from the point of prescription, preparation and administration that requires multi-professional staff to work in new ways. Simulation can help test these approaches and help prepare staff without placing patients at any risk

- Embracing direct and indirect feedback from patients, families, and carers about their experience of the health and care system as part of a more holistic approach to co-designing and testing improvements in quality from the patient as well as staff and organisational perspectives

- Engaging with organisations such as the Health and Safety Investigations Board (HSIB) to inform potential national investigations, understand specific areas of practice in greater depth, and help test and embed recommendations where appropriate.

1.4 Implementation of the national patient safety strategy and syllabus

- The national patient safety syllabus is an integral component of a national strategy to improve patient safety in the NHS. The use of simulation is specifically being considered as a form of safe experiential learning, allowing people to fail safely, allowing them to develop capabilities and personal resilience to address rare, but new and emerging threats, rather than being put in high risk processes too early in their training

- Several of the competences or capabilities described within the national patient safety syllabus can be addressed directly by simulation-based opportunities, either for individual staff or within their multi-professional teams. These popular Human Factors approaches are based on non-technical skills such as communication, stress management and situational awareness, commonly referred to as Team or Crew-Resource Management when applied in the multi-professional team working context

- The syllabus also explicitly emphasises a systems-based Human Factors approach to safety, where working systems and their interaction with staff are paramount in creating safety for patients and supportive working conditions for staff. The use of simulation, particularly when carried out 'in situ' offers a unique opportunity to test systems or raise awareness amongst staff when conditions may be more hazardous to delivering safe, effective care. Discussions with the HEE Patient Safety Programme are already in progress to explore this in more depth

2. Delivering a modern workforce

Supporting the safe, effective delivery of health and care by our workforce is a critical focus for the HEE TEL simulation programme. The expectations of patients and the system requirements by which care is delivered are dynamic and often challenging. In response, the individuals and multi-professional teams who are involved directly or indirectly in health and care need to be increasingly adaptable and flexible in how they work and learn, and given support for how they can help generate and sustain a culture of improvement that continues throughout their careers. There are many opportunities within everyone's career in health and care where simulation can help create these conditions and provide insight or direction for the lifelong development of staff.

The We are the NHS People Plan 2020/21 outlines several priorities about how the current and future workforce needs to be prepared for meeting the demands of delivering health and care in the 21st century. This is in response to the changing demographics and healthcare requirements of associated acute and long-term needs of the population. In addition, the continual expansion of medical knowledge, treatment options and healthcare technologies provide further drivers for the need to change. Recommendations in the plan include actions to support transformation across the whole NHS. This includes important attention to inclusivity, wellbeing, workforce development and training, and adopting new ways of multi-professional working alongside embracing new technology and innovation. These actions and their underpinning principles are intended to endure beyond the next twelve months and will require close working amongst NHS organisations and with external partners in different care and local government sectors. Progress to date with the formation of new Integrated Care Systems (ICS) will help promote cross sector collaboration towards the aim of transforming health and care delivery on national, regional, and local levels.

The role and potential value of simulation needs to be highlighted in these programmes of work, which this document seeks to support.

The HEE Star tool has been designed to support workforce transformation, helping providers understand their workforce requirements and offering a range of potential solutions. It provides a single directory for providers and systems to access and explore the range of workforce transformation solutions available to help address the workforce requirements identified - including tools, training materials, case studies and other interventions, realising the potential of workforce transformation investments. This will also offer an important route through which simulation-based interventions can enhance or offer different ways to address local or national needs.

A national vision for the role of simulation and immersive technologies in health and care

It is inevitable that all health and care workers will require new knowledge and skills to enable them to be part of a modern workforce. The use of simulation allows these skills to be acquired and demonstrated, enabling staff to develop the confidence needed to embrace the process of change that is going to influence both the current and future workforce.

The psychological component of making the transition to new ways of working requires strong, effective, and empathetic leadership together with coaching, mentoring and supervision in practice. Under *'Human factors; organisational change'* on the Health and Safety Executive (HSE) website: it notes that rapid or continual change can have a detrimental effect on health and poorly managed organisational change can increase the workforce's experience of stress. This strengthens the argument to explore how effective use of simulation can be incorporated into change management strategies, both as an educational tool and as a lens on system design and change. This link between simulation and system design, performance and staff wellbeing is becoming increasingly evident and has been utilised in other industries.

Simulation can therefore be used to develop a consistent approach to support the necessary changes. It provides opportunities for staff to gain new skills and behaviours that can be acquired at a pace suited to the individual. The importance of effective, guided feedback or debriefing from trained faculty is a fundamental feature; allowing the opportunity to enhance self-reflection and clarify individual or team-based strengths and deficiencies which might require further, focused development.

The remainder of this chapter offers insights into how and where simulation offers opportunities to support workforce development and transformation. These insights are offered under specific headings that focus on different stages of an individual's career in the health and care sector.

These stages include:

2.1 Recruiting the future workforce

2.2 Enhancing selection processes

2.3. Enhanced induction including assessment of current skills, identification of learning needs and return to training/practice

2.4. Assessment, career progression, reskilling, and remediation

2.5. Lifelong learning (including revalidation)

2.6. Workforce retention and wellbeing

2.7. Adopting new technologies and ways of working.

2.1 Recruiting the future workforce

Awareness of the variety of workforce roles in the health and care sector and the career opportunities these can offer can be brought to life by carefully designed simulation-based exercises at small or large scale, according to the intended audience. This can enhance subsequent recruitment drives in different geographical areas or workforce domains according to specific needs, which can highlight new or emerging routes into a career in health and care that are being introduced.

There is a pressure to recruit widely across all sectors of health and care in competition with other employment sectors both nationally and globally. The NHS as an employer is aware of the need to attract people with appropriate values and behaviours in enough numbers and with appropriate attention to diversity and inclusion. Many of these issues will determine the shape of the future workforce, as outlined in the NHS Long Term Plan.

Effective recruitment requires potential applicants to be aware of the wide range of roles and working environments available to them, as well as opportunities in terms of job satisfaction and career development.

Simulation, in its different forms, offers some unique opportunities to raise awareness of the work undertaken by health and care colleagues, by providing exposure to and simulated experiences of various care settings, many of which may not be recognised, to a wide and diverse audience of potential colleagues.

To release the potential for simulation in recruitment, several steps may be taken:

- HR teams and those involved in local workforce recruitment could partner with simulation teams to 'market' the health and care professions and promote recruitment within their local geography

- Professional bodies and the education sectors might liaise with the NHS as a significant employer in their locality to actively promote the use of simulation at career, employment, and recruitment events. The expansion of extended reality and other immersive technologies is making these opportunities more feasible on a wider scale, whilst taking different sections of local communities (for example, students undertaking courses at schools and colleges) into different physical simulated environments offers a powerful link to different career pathways

- Experiences of using simulation to enhance awareness of the NHS working environments and career opportunities could be made widely available across the NHS. This could enhance the work of NHS Ambassadors and other workforce recruitment schemes by offering simulated experiences to members of local communities at open meetings or as guided events in more specialised simulation environments A link to relevant case studies will be provided here

2.2 Enhancing selection processes

The People Plan 2020/21 highlights the need to recruit more people to ensure that services are appropriately staffed. Enhanced evidence-based selection processes for specific professions, disciplines or roles can incorporate carefully designed simulation exercises that will help identify the most suitable candidates for a career pathway or new role with different requirements and responsibilities.

Selection processes are intended to ensure that the right people are chosen for the right roles, but traditionally rely on application forms and interviews. These processes have well-recognised flaws and therefore multi-modality selection centre processes have become more widely used, particularly in high stakes selection outside of health and care. This often involves one or more modes of simulation-based activity, designed to test the specific attributes that are important to distinct roles or career pathways. In the health and care context, there are examples of this approach in selection into specific medical specialty training programmes (for example, general practice and surgery) or nursing specialties (for example, critical care). This approach has also been used for appointing senior clinical or leadership roles within an organisation.

Some key advantages of using specific simulation modalities in this context include:

- Opportunity to examine attributes of an applicant's skill set or values in a consistent, validated manner, with exercises designed to test specific attributes more clearly (for example, communication skills with patients, interpersonal skills when problem solving in a team context and ability to work safely under specific challenges such as time pressure)

- Construction of a more complete profile of an applicant's strengths and gaps in important key skills that may predict future performance in role, and which might guide more focused development needs, if appointed. This aspect has particular relevance for doctors and dentists in training, where selection into (and progression through) specialist training programmes represents a significant investment for trainees and training programmes

- Greater clarity to the applicant regarding role expectations and orientation into different working environments or new roles and ways of working, for example with advanced practitioner programmes.

The effective use of simulation within this context depends on several factors:

- The assessments should be relevant to the specific role and the attributes required

- The assessments should test specific attributes and be demonstrated to be both reliable and valid

- The selection process should be quality assured

- Decisions need to be made around feasibility and cost

- Generic attributes or similarities in roles and positions within organisations may benefit from collaboration to design exercises and agree standards. It might be useful to have central shared resources and expertise that can be accessed by several appointment processes as required. National collaboration between Royal Colleges and specialty schools might offer an effective method for design, delivery, and evaluation of such techniques.

2.3. Enhanced induction including assessment of current skills, identification of learning needs and return to training/practice

Induction and orientation of staff to new working environments or roles with increased responsibilities is an established process that is accessed when commencing a new job or place of work. Similarly, understanding the specific needs of different practitioners or trainees who are returning to their roles after a period of absence is critical to helping make this transition successful and supportive. These principles promote the drive for a compassionate and inclusive culture, which values staff and creates a sense of belonging (NHS People Plan 2020/21). Simulation can play a valuable role in offering experiential support that is personalised to individuals and specific to the role and the responsibilities it brings. This will help the wellbeing of those staff involved and provide assurances to employers that individuals are prepared safely and robustly for this time in their career.

The induction and orientation of staff in all roles or professions is accepted as best practice across the NHS and is mandated within local employment policy.

For many, staff induction programmes are offered when starting a job within a new organisation, or when taking up a new role with new responsibilities. However, it is also recognised that many staff take breaks from their working lives for a variety of reasons and need to be supported when returning to practice. These staff need a similar induction and orientation programme but may also need additional support according to role-specific or individual factors. This is a leading priority in the NHS People Plan *'Looking after our people'* and provides one route to close the gap on workforce shortages: giving an effective use of both time and funding.

Simulation has a very practicable offer to make in this respect for staff as well as employers, by providing needs-led and outcomes-driven experiential learning that is educationally coherent and delivered by trained and content credible faculty members.

By integrating simulation with other aspects of induction, new or returning staff can address personal concerns in terms of refreshing knowledge, rehearsing fundamental or more complex practical procedures, and demonstrating a level of competence with broader professional capabilities and values that will be required in the workplace.

Adopting the use of simulation alongside more conventional processes provides additional assurance to patients, public and employers that staff are well prepared for practice. More recently, innovative use of immersive technologies, including virtual reality tours of working environments, have been used to address concerns about orientation and have shown positive impact on the mental wellbeing of some staff.

A national vision for the role of simulation and immersive technologies in health and care

In order to develop these simulation-based interventions, employers and other professional bodies should consider what information they need on the learning needs of specific staff groups and individuals. For example, the 'HEE Supported Return to Training Plan' for doctors described several key areas of focus, including:

- Knowledge gaps resulting in time out of practice (for example, clinical, protocol, policies)

- Fade in procedural competence due to time out of practice

- Generic professional capabilities (professional, leadership and team-working skills)

- Decision-making skills

- Responding to generic and specialty-specific emergencies

- Self-confidence and self-perception in one's clinical abilities

- Adjusting to new circumstances and working practices.

The training plan provided a clear picture to direct funding of specific simulation-based interventions, co-ordinated on a regional basis. Feedback from participants confirmed the value of these resources to help update key clinical skills and discuss broader professional and personal issues amongst peers, such as anxiety and confidence, that might influence clinical performance[3], as well as meet colleagues in a similar position, and discuss wider issues, such as anxiety and confidence.

[3] The Executive Summary of this evaluation is available here.

2.4 Assessment in career progression, reskilling and remediation

Simulation can provide robust assurances to individuals, professional bodies and employers about specific competences and capabilities that underpin career progression, or when preparing to undertake new roles and responsibilities. This provides significant opportunity to offer focused and personalised remedial support to individual professionals at an early stage when they are identified as not meeting certain standards of practice. As a result, significant time and cost savings can be enabled compared with intervening at a more delayed stage.

Assessment within the NHS is important to provide assurance to professional bodies, employers, regulators and the public that staff can fulfil the requirements for their roles and responsibilities. Generally, assessment is a blend of summative assessment (where the focus is on participants' demonstrating a level of knowledge, technical competency or clinical practice against an agreed standard) and formative assessment (where the focus is on improving learning and practice by receiving timely feedback on current knowledge, skills or practice and identifying strengths as well as areas for improvement).

A balance of these is important, so that staff and learners can feel that their development is being done 'with' them, rather than 'to' them. The use of simulation is well established in both these areas of assessment for individual learners and comes with a wealth of supporting literature.

With appropriate attention to design and quality assurance of implementation, various modalities of simulation are well placed when used for summative or high stakes assessment of technical (procedural) abilities and more general professional skills such as communication, problem solving, team work and leadership.

The validity and reliability of such a use is strengthened further by triangulation of data from other sources of observed performance. Whilst assessment delivered using simulation is established and accepted by staff and professional bodies, it also poses a few challenges.

The use of simulation within large scale assessment programmes requires coordination of equipment (or simulated patients), access to trained assessors and an appropriate environment. Consequently, such assessments are often centralised and need to be scheduled well in advance.

There is a burden on employers to release assessors and staff or students, whilst physical simulation equipment may be purchased and used in quantity over a short period, yet remain underutilised until the next assessment event.

There is considerable value in considering how simulation and immersive technologies could enhance preparation and demonstration of achievement of professional capabilities at specified transitions of a training programme alongside existing workplace-based performance measures. The case for using simulation modalities in formative assessments of performance is strong and well established, but beset by challenges of equity of access and local variations in investment, including the commitment to recognise and support simulation faculty.

The use of 'in situ' simulation offers some advantages over the use of bespoke specialised simulation centres by offering succinct learning episodes to multi-professional teams in the context of their usual place of work.

However, this solution is affected by clinical environments being under pressure to maintain clinical service as a priority. It is also not without other risks, including those to learners if exercises are facilitated poorly in respect to psychological safety for learners, and the risk of cross-contaminating simulation and clinical artefacts (for example, drugs, documentation, equipment) if sessions are not planned and managed professionally.

Some practitioners at any stage of their career may occasionally require support when specific aspects of their individual practice are identified as not meeting an accepted standard. These include areas such as leadership, patient or colleague interaction or other behavioural issues, as well as shortcoming in knowledge and skills in the context of their clinical practice. Personalised action plans, to support return to practice, may be enhanced by simulation-based interventions that can be carried out away from patients and colleagues if necessary.

Practitioner Performance Advice, formerly known as the National Clinical Assessment Service (NCAS), provided by NHS Resolution, offers impartial advice to healthcare organisations on how to effectively manage and resolve concerns raised about the practice of individual practitioners.

Simulations are used as part of their assessment process in the absence of being able to conduct an observation of practice. The opportunity to access this type of resource at an early stage of concerns regarding individuals would benefit all parties involved.

The challenge faced by professional bodies and employers in health and care is how to provide access to high quality simulation at an appropriate time and frequency for staff to derive real benefit. Closer collaborative working relationships across organisations, professions and geographies are more likely to capture and meet the existing and future needs of the health system and workforce.

2.5 Lifelong learning (including revalidation)

The health and care workforce needs to be able to adapt and apply new knowledge and skills throughout their careers. Simulation offers unique ways to help develop and provide evidence of attainment of new capabilities alongside specific skills that need to be refreshed if not used regularly in practice. This will provide stronger assurance to employers, regulators, patients, and the public by enhancing the current appraisal and revalidation mechanisms in place.

For a professional career to have longevity, provide sustained interest, support opportunities for development, and address advances in practice, there needs to be a clear pathway for lifelong learning. This need is referred to in 'Working together, Learning together' by the Department of Health in 2001. It follows from the preceding sections that the opportunities offered by simulation for orientation into a role and progression through training are also pertinent to supporting staff with specific lifelong learning needs.

In addition, following the introduction of revalidation for many healthcare professionals, regulatory bodies are now actively describing and mandating lifelong learning within their respective professions including the General Medical Council (GMC), Nursing and Midwifery

Council (NMC), Health and Care Professions Council (HCPC), the General Pharmaceutical Council (GPhC) and General Dental Council (GDC).

In other safety critical industries, the process of maintaining a professional licence requires compulsory simulation-based demonstration of performance. A well-known example of this is the Civil Aviation Authority and licensing for professional pilots. In health and care this may often be of an advisory or recommended nature; for example, maintaining a certificate in advanced life or trauma life support, where completion of a course of training and its updates require an assessment of performance in a simulated context.

2.6 Workforce retention and wellbeing

The NHS People Plan 2020/21 emphasises the need to keep staff safe, healthy, and well, both physically and psychologically. This need was highlighted powerfully during the immediate and early stages of the NHS response to COVID-19, which illustrated the vital importance of resilience amongst our people and systems. Simulation has a critical role to play in helping design or test changes in work practices and environments in a manner that promotes staff wellbeing as an important outcome. With appropriate planning and faculty this can help create working conditions that engage staff in continuous improvement and support a "just culture".

Workforce retention within health and care is a problematic issue. There are significant variations geographically and between professions. For example, there is variation between university programmes in the proportion of student nurses completing their course to graduation. The reasons for student attrition or staff not continuing in existing roles are multifaceted and have a negative impact on workforce shortages in many sectors and regions across the NHS.

The concept of staff wellbeing is critical to staff retention. One in three members of staff is reported to have felt unwell due to work-related stress. The HEE report on NHS staff and learners' mental wellbeing commission, written to support the NHS Long-Term Plan, published in February 2019, notes that the cost of poor mental health in NHS staff equates to just over £2,100 per employee.

In other industries the science and practice of Human Factors (Ergonomics) has been key to understanding how the workplace, working practices and interaction with technologies and people can impact on employee wellbeing, as well as system performance. By comparison within health and care, relatively little attention has been focussed on this subject, although it has recently become more prominent within policy and strategy discussions. It is now a short step to appreciate how simulation can be brought into this field.

By using simulation in a constructive and collaborative manner, there is an opportunity to test and implement changes in practice, guidelines or policies in a way that will enable staff to work more effectively and to manage periods of real or potential stress in their daily practice. This can also dovetail entirely with helping staff and teams learn from harm when care has not proceeded according to plan. This will promote a more open and learning culture in practice that can recognise, celebrate, and embed resilient practices within individuals, teams, and systems, and which subsequently will have a positive impact on patient care.

2.7 Adopting new technologies and ways of working

The NHS People Plan 2020/21 describes the value of making best use of the full range of skills and experience amongst our people to deliver high quality care. Reshaping how different clinical services are delivered, building in adaptability to allow an agile response to changes in demand, and advances in science and introduction of new technologies will represent major challenges and offer opportunities to how the current and future workforce supports the delivery of safe, effective health and care. Simulation can be a tool to help learn and test these new developments or ways of working without placing the patient at risk and in a way that provides greater insight into the impact on ways of working that these changes will bring.

The Topol report 'Preparing the healthcare workforce to deliver the digital future' explores the impact that advances in digital health care technologies, genomics and artificial intelligence will have on the future of healthcare and the NHS workforce. The We are the NHS: People Plan 2020/21 offers many examples of digital transformation being adopted (for example, remote consultations) and the opportunities for innovation in existing roles and jobs and those that were particularly apparent during the early response to COVID-19 and which have been emerging through increased responsibilities taken on by advanced clinical practitioners in many different settings.

The opportunities offered to build better intelligence and shape future delivery of care from analysing 'big data' across the NHS will require cultural changes and service transformations of a significant nature, including an investment in future clinical and analytics staff to analyse and interpret the growing mass of clinical and other data, and the need to build the intelligent systems to drive service improvement. There will be a need to develop explicit digital skills or capabilities across the entire workforce. This represents a huge skilling and reskilling task for the NHS, in many instances requiring the use of simulation-based activity.

Simulation can also offer a relatively risk-free, quality controlled and cost-effective approach to test and develop new technologies and procedures. This will help to understand how innovation will influence current and future staff working patterns and lives. Interaction with patients and the public will also be changed dramatically as the various technologies are introduced and adopted at scale. This will then have an impact on the way in which members of staff communicate with patients, families, and wider society and vice versa, aligned to the moving experience for practitioners, between being practitioner – patient – carer.

Digital and information technology leaders as well as research and innovation leaders may seek to collaborate with the simulation community and consider how simulation can best be used to support the digital revolution in healthcare.

3. Enhancing the quality and capacity of the learning environment

An integrated approach to using simulation-based interventions can both enhance learning opportunities within the workplace; close to the point of care, as well as better prepare students, trainees and staff to optimise their level of preparation for planned changes in their clinical or working environment or areas of practice. This will enhance their ability to work effectively and safely when these changes take place. This need is particularly felt in the current COVID-19 era with pressure on workplace placements and constrained access to learning in different clinical environments due to necessary changes in delivery of services.

The HEE Quality Framework for education and training 2019/20 sets out the expectations for quality within the work-based learning environment. This framework is undergoing a refresh, to ensure that the changing needs of the workforce are properly reflected. Through contracts with universities and education placement providers, HEE works to assure the quality of learning for students.

Practice Learning Facilitators (PLFs) work across disciplines and organisations to help maintain and generate placement opportunities, develop new models of placement learning and support quality assurance processes. Similar processes take place in support of postgraduate training across the different medical specialties and disciplines.

One of the current challenges is to ensure these standards are maintained during changing patterns of health and care provision. An increased emphasis on delivering care directly within the community requires current and future staff to be provided with the necessary skills to be able to work effectively and safely in the changing environment.

The benefits of simulation in delivering high quality educational opportunities is well established and will be needed to provide support for the education and training of a workforce with rapidly changing needs.

Another challenge arises from a workforce strategy that sets out to increase new graduates and staff in specific professions and specialties, and to respond to geographical variations in key staff shortages. The requirement for increased workforce recruitment results in additional pressure on the ability to deliver training in the clinical workplace, where opportunities for learning are often limited. Simulation has the potential to bridge this gap by providing all learners with an opportunity to experience a wide range of clinical situations and settings in a reliable and educationally coherent way. An important resource to consider in helping shape how this potential might be realised successfully is found on the NHS Employers' website, which describes six steps to expand placement capacity in a sustainable manner (Table 1).

Table 1: Steps to expand placement capacity (NHS Employers, 2019)

Step	Considerations
1. Manager buy-in and mindset	Ensure managers realise the need and are engaged and familiar with different approaches available Aim to build sustainable solutions and help facilitate the change process with local teams and services
2. Relationships with HEIs	Engagement – consider placement timings and staggered start dates Highlight the importance of data sharing on student numbers versus potential workforce gaps to aid planning Identify and support academic and practice assessors
3. Using resources effectively	Help build capacity and capability in the provision of staff (faculty) able to offer student supervision, mentoring and assessments Use the electronic staff record (ESR) to create a dashboard to illustrate faculty resource and consider retraining inactive registered mentors / supervisors
4. Evaluation	Identify and use evidence-based outcome data based on quality and safety of care metrics Encourage open forum sessions with staff and students to share progress, address concerns, and embed an appetite for change and improvement
5. Different models of delivery and settings	Use coaching leadership methods to introduce and embed new models of delivery Engage system partners within STP / ICS geographies to explore placement options in different settings and providers and identify benefits and potential disadvantages Rotate students between placements and consider nominating dedicated training clinical environments to encourage inter-professional learning
6. Moving the agenda forward	Pursue and gain strategic support from board and senior leadership team members Identify a senior manager to lead this work and seek to appoint full-time practice facilitators to embed new approaches Support and help present necessary business cases based on use of placement tariff

Even when there are no constraints on placement capacity, prior experience in a simulated context – particularly using an approach that highlights the value of inter-professional collaboration – can enhance the subsequent learner experience when they are in the workplace. Further, the professional bodies, particularly in light of the COVID-19 pandemic, are looking at fresh ways of ensuring that placement capacity is enhanced, with simulated practice being an obvious choice. In order for simulated practice to be offered as a valid alternative though, engagement with the professional regulators is going to be necessary to reach a cohesive and agreed approach that provides assurances regarding equivalent standards of competence and capability can be demonstrated for learners.

- Within the organisation, leaders and educators should consider how well designed, educationally robust simulation programmes can enhance the learning environment for all members of the workforce. This is being highlighted within different professional and specialty training pathways that are heavily dependent on being able to support and assess the development of procedural and non-technical teamworking professional capabilities

- Evolving technologies, such as virtual reality and other immersive technologies, will allow learning to be self-guided and personalised, deliverable on a larger scale and hence more efficient in terms of time and cost

- The learner experience can be further enhanced if simulation faculty are involved in clinical supervision, as this gives a more extensive and holistic approach to training and learning.

4. Involving patients and the public

Essentially, if simulation is intended to enhance preparedness for when a practitioner encounters a patient, or in testing and improving the design of a pathway or service to deliver high quality health and care, then listening to patients and members of the public and appreciating their concerns is going to be key. Patients can become the 'champions' of simulation but to do so will need to be better informed about the opportunities that simulation can offer to patient care and have any doubts or misgivings about its use allayed.

There are some fundamental principles that patients and the public want to support in the NHS where simulation has a real or potential role to play. These centre largely on the concept of pursuing values-based recruitment and staff development, compassionate leadership at all levels of care provision, and having a health and care system that is designed to promote staff wellbeing and satisfaction alongside offering personalised care that adopts a more holistic patient perspective and embraces wider public and society engagement.

The previous sections in this document describe a number of these aspects under more specific headings. This chapter, however, argues that seeking more direct patient and public engagement in how each theme is taken forward will add significant value to both the direction and pace of travel and potential impact in each piece. In consideration of recruiting and retaining the 'right people' for the 'right roles', patients and the public alike will be reassured by approaches that identify and select practitioners who will be passionate and fulfilled in their future careers, empathic to specific needs of patients and carers, able to access the highest quality education and training to develop appropriate clinical, managerial and leadership skills, and able to adapt to the changing needs of the system.

Simulation offers practitioners the opportunity to understand the lifestyle of a patient, enabling delivery of care that allows a patient to maintain or enhance the quality of their life. Embracing this holistic perspective as an outcome within broader programmes of simulation and immersive technology-based learning is needed to address the concern of some patients that innovations in education and training may be 'desensitising' the presence of the patient as a human being. This may be overcome by incorporating input from expert patients, making use of patient stories more explicitly, and ensuring standardised patients ('role players') are able to offer an authentic voice based on real world, lived experiences of patients.

Another valuable feature of simulation and immersive technologies is that they can play an important role in educating and assisting in the treatment of patients, carers and the public in terms of living with specific conditions and playing an active role in their own care, as well as offering unique insights and raising awareness of wider public health issues that are relevant to society as a whole.

A national vision for the role of simulation and immersive technologies in health and care

The need for inclusivity from both the employee and patient frame of reference is captured in the following quote provided by a member of the HEE TEL Patient Advisory Forum:

> **'There can be barriers in the healthcare professions that are felt by both students and patients alike. Having been a patient my entire life, I know how much that diversity amongst all frontline workers matters. Ensuring that there are staff whose own experiences reflect ours allows us to feel a little bit of comfort during times of vulnerability.'**

For these ideas and principles to become a reality, effective and transparent patient, and public engagement in the future role of simulation in health and care will be necessary with appropriate coordination and collaboration across the system.

5. Developing the simulation and immersive technology community

The rapid expansion in application of simulation and immersive learning technology in the health and care sector benefits from active engagement of a diverse and widely distributed community of educators, simulation technicians, practitioners, managers, academics, and industry colleagues. This also brings a number of challenges related to how this community can be given access to resources that will support their own development needs and gain recognition within the wider system for the contributions that they can make. Developing and strengthening a more cohesive community of practice will enable improvement in communication, coordination, cooperation and collaboration at scale, which in turn will help accelerate innovations into practice and create greater opportunity to demonstrate impact for service transformation and patient care.

The provision of education and training to the current and future health and care workforce involves many different organisations spanning professional, geographical, and educational boundaries. This work is undertaken by individuals and teams from diverse backgrounds, all of which combines to ensure many different contexts and influences can be included in the overall offer and that local innovation can flourish under the right conditions. This picture is certainly apparent within the simulation and immersive technology world, which has been an important focus when seeking stakeholder engagement in the past by HEE TEL and will continue to be an important component in our future strategy and activity.

Whilst recognising that there are established professional and organisational networks in existence with similar interests, the HEE TEL Simulation and Immersive Technology Programme has identified a number of cross-cutting themes or workstreams where specific support could add value to all parties across the health and care system. These include:

- Offering a national simulation faculty programme that supports professional recognition for individuals in their educational and/or patient safety work. This follows on from experience with piloting the materials and methods used in the Australian National Health Education and Training in Simulation (NHET-Sim) faculty programme, which has identified a structure and process to provide a similar programme for the NHS. Our intention is to co-design this with input from experienced education leads with expertise in design and delivery of local or regional simulation faculty programmes. This will also explore opportunities to build in professionally recognised CPD or accredited awards for participants that are recognised nationally by employers

- Creating greater recognition and development opportunities for simulation technicians and others involved in developing or supporting use of immersive technologies. This is aligned with the faculty development workstream, and acknowledges that this specific workforce cohort are playing an increasingly important role in supporting the design and delivery of high quality education and training for all staff groups as well as providing a valuable source of innovation

A national vision for the role of simulation and immersive technologies in health and care

- Developing an immersive technology strategy that can help frame the design and implementation of new immersive technologies. This strategy will focus attention on the need for more explicit standards and consistency in this field, create the conditions to bring together a consortium of industry, academic and clinical representatives to enhance the transition from innovation to implementation, and help ensure this work addresses specific needs in the system with clear evaluation of outcomes and impact.

- Strengthening the relationship between HEE TEL and the Association for Simulated Practice in healthcare (ASPiH), which is the UK learned society that has a multi-professional membership from higher education, NHS and industry sectors. HEE TEL has previously supported ASPiH in developing national standards pertinent to offering high quality simulation-based education (SBE), which subsequently helped inform the national framework for SBE published by HEE in 2018. The impact of the COVID-19 pandemic on provision of education and training has provided additional emphasis to the importance of this relationship and offers an essential route for dialogue between HEE TEL and key representatives of the community of simulation providers (whether faculty, technicians, managers or learners) who deliver this work on a daily basis

- Reinforcing links with professional bodies and regulators that recognise the importance of supporting their work in responding to workforce and system transformation whilst maintaining standards of training and clinical practice across all professions and staff groups. Many of these relationships exist within the HEE through e-Learning for Healthcare and the Learning Hub development, as well as the Blended Learning programme and other workstreams such as Advanced Clinical Practice, Return to Practice (or Training), and Apprenticeships. Once again the COVID-19 pandemic has brought the importance of these relationships into sharp focus as all parties focus on re-establishing sustainable education and training activities that benefit from the experience and resources available through HEE TEL and the Simulation and Immersive Technology programme. This will be helped further by engagement with the Digital Readiness programme and the work being conducted with NHSX looking at connected communities.

6. Research and innovation

Use of simulation as a focus for health service research or a methodology to enhance existing research and innovation programmes is an opportunity waiting to be developed at scale. This has the potential for massive impact on how industry, academic and service partners can design and undertake usability testing of new systems of care, environments, equipment, and technologies prior to wider implementation. It can also explore how the future workforce will develop the capabilities and adaptability to work in an increasingly complex work system.

The NHS has a long and distinguished history of supporting research and innovation in health and care. There are strong relationships with academic and industry partners that foster a collaborative and sustainable approach, often bearing significant benefit to patients and the public, both in the UK and globally. The workforce, as well as patients and the public, will have expectations that their education, health and care will continue to benefit from the development and safe implementation of new treatments, techniques and technologies; many of which are supported by publicly funded research and innovation enterprises.

Research, innovation and design in the health and care sector has traditionally not favoured inclusion of education-based research at the same scale as is afforded to studying the potential for new medical treatments or techniques. However, in an era of system and workforce transformation it will be critical to raise the profile of how we study and understand the development, integration and impact of new technologies and ways of working on the needs of the future workforce. Simulation in its many modalities will play a crucial component of this future state and this will need consideration in terms of leadership support and investment.

Two separate research projects are currently being undertaken by HEE TEL. The first has arisen as a result of COVID-19 and is looking at the response of the simulation community to assist rapid reskilling of staff and prepare and adopt key changes in workplace practices (for example, redeploying from an acute ward, operating theatre or outpatient clinic setting in order to support or provide clinical bedside care in a critical care environment, or wearing PPE and managing its effect on effective communication skills). This project will also consider some of the likely future factors that will need to be considered if and when the use of simulation needs to be applied rapidly and at scale to a serious system-wide issue to enhance our preparations or response accordingly.

A longer term research project is reviewing evaluation frameworks that can be applied to complex system-wide interventions, which historically has been a difficult field in which to develop evidence of benefit for any type of educational or clinical practice intervention. The goal of this work is to identify key methods and frameworks that can support systematic evaluation at scale and offer longer term analysis of the benefits and impact of simulation in these areas. It is anticipated that this work will help secure specific research and innovation funding in this field and inform future commissioning practices, as well as being beneficial globally by contributing to the evidence base in improving workforce development and transformation, staff wellbeing and system performance.

7. Lessons from outside of health and care

High reliability and safety critical industries have a long history of using simulation to enhance how their workforce is prepared for work and to ensure that working conditions empower safe, effective practices in ways that support continuous improvement. Health and care can learn lessons from these different work sectors, whilst also sharing how we support adaptability and resilience in delivering safe care amidst significant change and greater complexity than is seen in many other sectors.

Many high reliability or safety critical industries outside of health and care have invested in simulation as a key component of their strategies and operational practices to manage risk and prevent, trap or mitigate against the consequences (to the workforce, the organisation or the public) of avoidable harm arising from humans interacting with imperfect systems and processes.

One clear example of this is within aviation, where professional pilots must spend a minimum of 1,500 hours in simulation-based training and subsequent assessment of performance before gaining (and then maintaining) their licence. In the RAF, simulated practice, or 'synthetics' has been mandatory for 50 per cent of training time for all staff since 2015.

Other industries have focused on efficiencies in both risk and cost. Professional motorsport (see the case study at the end of this chapter) was moved into action by the untimely deaths of several prominent racing drivers, which resulted in a total review of the safety culture and practices across the whole motorsport industry. Singular accountability without blame has resulted in massive improvements to safety, culture and climate and has been underpinned by an open culture of learning and sharing safety improvements across highly competitive partners. NASA has had a long history of using simulation both to help design and test new technologies and design but also to help select and prepare astronauts for space flight.

In the construction industry, a clear leadership commitment has led to large investments in comprehensive simulation training as part of staff induction. One example is the **Tideway Employer Project Induction Centre (EPIC)** which provides simulated safety training for all members of a huge construction project and is mandated prior to gaining a permit to work on site. Further examples of full day simulations exist in other industries such as alternative energies – wind turbines.

A national vision for the role of simulation and immersive technologies in health and care

In banking, simulation software is used to make comparisons between funding systems and to assess available liquidity in simulated payment systems. In the automotive industry, simulation is used in the design process, allowing learners the opportunity to carry out analysis of efficiency of parts and vehicle specification, prior to build. Human resource departments are utilising simulation-based interventions to develop inter-personal relationships and learn how to best manage difficult conversations. Similarly, simulation is used in sales to support staff in imaginary business situations; specifically focusing on human factors.

Health and care can learn from other sectors by looking at timelines for industry-wide engagement, implementation, and evaluation of simulation-based interventions within the wider profile of safety, resilience, and performance in these safety critical industries. One significant common denominator in the examples and case studies cited is the vision and commitment from senior leadership. This is key in ensuring that a system-wide culture of learning, improvement and workforce wellbeing is clearly articulated and demonstrated in daily practices for all current and new members of staff as a cohesive approach to both safety and risk that aligns with new ways of thinking and working.

In health and care the benefits of using simulation across the whole system need to be better explained. Leaders with responsibilities in system design, transformation, commissioning, regulation, workforce development, governance, research and innovation can immediately begin to identify how a more cohesive approach to investment and shared learning will enhance many different facets of improving system performance, workforce wellbeing and other markers of quality of care including effectiveness and patient experience.

8. Reflections on the impact of COVID-19

The simulation community responded in a rapid and agile manner to the immediate increased needs in critical care provision during the early COVID-19 pandemic. This will offer important lessons for how a national response of this nature might be orchestrated and activated in the future, if necessary. In the immediate future though, there are new conditions and restrictions in the delivery of face-to-face education and training or the provision of care. These new circumstances will influence simulation-based interventions, many of which are described in the case studies associated with this document. Rather than dismissing these as no longer feasible, we are witnessing the simulation community adapt and learn new approaches to support the use of simulation across all fields of application. In particular there are innovations in how to develop and integrate remote access learning alongside, or in place of, face-to-face training, which may have significant implications in the future development and implementation of remote access care platforms as well as how new technologies are tested and used by patients and staff alike.

The impact of COVID-19 on health and care education and training was rapid and profound. Trying to manage the balance between the expanding demands of clinical work for many faculty members was, and continues to be, a challenge. An early survey shared amongst the simulation network and other stakeholders showed that, whilst there was potentially faculty available early in the pandemic, the situation began to change quickly as more faculty returned to clinical duties. Further, understandable concerns about delivering face-to-face training have meant that options for digital alternatives, including simulation through immersive technologies, needed to be considered and accelerated. This has raised concerns that a 'scatter-gun' approach to delivery will occur, which will only serve to widen the already existing gaps around cohesion, equity of access and reliable evaluation of learning outcomes, etc. There are several workstreams within HEE TEL that are seeking to address these issues and concerns with as nimble a response as possible.

- Discovery work carried out with the HEE medical and dental postgraduate deans, as well as nursing and allied-health professional colleagues to deliver a national online learning solution as a form of virtual classroom environment

- The HEE TEL Simulation and Immersive Technologies programme has produced an initial COVID-19 toolkit that provides guidance and principles for safe simulation in health and care. Also available is a document, developed by the simulation community in association with HEE and ASPiH, that describes practical tools and techniques to ensure appropriate risk management for learners, educators and support staff

- A 'simulation restart' programme has commenced with the Foundation School Directors to identify and assist the implementation of different approaches to maintain face-to-face simulation training. This seeks to encourage sharing of learning resources nationally and promote a more blended approach that school programmes can implement according to local needs. This has benefited from engagement of simulation technicians (via ASPiH) and regional or local network leads

A national vision for the role of simulation and immersive technologies in health and care

- The TEL strategy, once published, will detail how TEL plans to support learners' access to immersive technology content through its development of immersive technology platforms

- HEE TEL immersive technologies special interest group (ImmTech SIG) developing advice, guidance, and support for the delivery of immersive technologies (including virtual, mixed, and augmented realities)

Adopting a more strategic and coordinated approach to the integrated application of simulation will bring greater opportunities to respond to prioritised, specific system-wide needs at scale, whether anticipated or unanticipated as exemplified by the requirements identified for the COVID-19 pandemic.

The simulation community within the NHS and HEI sectors demonstrated a willingness to respond in an agile and rapid manner when asked, which illustrates a culture worthy of recognition and support. For most situations, such a response would be much more anticipated and planned, but there is a need to offer a more sophisticated approach to how such a force can be mobilised with purpose, coordinated, and offered channels of communication by which cooperation and collaboration can be harnessed efficiently.

The immediate requirement of this nature and size concerns how to re-establish and sustain new approaches to simulation-based activity that must adapt to the circumstances and constraints of the ongoing challenge from COVID-19. This is likely to see a significant increase in designing and delivering more blended approaches to the use of immersive technologies across the TEL spectrum, which may mean some compromise in possible applications but will also herald many innovations and possibilities.

The simulation community across all its modalities and applications should be encouraged to be innovative and given support and guidance to ensure that learners, educators, technicians, and administrators remain safe during this period.

This will therefore develop stronger evidence for relevant benefit and longer-term impact. This is particularly important as rapid advances in health and care, science, and technologies, including extended reality technologies, are more likely to be harnessed and capitalised upon by an integrated and collaborative system-wide approach.

9. Linking the national vision for simulation and immersive technologies with current and emerging HEE programmes of work

This document has described various opportunities or areas of need where the HEE TEL Simulation and Immersive Technologies programme can support key national work programmes that HEE is leading or supporting as an active partner. Several of these are described below to help reiterate and summarise the practical opportunities and benefits that can be achieved if this approach is adopted more widely across current and future health and care system needs.

- Improving patient safety

- Delivering a modern workforce

- Enhancing the quality and capacity of the learning environment

- Involving patients and the public

- Developing the simulation and immersive technology community

- Research and innovation.

9.1 Improving patient safety: National Patient Safety Programme

The HEE Simulation and Immersive Technologies programme is actively engaged with the Patient Safety Programme in terms of supporting innovative approaches to delivery of its syllabus and being aligned closely with the integration of Human Factors as a science and professional practice in health and care. In many ways this overarching aim is also supported directly or indirectly by the other areas where simulation and immersive learning technologies are being applied by specific HEE programmes.

9.2 Delivering a modern workforce: Return to practice/training

TEL is helping the Supported Return to Training Team (SuppORTT)

in the use of digital and online resources to support doctors return to training programmes after time out. Specific projects will focus on the use of immersive technologies such as virtual reality and 360-degree videos to focus on managing difficult conversations and speaking-up / challenging senior colleagues. The use of simulation and immersive technologies has also been used extensively during the initial phase of the COVID-19 pandemic to support staff returning to critical care practice (from career breaks, retirement, or after moving into non-critical care roles). This has been aligned with considerable development and access to resources on the e-Learning for Healthcare platform, and it is anticipated that the Learning Hub will play an important role in this respect in future.

9.3 Enhancing the learning environment: ReStart

HEE TEL is supporting the ReStart programme and the need to consider different ways of fulfilling the demands for an additional 25,000 allied health professionals and 50,000 nurses. Engagement work has included contributing to national webinars, gathering, and sharing case studies that illustrate innovative methods and demonstrating early benefit in enhancing or providing alternatives to clinical practice placements. One example of work in this area being supported by TEL is a project in the east of England that will use virtual reality experiences to offer as an alternative to placement practice for nurses in GP surgeries. This and other examples of simulation and immersive technologies are likely to have strong appeal to specialty and advanced practice training programmes where the COVID-19 pandemic is expected to have a significant impact on previously established training opportunities in practice.

Another important project that HEE TEL has initiated is with the Foundation School Directors to support ongoing access to safe simulation experiences during the COVID-19 pandemic. This includes gathering and sharing novel approaches to support remote access simulation training and collating specific learning resources linked to curriculum that have been developed locally but not previously offered for open access nationally. This #ReStartSim project will make use of the Learning Hub to gather and share resources such as a series of simple 'How to' guides offered by educators and technicians within the simulation community. It is anticipated these forms of guidance will have relevance and benefit to simulation-based training for many other staff groups.

9.4 Building and enhancing communities of practice: immersive technologies

The interest in immersive technologies to support education and training has grown significantly since the onset of the COVID-19 pandemic. In March 2020, just prior to the arrival of the pandemic, HEE TEL and the HEE policy team collaborated in the coordination of a national immersive technology event to help scope, and provide a report on, the scale and breadth of this activity. This marketplace approach afforded developers a valuable opportunity to share work and have an open forum for discussion about opportunities and barriers. Subsequently the HEE TEL Digital Topol Fellow has authored a framework for the pedagogy that underpins immersive learning technologies (currently awaiting publication in a peer reviewed journal). This will soon be supported by a number of case studies describing good practice (to be released via the Learning Hub) and planning is underway to develop a consortium of immersive technology developers who can help develop consensus statements on standards and best practice, as well as offer a more consistent resource to support specific innovations and developments in more detail. It is anticipated that this work will align with that being undertaken by NHSX to explore the wider impact that digital technologies will bring to health and care transformation.

9.5 Innovation and evaluation: building the evidence and demonstrating impact

There are several pilots and projects that the TEL team is currently engaged in regarding horizon scanning – looking at the feasibility of using the latest equipment to measure its efficacy as an educational modality. Careful reviews of new immersive technology tools will include more formal assessments to be undertaken that can help inform choice and prevent unnecessary cost and duplication of effort. These pilots range from looking at the use of Google Glass and HoloLens to supporting the development of the VR Lab in Torbay – which was successfully initiated in 2017 and now boasts the additional benefit of the health and wellbeing centre, launched during the early stages of the COVID-19 pandemic to help staff during this period. Development of a number of evidence-based approaches to evaluation of simulation and immersive technology interventions will be piloted in several of the programmes described above, all of which will help strengthen evidence of impact and support changes in commissioning, policy and regulation where appropriate.

Summary

Simulation including immersive technologies has grown significantly in the past decade as an educational endeavour to enhance workforce development and as a technique to examine and improve system performance in health and care. The spectrum of techniques, technologies and tools that are encompassed under this umbrella is diverse, and the examples of innovation that inform future practice are plentiful.

This document has described the need and value of pursuing system-wide sharing and collaboration amongst different stakeholders for simulation-based interventions to support the ambitions being described in our longer-term planning and to help address challenges that we face as a health and care community. This is especially true in this COVID-19 era in relation to how we re-establish education and training programmes alongside driving forward the workforce transformation agenda.

Simulation also significantly contributes to how we support delivery of the patient safety strategy and syllabus and optimises how our workforce can continue to deliver high quality, safe care and promote improvement throughout the health and care system.

Further to this ambition, simulation can play an important role in how we design and assess safe workplaces and systems and test our policies, protocols, and guidelines. This broader application to Human Factors or system resilience is a critical component of promoting staff wellbeing and responding to any challenges that are being faced within different health and care settings. The role played by simulation to help redesign clinical care models and support safe workforce redeployment was seen clearly in our early and ongoing response to the COVID-19 pandemic. HEE has an important leadership role to play in highlighting established and innovative uses of simulation to support the development of our current and future workforce. These methods and resources will also be beneficial to our leadership partners who are addressing separate, but overlapping, strategic goals and policies to help our health and care system adapt and improve amidst the challenges ahead. We feel this document can act as an important stimulus to initiate or strengthen existing dialogue between different stakeholders in relation to how, when and where simulation-based interventions can be developed and applied as a collaborative approach, making best use of existing resource or planning investment to meet future needs across the whole system.

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Acknowledgements