Human Factors & Ergonomics Taster Workshops Final report

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Summary Report

A series of Human Factors & Ergonomics (HFE) Taster Workshops were provided to introduce HFE principles and practices in healthcare as systems and design concepts as part of Health Education England campaign '*Learning to be Safer*'[1]. The workshops were accredited as a Short Course by the Chartered Institute of Ergonomics and Human Factors[2].

Delegates were recruited by Local Education & Training Boards and Health Education England at 5 locations in England (Bristol, Cambridge, London, Loughborough and Manchester), following 2 pilot sessions in Coventry. The workshops were delivered to 189 healthcare staff, mostly from the acute sector (82%). The delegates included medical (33%) and nursing (40%) staff as both direct healthcare providers (46%) and managers (42%).

The delegates were asked to list challenges they felt prevented the delivery of effective, high quality and safe care. These data were grouped as resources (including finance, staffing and technology); systems (including communication, IT, reporting tools, patient care pathway, policies and procedures); and culture (including hierarchies, instability of organisation and teams, silo-working and blame culture).

Over 90% of delegates agreed that the content was directly relevant to their work. The Learning Outcomes were achieved with 95% of delegates demonstrating an introductory knowledge of HFE principles and practices, with over 97% reporting the HFE can help to improve safety, performance and wellbeing for patients, staff and organisations.

91% of delegates stated an intention to look for further education in HFE for both themselves and their team, with 85% stating that they would look for HFE education for their organisation.

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[1] http://hee.nhs.uk/work-programmes/human-factors-and-patient-safety/

[2] http://www.ergonomics.org.uk/

Background

In the UK, there has been a specific focus on taking an HFE approach for patient safety as part of the response to the catastrophic failings in the quality and safety of care at Mid Staffordshire NHS Foundation Trust[3]. The National Quality Board brought together 16 agencies (including professional colleges, regulators, commissioners, patient groups, and government departments) to support the statement: '*We, the undersigned, believe that a wider understanding of Human Factors principles and practices will contribute significantly to improving the quality (effectiveness, experience and safety) of care for patients'.[4]*

Workshop Objectives

The objectives of the Taster Workshop were to provide an introduction to HFE principles and applications in healthcare by:

1. Exploring how HFE principles are understood and applied in the NHS through reflection on current (and previous) activities and initiatives.
2. Outlining HFE principles and practices with respect to safety (patients, staff and other people in the system), wellbeing and performance.
3. Sharing examples of HFE best practice.
4. Identifying opportunities as design of micro (product), meso (team) and macro (organisational) HFE systems.
5. Providing networking and expert support in HFE.
6. Outlining the relationship between HFE and quality improvement.

Who attended?

The 12 (+ 2 pilot) workshops were attended by 189 healthcare staff (82% acute care), with 46% direct healthcare providers and 42% managers; 33% registered with GMC and 40% registered with NMC (Annex 1).

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[3] Flin, R., M. Bromiley, P. Buckle, and J. Reid. 2013. "Changing behaviour with a human factors approach". *BMJ* 346, f1416.
[4] http://www.england.nhs.uk/wp-content/uploads/2013/11/nqb-hum-fact-concord.pdf

What did the delegates think about the workshop?

The workshops were evaluated with positive outcomes (Annex 2):

- 94% agreed that the content was directly relevant to their work.
- 98% agreed that course objectives were met.
- 88% agreed that they would recommend this type of course to others.
- 91% agreed that the pace of the workshop allowed enough time to understand and absorb the content.
- 99% agreed they were fully satisfied with the facilitator's style of delivery of the workshop.
- 91% of delegates stated an intention to look for further education in HFE for both themselves and their team, with 85% stating that they would look for HFE education for their organisation.

What did the delegates learn?

The Learning Outcomes (Annex 3) were achieved with delegates demonstrating an introductory knowledge of HFE principles and practices. Following the workshop, over 97% reported that HFE can help to improve safety, performance and wellbeing for patients, staff and organisations.

The delegates were introduced to Systems and Design HFE principles. Over 90% reported an understanding that Systems can involve and human-machine or human-human interactions, and also be 'large and complex or small and simple'.

85% reported an understanding of HFE design principles for functionality and user-centred design. Over 90% understood HFE principles of design for individuals, with 80% understanding HFE design principles for populations. 76% reported an understanding of HFE design principles in Standards, Guidelines and Regulations.

Which HFE Case Studies were most popular?

The delegates were given a pre-workshop choice of 6 case studies for theatres[5], maternity[6], ambulance[7], communication (design of admission forms)[8], hospital building[9] and falls[10].

In some workshops it was possible to offer parallel group working with more than one case study. The most popular case study was an evaluation and design of an adult admission assessment communication interface (43%) followed by falls (18%), theatres (13%), hospital building design (11%), emergency (9%) and maternity (7%).

A simple framework[11] was used to discuss the case studies and introduce some HFE tools (figure 1).

WHO	WHAT	WHEN	WHERE	HOW	WHY

Scope of issue/challenge/problem Define stakeholders: Participatory Ergonomics, Inclusive Design	Investigate/explore HFE methods/tools

Physical factors
Anthropometry, Biomechanics, Postural Analysis, Vision, Hearing, Thermal comfort

Cognitive factors
Mental models, Individual decision making, Variability, Human-Computer Interaction, Navigation (unfamiliar environments)

Organisational factors
Hierarchies (professional, employer and staff-patient relationships) , Team stability, Decision making (authority, accountability, responsibility, delegation)
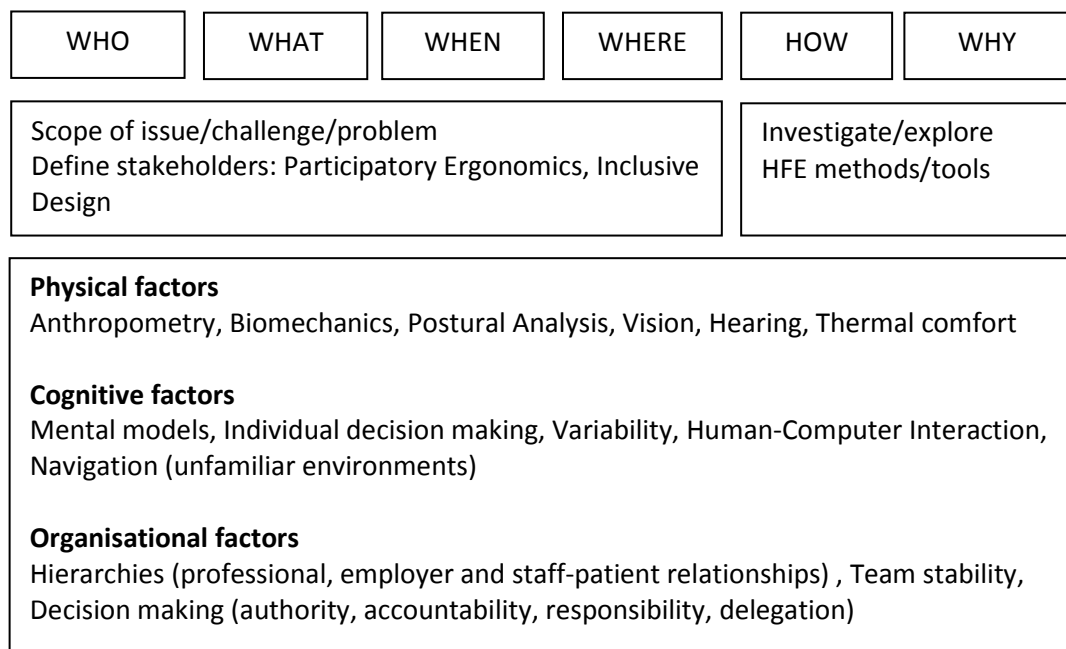
Figure 1. Framework for HFE Case Studies

[5] Hignett, S., Davis, M., Hillier, S., Hames, N., Hodder, S. (2015). Safer Anaesthetic Rooms: A Macro Ergonomic Space Analysis using Hierarchical Task Analysis. *Proceedings of European Healthcare Design Conference,* Royal College of Physicians. June 22-23, 2015
Hignett, S. Masud, T. (2006). A Review of Environmental Hazards associated with In-Patient Falls. *Ergonomics.* 49, 5-6, 605-616
[6] Hignett S (1996) Manual handling risks in midwifery - identification of risks factors *British Journal of Midwifery.* 4, 11, 590-596
[7] Ferreira, J. Hignett, S. (2005). Reviewing ambulance design for clinical efficiency and paramedic safety. *Applied Ergonomics.* 36, 97-105
Hignett, S., Crumpton, E., Coleman, R., (2009) Designing emergency ambulances for the 21st century *Emergency Medicine Journal* 26, 135-140
[8] Hignett, S., Goodwin, E., Wolf, L. (2014) Integrated nursing risk assessment: Patient handling, falls, pressure ulcers, continence, dementia. *Proceedings of the 3rd International Conference on Human Factors and Ergonomics in Healthcare / 5th International Conference on Applied Human Factors and Ergonomics.* Krakow, Poland. 21-25 July
[9] Hignett, S., Lu, J., Fray, M. (2010) Two case studies using mock-ups for space planning in adult and neonatal critical care facilities, *Journal of Healthcare Engineering* 1, 3, 399-414
Taylor, E., Hignett, S. (2014). The environment of safe care: considering building design as one facet of safety. *Proceedings of the HFES 2014 International Symposium on Human Factors and Ergonomics in Health Care.* Chicago, USA. 9-11 March 2014
[10] Hignett, S. (2012) Can inclusive environmental design be achieved in acute hospitals? Achieving quality outputs in a complex industry. *Proceedings of the 2nd International Conference on Human Factors and Ergonomics in Healthcare / 4th International Conference on Applied Human Factors and Ergonomics.* San Francisco, 21-25 July. 577-584
[11] http://www.kiplingsociety.co.uk/poems_serving.htm

HFE and Quality Improvement working together

The relationship between HFE and QI was explored using 4 previously published concepts[12] which suggested that HFE and QI could work together to:

1. Explore and define a problem by looking at the humans and the rest of the system.
2. Re-design the tasks, interfaces and system.
3. Define the elements and measures (metrics) of the intervention.
4. Implement the change using expertise facilitation and reworking of barriers.

The delegates reported clear roles for both disciplines with more benefits from using HFE to explore and define a problem by looking at the humans and the rest of the system, followed by the re-design of the tasks, interfaces and system. There were more benefits identified from using QI to define the elements and measures (metrics) of the intervention (figure 2).
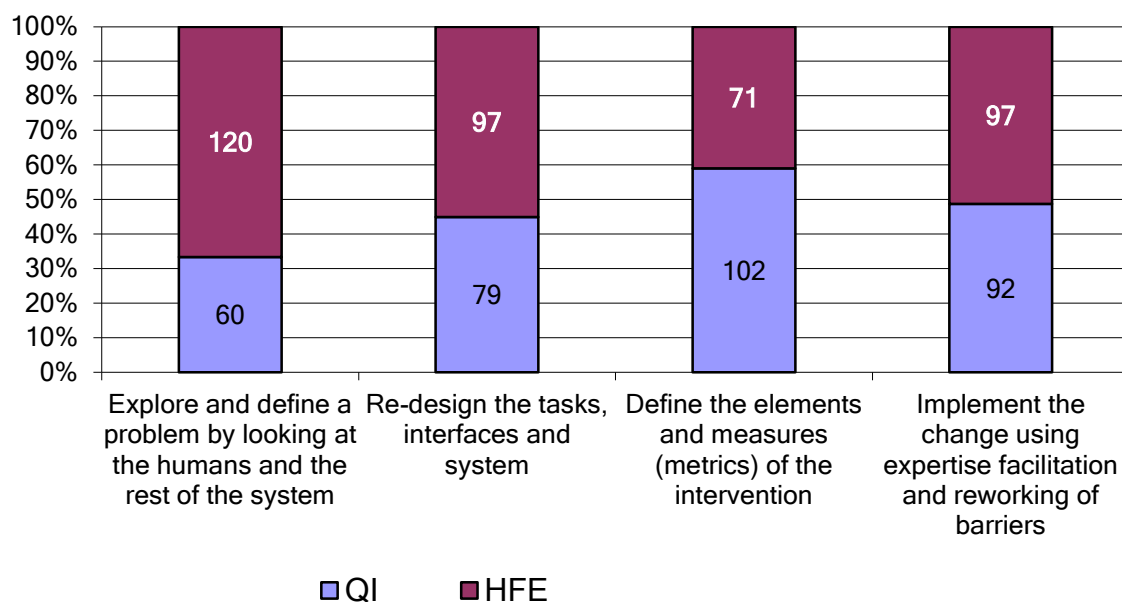

Figure 2: HFE and QI working together

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[12] Hignett, S., E. Jones, D. Miller, L. Wolf, C. Modi, W. Shahzad, J. Banerjee, P. Buckle, and K. Catchpole. (2015). "Human Factors & Ergonomics and Quality Improvement Science: Integrating Approaches for Safety in Healthcare". *BMJ Quality & Safety* 24, (4), 250-254.

Which top 5 issues/challenges were identified as preventing the delivery of effective, high quality and safe care?

The challenges were grouped as

- Resources: including finance, staffing (including numbers, competencies, workload, stress/burn out, training) and technology (missing and defective equipment).
- Systems: including communication, IT, reporting tools, patient care pathway, policies and procedures, interconnectivity between patients, care providers and technologies, lack of standardisation of basic processes (duplication etc.).
- Culture: including hierarchies (clinicians, managers, non-registered staff), instability (of NHS, organisations and teams), silo-working (professions, specialities and sectors), increasing demand and service expectations (from patients and NHS targets), blame culture, and a lack of clear vision leading to sustainability.

The top 5 challenges are shown for all challenges (Figure 3a) and top challenge (Figure 3b).

Figure 3. Word Cloud for (a) all challenges and (b) top challenge

The data have limitations due to the self-selection of attendance and completion of the pre-workshop survey.

Annex 1: Delegates

Annex 2: Course Evaluation

Annex 3: Learning Outcomes

Annex 1: Delegates

Delegates

Venue (2 workshops at each venue)	Participants (n=)
Coventry (pilot)	37
Bristol	34
Cambridge	21
London (1)	31
London (2)	10
Manchester	45
Loughborough	21
TOTAL	**189**

82% from acute hospitals (n=164 responses)

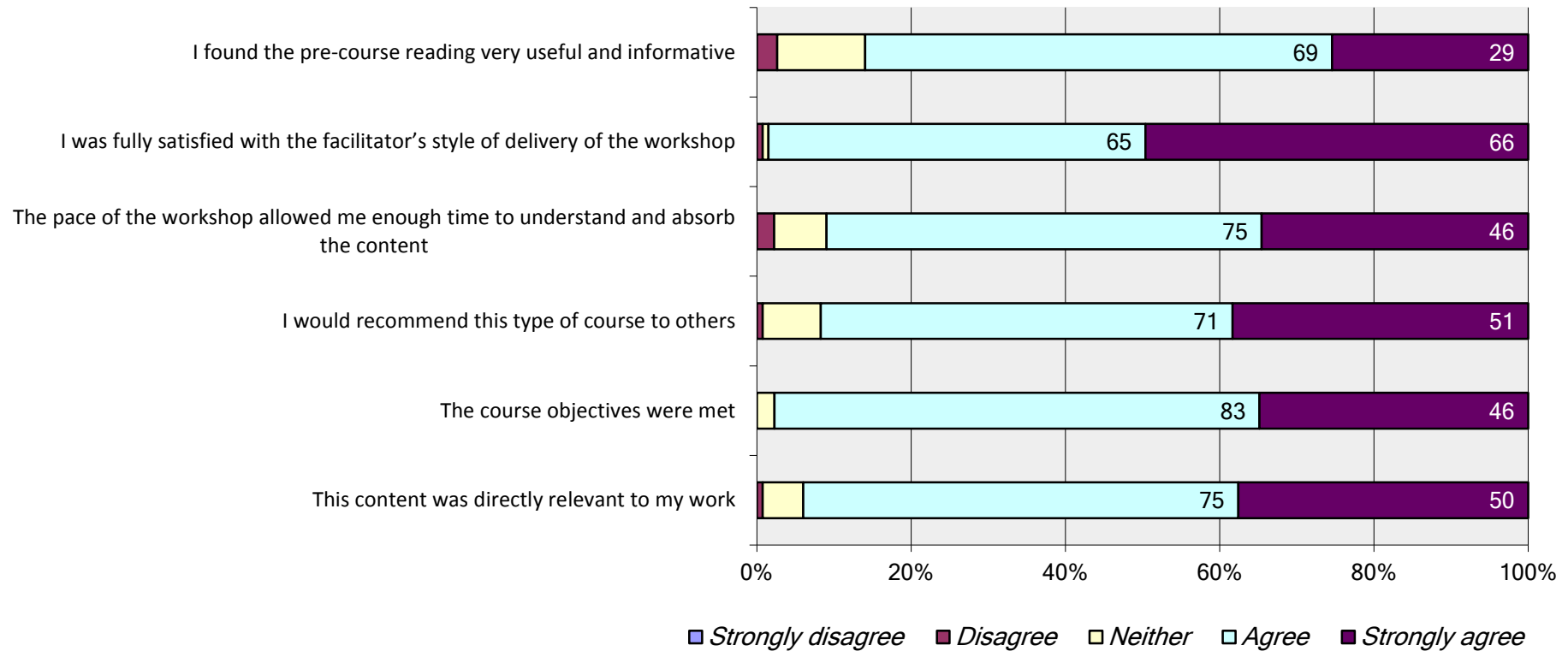|	
Acute Hospital	135
Rehabilitation/Community Hospital	3
GP Practice	1
Mental Health Organisation	10
Hospice Care	0
Local Authority	4
Community Health Organisation	10
Community Pharmacy	0
Social Care Organisation.	0

Professional role (n=156 responses)

- o 46% Direct healthcare providers
- o 42% Managers
- o 12% Support to care providers (e.g. patient safety leads, clinical governance)
- o 5%   Operational (IT etc.)

Regulator (n=115 responses)

- o GMC   33%
- o NMC   40%
- o HCPC   19%
- o GPC   7% (Pharmaceutical)
- o GDC   1% (Dental)

Annex 2: Course Evaluation

I found the pre-course reading very useful and informative — 69 | 29

I was fully satisfied with the facilitator's style of delivery of the workshop — 65 | 66

The pace of the workshop allowed me enough time to understand and absorb the content — 75 | 46

I would recommend this type of course to others — 71 | 51

The course objectives were met — 83 | 46

This content was directly relevant to my work — 75 | 50

☐ Strongly disagree ■ Disagree ☐ Neither ☐ Agree ■ Strongly agree

Percentage Agreement/Disagreement (Number of responses on chart)

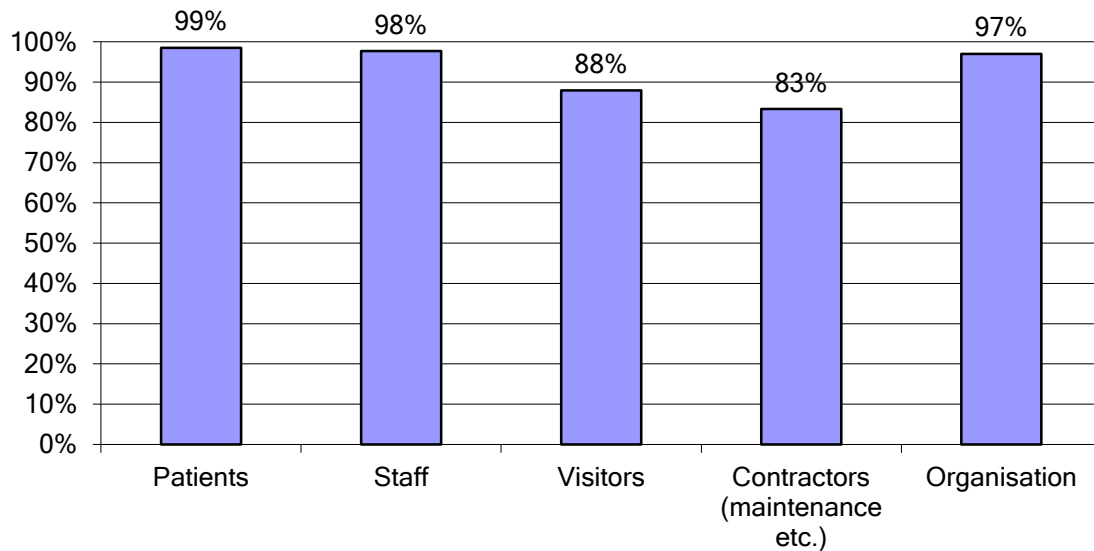## Are you likely to look for more education and training in HFE for:

■ Yes ■ No
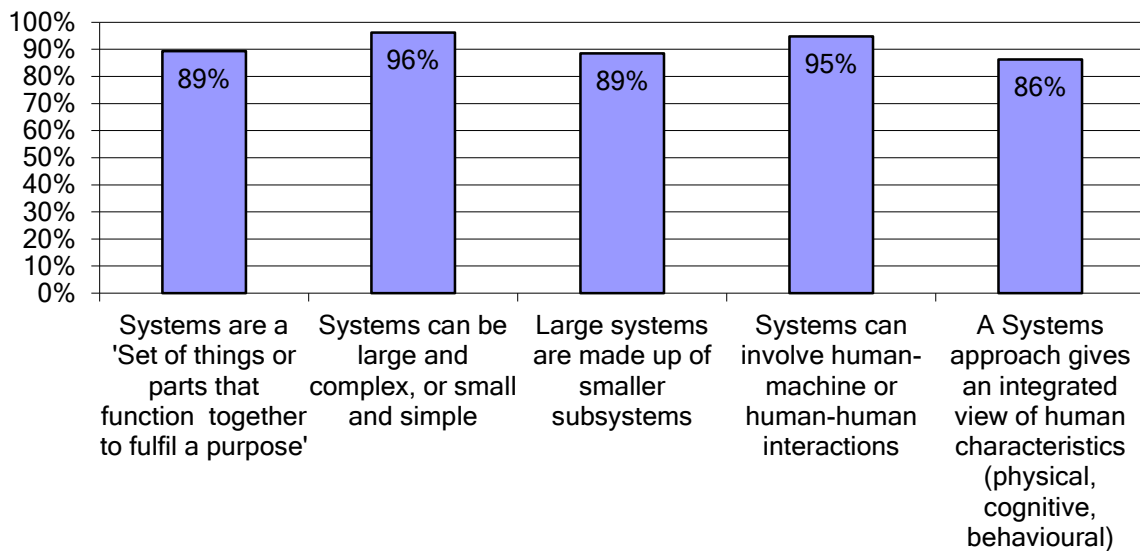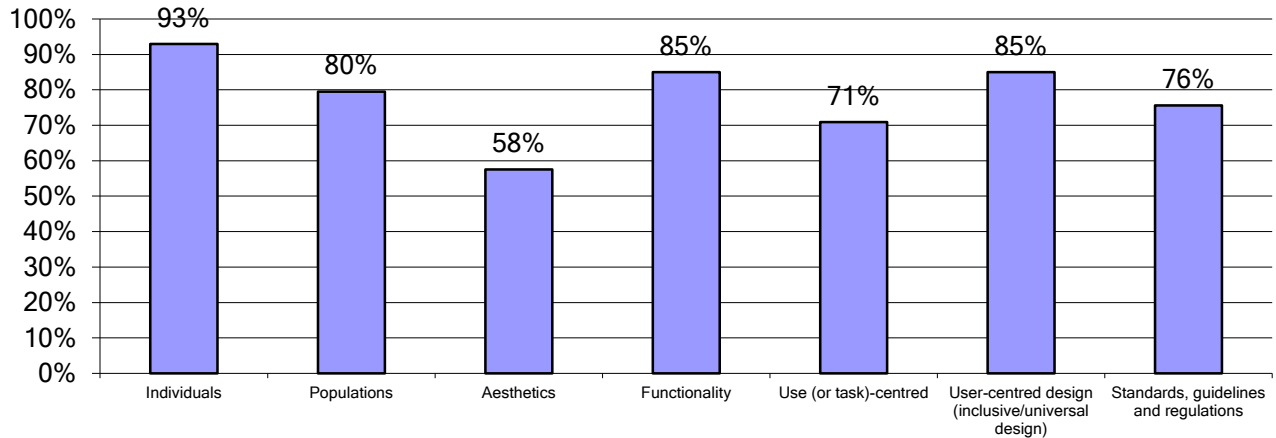
You	Your Team	Your Trust

Values shown in bars: You = 112, Your Team = 85, Your Trust = 72
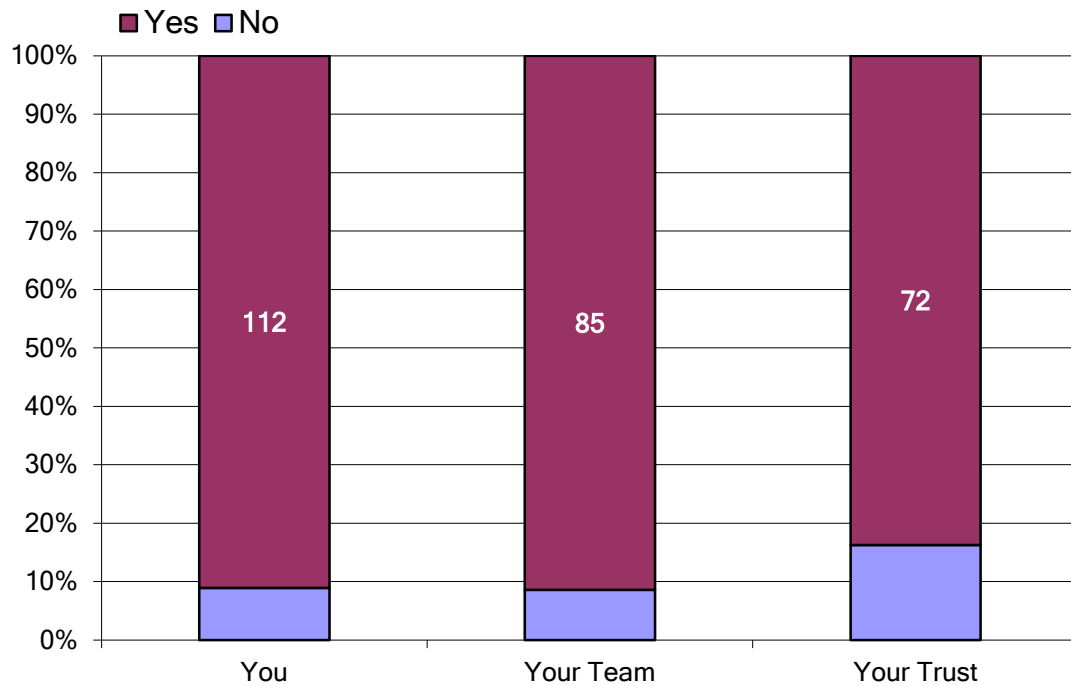
Annex 3: Learning Outcomes

HFE can help to improve well-being, safety and performance for:

Category	Value
Patients	99%
Staff	98%
Visitors	88%
Contractors (maintenance etc.)	83%
Organisation	97%

Introduction to Systems

Category	Value
Systems are a 'Set of things or parts that function together to fulfil a purpose'	89%
Systems can be large and complex, or small and simple	96%
Large systems are made up of smaller subsystems	89%
Systems can involve human-machine or human-human interactions	95%
A Systems approach gives an integrated view of human characteristics (physical, cognitive, behavioural)	86%

HFE can be used to design for :

Bar chart showing percentages:
- Individuals: 93%
- Populations: 80%
- Aesthetics: 58%
- Functionality: 85%
- Use (or task)-centred: 71%
- User-centred design (inclusive/universal design): 85%
- Standards, guidelines and regulations: 76%

Systems

- Set of things or parts that function together to fulfil a purpose

    – Can be large and complex, or small and simple

    – Large systems are made up of smaller subsystems

    – Can involve *human-machine* or *human-human* interactions

- Integrated view of human characteristics (physical, psychological, social)

Design

- Design for individuals and populations, aesthetics and functionality

- Use (or task)-centred AND User-centred design (inclusive/universal design)

- Translation of design principles, standards, guidelines and regulations into specific requirements