Human Factors Training in the National Health Service: A Scoping Study

For NHS Institute for Innovation and Improvement

June 2010

ACRONYM LIST

ALS	Acute Life Support
CRM	Crew Resource Management
CSRU	Clinical Safety Research Unit at Imperial College, University of London
DH	Department of Health
DVD	Digital Versatile Disk
FMEA	Failure Modes Effects Analysis
HEART	Human Error Assessment and Reduction Technique
HEL	Human Engineering Limited
HF	Human Factors
LIPS	*Leading Improvement in Patient Safety* (a training programme)
NICE	National Institute for Clinical Excellence
NHS	National Health Service
NHS Institute	NHS Institute for Innovation and Improvement
NPSA	National Patient Safety Agency
QHFT	Queen's Hospital NHS Foundation Trust, Burton-on-Trent
RCA	Root Cause Analysis
R^2IPS	*Recognising Risk and Improving Patient Safety* (a training course)
TRM	*Team Resource Management* (a training course)
UHCW	University Hospital of Coventry and Warwick

EXECUTIVE SUMMARY

Human factors concerns the interactions between people and technical components in complex systems. It is associated with a maturation of wider system safety management and can make an important contribution to equipment design, safety assurance, system management and incident investigation. It does this by allowing the requirements and constraints of the system operators (people) to be formally described and systematically understood.

It is recognised that human factors can provide enormous benefits to patient safety through better understanding of human related clinical tasks and risks and the people element of clinical processes, including cognitive, social and behavioural elements.
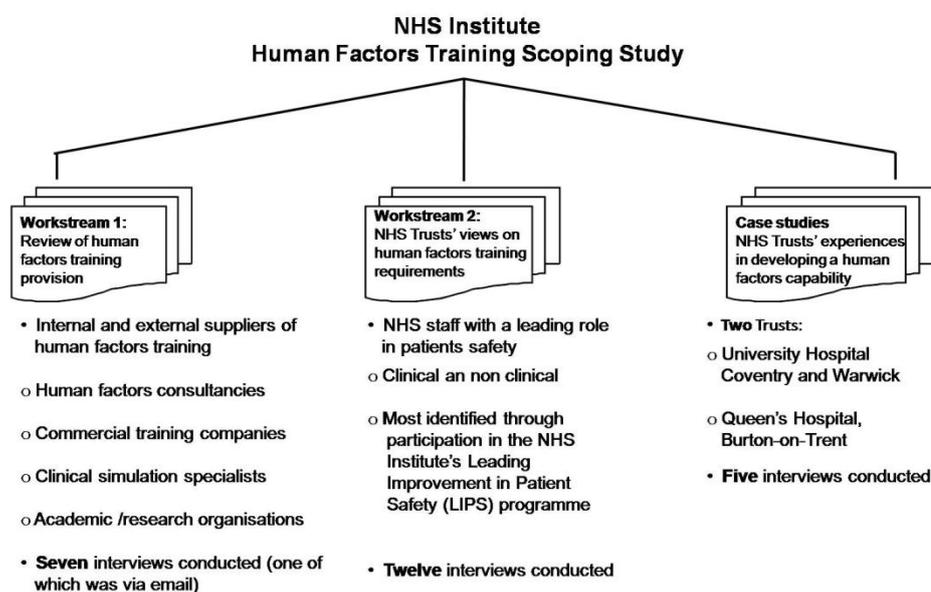
The Safer Care team aspires to; "build an NHS where every member of staff has the passion, confidence and skills to eliminate harm to patients." The NHS Institute is committed to raising awareness of and capability in human factors among NHS staff. This document reports the findings from a scoping study into human factors training in the National Health Service (NHS). This study has been undertaken by Human Engineering Limited and the NHS Institute for Innovation and Improvement's Safer Care team.

The aims of this scoping study were to:

- Describe current human factors provision to the NHS to:
  i. Inform NHS trusts who want to develop human factors capability and capacity
  ii. Identify gaps where work or training may need to be developed or commissioned
- Describe the views of NHS trusts in relation to human factors training:
  i. What would have the greatest impact in improving patient safety?
  ii. How they currently use human factors training to support patient safety
  iii. Barriers to accessing human factors training
  iv. Ways in which their use of training from a range of providers might be facilitated.

The study

The study was based upon interviews with different stakeholders: human factors training providers, NHS staff receiving human factors training and senior managers within NHS trusts interested in developing a human factors capability. As an initial exploration, this study has been limited in its scope to providers (commercial, higher education or NHS) easily identified as currently working alongside the NHS. Three sets of interviews were conducted:

NHS Institute Human Factors Training Scoping Study

Workstream 1: Review of human factors training provision
- Internal and external suppliers of human factors training
  o Human factors consultancies
  o Commercial training companies
  o Clinical simulation specialists
  o Academic /research organisations
- **Seven** interviews conducted (one of which was via email)

Workstream 2: NHS Trusts' views on human factors training requirements
- NHS staff with a leading role in patients safety
  o Clinical an non clinical
  o Most identified through participation in the NHS Institute's Leading Improvement in Patient Safety (LIPS) programme
- **Twelve** interviews conducted

Case studies NHS Trusts' experiences in developing a human factors capability
- **Two** Trusts:
  o University Hospital Coventry and Warwick
  o Queen's Hospital, Burton-on-Trent
- **Five** interviews conducted

Human Factors in Healthcare: Person and System-level Human Factors
This report distinguishes between two complementary strands of human factors in healthcare:

- Person-level human factors – Emphasises the skills that allow the individual to apply their clinical expertise efficiently, effectively and safely. Such skills include effective communication and decision-making, risk awareness for different situations, how to manage stress and fatigue and how to work as part of a team or lead a team. Such skills are very practical and may be developed specifically for specific groups of practitioners, reflecting the particular demands and experiences of different medical specialisms. Within healthcare this body of techniques is often called non-technical skills.

- System-level human factors – Emphasises analytical approaches for managing the human element within the healthcare system in support of activities such as incident investigation, assessment of new procedures, designing equipment, and maintaining a record of how different human-related risks are managed within an organisation. Such approaches are formal, based around processes such as error or risk identification, root cause analyses, and human-centred design. System-level human factors is closely related to systems-engineering and safety governance in organisations.

The insights afforded by this understanding of human factors into the training needs of different staff, of preferred course delivery, and of strategy to develop a human factors capability at a trust level are developed further in this report.

Workstream 1: Review of Human Factors Training Provision
The following points summarise the survey of training providers:

- Three broad categories of human factors training providers were distinguished:
    - Commercial companies
    - Higher education research centres
    - Human factors training capability available internally within the NHS.

- The training delivered in system-level human factors, while it uses many of the same concepts (such as human error) and addresses many of the same problems, is very different from that provided at the person-level. This presents the possibility of confusion, or uncertainty over the training that would be appropriate for a particular requirement.

- The bulk of the human factors training supplied to the NHS is in person-level human factors (synonymous with non-technical skills). This seems to reflect the level of demand within the NHS for these practical skills and the limited understanding of the scope of human factors. Also, such training tends to be delivered in critical care and theatre contexts within acute care .

- Anaesthesia has led the way in incorporating human factors principles and skills into clinical training and clinical practice. Training is routinely provided in high fidelity simulation centres across the UK by a pool of healthcare professionals who have become instructors in Crew Resource Management (CRM).

- The identification of non-technical skills relevant to anaesthetics (ANTS) and surgery (NOTSS) practice has allowed these skills to be explicitly incorporated into current training curriculum.

- Surgical simulation delivers high quality training at relatively high cost. Unlike the other person-level courses reviewed here, which are aimed at all front-line staff, this provision is currently used primarily in surgery.

- Within the commercial companies that supply predominantly person-level human factors training, the courses have similar content, aim to achieve a similar level of training attainment in their attendees and share similar costs and modes of delivery. It is concluded that this lack of variation reflects an established formula for delivering such training.

- It is possible to identify the following trends in the delivery of person-level human factors courses:

- o a move towards splitting the course delivery between a main session and a follow-up session later

- o a move towards delivering training to multidisciplinary teams who routinely work together to deliver care

- o the delivery of training through interactive or digital media

- o steps to introduce some type of assessment

Workstream 2: NHS trust views on human factors training requirements
The following general observations were made about the interviews with NHS staff:

- The staff interviewed were relatively senior, having been selected through their previous experience of Leading Improvement In Patient Safety (LIPS) programme or other courses.

- The human factors training provided in the LIPS programme offers an introductory session. This covers the basic cognitive aspects of human fallibility that form the foundation on which to build both system and person level human factors understanding.

- The human factors training provided in the LIPS programme places a greater emphasis on the system-level than person-level human factors. This seemed to be well suited to the requirements of staff undertaking the training.

- Person-level training provided in the LIPS programme included the creation of a fair or just culture in relation to incident reporting.

- Despite agreeing that human factors concepts would be useful for all staff across the service, participants also identified that the kind of training they had received in LIPS would not be suitable for all staff:

  - o They identified that some staff would require greater depth of understanding, while the majority of staff would require a less detailed, more practical understanding, as their different roles require.

  - o Among the priority areas of human factors for the NHS they identified culture (especially reporting), team working (especially issues relating to deference to authority) and reducing rule violations – the first two of which are more readily addressed through person-level human factors training.

  - o When discussing how human factors training can best be delivered in the NHS, participants expressed a preference for more practical on-the-job training closely related to the work of the staff undertaking the training. This style of delivery is unsuitable for the more theoretical system-level human factors, but applicable to the more practical person-level human factors.

  - o Some participants identified that a beneficial strategy for implementing human factors training within their organisations would involve trained staff training their colleagues. Again, this style of delivery is better suited to the more practical person-level human factors.

- Many participants identified that a programme to raise awareness of human factors and its contribution to patient safety would be necessary before a more extensive human factors training initiative can be undertaken. It was considered particularly important to have acknowledgment and support from the trust executive board to provide leadership for the human factors initiative.

Case studies: NHS trusts' experiences in developing a human factors capability

The experiences of two trusts were investigated:

- University Hospital of Coventry and Warwick NHS Trust in developing a human factors training capability with a commercial training provider

- Queen's Hospital NHS Foundation Trust, Burton-on-Trent with the R^{2}IPS course - a human factors training course developed by senior clinicians within the trust

The following key points are drawn from the case studies:

- Both trusts agree that the burdens of cost and backfilling staff sent for training are justified by the benefits to patient safety and quality, and acknowledged the importance of executive board support in sustaining a human factors capability.

- Both trusts have deployed person-level human factors training and have found it successful in addressing pressing issues in culture - particularly in encouraging discussion and reporting adverse events - and team working, particularly in encouraging authority to be challenged if safety might be threatened.

- Both trusts had initially delivered human factors training in the context of critical care and theatres in an acute setting, but believed that additional benefit could be gained by delivering this training across all clinical specialisms and were developing plans to do so.

- Both trusts have, to a different extent, drawn upon external advice to develop their human factors training programmes. As the courses have matured both have sought to develop (or extend) a training capability within the trust.

Analysis: Drivers, barriers and gaps in human factors training delivery

An analysis of drivers, barriers and gaps in the delivery of human factors training within the NHS is provided in Table 2 on page 26. In this analysis **drivers** are taken to be factors that are promoting human factors training, **barriers** are factors that are constraining the delivery of human factors training and **gaps** are the elements that are missing or under-developed in the mechanisms for delivering human factors training in the NHS. The analysis has been further divided into elements within the NHS (internal factors) and elements relating to the human factors suppliers of all kinds (external factors).

Analysis: Human factors training audience description

An analysis of the human factors proficiency required for different staff groups within the NHS is provided in Figure 5 on page 29 (and shown below). The staff groups have been divided into archetypes or personae, reflecting different safety functions within healthcare to illustrate different human factors training requirements across the service. Figure 6 on page 30 presents a similar analysis for two human factors specialist roles that could be made available, as required, to support trust patient safety initiatives and the development of human factors capability across a trust and /or within health communities.

Analysis: Signposting to human factors training

As part of the work the study team made suggestions about how to structure a signposting resource that can guide NHS staff seeking information about human factors training courses with the intention of procuring a training course to meet a particular training requirement in their trust. An illustration of how a resource might appear to a user is presented in Figure 7 on page 34.

Conclusion: Current human factors training provision in the NHS

This scoping study has found many encouraging indicators of the developing human factors capability within the NHS. The study team identified a number of human factors initiatives developed at a trust level by committed and enthusiastic staff. The human factors courses available to the NHS through both external suppliers and internally from NHS resources are perceived by those that commission them to be of a high standard, well-received by staff and effective in supporting trust safety policies (Section 5). This suggests that such initiatives at a trust level (UHCW and QHFT) and at a national level (LIPS) should continue.

Where gaps and barriers were found in the provision of human factors training, these were, as might be expected, in the availability of resources (staff time, cost), but also in the lack of a human factors strategy at a national level to support human factors capability being developed locally.

Conclusion: Informing the NHS

This study has identified human factors training appropriate for different NHS staff groups within a trust and has identified two additional human factors specialist roles that may be able to support patient safety initiatives.

- **Human factors training:** All staff involved in patient safety require an awareness of human factors that encompasses an understanding of the origins of human fallibility. This appreciation can be applied at a person-level or system-level of human factors and staff working in different roles in the NHS require a different balance of these skills.

- **Availability of human factors training:** Human factors training has tended to be developed in a piecemeal fashion, with individual trusts or interested groups developing capability in response to specific local issues. Non-technical training in the NHS has tended to be developed and delivered within the context of critical care and theatres in acute settings. The term **boundaried** has been adopted in this report to describe these two clinical settings: that is to say, they are differentiated from many other clinical settings through a combination of physical and professional requirements. As areas with high levels of acuity and risk, they may have clearer boundaries and more defined processes than, for example, a general ward or a community mental health team. In these boundaried areas of the NHS, human factors training has so far tended to emphasise person-level human factors rather than system-level. In contrast, it seems that **non-boundaried** settings have almost no exposure to human factors training.

- **Trends in human factors training delivery:** The development of internal human factors training capability within trusts has been driven by the higher costs of commercially supplied training and the increasing use of e-learning. Self-study allows individual members of staff to acquire human factors knowledge at convenient times outside of formal training courses, minimising extended periods of time out of service. To maximise the benefits of face-to-face training, trusts and training providers have found it more effective to spread person-level human factors training over a number of sessions, using the initial sessions to impart knowledge and later follow-up sessions to provide practical advice on implementation and coaching. These follow-up sessions encourage and reinforce behavioural changes in the everyday work of individual staff and teams.

Conclusion: Informing NHS staff

This study has identified a requirement for more information about human factors training to be made more widely available across the NHS. NHS staff interviewed expressed a preference for a single source of information that can be consulted on a webpage.

This study has considered different ways that information about human factors training courses can be consolidated into a single resource. It is recommended that this resource includes an interactive element, if possible, which would allow NHS staff who have worked with different suppliers or attended different courses to give feedback to inform other prospective attendees.

Conclusion: Informing the NHS Institute Safer Care team

This section proposes some priorities for the NHS Institute's Safer Care team, drawn from the conclusions of this study.

- The burden of leading the development of human factors training in the NHS is considerable and should not be borne by a single organisation. The NHS Institute should **continue to work in partnership** with the NPSA, Department of Health (DH) Patient Safety Division, the Health Foundation - Clinical Human Factors Group and other stakeholders to drive change across the NHS. A multi-faceted approach using drivers and incentives at policy, practice and practitioner levels is necessary to embed human factors in healthcare.

- The LIPS programme represents the only training course available in the NHS that covers system-level human factors and delivers explicit training in the origins of human fallibility in the constraints and abilities common to everyone. **The Safer Care team should continue to promote, deliver and develop human factors within the LIPS programme**.

- This study identified that awareness of human factors across the NHS is low. Those involved in human factors training recommended that the first step in wider delivery and application of these skills should be a period of awareness-raising. **The Safer Care team should support this awareness raising** – explaining how human factors can benefit patient safety, reporting the success stories from early adopters and directing those interested to sources of more detailed information.

- NHS staff noted that there was a requirement for a single point of information and guidance about human factors in general and, particularly, in the courses of training that are available. **The Safer Care team should investigate the best ways of addressing this requirement**, possibly through developing the signposting resource discussed in this report.

- This study identified certain areas of the NHS where human factors training is underdeveloped or less available – particularly in unboundaried contexts. **The Safer Care team should investigate how the demands of these working contexts differ from the better understood boundaried contexts**, and the different human factors techniques or strategies required to support work in these contexts.

- The widespread introduction of human factors across the NHS presents considerable organisational challenges. The **Safer Care team should investigate the different training implementation models available for distribution of such skills**, comparing the relative merits of different strategies and drawing upon experience of previous NHS training initiatives (for example, Box 4).

CONTENTS

1.   INTRODUCTION

1.1   Background

1.1.1   Human factors has emerged as a discipline that refers to the interactions between people and technical components in complex systems. The concepts and methods of human factors have been applied extensively in high-risk industries, such as air and rail transport, nuclear process control, defence and chemical industries. Human factors is associated with a maturation of wider system safety management and can make an important contribution to equipment design, safety assurance, system management and incident investigation by allowing the requirements and constraints of the (human) system operators to be formally described and systematically understood.

1.1.2   It is recognised that human factors can provide enormous benefits to patient safety, through the better understanding of human-related clinical tasks and risks and the people element of clinical processes, including cognitive, social and behavioural elements. As part of the Safer Care overall aspiration to eliminate harm to patients in the healthcare system, the NHS Institute is committed to raising awareness of, and capability in, human factors among NHS staff through:

- Identifying areas in which the Safer Care team can add value to human factors understanding within NHS trusts, or areas which require further development of NHS Institute Teaching Faculty.

- Developing a better understanding of how trusts have developed, or want to develop, their human factors capacity and capability.

- Increasing the information available to trusts regarding the range of human factors training currently available, sources of training and the anticipated outcomes of participating in human factors training.

- Designing solutions or products in such a way as to encourage and embed the sustainability of any improvement.

1.1.3   The Safer Care team has already made significant progress in the development and delivery of the Leading Improvement in Patient Safety (LIPS) programme and is preparing to extend the capability for human factors expertise by supporting cost-effective and efficient training and the development of an overall human factors strategy for the NHS.

1.2   Purpose

1.2.1   This document reports the findings from a scoping study into human factors training in the National Health Service (NHS). This study has been undertaken by Human Engineering Limited (HEL) and the NHS Institute for Innovation and Improvement (NHS Institute) Safer Care team.

1.2.2   The aims and scope of the project were described in the proposal document and are summarised below.

1.2.3   The aims of this work were to:

- Describe current human factors provision to the NHS to:
  - i.   Inform trusts who want to develop human factors capability and capacity
  - ii.   Identify gaps where work or training may need to be developed or commissioned

- Describe the views of NHS trusts in relation to human factors training:
    i. What would be the greatest impact in improving patient safety?
    ii. How they currently use human factors training to support patient safety
    iii. Barriers to accessing human factors training
    iv. Ways in which their use of training from a range of providers might be facilitated.

1.2.4   During the course of data collection, a variation to increase the scope of the work was accepted to capture the experiences of NHS trusts that have done significant work to develop human factors capability and capacity. This aimed to investigate the strategic intention for developing human factors capability, the level of capability that has been developed and how this capability has been developed by the trust.

1.3   What Does Human Factors Mean in the NHS?

1.3.1   The term 'human error' may be used in a dismissive way to avoid fully understanding the reasons behind adverse events. The human factors approach begins with an appreciation that humans have particular abilities and constraints in how they act. Human psychology places constraints upon memory, information processing, attention and perception. Human anatomy places constraints upon physical ability, strength, and endurance. Once it is understood that human fallibility arises from these universal human constraints and that these same abilities also underlie human competence and exceptional, heroic performance (Reason, 2009), it is no longer sufficient to dismiss adverse events as the result of incompetence or laziness. Rather, human factors allows these issues to be systematically managed.

1.3.2   In the conversations held with a range of NHS staff and suppliers of human factors training, though, it was clear that some interviewees attached a different meaning to the term human factors than others. Two distinct strands of human factors can be identified in these interviews.

- **Person-level human factors** – Emphasises the skills that allow individuals to apply their medical expertise efficiently, effectively and safely. Such skills include effective communication and decision-making, awareness of the risks of different situations, how to manage stress and fatigue and how to work as part of a team or lead a team. Such skills are very practical and may be developed specifically for particular groups of practitioners, reflecting the particular demands and experiences of different medical specialisms.

- **System-level human factors** – Emphasises analytical approaches for managing the human element within the healthcare system in support of activities such as incident investigation, assessment of new procedures, designing equipment, and maintaining a record of how different human-related risks are managed within an organisation. Such approaches are formal, based around processes such as error or risk identification, root cause analysis and human-centred design. System-level human factors is closely related to systems-engineering and safety governance in organisations.

1.3.3   The distinction between these two complementary strands of human factors in healthcare can be illustrated with some examples of particular clinical errors.

Drug administration errors
1.3.4   In the case of two similar ampoules carrying different drugs, or the same drug at different concentrations, it is possible that perceptual constraints or time pressure on the person administering the drug will result in occasions where he/she selects the wrong ampoule for use (Figure 1):

- Person-level human factors

Aim to address issues relating to the person administering the drug including:

- o That they understand that there is a risk of confusing the two different ampoules (cognitive problems)

- o That they are storing and transporting the ampoules in the correct way

- o That they follow procedures for checking

- o That they feel able to challenge another member of staff who may have handed the ampoule over for administration without being sure it has been checked

- System-level human factors

Aim to address issues relating to the design of the equipment and processes that influence this error hazard:

- o To identify frequent similar errors in records of adverse events to draw attention to a systematic issue

- o To design equipment and product packaging to minimise confusion where such a risk exists

- o To support clinicians in the re-design of procedures to ensure that credible opportunities for error are controlled through checking at the appropriate point

Figure 1 – Similarities between different ampoules may lead to misidentification

Hand-washing

1.3.5 Hand-washing represents an important step in many medical procedures. If this step is omitted there may be adverse consequences. Hand-washing may be omitted for a number of reasons it may be forgotten, or the person may choose to omit the task because he or she regards it as low priority compared to other pressing responsibilities, especially if the facilities for hand-washing are not conveniently available.

- Person-level human factors

Aim to address issues relating to the person required to wash their hands including:

- o That they understand that there is an risk of spreading infection

- That they know the circumstances and procedures under which hand-washing is required

- That they are using an effective technique for washing their hands

- That they can demonstrate leadership to others in role-modelling appropriate behaviour

- That they feel able to challenge another member of staff who may not be washing their hands correctly

- System-level human factors

Aim to address issues relating to the design of the procedures and facilities for hand-washing to ensure that:

- The procedures minimise the additional burden placed upon the staff, so that hand-washing is only specified where it is required

- The recommended hand-washing technique is as efficient as possible

- That the materials and facilities required to support hand-washing are suitably designed and readily available at the locations where staff must wash their hands

1.3.6   This person-system human factors distinction is a conceptual model that has been followed throughout this report. In making this distinction our report is reflecting developments in the academic literature:

- Earlier work in the human contribution to system safety - which has been highly influential across all high-risk industries - has emphasised system-level human factors approaches (for example, Reason, 1990 and 1997).

- More recent work has pointed out the important contribution to safety made by individual agents working in an organisation, particularly in the healthcare sector (for example, Flin et al, 2008; and Reason, 2009). Other authors (for example, Dekker, 2007) have written about the complex interactions between systems and the individuals working within them.

1.3.7   The insights into the training needs of different staff, of preferred course delivery, and of strategy to develop a human factors capability at a trust level afforded by this understanding of human factors are developed further in this report.

2. THE STUDY

2.1 Study Methods

2.1.1 This section briefly describes the methods used in the study. A full description of the methodology including the selection of participants, covering letters, briefing notes and questionnaires submitted and the protocol for the interviews is provided in the project *Interim Deliverable* (HEL, 2009d, section 2). Raw data collected in the study are also presented in this document.

2.1.2 The study was based upon interviews with different stakeholders: human factors training providers, NHS staff receiving human factors training and senior managers within NHS trusts interested in developing a human factors capability. Three sets of interviews were conducted. Figure 2 summarises the data collection activities for this project.
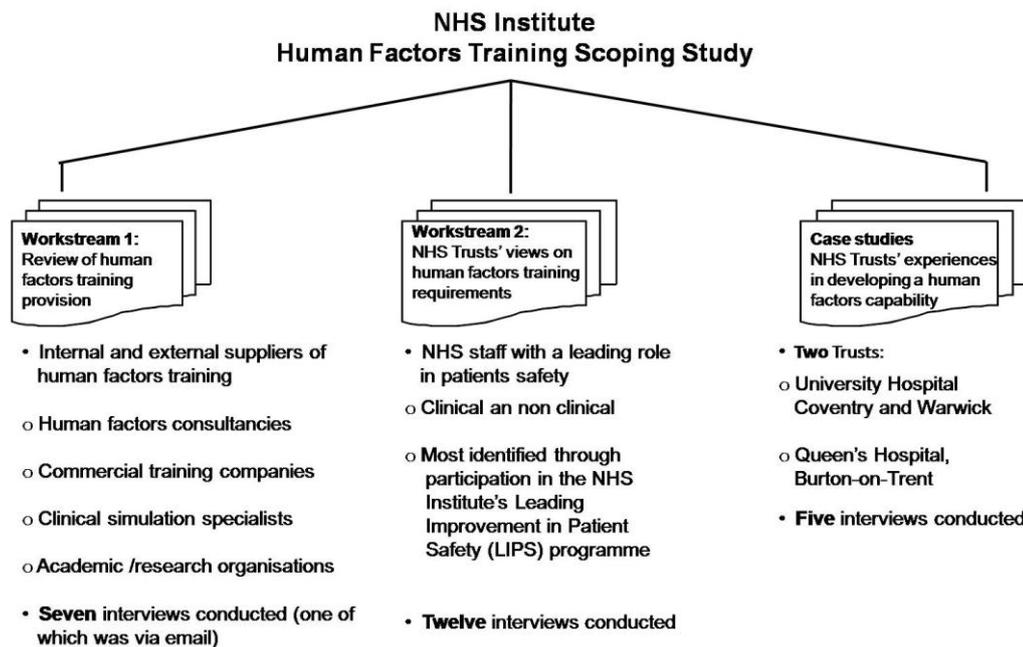

Figure 2 – Summary of data collection activities in the human factors training scoping study

Workstream 1: Review of human factors training provision

2.1.3 Workstream 1 interviews were directed towards organisations that provide human factors training to the NHS, or may supply such services in the future. These organisations, including private companies, higher education research establishments and training faculties within the NHS, were identified by the NHS Institute and Human Engineering Limited, drawing upon their knowledge of the healthcare sector and human factors training. This list of suppliers is presented in Appendix A.

2.1.4 From this list, seven interviews were completed, covering the background of the organisations, the training courses offered, and practical considerations about how a course would be procured and delivered. At the request of the NHS Institute these interviews focused on off-the-shelf training courses that the providers have ready for delivery, rather than the bespoke training services offered by many organisations, reflecting a desire to investigate the maturity of existing human factors courses rather than the ability to develop new material.

Workstream 2: NHS trusts' views on human factors training requirements

2.1.5 Workstream 2 interviews were directed towards members of NHS staff who had participated in the NHS Institute's Leading Improvement in Patient Safety (LIPS) programme, which has a human factors element within the Core Module, or who had participated in the NHIS Institute's Productive Series.

2.1.6   Twelve interviews with NHS staff were completed. These covered: the participant's role in the health service, understanding of human factors, experience of human factors training (as part of LIPS and any other courses), opinions about how human factors training can be best delivered to benefit their organisation (particularly in relation to improving patient safety) and how information about human factors training can be communicated within the NHS.

Case studies: NHS trusts' experiences in developing a human factors capability

2.1.7   An additional data collection exercise was undertaken (under HEL, 2009c) to investigate a number of trusts that have developed their own human factors training capability to a relatively advanced level. The experiences of these trusts feature as case studies within this report. The case studies were based around interviews with different members of staff at the trust who could answer questions on three different aspects of the trust's development of a human factors training capability:

- Strategic – The strategic intent in developing human factors training capability (addressed to senior management or risk governance representatives)

- Delivery – The aim and content of the training programme, how the programme had been developed and the target staff group or groups (addressed to those involved in the development and delivery of the course)

- Capability – The experiences of those who have been trained in the programme, particularly how their understanding of human factors has changed following the course, how the training has changed the way they work and the extent to which they feel they can lead human factors developments within their part of the trust.

2.1.8   Two trusts were investigated: the experiences of University Hospital of Coventry and Warwick (UHCW) in developing a human factors training capability with a commercial training provider and those of Queen's Hospital NHS Foundation Trust (QHFT), Burton-on-Trent with the R^2IPS course, a human factors training course developed by senior clinicians within the trust.

2.2   Sample Size

2.2.1   It was originally intended to collect 15 Workstream 1 interviews, 30 Workstream 2 and three case studies. While it was not possible to collect all these interviews within the period of the investigation (see Box 1), it was considered that collecting more interviews in Workstreams 1 and 2 would not have increased the insight achieved. Greater benefit was gained by shifting from collecting a broad range of views to detailed examination of the case studies, giving a combination of breadth and depth in the data collection.

Box 1: Learning points from the data collection

Despite considerable interest in the aims and intentions of the work, the study team found it hard to find staff available to participate due to the time pressure of their jobs. Those staff who have more control over their time (such as senior managers), and staff away from their day-to-day work (for events such as conferences) were better able to participate.

Where surveys are addressed to busy staff it is recommended that they are conducted following a focussed pilot study to identify the main areas of interest. This would allow a more streamlined set of questions to be used and administered during a short defined period when the member of staff can take time out of their duties. Where large numbers of staff are to be interviewed it is recommended that this is conducted at a dedicated group workshop, or individual interviews scheduled into their working day.

3.   RESULTS: HUMAN FACTORS TRAINING PROVISION

3.1   Review of Human Factors Training Providers

3.1.1   The seven providers interviewed and the courses they offer pertinent to the NHS human factors training requirement are summarised in Appendix B. This section reviews the providers, their courses and their experiences of supplying training to the NHS.

3.1.2   Three broad categories of human factors training providers were distinguished:

- Commercial companies – the largest supplier group, supplying the bulk of specialist human factors training to the NHS (within this group those supplying predominantly person-level human factors training, and those supplying predominantly system-level human factors training have been analysed separately).

- Higher education research centres – making use of research equipment, especially surgical simulation facilities.

- Human factors training capability available internally (for example, the NHS Institute's LIPS programme, or the R^2IPS course available at Queen's Hospital which is featured as a case study in Section 5). This element is described in the case study and is not considered further in this section.

3.1.3   Figure 3 illustrates how different organisations provide person and system-level human factors training to the NHS.
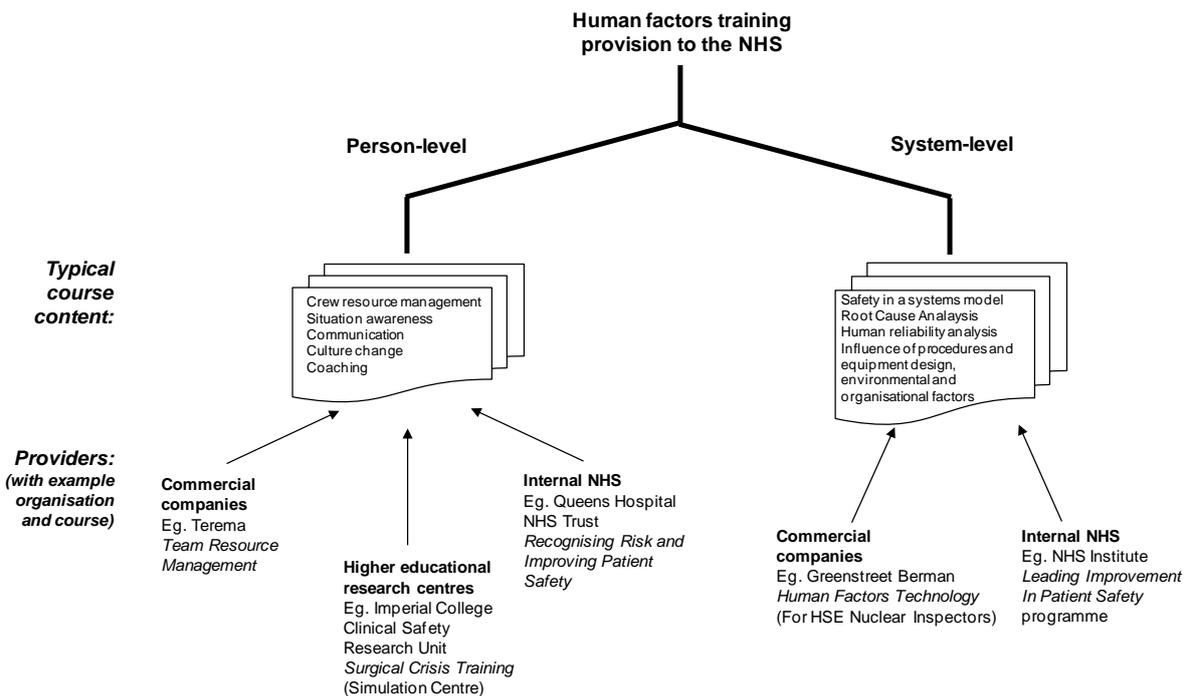

Figure 3 – Summary of different organisations providing person and system-level human factors training to the NHS

3.2 Commercial Companies: Person-level Human Factors Training

3.2.1 There are a large number of commercial companies offering predominantly person-level human factors training to the NHS (with some elements of system- level training provided e.g. RCA) Supplying a similar market, they also share much in background, structure and course content.

3.2.2 The majority of these companies (Atrainability, Global Air Training, LMQ and Terema) have a background in civil aviation, with key staff having experience as serving flight crew or as trainers. The experience of working in safety in such a high profile industry is regarded as an important part of their offering as it provides credibility, an alternative perspective from which safety in healthcare can be considered in a new light and a strong story: *"this has worked for us, and it can work for you".* These organisations tend to be relatively small (between five and ten staff) and develop and deliver their own proprietary training. Often the course will be structured to deliver a main training session, followed days or weeks later by a follow-up session.

3.2.3 Healthcare Team Training (HTT), based in the United States, offers a similar set of courses, but is distinguished in that their training material was developed in conjunction with a large number of bodies (including the US Agency for Healthcare, Department of Defense Military Health System, and Duke University) under a US Department of Defence funded project and by the relatively large capacity (40 training staff) and greater use of computer-based training, allowing some course modules to be delivered online.

Courses
3.2.4 Courses offered by these suppliers are delivered in a classroom environment or alongside technical skill training in surgical centres. The classroom based courses last between one and three days and combine elements of direct training with slides or other materials, practical exercises, discussion and coaching. Costs of the courses vary between £200 to £600 per attendee, with costs principally determined by the course duration and any requirement to hire a venue or provide hospitality.

3.2.5 While all these organisations offer training developed specifically for healthcare, their courses tend to reflect their aviation origins with the emphasis on two particular human factors techniques. Due to their early adoption these two techniques are well-recognised within health service applications:

- **Crew Resource Management (CRM)** - a long-established series of techniques developed in response to airline accidents where ineffective interactions between crew on the flight deck contributed to a failure. CRM provides practical training in teamwork, effective communication, leadership and group problem solving; with an emphasis on valuing the contribution of each team member to overall performance and particularly in encouraging more junior members to challenge more senior members if they feel safety is threatened. This approach has been modified in its particulars in medical application and may carry a different name (for example, Team Resource Management), but has proved very successful, addressing a widespread concern that deference by nurses and junior doctors to consultants and other senior staff has contributed to clinical errors by failing to challenge incorrect instructions.

- **Root Cause Analysis (RCA)** – a general technique for reviewing previous poor performance or safety incidents to identify common mechanisms by which errors have occurred. This approach aims to improve the safety performance of a system by encouraging an organisation to focus on underlying causes of poor performance rather than the apparent features. In a medical human factors training course, RCA is often demonstrated practically by drawing on an example medical error and asking participants to identify the features that contributed to the incident and how they could be controlled to improve the safety of the activity in the future. The RCA will identify both system- and person-level human factors issues, but the process of identifying all these issues as a team exercise is a distinctive feature of the person-level offering.

3.2.6   These suppliers were quick to identify the human factors training requirement in healthcare and have developed long-standing relationships to supply training to various healthcare organisations, including NHS trusts (for example the relationship between University Hospital of Coventry and Warwick and a commercial training provider, which also features as a case study in Section 5). All suppliers identified that they regularly supplied training to acute trusts, some noted infrequent training in primary care trusts, community trusts and general practices and only a single company reported regular experience in mental health trusts.

3.2.7   Healthcare Team Training has not yet supplied the NHS, but has considerable experience in US hospitals, and has representation in the UK, through which their training is offered.

3.3   Commercial companies: System-level Human Factors Training

3.3.1   Greenstreet Berman is one of the few human factors consultancies that was identified as offering system-level human factors training amongst their other services. Such consultancies draw staff from a range of backgrounds including ergonomics, psychology, occupational health and safety management - most of whom have developed their skills through formal academic education. Human factors consultancies provide support to a wide range of industries, employing highly technical human factors expertise to address problems relating to the design, evaluation and management of complex systems.

Courses

3.3.2   Consultancies specialise in bespoke training to match particular client requirements. The training course discussed with Greenstreet Berman was a three day classroom-based course developed for Nuclear Installation Inspectors of the Health and Safety Executive (HSE). Developed as a bespoke training package by the consultancy, it has been retained to be delivered as an off-the-shelf package on an occasional basis to provide specialist training that would not be cost-effective for the HSE to maintain internally. The course costs approximately £8,000 for up to 12 attendees.

3.3.3   Regarded as an intermediate course by the provider this represents a very detailed technical course in comparison to others reviewed in this project. It aims to provide attendees with capability in these formal human factors methods. Two examples of this would be:

- **A systems model of the human contribution to safety** – The systems approach is a theoretical understanding of how interaction between the different human operators, the equipment and the operating procedures mediates the capability of a system. This approach allows an analyst to describe, evaluate and consider the effect of different kinds of failure in a wide range of human tasks. This approach is necessary when supporting a formal safety analysis, for example as part of a major incident investigation, in providing assurance to a regulator for a new or revised operation, or in evaluating the merits of two different operations. However, there is merit in considering the application of this science to support design of equipment, tasks and working environments on a routine basis.

- **Human reliability analysis** – These approaches allow an analyst to formally evaluate human error within a complex activity: describe what can go wrong (for example, using Failure Modes Effects Analysis (FMEA) to identify all the possible human errors in an activity and their consequences), estimate how often this may happen, identify measures that will reduce the propensity for a human to make a particular mistake within a task, or identify means that will encourage error recovery or limit the consequences of error. Again, these methods are detailed and often numerical, but necessary to provide formal assurance.

3.3.4   Like other human factors consultancies, Greenstreet Berman has had some experience of providing training to the NHS at trust level (incident investigation training for University College London Hospital) and would be prepared to provide similar courses again, but have had little interest at this level. Greenstreet Berman has had more experience providing specialist advice to national healthcare institutions, including the National Patient Safety Agency (NPSA), National Institute for Clinical Excellence (NICE) and the Department of Health (DH).

Other suppliers of systems-level human factors training
3.3.5   Note that systems-level human factors training is not only provided by the commercial sector. For example, the Warwick Medical School provides a dedicated course (which was not evaluated in this work), *A Systems Approach to Patient Safety*, as a stand-alone five day course and as a module of the MSc in Medical Leadership. This course covers similar topics in systems-level human factors, including approaches to error management such as FMEA, with examples and practical guidance drawn from application of these methods in healthcare.

3.4   Higher Educational Research Centre: Simulation Training

3.4.1   One of the earliest adaptations of aviation CRM to healthcare, was David Gaba's development of Anaesthesia Crisis Resource Management (ACRM). This simulator-based training is widely available across the USA and the majority of the established high fidelity simulation centres in the UK are involved in delivery of simulation based CRM style courses for anaesthetists. These are either based on the ACRM principle or training using the Anaesthetic Non-technical Skills (ANTS) taxonomy. These CRM principles are commonly incorporated into all aspects of simulator-based training for other disciplines attending courses in these centres. The established simulation centres therefore represent a pool of healthcare professionals who are experienced and trained CRM instructors within the UK

3.4.2   The Clinical Safety Research Unit (CSRU) of Imperial College is an example of a higher educational research centre that provides specialist training alongside its primary research function. The research investment available to the CSRU permitted the development of a sophisticated surgical simulation facility and a variety of high fidelity representations of particular surgical scenarios for research purposes - for example, to develop new procedures. The close relationship with the education of medical students and junior surgeons has led the CSRU facility, like other simulation facilities, to be used to provide serving surgeons with an opportunity to develop their surgical skills. Simulation centre facilities have also been developed within the NHS and certain trusts provide simulation training to their staff and the staff of other trusts.

Courses
3.4.3   The identification of non-technical skills relevant to anaesthetic (ANTS) and surgical (NOTSS) practice has allowed such skills to be explicitly incorporated into current training curricula. An MSc in Patient Safety: A Clinical Human Factors Approach is available from Aberdeen University. Short courses are also routinely available within anaesthesia.

3.4.4   In training whole teams of surgical staff it has become common to deliver training in teamwork and communication skills – often called non-technical skills – alongside the technical surgical skills. The CSRU employs psychologists alongside its surgical training faculty to deliver this training. Other simulation centres may draw upon external suppliers (for example, the company LMQ offers such a course). The facility is provided for between £500 and £1000 for a half day and training staff (members of the faculty) costs would also be incurred. Typically, a surgical team of between four and five staff would receive a half-day training course.

3.4.5   The non-technical skills training covers the same range of skills as CRM-type approaches - teamwork, communication, and leadership - but are delivered in a representative surgical context allowing a team to learn together in a practical way, directly evaluating the effect of

the new behaviours. The ability to model different scenarios allows the simulation centre to provide additional training in crisis management skills.

3.4.6   With trained psychology staff as part of the faculty, the CSRU also offers lecture-based training in surgical decision making, reflecting the practical implementation of the research interests of the staff involved. This short course aims to allow attendees to understand how they might make systematic errors (biases) in making surgical decisions and teaches practical skills to overcome them. It is provided at no charge on an occasional basis through the Royal College of Surgeons.

3.5   Internal NHS Human Factors Training Capability

3.5.1   Queen's Hospital NHS Foundation Trust in Burton-on-Trent, is an example of an NHS trust that has developed a human factors training capability to address a locally recognised requirement.

3.5.2   The course, *Recognising Risk and Improving Patient Safety* (R^{2}IPS) was developed in 2002 by consultants working in Queen's Hospital's critical care department, in association with a training officer from the trust's simulation facility and a former commercial aviation flight safety manager. The R^{2}IPS team aimed to apply the person-level human factors methods being used in aviation to a healthcare setting.

Course
3.5.3   The R^{2}IPS course covers person-level human factors topics with CRM and an RCA technique featured as core components - similar to the courses offered by the commercial companies (section 3.2). The course is aimed at all frontline healthcare staff, including medical students and trainees. Training is delivered either to particular staff groups (for example nursing matrons) or multidisciplinary teams.

3.5.4   The course is based around a film of a patient journey through different stages of hospital care - each stage being used to demonstrate a particular course module - which is then discussed by the facilitator. The course developers felt that illustrating human factors issues by reviewing accidents, often drawn from other industries, did not engage attendees as the context is not familiar and the circumstances that trigger the incident may be exceptional. Instead, they produced the *Mildred* DVD to represent the issues present in typical day-to-day activities of hospital care and, by showing a complete patient journey, to encourage consideration of the whole process of patient care.

3.5.5   The course is regularly delivered at the Queen's Hospital training facility but can also be delivered at a client site. The standard one-day course costs £100 per attendee (£200 at a client site) and includes all course materials. The team recommends a follow-up reflective session some period after training. A two-day train-the-trainer course is also offered, at £380 per attendee, with the first day covering the course content and the second allowing the attendee to participate in a standard course as a facilitator. The team recommend that at least six staff members are trained as trainers to sustain a course in another trust.

3.5.6   The R^{2}IPS team have 20 trainers available, with ten regularly delivering the course internally. The course has been delivered to more than 650 NHS staff members and students, most of whom are employed at Queen's Hospital. The team has also delivered the train-the-trainer course at Chester NHS Acute Trust.

3.6   Availability of Human Factors Training

From the research it is evident that non-technical training in the NHS has tended to be developed and delivered within the context of critical care (anaesthetics and intensivists) and theatres (surgeons and anaesthetists). Critical care and theatres are highly specialised clinical settings characterised by the following: specific geographical location, physical separation/controlled entry, highly specialised equipment, non-transferable professional roles and proscribed hierarchies.

3.6.1   As areas with high levels of acuity and risk, critical care and theatres may have clearer boundaries and more defined processes than, for example, a general ward or a community mental health team. We have used the term **boundaried** to identify these areas with high levels of acuity and risk, where human factors training in the NHS has tended to emphasise person-level human factors over system-level.

We have used the term **non-boundaried** to identify collectively areas which, in contrast to the above, have lower levels of acuity and risk and have less access to human factors training. These non-boundaried areas may include general wards and community health teams, which may be characterised by geographically dispersed teams, interacting loosely and performing a wide range of activities interchangeably and/or in parallel, with relatively low dependence on technical equipment. Laboratories, pharmacy services and community care could also be considered to operate largely in the non-boundaried context.

3.7   Summary

3.7.1   The following general points summarise the survey of training providers:

- The training delivered in system-level human factors, while it uses many of the same concepts (such as human error) and addresses many of the same problems, is very different from that provided at the person-level. This presents the possibility of confusion, or uncertainty over the training that would be appropriate for a particular requirement.

- The bulk of the human factors training supplied to the NHS is in person-level human factors. This seems to reflect the level of demand within the NHS for these practical skills. Also, such training tends to be delivered in critical care and theatre contexts (which may be considered as boundaried working contexts, section 3.6).

- Anaesthesia has led the way in incorporating human factors principles and skills into clinical training and clinical practice. Training is routinely provided in high fidelity simulation centres across the UK by a pool of healthcare professionals who have become instructors in Crew Resource Management.

- The identification of non-technical skills relevant to anaesthetics (ANTS) and surgery (NOTSS) practice has allowed these skills to be explicitly incorporated into current training curriculum.

- Surgical simulation delivers high quality training at relatively high cost. Unlike the other person-level courses reviewed here, which are aimed at all front-line staff, surgical simulation training is of benefit only within the surgical specialism.

- Within the commercial companies that supply person-level human factors training, the courses offered have similar content, aim to achieve a similar level of training attainment in their attendees and share similar costs and modes of delivery. It is concluded that this relative lack of variation reflects an established formula for delivering such training.

- It is possible to identify the following trends in the delivery of person-level human factors courses:

  o A move towards splitting the course delivery between a main session and a follow-up session days or weeks later, to allow discussion of putting the principles into practice and an opportunity to coach attendees in how to use their developing skills. This reflects the importance of fostering behavioural change in these courses, in addition to the delivery of the factual component.

  o A move towards delivering this form of training to multidisciplinary teams of staff who routinely work together to deliver care. This allows the team to respond collectively to the training and consider the way that their behaviour as a group can change to improve safety.

o Some suppliers are exploring ways of delivering training through interactive or digital media (e-learning)[1] to supplement their traditional classroom-based training. This is useful as it introduces some variety and autonomy into the learning experience and allows the factual component of a course to be delivered (at least in part) without requiring the trainer, so that more of the training session can be spent on the behavioural change and coaching of attendees.

> **Box 2: Specialist human factors training courses**
>
> Of the human factors training developed within the NHS for internal use, the study team identified a particularly innovative example in the Improving Patient Safety presentation created to support the Your Record, Your Care presentation. This initiative, for the NHS Care Records Service , was provided by Mr Ian Scott of NHS Connecting For Health, and Prof. James Reason, a professor in human factors.
> e records. Unlike traditional courses delivering person-level human factors to front-line staff, this presentation gave a simple introduction to system-level human factors encouraging attendees to consider the record-keeping as part of a broader healthcare system and understand how errors in record keeping and delivery of information can cause harm to patients. The presentation stressed how careful design of records systems and record keeping processes can control these risks.

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[1] The Foresight training package produced by the NPSA is an example of e-learning for HF

4. RESULTS: THE HUMAN FACTORS TRAINING REQUIREMENT

4.1 NHS Trusts' Views on Human Factors Training Requirements

4.1.1 The twelve NHS staff interviewed[2] each provided a particular insight into the way human factors training is delivered and put to use in the NHS. This section summarises the opinions expressed in those interviews, using interviewees' own words as far as possible, on the following areas:

- Experience of human factors training

- Opinions about how human factors training can improve patient safety in the NHS – and priorities

- How information about human factors training can be communicated within the NHS

4.1.2 Where a clear view was expressed by all interviewees (or by a particular group), this has been identified, but more often a diversity of opinions was expressed.

4.2 Backgrounds of Staff Interviewed

4.2.1 Staff were selected for interview on the basis that they had previously attended training provided by the NHS Institute, either in the LIPS programme, or the Productive Series.

4.2.2 These programmes are provided only to more senior staff so the staff interviewed all held positions of responsibility within their respective trusts, including: medical director, assistant director of patient quality and safety, lead nurse - patient safety and lead clinician in clinical risk. Most participants had a background in either formal safety management or were clinicians who had crossed over into the management and governance sector:

> *"I was a full time consultant surgeon for 20 years; I then switched from clinician to management within the trust."* - Medical Director

4.2.3 Due to the senior positions held by interviewed participants within their trusts, each held a responsibility of leadership in particular teams, ranging from:

- Managing clinical teams:

  "I provide professional leadership to the nursing team; including training education on patient safety." - Lead Nurse – Patient Safety

- Management of trust programmes and initiatives:

  "I am responsible for patient safety and clinical risk management over the trust." - Lead Clinician in Clinical Risk

- Management of hospital sectors:

  "I am the professional manager of consultants within the trust; I am not their line manager but rather the next step above." - Medical Director

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[2] This scoping study was constrained in the number of interviews that could be conducted by time and availability of staff, see section 2.2 and Box 1.

4.3 Participant Human Factors Training

4.3.1   Eleven out of the 12 staff interviewed had attended the LIPS programme which has a human factors element within the Core Module. When compared with the courses provided by commercial companies, the LIPS course places more emphasis on the system-level human factors, covering elements such as: the systems approach, the influence of the design of procedures and equipment, factors in the work environment, and how internal pressures can cause systems to migrate towards the limits of safety. The attendees were introduced to particular strategies and tools to identify the causes of error and rule violations and introduce changes to the procedure, equipment or working environment to minimise sources of error and improve compliance.

4.3.2   The participant who had not attended LIPS training - a ward senior sister - had received Productive Ward training. She reported that she had not heard of human factors before, but recognises human factors-related terms 'human error' and 'rule violation'. She had found the Releasing Time to Care module particularly useful and now promotes its application in her work. She described her understanding of how time pressure increases the propensity for errors as an example of human factors.

4.4 Experience of Human Factors Training

Staff awareness of human factors

4.4.1   Many participants had heard of human factors before they had attended LIPS training, generally in relation to safety. One participant had received extensive human factors training through their Masters Degree training in risk management and another had previously attended training by a commercial training provider.

> "*I was intellectually aware of it and some basic principles and application, for example human factors in planes. But I was basically a human factors virgin and never really related it to medicine.*"
> – Medical Director

4.4.2   Following training:

- All participants were able describe human factors, generally emphasising the system-level human factors:

  "*Human beings introduce error into systems either inadvertently or knowingly.*" – Consultant Haematologist

  "*Designing systems and processes to mitigate human error.*"

  – Associate Director Quality and Improvement

- All participants were able to identify examples of the application of human factors in their own working experience:

  "*Nurses now wear tabards with 'do not disturb' written on them when they are doing a drugs round so that people don't distract them from this important process.*" - Service Improvement Manager

  "*We found that completed 'early warning charts' for patients had not been communicated properly... so there were prescribing errors. We brought in a simpler, colour coded chart to simplify the process.*" - Assistant Director Patient Quality and Safety

- All participants could identify techniques that they had been taught during human factors awareness training, including Just Culture and Incident Decision Tree, although opinions varied on the merits of the different techniques:

  "*......the Incident Decision Tree isn't as robust, so we only use it occasionally here.*" – Lead Clinician in Clinical Risk

4.4.3   Some participants had sought further information on human factors, and others had attended further training, including that given by commercial training providers:

> *"I try to attend conferences or sessions where certain topics are covered, for instance I went to see Ken Catchpole's Pit Stop theory; speaking out if you see a problem."* – Director of Safety

> *"Another course involving human factors has just come up although I didn't go as I feel I'm not going to learn anything new after I read the content."* - Director of Nursing & Patient Safety / Infection Prevention and Control

Experience of LIPS programme

4.4.4   All participants agreed that the LIPS programme was beneficial and identified the following points:

- The benefit of delivering practical tools:

  > *"They introduced tools such as ..... SBAR, such tools could be very beneficial and I also think it highlighted the importance of patient stories."* – Director of Nursing & Patient Safety / Infection Prevention and Control

- The importance of having executive board level staff participate in some of the course to ensure lessons are learned at an organisational level;

  > *"It involves other people in the trust at all levels, not just the safety and quality team. As a result, everyone will be involved. So when it comes to patient safety and risk management it means I don't have to bang my hands on the table and kick up a fuss as the points will be communicated to everyone."* - Assistant Director Patient Quality and Safety

4.4.5   One participant identified the limitations of what could be achieved in the training:

> *"Where I sit as a senior executive I saw [the human factors module of the LIPS course] as the real nuts and bolts of patient safety, it described the macro aspects of the culture which is good. But as a senior executive.... I felt there was a great deal of wasted time on 'this is how you do it'...What I wanted to know in philosophical terms is how we could take this forward in the organisation."* - Medical Director

4.5   How Human Factors Training can Improve Patient Safety

Benefits of human factors in patient safety

4.5.1   All participants identified that developing a human factors capability within their trust was an important, even necessary, part of improving patient safety:

> *"...Because it will help us understand why things aren't working as they should do."* – Lead Nurse – Patient Safety

Priority Human Factors topics for improving patient safety

4.5.2   Participants identified the following as 'priority areas' to address:

- Identifying problems prospectively:
  > *"We must catch problems at the top of the cliff and not at the bottom."* - Consultant in Critical Care

- Standardisation:
  "Standardising equipment is key." - Director of Nursing & Patient Safety / Infection Prevention and Control

- Changing the culture:
  "Yes we need to change the culture of the organisation. That a mistake does not equal a bad person....rather that the systems and processes need to be looked into." – Assistant Director Patient Quality and Safety

- Effective team-working:
  "Team-working! Because we need more of it!" - Lead Clinician in Clinical Risk

  "People should feel empowered enough to stop a process and voice their concern." - Director of Nursing & Patient Safety / Infection Prevention and Control

- Rule violation:
  "Irresponsible contradictions that we have in our organisation. The tolerance of ... people who are accustomed to cutting corners. Even though it is a mandatory norm, people don't believe they have to do it." - Medical Director

How best to deliver human factors training

4.5.3 Various views were expressed about the best way to deliver training, but the constraints upon training, especially for front-line staff, were clear:

"Time out of work is our biggest problem and finding such time to organise and deliver the training." - Director of Safety

4.5.4 The following issues were raised by the participants in relation to the best way to deliver training:

- Using train-the trainer courses to train key staff to roll out training amongst their colleagues;

  "The cost most of all, and time out of work... leads me to believe train the trainer would be the best option to arrange local training at convenient times." – Deputy Head of Nursing

- Human factors training should be integrated into established training and initiatives;

  "We have current structures that support our training programmes. With training you need to identify where 'it lies' and how important it is – if it is mandatory and is it really as important as clinical training?" - Senior Sister

- Recognition that different staff would require human factors training at different levels and content;

  "I take the approach that two methods should be used; spread the information thin and wide for all to see – this is good; but also investment is needed in intense training in key areas, we need to approach both ways." - Medical Director

  "To undertake 'on-the-job' training is very effective in training staff and engaging them. But I think at a higher level (more senior roles) more technical training is needed." - Director of Safety

Priorities for developing a human factors capability in trusts

4.5.5 In addition to explaining how human factors training can be most effectively delivered, participants were also asked about the other activities that would be required to enable a human factors capability to be developed within their trust.

4.5.6 Some emphasised the importance of sponsorship of human factors at a senior level:

> *"If I'm completely honest the senior executives in the organisation
> need to understand the benefit of human factors and demonstrate it
> themselves; it needs to start at the top and work down."*
> - Consultant Haematologist

4.5.7   Others believed that raising awareness across the whole organisation would be necessary:

> *"People need to believe it will make a difference."* – Lead Nurse
> Patient Safety

> *"Building the will in the organisation to help with the change."*
> – Director of Safety

4.5.8   Other participants, while noting these points, also identified that additional management frameworks and structures would be required to support the move towards full integration of human factors into the NHS:

> *"I'm not sure training would be the first thing we would talk
> about....other factors should be considered first. So before training
> comes: fitting to the culture, structural considerations,
> communications to senior managers, etc."* - Deputy Medical
> Director – Patient Safety

4.6   How to Communicate Information about Human Factors Training

Signposting to training
4.6.1   There was a consensus from all participants that effective signposting to human factors training would be needed to support future initiatives, as currently information about human factors training is too diffuse and difficult to locate. There was a preference for online delivery and some means of evaluating the quality of the different training offerings:

> *"On the NHS Institute website with instruction and guidance, also e-
> mail notification would be helpful."* - Lead Nurse Patient Safety

> *"Via the trust intranet is probably best. I get seven or eight courses
> arrive in my inbox every day."* - Director of Nursing & Patient Safety
> / Infection Prevention and Control

> *"Personally, I'd like to click on the NPSA website and be directed to
> human factors training with an explanation of what you get... but
> people need to be directed and informed how good courses are... I
> want to find training, but I don't want to have to spend two days
> searching or deciding upon it."* - Director of Safety

4.6.2   Many participants noted that it would be useful to package other human factors-related material alongside such a resource:

> *"We need a proper 'sales outlet', especially for e-learning, free of
> charge, and for books and other resources."* - Medical Director

4.7   Summary

4.7.1   The following general observations were made about the interviews with the NHS staff:

- The staff interviewed were relatively senior, having been selected through their previous experience of LIPS or other courses.

- The human factors training provided in the LIPS programme offers an introduction to the basic cognitive aspects of human fallibility that forms the foundation for both system and person level human factors understanding.

- The human factors training provided in the LIPS programme emphasises the system-level human factors – this seemed to be well suited to the requirements of the staff undertaking the training, who demonstrated good understanding of system-level human factors and readily described the application of human factors principles and tools at the level of the whole system, changing processes, equipment and workspaces to better support the activities of their colleagues. Person-level training provided in the LIPS programme included the creation of a fair or just culture in relation to incident reporting.

- Despite agreeing that human factors concepts would be useful for all staff across the service, participants also identified that the kind of training they had received in LIPS would not be suitable for all staff:

  o They identified that some staff would require greater depth of understanding, while the majority of staff would require a less detailed, more practical understanding, to suit their different roles

  o Among the priority areas of human factors for the NHS they identified culture (especially reporting), team working (especially issues relating to deference to authority) and reducing rule violations – these issues are more readily addressed through person-level human factors

  o When discussing how human factors training can best be delivered in the NHS, participants expressed a preference for more practical on-the-job training that is closely related to the work of staff undertaking the training. This style of delivery is unsuitable for the more theoretical system-level human factors, but more applicable to the more practical person-level human factors

  o Some participants identified that a beneficial implementation strategy would involve trained staff training their colleagues. Again this style of delivery is better suited to the more practical person-level human factors

- Many participants identified that a programme to raise-awareness of human factors and its contribution to patient safety would be necessary in their trust before a more extensive human factors training initiative could be undertaken. It was considered particularly important to have that acknowledgment and support from the trust executive board, to provide leadership for the human factors initiative.

Box 3: How person-level and system-level human factors work together

In this report a distinction is made between person-level and system-level human factors because they support patient safety in different ways. They represent different but overlapping skills sets, some of which are more applicable to different staff groups and levels of responsibility. They are complementary, and both are necessary to fully benefit from the human factors approach.

One of the participants in this section was familiar with the work of Dr Ken Catchpole at the Quality, Reliability, Safety & Teamwork Unit, a research team within the Department of Surgery at Oxford University. Dr Catchpole's research interests in healthcare human factors encompass both the system-level - such as equipment design - and also the formal design and evaluation of person-level approaches. From his observations of surgical procedures, patient hand-overs, and ward drug rounds he has been able to identify the contribution to safety of person-level non-technical skills of the staff involved . Dr Catchpole has developed formal approaches to measuring the effectiveness of non-technical skills training in surgical teams and has adapted procedures from other industries (including Formula 1 motorsport, the pitstop handover model) to address particular issues identified through system-level evaluation of observations and historical incident records.

5. CASE STUDIES: DEVELOPING A HUMAN FACTORS CAPABILITY

5.1 The Case Studies

5.1.1 This section compares the experiences of two trusts developing their capability and capacity for human factors. The different approaches adopted by the trusts are first described and then compared, focusing on the strategic intentions, training delivery, capability developed, and lessons learned.

5.2 University Hospital of Coventry and Warwick NHS Trust (UHCW)

5.2.1 The study team conducted detailed interviews with the Director of Governance, who had played a prominent role in advocating and arranging human factors training within the trust, and maintained the relationship with the commercial training provider; and a consultant in critical care medicine, who had received the human factors training and acted as a human factors champion within the trust.

Experience of developing a human factors training capability

5.2.2 UHCW identified a requirement for human factors training in 2001 and undertook an extensive programme of human factors training delivered by a commercial training provider between 2002 and 2005. It followed a Department of Health Review in 2001/2 that criticised clinical governance in the trust. The training was well received and the programme was considered to be meeting its strategic objectives.

5.2.3 At the end of 2005 the trust curtailed the training programme to focus on other internal developments and because the financial burden was high. The trust maintained a relationship with the commercial training provider during this period, running the course occasionally to address particular requirements.

5.2.4 The trust now has a strategy of developing a sustainable human factors training capability within the trust and is planning to commission the external provider to deliver a series of train-the-trainer courses, so that trust staff are trained to deliver the human factors course. These staff will then continue to deliver the course in the future in a cost effective way.

5.3 Queen's Hospital NHS Foundation Trust, Burton-on-Trent (QHFT)

5.3.1 The study team conducted detailed interviews with a clinical risk manager, who had been involved in developing the training course and representing the course to the executive board; one of the consultants in critical care medicine (a senior member of the team that led the development and delivery of the course); and a matron in intensive care who had received the human factors training. The study team also held a brief discussion of the trust's strategy with the Medical Director.

Experience of developing a human factors training capability

5.3.2 The *Recognising Risk and Improving Patient Safety* (R^2IPS) programme was developed in 2002 by consultants working in QHFT's critical care department in association with a training officer from the trust's simulation facility and a former commercial aviation flight safety manager. The development, content and delivery of the R^2IPS course are reviewed in detail in section 3.5.

5.3.3 The QHFT experience has different origins to UHCW's in that the requirement for such a course was first identified by clinicians, who subsequently developed the course. The importance of human factors training has only been recognised by more senior management relatively recently, after a long period of internal promotion and discussion by representatives of R^2IPS. With the executive board supporting the R^2IPS programme, the trust is currently developing a strategy for wider deployment.

5.3.4   In the brief discussion with the Medical Director the study team asked how such a great training burden could be supported. The Medical Director suggested that similar initiatives had been undertaken in the NHS and identified the experience in disseminating Acute Life Support (ALS) skills as an example (see Box 4).

5.4   Comparison of Experiences

5.4.1   Table 1 presents a comparison of the experiences of UHCW and QHFT in the development of a human factors training capability.

5.5   Summary

5.5.1   The following key points are drawn from the case studies:

- Both trusts agree that the burdens of cost and backfilling staff sent for training are justified by the benefits to patient safety and quality and acknowledged the importance of executive board support in sustaining a human factors capability.

- Both trusts have deployed person-level human factors training and have found it successful in addressing their pressing issues - in culture, particularly in encouraging discussion and reporting adverse events - and team working, particularly in encouraging authority to be challenged if safety might be threatened.

- Both trusts had initially delivered their human factors training in the context of acute and critical care and theatres, but believed that additional benefit could be gained by delivering this training across all clinical specialisms and were developing plans to do so.

- Both trusts have, to a different extent, drawn upon external advice to develop their human factors training programmes. As the courses have matured both have sought to develop (or extend) a training capability within the trust.

Box 4: Acute Life Support Skills (ALS) – a model for delivering knowledge in the NHS

ALS is set of techniques developed to resuscitate and stabilise a patient. In the UK a voluntary body of clinicians, the Resuscitation Council, was established to promote the skills, develop a training course and certify those who had completed training. Within each trust particular staff were trained to act as trainers and deliver the ALS course within their own organisation. ALS courses are now widely available and run on a frequent basis in most trusts and all staff seeking to acquire such skills can apply and have their qualification recognised.

The NHS experience of ALS training is pertinent to this study as it offers one possible model for implementing training in a specialist skill set across a large number of NHS staff in a cost-effective and efficient manner. This is only one example of such a model and other implementation strategies should be explored in future work.

Table 1 – Comparison of the experiences of developing a human factors training capability by two NHS Trusts

Aspect	University Hospital Coventry and Warwick NHS Trust	Queen's Hospital NHS Foundation Trust	Comparison of experiences
Human factors strategy	Identified requirement for support following a Department of Health Review in 2001/2 that criticised clinical governance in the trust, particularly in a breakdown of relations in senior clinicians and governance staff and poor patient safety and risk assessment practices. Human factors training supplied by a commercial provider was selected as a central plank of the recovery strategy to address issues over risk awareness, communication, leadership and to encourage support for incident reporting initiatives. After a period of intensive training between 2002 and 2005, human factors training was curtailed - partly due to the high cost and partly due to the disruption introduced by other changes (moving the hospital to a new site in late 2006). Training now due to restart, but with greater emphasis on train-the-trainer courses to allow trust staff to deliver human factors training.	In the last 18 months R²IPS has won the enthusiastic support of trust executive board after many discussions with the Chief Executive and Medical Director. The board is particularly interested in the ability to address a failure to challenge in relationships between senior and junior staff members. The trust's human factors strategy is at an early stage. Systematic implementation of the R²IPS course is planned with the future aim of delivering this course widely to all staff who would benefit from it. The Medical Director suggested that a beneficial strategy for the wider implementation of R²IPS (and other human factors training) would be that used in the promotion of Acute Life Support (ALS) skills through an independent national organisation made of clinicians (the Resuscitation Council (UK).	The development of human factors training has been strategy-led at UHCW, with training commissioned in response to a requirement identified at a board level, and solution-led at QHFT, where staff at a clinical level developed a solution to a short-coming they had identified. UHCW's strategic commitment permitted considerable investment to be made in human factors, but this level of investment has been difficult to maintain and the trust is changing strategy to develop a more sustainable internal human factors training capability. QHFT's experience has demonstrated the commitment and willingness of clinical staff to incorporate human factors into healthcare practice. The R²IPS course has been applied with success at QHFT, and now seeks the support of senior management to extend and formalise the training within the trust. Both UHCW and QHFT expressed frustration at the slow pace of development of healthcare human factors at a national level. It was felt that national institutions such as the DH, NPSA and NHS Institute could prepare the NHS for the adoption of human factors by raising awareness, put human factors on the agenda of executive boards, and save other trusts much time and effort by making their experiences more widely available.

Aspect	University Hospital Coventry and Warwick NHS Trust	Queen's Hospital NHS Foundation Trust	Comparison of experiences
Human factors training delivery	Course delivers person-level human factors training: Team Resource Management, situational awareness, communications, personality and behaviour, feedback, risk management and leadership and motivation. Delivered by external training provider staff in two day training session, based on lecture slides and workshops, supported by training packs, with a one or two day follow-up session to allow experiences to be shared and coaching provided. Course developed by the commercial training provider during period 2002-5, based on their previous experience of aviation flight safety management, in close association with UHCW to make the course suitable for the healthcare context. The company now supply this training to a wide range of different NHS trusts.	Course delivers person-level human factors training: situational awareness, communication, leadership, team working and empowerment. Delivered by Queen's Hospital's R²IPS team in a one day training session, based on a patient journey DVD ('Mildred') and workshops, supported by a training workbook, with an optional one day follow-up session to allow experiences to be shared and coaching provided. Course developed in 2002 by members of the R²IPS team - practising clinical staff with an interest in using human factors techniques developed in the aviation industry to improve safety in healthcare. Initial course development given financial support by the NPSA. R^2IPS team has found it difficult to promote the adoption of their training outside of their trust.	Very similar courses - in their person-level content, the mode of delivery and the follow-up session. The shorter course and use of the patient journey DVD as a substantial component of the internally developed R²IPS training may reflect the practical constraints upon such courses - limited contact time with members of staff and a requirement to deliver content efficiently. As the R²IPS course is managed by a staff team within QHFT the trust can exercise control over content, delivery and resourcing of trainers. UHCW has developed a collaborative relationship with an external training supplier.
Human factors capability developed	Trust very satisfied with training outcomes - noting improvements in team relations and willingness to report adverse events. Has found it particularly beneficial to train staff in their multi-disciplinary teams. Approximately 700 to 800 staff currently trained in the basic TRM course. Majority of these have been clinical staff, notably surgical teams. Presently have no capability to deliver such training internally.	Training has been enthusiastically received by staff. Has also found it particularly beneficial to train staff in their multi-disciplinary teams. Have provided training to more than 650 NHS staff, the majority of whom have been staff and medical students within Queen's Hospital Foundation Trust, where the course is run approximately 20 times a year. Has also developed an internal training capability of 20 trainers, with ten regularly delivering the course internally.	Both hospitals have succeeded in training a large number of NHS staff in a similar period, focusing on front-line clinical roles, especially the surgical teams which can be more readily released for training than general ward staff. UHCW has tended to train more senior and more permanent staff to retain the skills in the trust. QHFT has been more willing to train medical students and clinical trainees as part of their curriculum. Both have trained members of the executive board to allow understanding and encourage senior support. QHFT has developed an internal training capability, and also UHCW seeks to develop such an internal capability in the near future.

Aspect	University Hospital Coventry and Warwick NHS Trust	Queen's Hospital NHS Foundation Trust	Comparison of experiences
Lessons learned	Importance of planning a sustainable programme of development. Recommends using external training providers to develop an internal training resource, so that trust staff trainers can conduct follow-up training, and eventually deliver the courses themselves.	The benefits of training in teams, and the importance of sponsorship at the executive board level to develop a mature human factors training programme across the whole trust. Also recommended setting realistic expectations for what could be achieved with human factors training to avoid misunderstanding.	Both trusts agree that the burdens of cost and backfilling staff sent for training are justified by the benefits to patient safety and quality and acknowledged the importance of executive board support in sustaining a human factors capability. Both trusts have deployed person-level human factors training, and have found it successful in addressing their pressing issues: in culture; particularly in encouraging discussion and reporting adverse events, and team working; particularly in encouraging authority to be challenged if safety might be threatened. Both trusts have, to a different extent, drawn upon external advice to develop their human factors training programmes. As the courses have matured both have sought to develop (or extend) an internal training capability within the trust. As QHFT has been able to draw upon an internal training resource from the beginning this trust has been able to develop a similar level of human factors capability to UHCW for a lower cost.

6. ANALYSIS

6.1 Overview

6.1.1 This section draws together the findings from workstreams 1 and 2 together with the case studies to produce an analysis of the drivers and barriers to human factors training in the NHS, a description of the human factors training requirements of different staff groups, and a gap analysis identifying where features necessary to meet the NHS human factors training requirements are absent.

6.1.2 This section also presents a set of proposed requirements for a signposting resource to inform NHS staff about the different human factors training courses available, with an illustrative example of how such a resource might appear to a user.

6.2 Drivers, Barriers and Gaps in Human Factors Training Delivery

6.2.1 Table 2 presents the analysis of drivers, barriers and gaps in the delivery of human factors training within the NHS.

6.2.2 In this analysis **drivers** are taken to be factors that are promoting human factors training, **barriers** are factors that are constraining the delivery of human factors training and **gaps** are the elements that are missing or under-developed in the mechanisms for delivering human factors training in the NHS.

6.2.3 The analysis has been further divided into factors within the NHS (internal factors) and factors relating to the human factors suppliers of all kinds (external factors).

Table 2 – Analysis of drivers and barriers to the delivery of human factors training within the NHS

	Drivers (Promoting factors)	Barriers (Constraining factors)	Gaps (Under-developed elements)
Within the NHS **(Internal factors)**	**Requirement in patient safety initiatives** to address issues relating to human factors: culture, communication, team working, handovers and adverse event reporting behaviour. **Formal safety management approaches require that human factors are considered** in the investigation of adverse events, in the assessment of new or revised procedures and equipment, and that risks relating to human factors are identified and monitored. **Growing interest** in healthcare human factors by clinicians, human factors practitioners, safety researchers and patient safety campaigners.	**Cost** of developing or procuring training. **Difficulty releasing staff for training** (and difficulty backfilling their posts). This constraint applies more to general ward staff than surgical staff. **Difficulty sustaining human factors training**. Staff who have received training often cannot be made available for follow-up courses. In addition, periodic refresher training presents a great financial and organisational burden - restricting the ability of training to be converted into behavioural/cultural changes. **Lack of a national strategy for human factors** – means that strategy must be developed at a local level, so that development of a human factors capability is fragmented and difficult to sustain as a priority when other pressures must be taken into account.	**Awareness of human factors is limited at all levels and disciplines**. Consequently, human factors is not a priority at senior management level, and regarded by front-line staff as a distraction from care delivery. **Little guidance is available** on the different aspects of human factors that can support safety in healthcare, although the recent Patient Safety First report: *How To Guide to Implementing Human Factors in Healthcare* (NHS, 2009), has addressed this point, and the recent Parliamentary Select Committee report is likely to to bring human factors to the attention of policy-makers. **No structure or internal curriculum exists** to guide the minimum requirements of a human factors course. Consequently, it is very difficult to compare training courses or recognise a particular level of attainment achieved by an individual staff member.

	Drivers (Promoting factors)	Barriers (Constraining factors)	Gaps (Under-developed elements)
Training Suppliers **(External factors)**	**Relatively mature training courses are available** within some parts of the NHS and additional capacity is available through external commercial suppliers, covering a broad range of human factors - both person and system-level. However, these courses are only available in certain parts of the NHS and predominantly only available for person-level human factors. **Increasing interest in human factors shown by the NHS**. Commercial suppliers report a general increase in demand for their courses and internal suppliers and simulation centres are encouraged that non-technical skills and team-working skills are increasingly forming part of a training strategy at a trust and national level (for example human factors training was recommended in the Chief Medical Officer's Annual Report, p53 of DH, 2009).	**Difficulty converting interest in human factors into agreement to supply training** - progress can be blocked by key decision makers or due to funding constraints and difficulty releasing staff and can take a long time for trusts to make arrangements for receiving the training. **Lack of a strategy for human factors training in the NHS makes future demand difficult to judge**. Commercial providers with established relationships to provide training to trusts have to manage great uncertainty in how much training they can expect to supply in the future. Internal providers are frustrated by difficulty in promoting their courses to other trusts. **Capacity for delivering high volume of human factors training is constrained** by the relatively small number of trainers available, but is adequate for current demand. Plans to increase the amount of human factors training delivered would require more trainers to become available. The volume of surgical simulation training is additionally limited by the requirement for specialist training equipment.	Person-level human factors courses have tended to be developed in the context of acute and critical care and surgery. While these courses have also been delivered successfully to front-line staff in other areas **there has been relatively little opportunity to identify additional person-level techniques that would be appropriate in different healthcare contexts**. There appear to be **no courses available to deliver more detailed level of instruction in system-level human factors** tailored for a healthcare context beyond the awareness/application level provided through the LIPS programme.

6.3 Human Factors Training Audience Description (Conceptual Design)

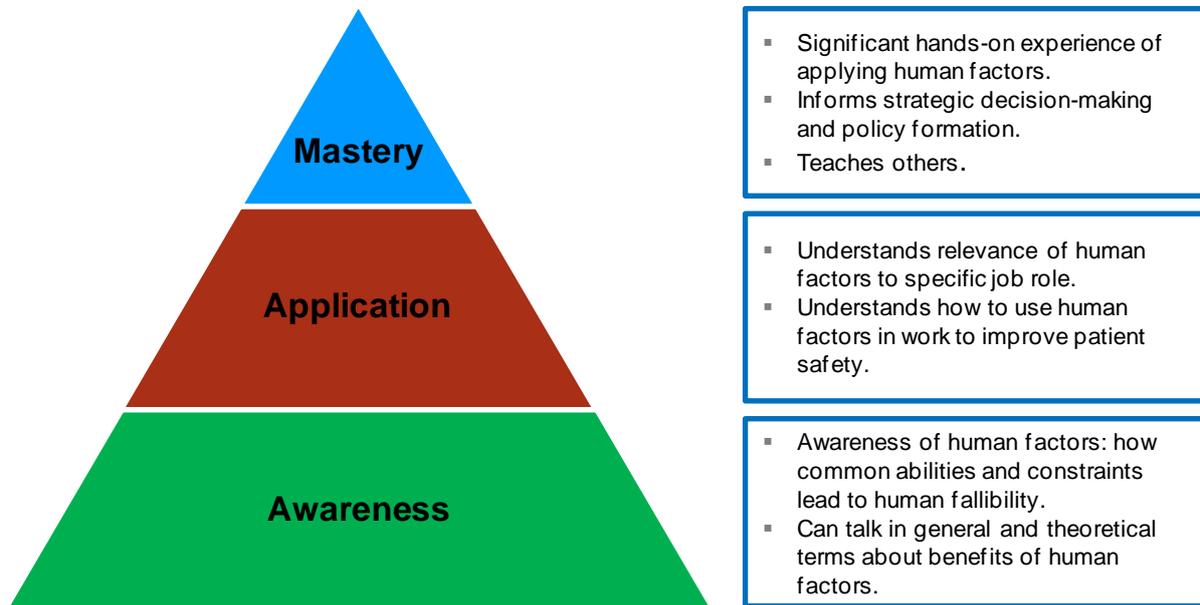6.3.1 Figure 4 presents a model of different levels of human factors proficiency.

Figure 4 –Model of different levels of human factors proficiency

6.3.2 This model was used to support an analysis of the human factors proficiency required for different staff groups within the NHS. Figure 5 presents this analysis as a conceptual design.

6.3.3 Figure 6 presents a similar conceptual design for two human factors specialist roles that could be made available, as required, to support trust patient safety initiatives and the development of human factors capability across the trust.

6.3.4 The staff groups have been divided into archetypes or personae, reflecting different safety functions within healthcare. As the NHS is composed of a complex range of staff roles the personae should be considered a necessary abstraction to illustrate different human factors requirements rather than a perfect description.

Figure 5 – Training Audience Conceptual Design: Description of possible Human Factors Training Requirements for Different NHS Staff Groups ("personae")

	Typical roles	Human factors capability required to support Patient Safety work		Human factors proficiency requirement		Appropriate human factors training (content and delivery)
		Person-level	**System-level**	**Person-level**	**System-level**	
Front-line staff	Nurse Doctor Pharmacist	• Applying person-level human factors in their patient care work	• To recognise system-level human factors issues in equipment or procedures, and report to their team leaders	2 - Application	1 - Awareness	• Combination of workshop and on-the-job training, supplemented by e-learning or video resources • Initial training to focus on factual content, with periodic top-up sessions to emphasise behavioural change • Training specific to job role
Team leaders	Sister/Matron Consultant	• Applying person-level human factors in their patient care work and set standards in application for their team • Evaluate contribution of human factors to safety performance of their team	• To recognise system-level human factors issues in equipment or procedures, and in reports of their staff • To communicate with safety managers about human factors issues	2 - Application	1 - Awareness	• Combination of workshop and on-the-job training, supplemented by e-learning or video resources • Initial training to focus on factual content, with periodic top-up sessions to emphasise behavioural change • Training specific to job role
Safety manager	Clinical Risk Manager	• Supporting development of person-level training initiatives across the Trust • Monitor effectiveness of person-level human factors training in improving Trust patient safety performance	• Lead incorporation of system-level human factors in Trust safety governance processes • Identify system-level human factors issues in adverse events, and incident records	2 - Application	2 - Application	• Lectures, self-study and some formal evaluation (coursework or learning portfolio of practical work) • Training to build on existing safety management skills
Non-clinical support	Clinical Systems Specialist	• Understand the person-level human factors relating to the way NHS staff use equipment and processes	• Use system-level human factors to support the design of equipment and processes • Evaluate equipment and processes designed by other suppliers and monitor human-system interface of items procured for use in Trust	1 - Awareness	2 - Application	• Lectures, self-study and some formal evaluation (coursework or learning portfolio of practical work) • Training to build on existing technical skills
Executive manager	Chief Executive Medical Director	• Understand and critically evaluate contribution of person-level human factors in the Trust's patient safety work • Develop strategy for acquiring and maintaining person-level human factors capability in the Trust	• Understand and critically evaluate contribution of system-level human factors in the Trust's patient safety work • Develop strategy for acquiring and maintaining system-level human factors capability in the Trust	1 - Awareness	1 - Awareness	• Initial awareness training through briefings, e-learning or video resources, to make best use of senior management time • Participation in the training delivered to front line staff, and follow-up observations in job setting (e.g. safety walkaround)

Figure 6 - Training Audience Conceptual Design: Description of possible Human Factors Training Requirements for Two Proposed Human Factors Specialist Roles to Support NHS Patient Safety Initiatives

	Typical roles	Human factors capability required to support Patient Safety work		Human factors proficiency requirement		Appropriate human factors training (content and delivery)
		Person-level	**System-level**	**Person-level**	**System-level**	
Person-level HF specialist	New dedicated Role (covering health community)	• To provide person-level human factors training to NHS staff at all levels, including train-the-trainer sessions. •Work with patient safety and clinical leaders to improve and promote person-level human factors training.	• To provide awareness level training of system-level human factors. • To understand how system-level human factors approaches can support person-level human factors initiatives.	*3 - Mastery*	*2 - Application*	• Expected to have achieved person-level human factors to Application level from a background in safety-critical team working – especially in healthcare • Mastery level person-level human factors acquired through lectures, self-study and some formal evaluation (coursework or learning portfolio of practical work)
Systems-level HF specialist	New dedicated Role (covering health community)	• To understand how person-level human factors approaches can be supported by system-level human factors.	• To provide system-level human factors support and advice to safety managers and clinical systems support staff . •To provide authoritative support to safety management in all aspects of system-level human factors: conducting investigations of adverse events, supporting design of equipment and processes, advising on strategy	*2 - Application*	*3 - Mastery*	• Human factors skills acquired through course of formal education (Masters degree or doctorate) • Healthcare domain knowledge acquired through working in the sector, self-study and briefings by domain experts
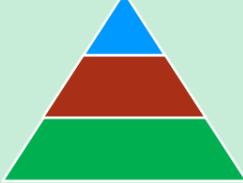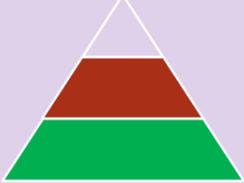
6.4   Signposting to Human Factors Training

6.4.1   As part of the work the study team made suggestions about how to structure a signposting resource that can guide NHS staff seeking information about human factors training courses to meet a particular training requirement in their trust. Two observations have guided this exercise:

- In the review of human factors training providers, it was noted that it is difficult to distinguish between the courses offered by different training propositions without access to more detailed information or direct experience of receiving the course.

- In the interviews with NHS staff a specific question was asked about how interested individuals in the NHS could best find out about human factors training providers. Participants expressed a clear preference for a single source of information, made available through a webpage - possibly alongside other human factors resources - on a site that is readily accessible by NHS staff.

6.4.2   Such a resource would provide guidance to users in the following way:

- Identify the requirement – Not all NHS staff would be able to identify that a particular issue in their trust could be addressed through human factors training and so would not visit the page. It would be beneficial to make this page accessible from a site where general patient safety matters are considered, for example within the NHS Institute's Safer Care site. The identification of the requirement can also be made through online tools, for example, human factors training (with a link to the signposting site) could be offered as a solution in an online troubleshooting resource (similar to the NPSA's Root Cause Analysis resource).

- Training providers – It is demanding to maintain accurate up-to-date information in an online resource. It is recommended that only brief details are recorded in this resource with a clear link to the publicly available information available on the provider's own website, or other online document they have produced.

- Point-of-contact – A designated person at the training provider prepared to receive enquiries from NHS staff would encourage interested staff members to communicate directly.

- Course selection – Many training providers offer a number of different courses, so the resource should be able to record and represent information about a range courses.

- Course name and content – As the users of the resource are expected to be browsing through a number of records and will value speed and brevity, it is recommended that information about the course is brief and clearly structured around key details (for example, course cost, duration, group size and delivery, training objectives, course content, and materials and tools delivered in the training). More detailed information can either be collected as required from the provider, or through a link that refers to a more detailed description.

- Feedback of experience – The resource would act as a forum for NHS staff with recent experience of a particular course or provider to be able to submit feedback on the course, assessing the training experience (similar to the private feedback forms given after a training course) and made available to other potential users. The feedback would include such items as:
    - evaluations of the course content,
    - quality of the presentations,
    - instruction or coaching, how well it met the attendees' requirements
    - particularly after some time has elapsed, what impact the training has made in the safety and quality of care provided by the trust.

    The users would also be able to apply their experience and understanding of the NHS to make a judgement about what kind of requirement the course could best

meet and recommend its use for particular applications or problems. To encourage open and honest exchange of feedback it could be useful to limit access to this feature of the resource to members of NHS staff with a bona fide reason for using it.

6.4.3　Following the experience of other resources of practical experience, similar to the reviews of books provided by online sales providers, we suggest that the feedback element of the page would offer the most value to a person planning to commission human factors training on behalf of their trust, providing information about the course and the provider only available to those who have already taken the course. An illustration of how such a resource might appear to users is presented in Figure 7.

6.4.4　Such a resource would take time to develop. A less demanding solution could be to distribute the same information (without the interactive feedback) through a table of human factors training suppliers within a briefing document. An example of such a table is presented at Table 3.

Table 3 - Illustration of a tabular presentation of signposting human factors training information
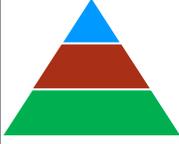
Provider	Course title	Target audience	Content	Description	Costs	Frequency	Practicalities	Proficiency level	Observable outcome
Sodor Training Limited Website: www.sodortraining.com Point-of-contact: Will Awdry, Associate Director Email address: WillA@sodortraining.com	*Incident Investigation and Analysis*	All front-line staff	Human factors Incident investigation techniques Root cause analysis	Workshop Two days, full-time, groups of between ten and 20 Course created in 2004 and has been delivered approximately ten -15 times in the past two years.	£1600 per course	Available on demand	Requires client to provide a venue and all catering	System-level *Awareness & Application*	
Accreditation CAA Institute for Ergonomics and Human Factors Investors in people **Recent NHS clients** Wembley NHS Trust Wickham PCT	*Train-the-Trainer*	Staff selected to act as trainers in future internal training initiatives	Detailed review of course materials Confidence building Coaching skills	Workshop Two days, full-time, groups of between two and four (must be combined with an Incident Investigation and Analysis Course) New course for 2009, yet to be run.	£3200 per course	Available on demand	Trainees must have previously attended Incident Investigation and Analysis training	System-level *Awareness, application & mastery* Person-level *Awareness & Application*	
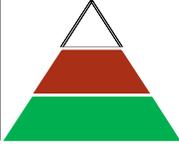
Figure 7 – Illustration of how an electronic resource signposting human factors training might appear to a user

7. CONCLUSIONS

7.1 Current Human Factors Training Provision in the NHS

7.1.1 This scoping study has found many encouraging indicators of the developing human factors capability within the NHS. The study team identified a number of human factors initiatives developed at a trust level by committed and enthusiastic staff. The human factors courses available to the NHS both through external suppliers and from internal NHS resources are perceived by those that commission them to be of a high standard, well-received by staff and effective in supporting trust safety policies (Section 5). This suggests that such initiatives at a trust level (UHCW and QHFT) and at a national level (LIPS) should continue.

7.1.2 Gaps and barriers were found in the provision of human factors training and, as might be expected, in the availability of resources (staff time, cost), but also in the lack of a human factors strategy at a national level to support the human factors capability being developed locally.

7.2 Informing the NHS

7.2.1 This study has identified human factors training appropriate for different NHS staff groups within a trust and has identified two additional human factors specialist roles that may be able to support patient safety initiatives.

7.2.2 The following general conclusions were drawn about human factors training in the NHS:

- All staff involved in patient safety require an awareness of human factors that encompasses an understanding of the origins of human fallibility in the physical and psychological abilities and constraints shared by everyone.

- This appreciation of human fallibility can be applied at a person-level or system-level – two complementary approaches that use different skills to improve human performance.

- Staff working closely with patients require a greater proficiency in person-level human factors skills to allow them to apply own their medical expertise efficiently, effectively and safely and optimise interaction within teams.

- Staff working in technical support or safety governance require greater proficiency in system-level human factors skills to allow them to manage the human element within the healthcare system in support of activities such as incident investigation, assessment of new procedures, designing equipment and maintaining trust records on how human factors issues are managed.

7.2.3 This study investigated the availability of human factors training in the NHS:

- Human factors training has tended to be developed in a piecemeal fashion, with individual trusts or interested groups developing capability in response to specific local issues. This approach can be difficult to sustain as local priorities change, key individuals move on and local resource constraints threaten the continuing process of periodic top-up sessions, which are necessary to maintain the capability and safety behaviour changes in staff.

- Human factors training in the NHS has tended to be developed and delivered within the context of critical care and theatres. This partly reflects the increased vulnerability of patients in the event of an error, but also the greater ability to influence human behaviour in those contexts. These settings have been described as **boundaried** contexts (see 3.6) – where a relatively small number of staff, working closely together in stable teams, performing well-defined collaborative activities.

- In contrast, human factors training is less available in **non-boundaried** contexts, in which teams are distributed geographically, interacting loosely and performing a wide range of activities in parallel, such as in wards, laboratories, pharmacies and community care. This partly reflects the fact that individual patients may be less vulnerable to immediate harm in the event of errors in these contexts, but also that non-boundaried contexts are more difficult to describe, analyse and manage, and may require different approaches to the traditional person-level human factors based on CRM in aviation. As a large number of patients are treated in these non-boundaried contexts, the lack of human factors training in these contexts should be considered as a gap worthy of further exploration.

- Human factors training in the NHS has tended to emphasise person-level human factors rather than system-level. The lack of a detailed system-level human factors training course specific to the healthcare context, of the kind that would be required by safety governance staff, was identified as a gap.

7.2.4 The study noted the following trends in human factors training delivery. These trends reflect the pressures of human factors training in the NHS:

- The development of internal human factors training capability has been driven by the higher costs of commercially supplied training, which has made it difficult to sustain training delivery for the long-term.

- E-learning and self-study allows individual members of staff to acquire human factors knowledge at convenient times outside of formal training courses, minimising the extended periods of time out of service, and to maximise the benefits of face-to-face training.

- Trusts and training providers have found it more effective to spread person-level human factors training over a number of sessions, using the initial sessions to impart knowledge and later follow-up sessions to provide practical advice on implementation and coaching. These follow-up sessions encourage and reinforce the behavioural changes in the everyday work of individual staff and teams.

7.3 Informing NHS staff

7.3.1 This study has identified a requirement for more information about human factors training to be made more widely available across the NHS. NHS staff interviewed expressed a preference for a single source of information that can be consulted on a webpage.

7.3.2 This study has considered different ways that information about human factors training courses can be consolidated into a single resource. If possible, it is recommended that this resource would benefit from an interactive element that would allow NHS staff that have worked with different suppliers or attended different courses to give feedback which informs other prospective attendees.

7.4 Informing the NHS Institute Safer Care Team

7.4.1 This section proposes some priorities for the NHS Institute's Safer Care team, drawn from the conclusions of this study:

- The burden of leading the development of human factors training in the NHS is considerable, and should not be borne by a single organisation – the NHS Institute should continue to work in partnership with the NPSA, DH Patient Safety Division and other stakeholders to drive change across the NHS.

- The LIPS course represents the only training course available in the NHS that covers system-level human factors and delivers explicit training in the origins of human fallibility in the constraints and abilities common to everyone.

- This study identified that awareness of human factors across the NHS is low. Those involved in human factors training recommended that the first step in wider delivery and application of these skills would require a period of awareness-raising. The Safer Care team should support this awareness raising – explaining how human factors can benefit patient safety, reporting the success stories from early adopters and directing those interested to sources of more detailed information.

- NHS staff noted that there was a requirement for a single point of information and guidance about human factors in general and, particularly, in the training courses available to begin to develop a human factors capability. The Safer Care team should investigate the best ways of addressing this requirement, possibly through developing the sign-posting resource discussed in this report.

- This study identified certain areas of the NHS where human factors training is underdeveloped or less available – particularly in unboundaried contexts. The Safer Care team should investigate how the demands of these working contexts differ from the better understood boundaried contexts and should work with partner organisations to explore and develop the different human factors techniques or strategies required to support work in these contexts.

- The widespread introduction of human factors across the NHS presents considerable organisational challenges. The Safer Care team should investigate the different training implementation models available for distribution of such skills, comparing the relative merits of different strategies and drawing upon experience of previous NHS training initiatives (for example, Box 4).

8. REFERENCES

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APPENDIX A:
HUMAN FACTORS TRAINING PROVIDERS IDENTIFIED IN THE SCOPING STUDY

Type of organisation	Name	Website	Participation in study
Specialist human factors training company	Atrainability	www.atrainability.co.uk	Participated
	Afterburner UK	www.qaicanada.org/conferences/October2006/bios/Dewey.pdf	
	Global Air training	www.globalaviation.com	Participated
	Heathcare Team Training	www.healthcareteamtraining.com/	Participated
	LMQ	www.lmq.co.uk	Participated
	Pascal Metrics	www.pascalmetrics.com/Our-Group.html	
	Terema	www.terema.co.uk	Participated
Human Factors Consultancy Company	Air Affairs	www.airaffairs.co.uk/about-us.html	
	CCD Design and Ergonomics Limited	www.ccd.org.uk	
	Greenstreet Berman Ltd	www.greenstreet.co.uk	Participated
	Human Reliability Associates	www.humanreliability.com/	
	Hu-Tech Associates Limited	www.hu-tech.co.uk/	
	Interaction of Bath	www.interactionofbath.com/services/training.shtml	
	Quintec Associates Limited	www.quintec.com	
	Systems Concepts	www.system-concepts.com/	
Academic Institutions	Brunel University	www.brunel.ac.uk/about/acad/sed/sedres/dm/hcdi	
	Cranfield University	www.cranfield.ac.uk/soe/departments/humanfactors/index.jsp	
	Imperial College	www.imperial.nhs.uk/index.htm	Participated
	Loughborough University	www.lboro.ac.uk/business/	
NHS trust (or closely associated)	Medical Simulation Centre, Barts and the London NHS Trust	www.bartsandthelondon.nhs.uk/simulation	
	Queen's Hospital Burton on Trent	www.burtonhospitals.nhs.uk/	Participated
	Trent Simulation & Clinical skills Centre	www.tin.nhs.uk (has record for Trent Simulation Centre)	

APPENDIX A:
HUMAN FACTORS TRAINING PROVIDERS AND COURSES
- KEY FACTS

Subject to agreement for release from the companies concerned, this information will be available on our web site shortly
www.institute.nhs.uk/humanfactors .

Specific enquiries will also be answered where possible.