



Human Factors

Optimising System Performance and Human Wellbeing

Paul Bowie

PhD C.ErgHF MCIEHF FRCPEd FRCGP (Hon)

Programme Director (Safety & Improvement)

Twitter: @pbnes

Email: paul.bowie@nhs.scot



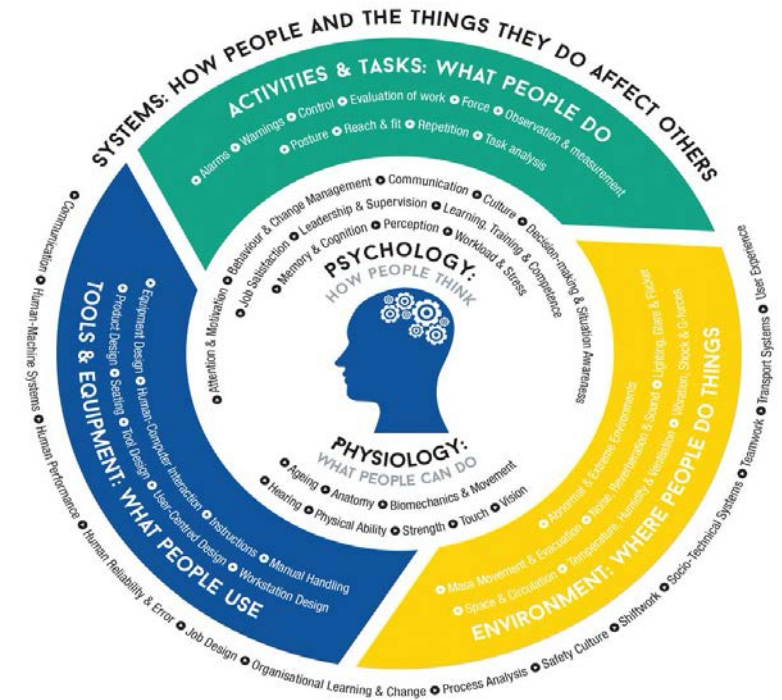
Session Content

- What is Human Factors (HF)? What its Not!
 - Systems Thinking
 - Systems Approach
 - Learning from Safety Incidents
 - Workplace Design
- Challenge current understanding for some!?
- 4 Practical HF Tips
- Rollercoaster Ride!
- Q&A



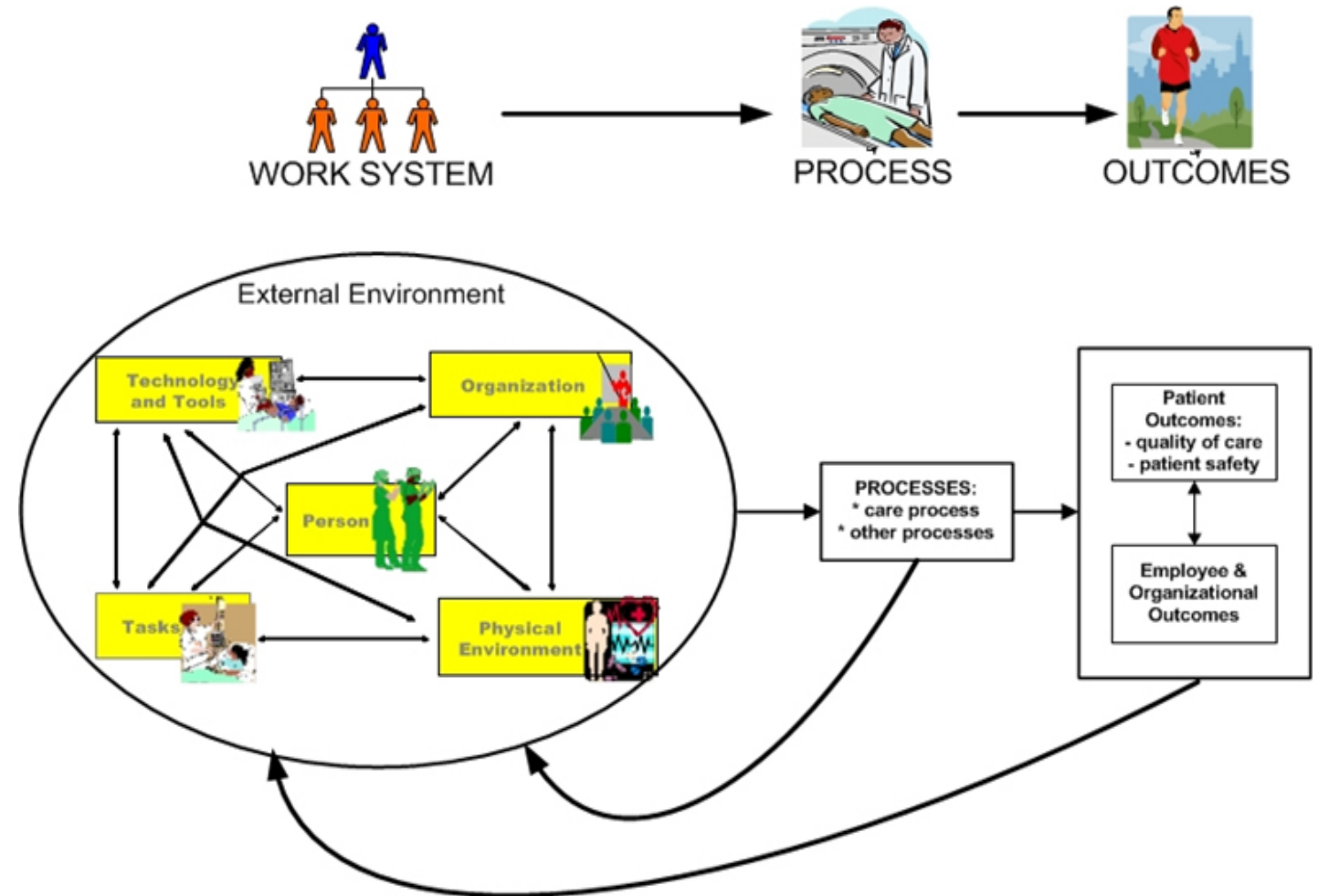
Human Factors in Healthcare

- “Ergonomics (or human factors) is the **scientific discipline** concerned with the understanding of **interactions** among humans and other elements of a system, and the **profession** that applies theory, principles, data, and methods to **design** in order to **optimize human well-being and overall system performance**.” (IEA, 2000)
- In other words:
 - “Evaluating and improving human work to make things easier and safer for people”



Distinguishing Features of Human Factors (Safety Science)

1. It **ALWAYS** takes a **Systems Approach** (holistic)
2. It is **ALWAYS** **Design Driven** (to take account of human characteristics, needs, capabilities and preferences)
3. It focuses **ALWAYS** on two closely related outcomes: **System Performance** and **Human Well-being** (“Twin Aims” = “Joint Optimisation”)



Other High Risk Industries

Human Factors is a profession and a scientific discipline, with scientific methods, highly established in other safety critical industries:

- Nuclear
- Maritime
- Military
- Aviation
- Rail
- Surveillance
- Offshore industries
- Energy

Aviation versus Healthcare Comparison!!!

- EUROCONTROL c7500 employees (40 professionals)
- UK Health Service c1.3m employees (<10 professionals)
- Urgent need to build capacity & capability



Human Factors “Myths and Misunderstandings”

(Russ et al, 2013)

SEPARATING FACT FROM FICTION

Fact #1: *Human factors is about designing systems that are resilient to unanticipated events.*

Fiction: *Human factors is about eliminating human error.*

Fact #2: *Human factors addresses problems by modifying the design of the system to better aid people.*

Fiction: *Human factors addresses problems by teaching people to modify their behaviour.*

Fact #3: *Human factors work ranges from the individual to the organisational level.*

Fiction: *Human factors is focused only on individuals.*

Fact #4: *Human factors is a scientific discipline that requires years of training; most human factors professionals hold relevant graduate degrees.*

Fiction: *Human factors consists of a limited set of principles that can be learnt during brief training.*



Human Factors Myths & Misunderstandings in Healthcare

BMJ Quality & Safety Online First, published on 30 November 2011 as 10.1136/bmjqs-2011-000421
Viewpoint

Time to accelerate integration of human factors and ergonomics in patient safety

Ayşe P Gurses,¹ A Ant Ozok,² Peter J Pronovost^{1,3}

Downloaded from <http://qualitysafety.bmj.com/> on October 30, 2014 - Published by group.bmj.com

EDITORIAL

Spreading human factors expertise in healthcare: untangling the knots in people and systems

Ken Catchpole

Downloaded from <http://qualitysafety.bmj.com/> on October 30, 2014 - Published by group.bmj.com

VIEWPOINT



OPEN ACCESS

The science of human factors: separating fact from fiction

Alissa L Russ,^{1,2,3,4} Rollin J Fairbanks,^{5,6,7} Ben-Tzion Karsh,^{*8}
Laura G Militello,⁹ Jason J Saleem,^{1,2,3,10} Robert L Wears^{11,12}

1. Human Factors ≠ Factors of the Human
2. Human Factors ≠ Cause of failure
3. Human Factors ≠ Team Training
4. Human Factors ≠ Non-Technical Skills
5. Human Factors ≠ Crew Resource Management
6. Human Factors ≠ QI
7. Human Factors ≠ Clinical Skills
8. Human Factors ≠ Simulation

“Hard Truths”

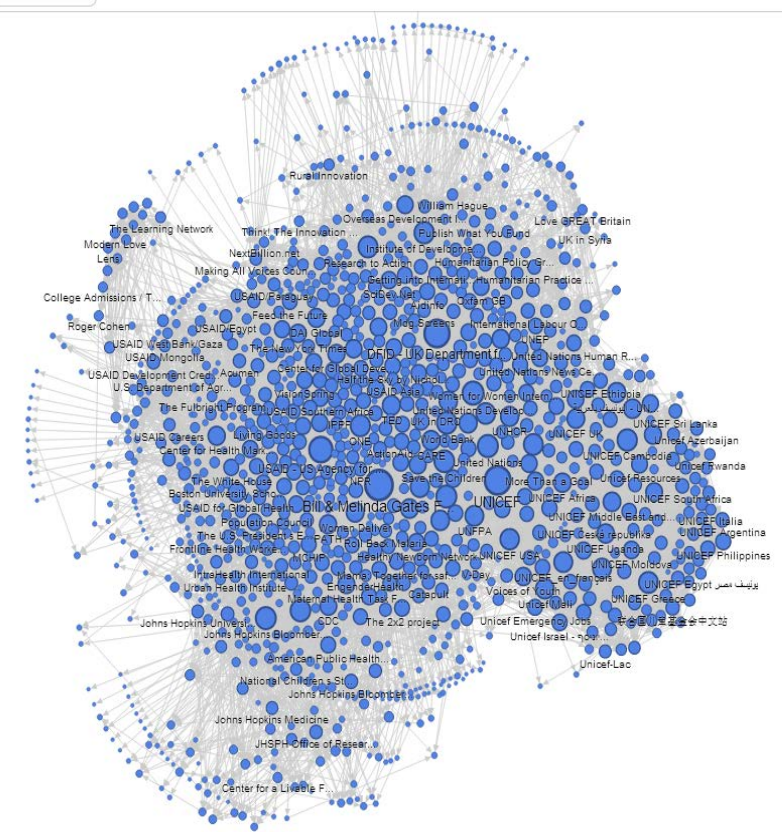
**Most healthcare publications
misunderstand and misrepresent
Human Factors/Safety Science
principles and methods**



Practical Human Factors Approaches

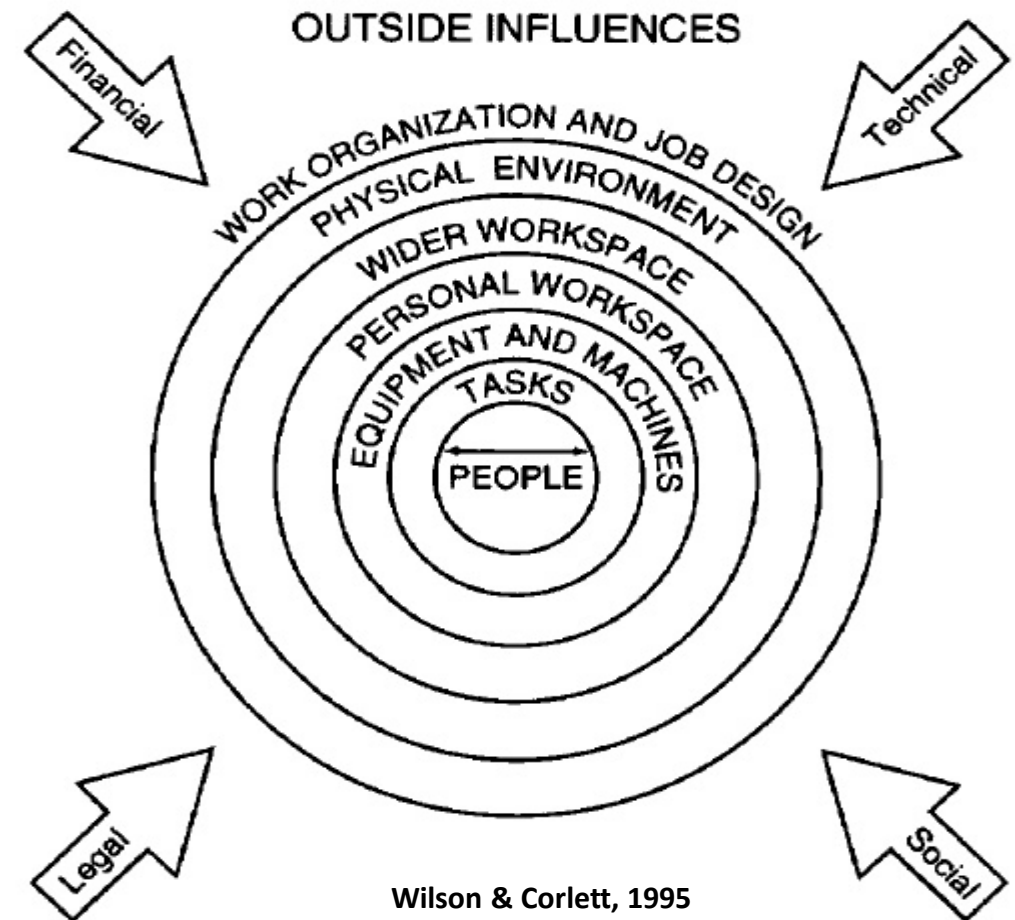
1. Systems Thinking

Draft Principles for Understanding and Designing Complex Healthcare Systems



Principle

Safety incidents are caused by multiple, interacting contributory factors from across the care system



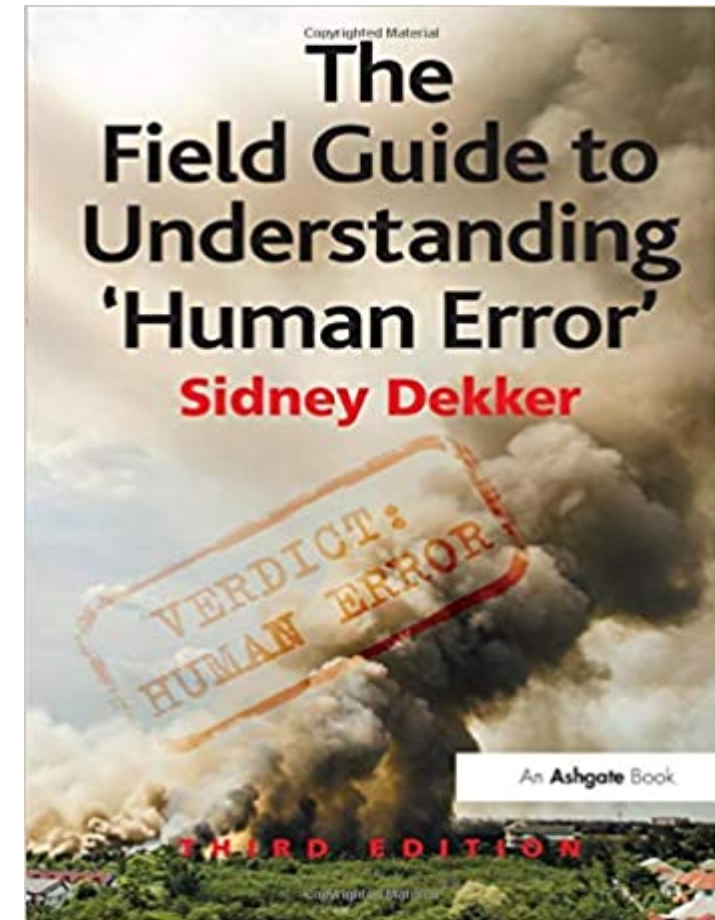
Principle

Seek multiple perspectives when attempting to understand and improve system safety



Principle

Consider 'human error' as a symptom of a system problem, not its cause (or conflate it with harm)



Principle

Recognise that there is no 'root cause' of a safety incident in highly complex care systems

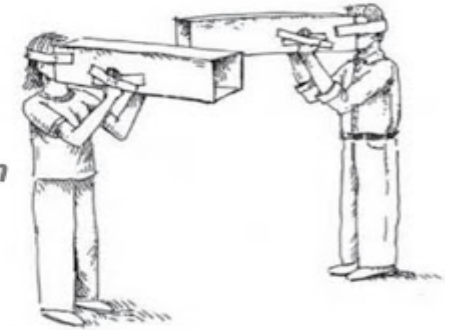
We tend to be looking for the root cause of something, but in complexity, there's no root cause. There's no root cause of a hurricane. There's no root cause of a tsunami. There's no root cause in nature. There are just many forces that interact together to get you a particular effect. Similarly, there's no root cause of trust. There's no root cause of leadership. These are all a series of things that happen together.

Principle

Consider Local Rationality when investigating and learning from previous safety incidents

Understanding Local Rationality

People do things that make sense to them, given their goals, understanding of the situation and focus of attention at that time.



...and avoiding counterfactual reasoning!

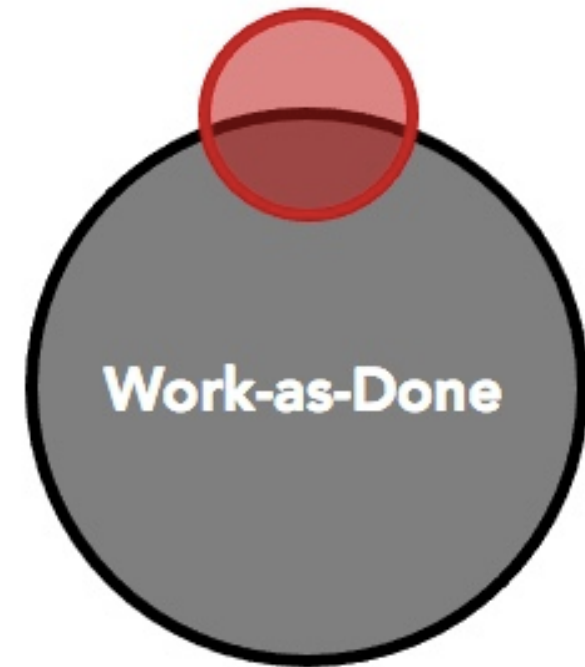
The WOULD, COULD, SHOULD Effect

“Counterfactual thinking is a concept that involves the human tendency to create possible alternatives to life events that have already occurred; something that is contrary to what actually happened. Counterfactual thinking is, as it states: “counter to the facts”.

Principle

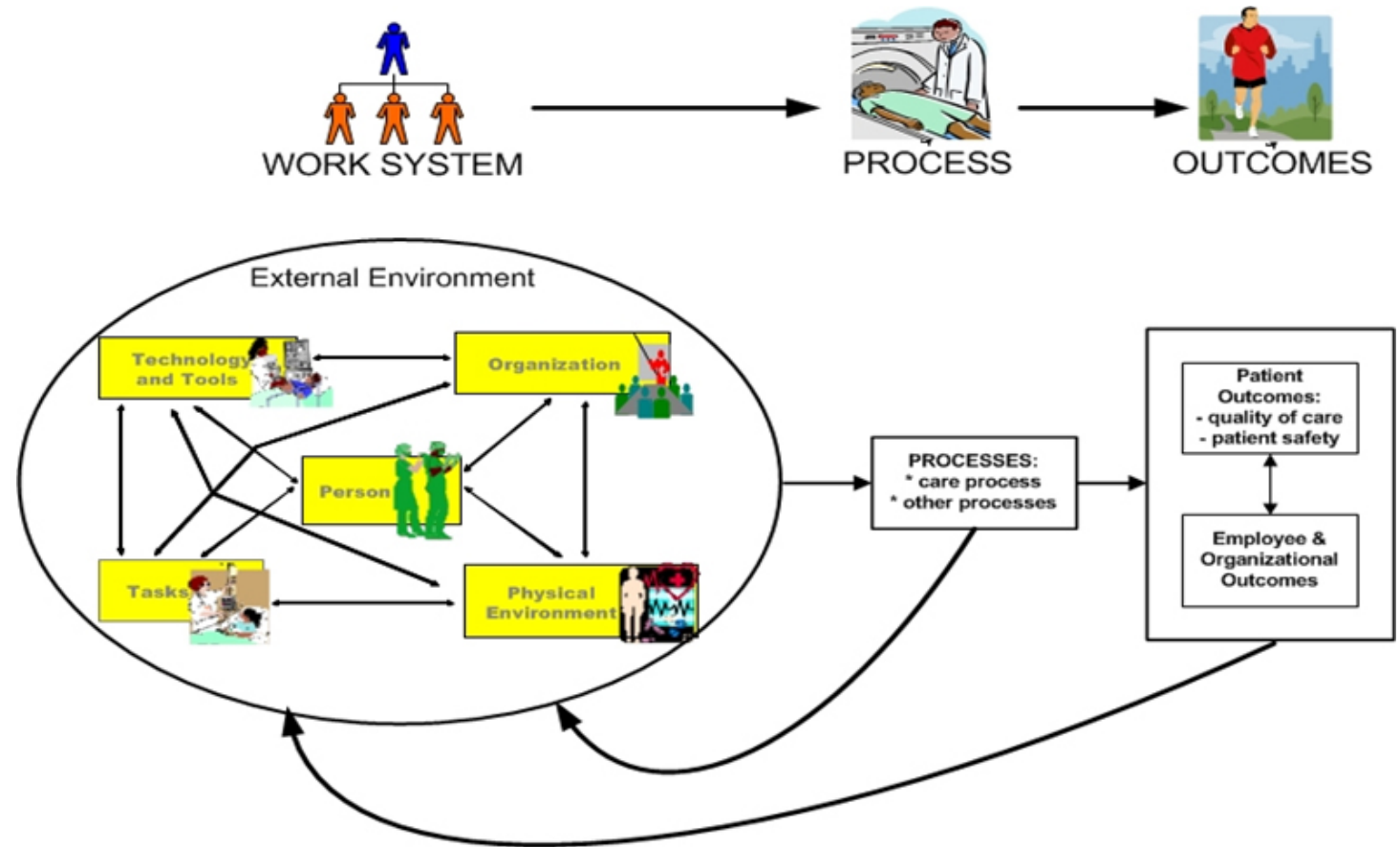
It is critical to explore and reconcile 'work-as-imagined' and 'work-as-done'

Work-as-Imagined

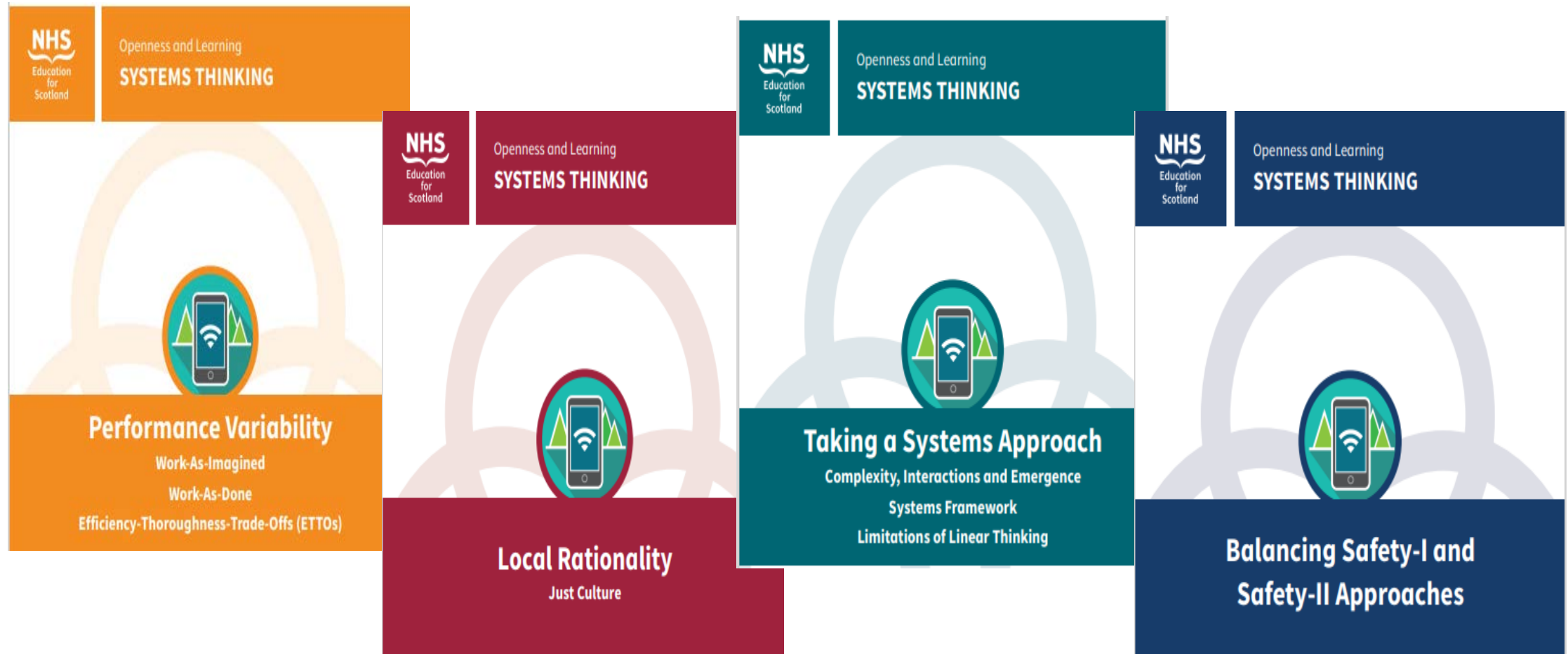


Principle

**Adopt a
recognised
systems approach
to analysis,
investigation,
learning, design
and improvement**



Systems Thinking Challenge Cards

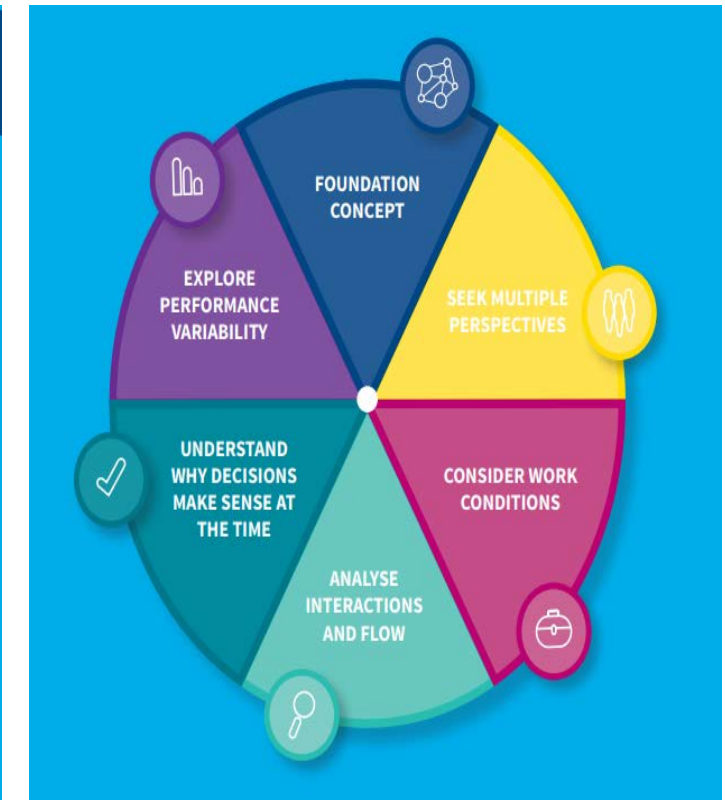
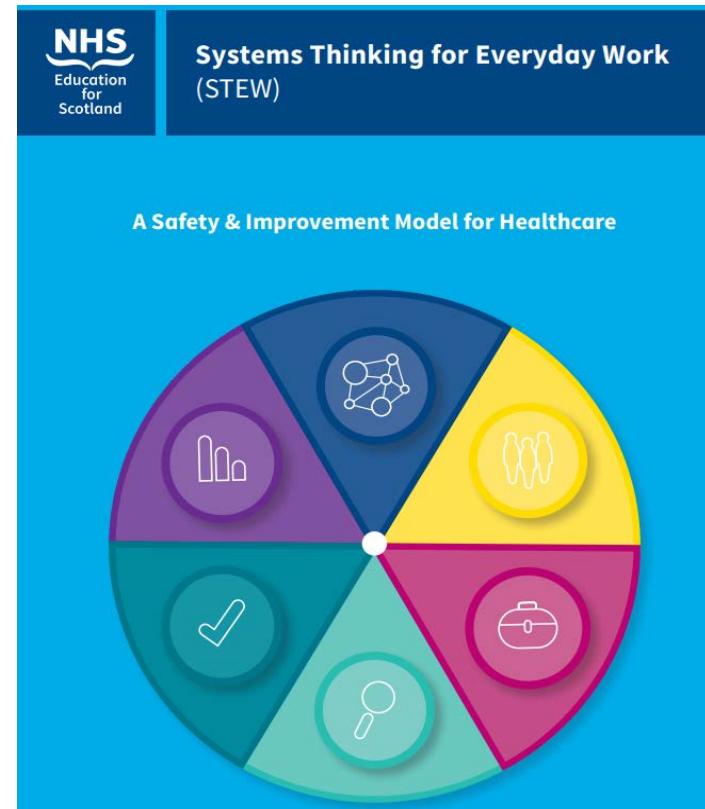


Systems Thinking for Everyday Work (STEW)

- The principles contained in these cards can be used to frame team discussions to encourage a systems approach to exploring and improving safety in healthcare.

They can help to:

- Understand the current system
- Analyse incidents (with both wanted and unwanted outcomes)
- Identify improvement priorities
- Develop change ideas and their implementation into current work systems
- Monitor, evaluate and spread change



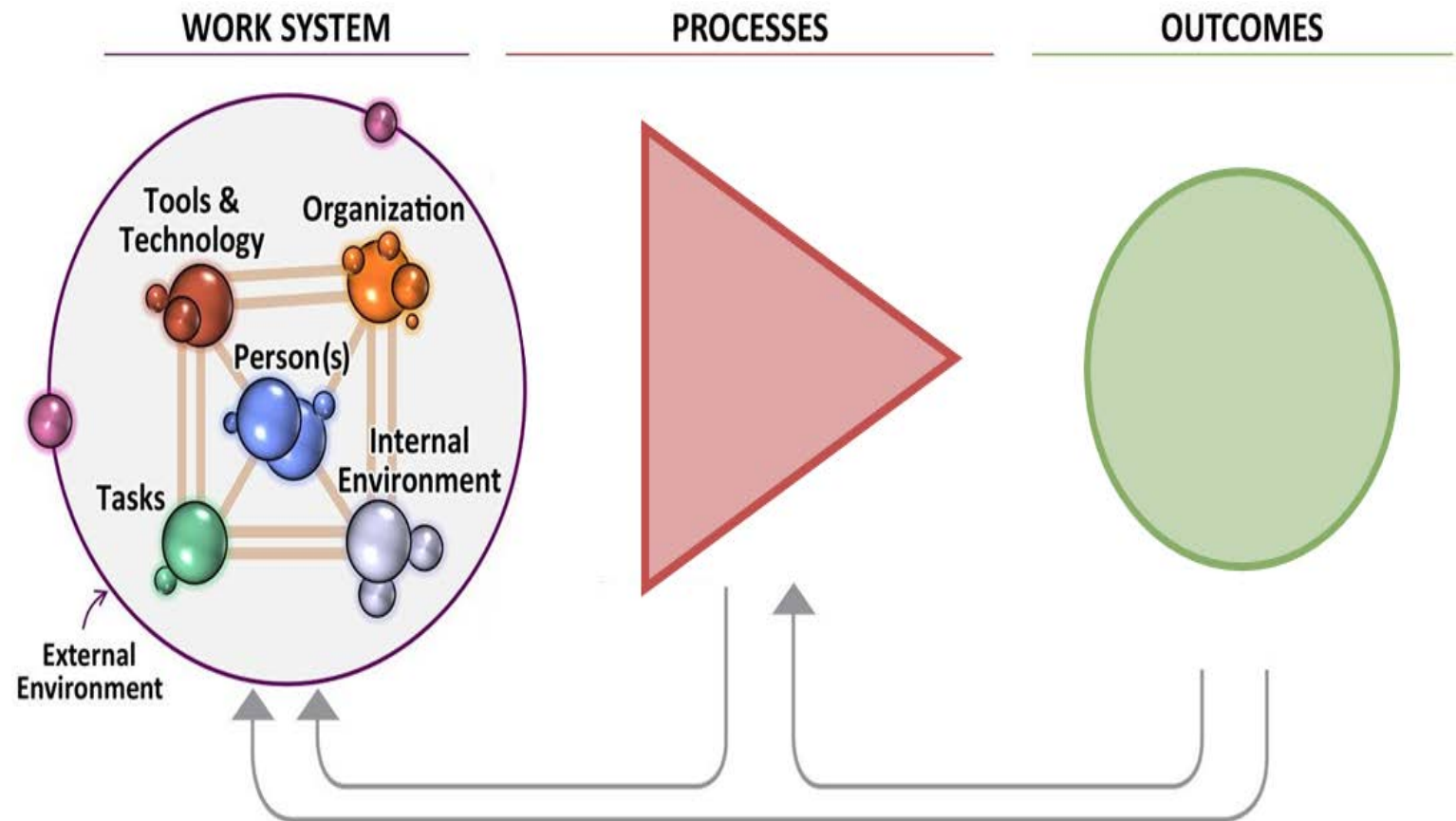
Practical Human Factors Approaches

2. The Systems Approach

Introducing the Systems Approach

(Systems Engineering Initiative for Patient Safety – SEIPS)

- A framework for understanding outcomes within complex socio-technical systems
- Describes how a **'work system'** (or 'socio-technical system, right) can influence **processes** (work done, middle), which in turn shapes **outcomes** (right)
- Acknowledges that work systems and processes constantly adapt and feed back on each other (**arrows**)
- NES / NHSEI / HSIB



SEIPS – A Multi-Functional Tool for all Health and Social Care Teams

- Multi-Functional Tool e.g.
 - Incident reporting and data collection
 - Process mapping and systems thinking
 - Care system designs and redesigns
 - Design of simulation scenarios
 - **Hazard identification, risk assessment & control**
 - **Team-based learning from incidents, complaints and everyday work**
 - **Organisational safety and complaints investigation/learning**
 - Considering Workforce wellbeing issues
 - Teaching fundamentals of the HF Systems Approach
 - **Designing standard operating procedures**
 - **Problem solving everyday hassles and irritations**

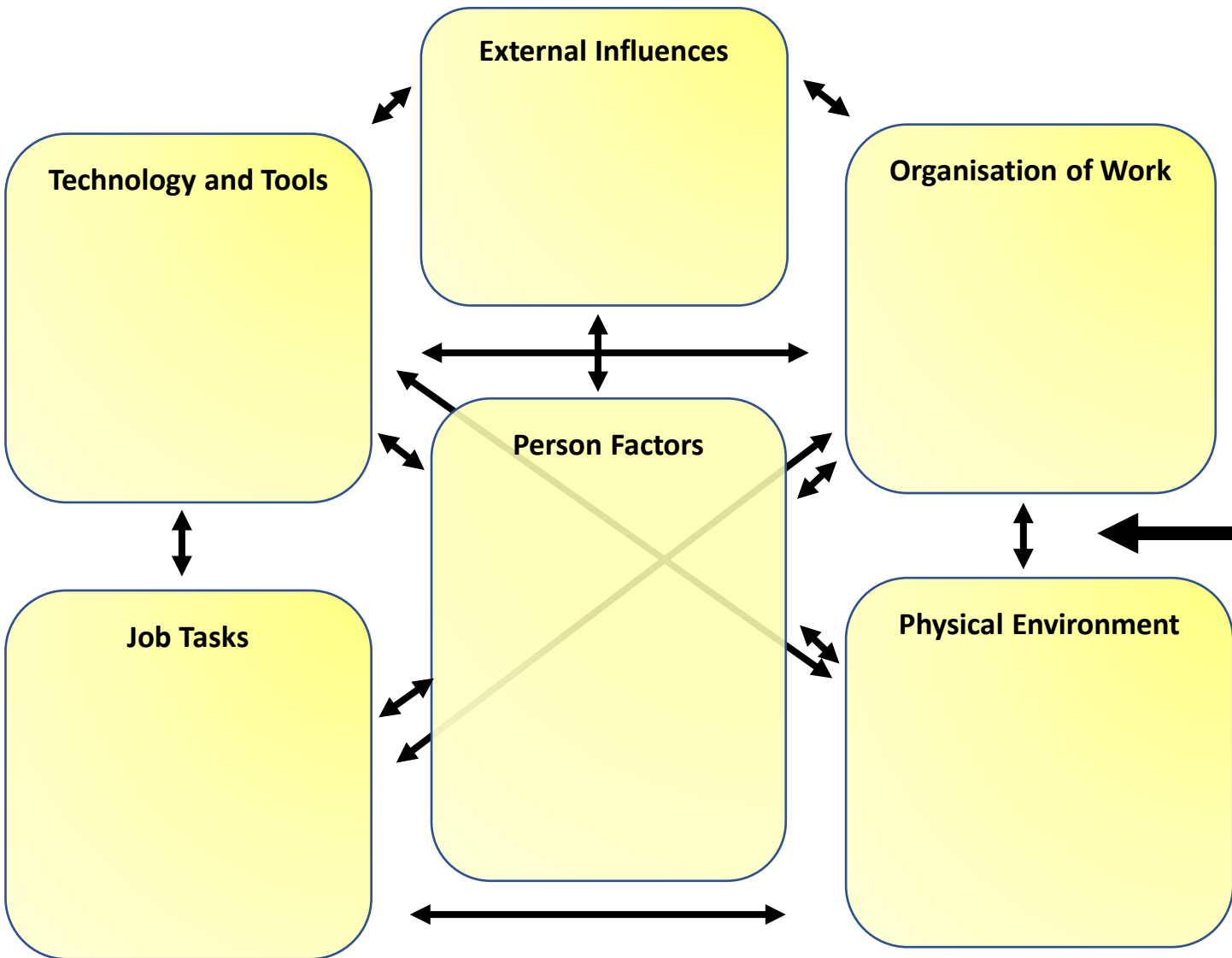


SEIPS: the 'Swiss Army Knife' of Human Factors

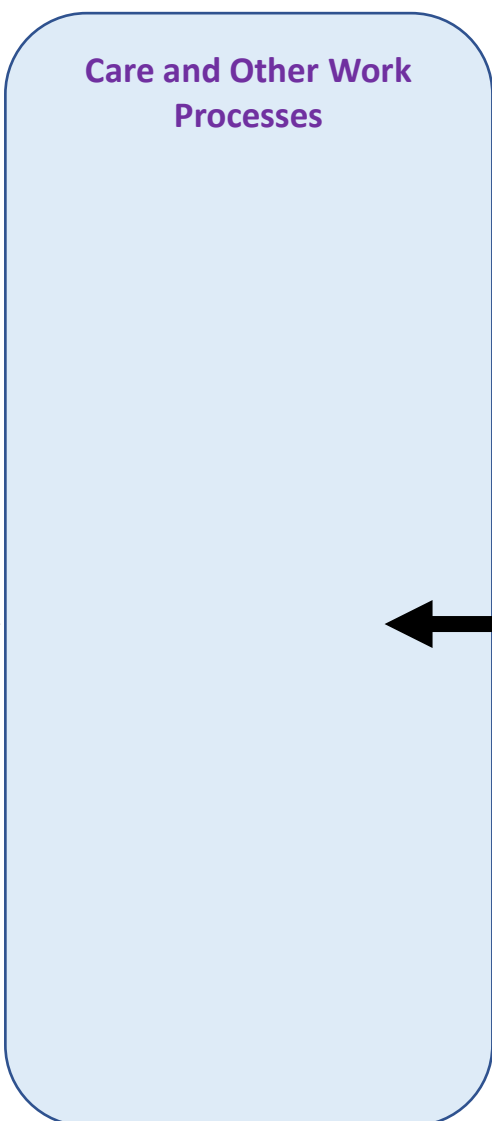
P Bowie, H Vosper, M Kumar, I Davidson, A Ross, T Herlihey, L Pickup, D Owens, D Benson, B
Baxendale, M Money Penny, A Carson-Stevens

Systems Engineering Initiative for Patient Safety (SEIPS) Worksheet

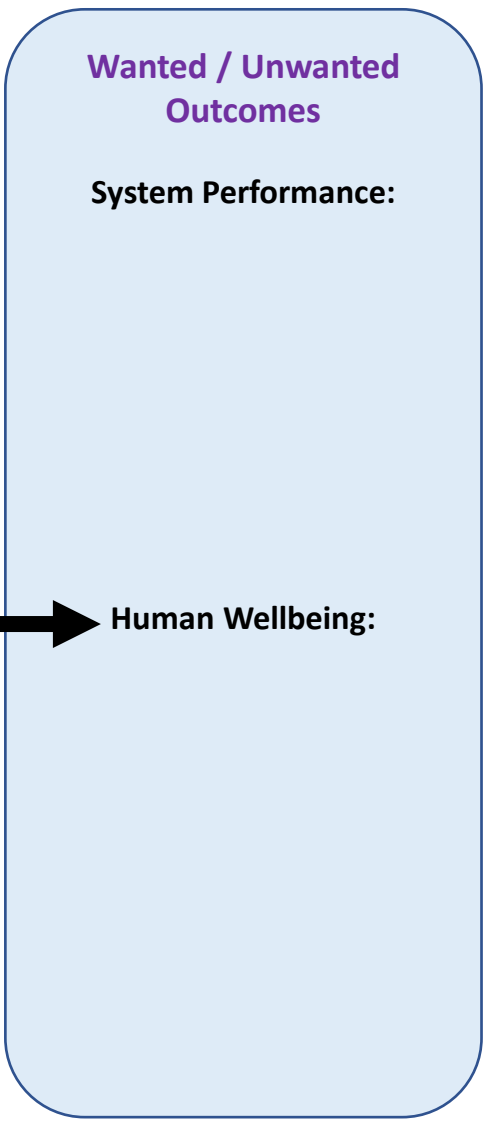
Work System Design Issues (e.g. Facilitators or Barriers)



Care Process



Outcomes



Human Wellbeing:

SEIPS Explained

- **SEIPS is the Safety Engineering Initiative for Patient Safety.**
- **It is based on a Human Factors systems approach to understanding care systems, processes and outcomes to inform better design and improvement.**
- **SEIPS can be used by anyone as a general systems analysis and problem-solving tool e.g. incident investigation; hazard identification; incident reporting & data collection; simulation design; protocol & checklist development; research design and data analysis..**

Guiding Step

1. **As a team, use the worksheet as a prompt to highlight the system-wide factors that contribute to the issue at hand**
2. **Seek to understand how these factors influence processes and interact to produce outcomes (wanted or unwanted)**
3. **Link this new knowledge to making improvement recommendations**

Examples of Performance Influencing Factors (PIFs)

Person Factors

e.g. Physical, psychological capabilities, limitations and impacts (frustration, stress, fatigue, burnout, musculoskeletal, satisfaction, enjoyment, experiences, job control); personality or social issues; cognitive ; competence, skills, knowledge, attitudes; risk perception; training issues; personal needs and preferences; psychological safety; performance variability; personal goals; adaptation to work conditions.

Care team e.g. roles, support, communication, collaboration, supervision, management, leadership

Patient/client e.g. complexity of clinical condition, physical, social, psychological, relationship factors

Others e.g. families and carers, and other health and social services colleagues

Tools & Technology

e.g. design interaction and device usability issues; familiarity; positioning, accessibility; availability; access; mobility; operational /calibrated /maintained; device usability; various IT design issues.

Task Factors

Specific actions within larger work processes, includes task attributes such as:

- level of task difficulty /complexity;
- time taken;
- hazardous nature;
- variety of tasks;
- sequencing of tasks
- workload, time pressure, cognitive load,

Physical Environment

e.g. Layout; noise; lighting; vibration; temperature; humidity and air quality; design of immediate workspace or physical environment layout; location; size; clutter; cleanliness; standardisation, aesthetics; crowding

External Influences

e.g. Societal, government, cultural, accreditation and regulatory influences e.g. funding, national policies and targets, professional bodies, regulatory demands, legislation and legal influences, other risks and influences

Organisation of Work Factors

e.g. Structures external to a person (but often put in place by people) that organise time, space, resources, and activity.

Within institutions:

- Work schedules/staffing
- Workload assignment
- Management and incentive systems
- Organisational / safety culture (values, commitment, transparency)
- Training
- Policies/procedures
- Resource availability and recruitment

In other settings:

- Communication
- Infrastructure
- Living arrangements
- Family roles and responsibilities
- Work and life schedules
- Financial and health-related resources

Outcomes

Outcomes – System Performance
e.g. Safety; productivity; resilience; efficiency; effectiveness; care quality

Outcomes – Human Wellbeing
e.g. Health and safety; patient satisfaction and experience; enjoyment; staff turnover; staff welfare; job satisfaction

SEIPS Explained

- **SEIPS is the Safety Engineering Initiative for Patient Safety. It is based on a Human Factors systems approach to understanding care systems, processes and outcomes to inform better design and improvement.**
- **SEIPS can be used by anyone as a general systems analysis and problem-solving tool e.g. safety investigations & learning reviews.**

Guiding Steps

How to use this worksheet

- The questions are simply SEIPS-based prompts to support you in developing a semi-structured interview schedule, largely for use with professionals who were involved in an incident or have knowledge about the work systems where an incident took place.
- Use the **bold** question at the top of each system element first, then use the other questions if you need to dig a little deeper.

Safety Investigations: Examples of Systems-Focused Questions

People & Teams

Patient and Family: Is there anything about the condition of the patient that made the process more challenging?

- Please describe the clinical condition of the patient
- How are patients/families usually involved in their care at this step in the process?
- Were there any particular factors you had to consider when dealing with this patient? E.g. language, culture, lifestyle? (was translation available?)

Professional: How do you feel about this incident?

- (if involved in the incident) Do you need any additional support following the incident?
- (if involved in the incident) Is there anything personally that we need to take into account the incident investigation?

Task Factors

Does everyone do this process the same or slightly differently?

- Is this process/task the same as described in the guideline?
- What do you need before starting to make sure this goes well?
- Are there any time pressures around completing this task?
- Can you tell me about the training that you/others have had to complete this task?

Physical Environment

Is this area well suited to what you need to do for this process?

- Are you always in the same place to complete this job?
- Does the noise/light levels affect your ability to complete your tasks?
- What is the infrastructure like here? E.g. office space, theatres, wards, work areas

Equipment, Tools & Technology

Is the equipment, tools & technology fit for purpose and easy to use?

- Is it available when you need it?
- Where is all the information held? Does it alert you to new information?
- Do the different pieces of technology 'talk to each other'?
- Was there equipment/technology you were meant to use but did not?
- Are there any checklists/SOPs/job aides? If so, are the liked and easy to use?

External Influences

Are there any factors, external to the organisation, that may have affected this incident?

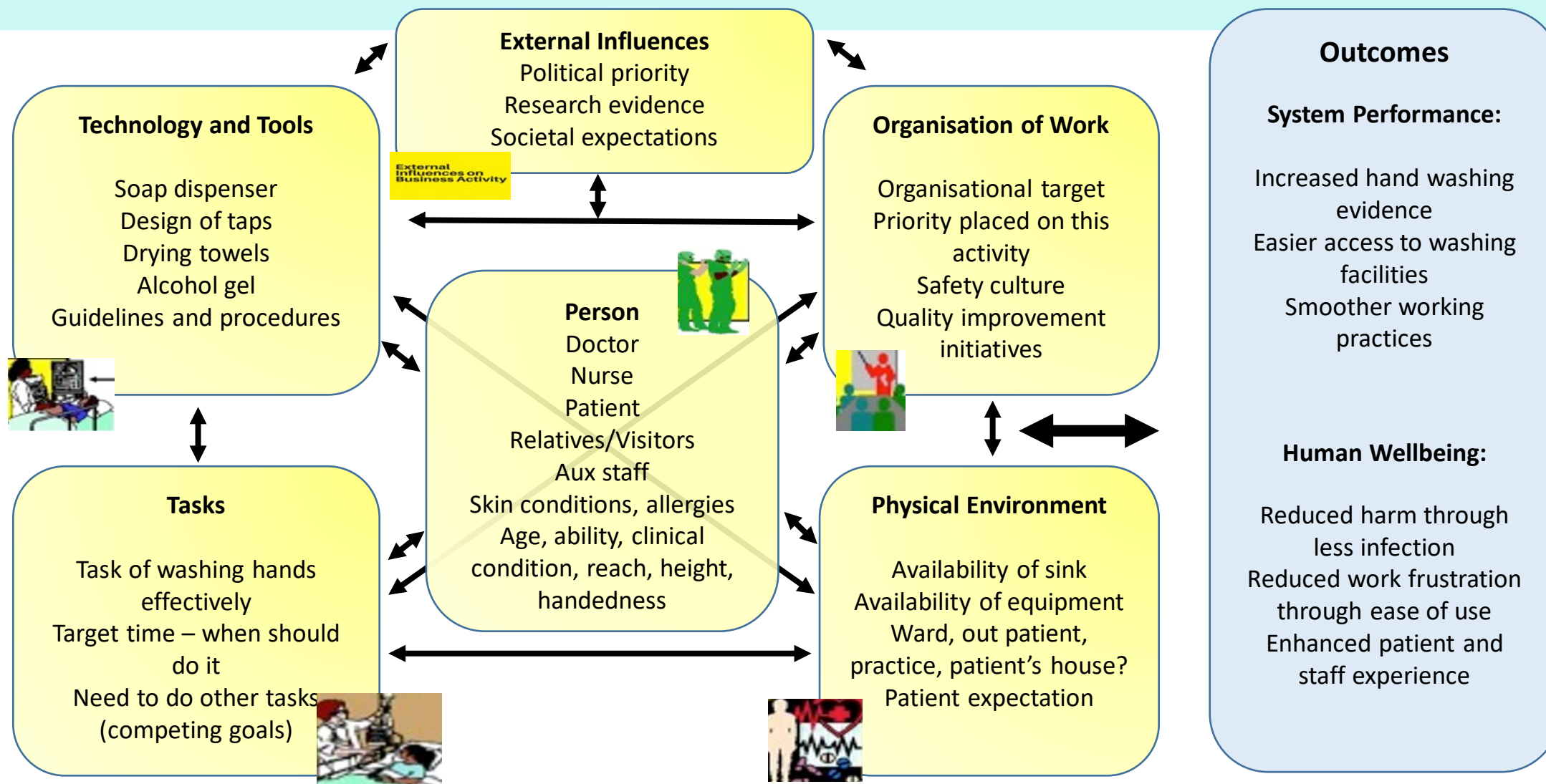
- Is there any National guidance that relates to the process?
- Have there been any changes to national guidance on this?
- Is there any increased external scrutiny over the process?

Organisation of Work Factors

Is this process of care running well normally?

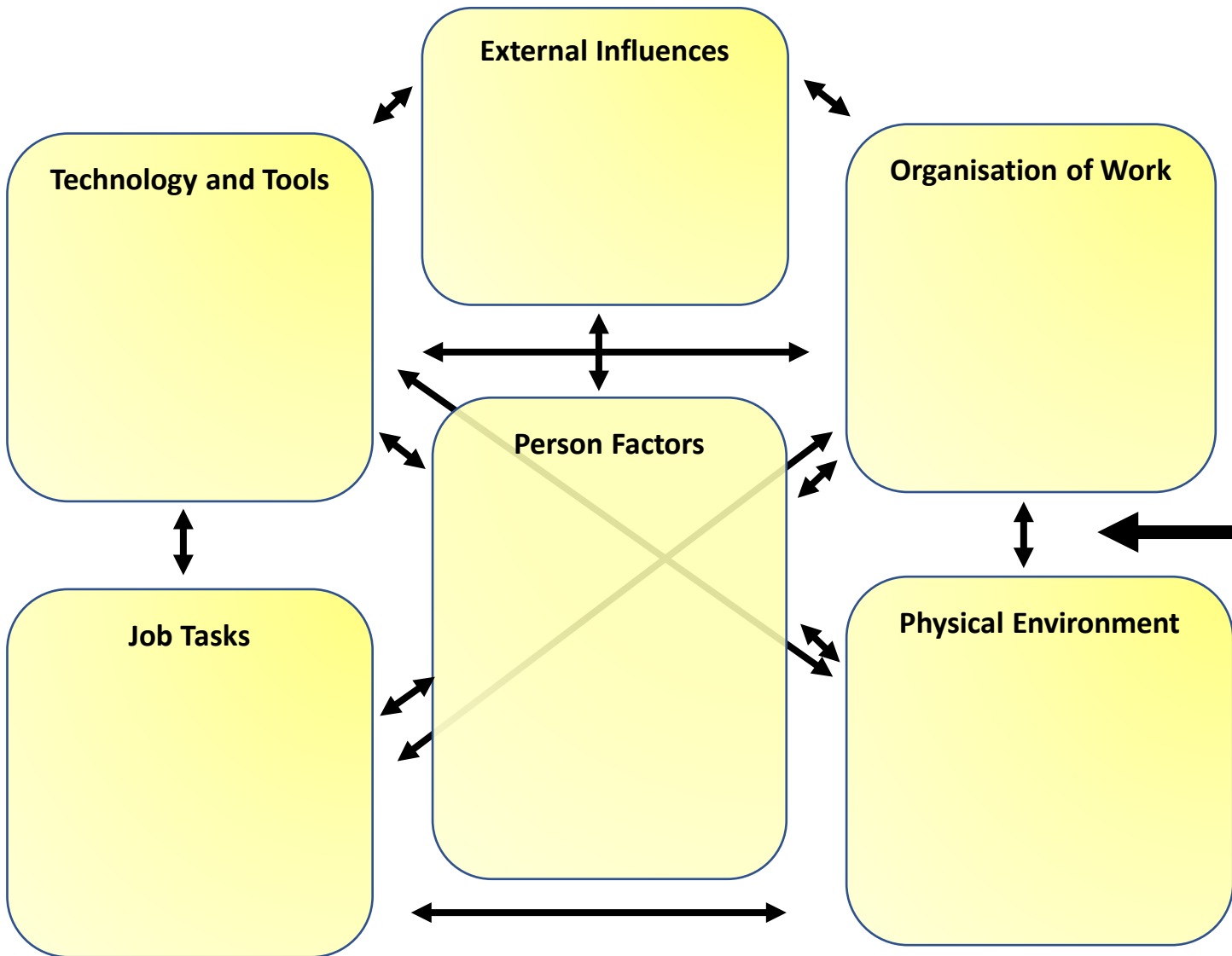
- Is there any indication that staff are feeling overwhelmed with workload?
- Do you feel you have enough staff on your team/unit?
- Is the skill mix appropriate at all points on shift?
- What is the process for escalation of concerns? Does this work well?
- Describe how you manage a patient through their care pathway?
- What are you most concerned about for this process, what's the next thing that you think might happen?
- Was this a known complication of this task/process, or was everyone surprised?
- Does the process require the patient to transfer between areas of care, e.g. from community to hospital, and how does this work?

Hand Hygiene System Story - Healthcare System Interactions and Outcomes

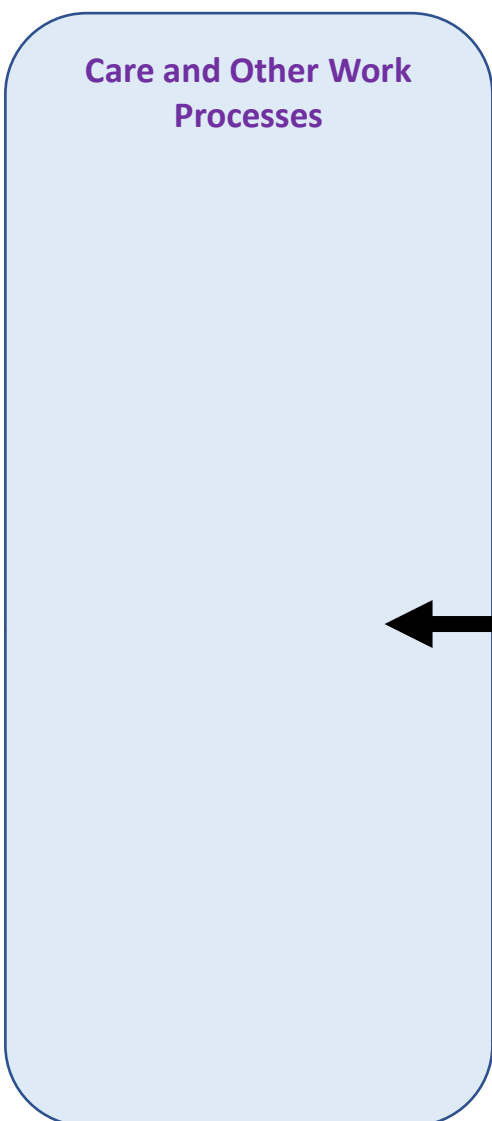


Systems Engineering Initiative for Patient Safety (SEIPS) Worksheet

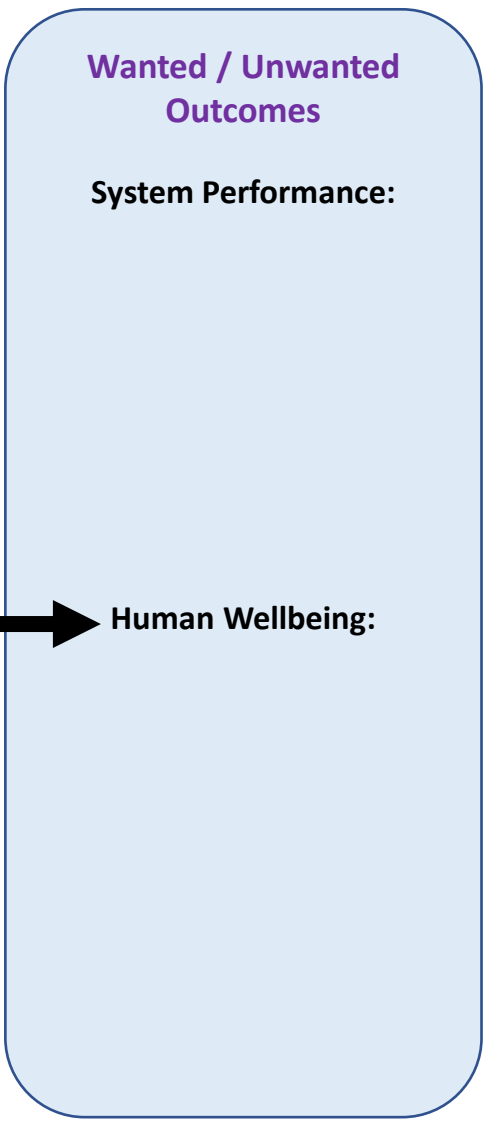
Work System Design Issues (e.g. Facilitators or Barriers)



Care Process



Outcomes



Human Wellbeing:

SEIPS Explained

- **SEIPS is the Safety Engineering Initiative for Patient Safety.**
- **It is based on a Human Factors systems approach to understanding care systems, processes and outcomes to inform better design and improvement.**
- **SEIPS can be used by anyone as a general systems analysis and problem-solving tool e.g. incident investigation; hazard identification; incident reporting & data collection; simulation design; protocol & checklist development; research design and data analysis..**

Guiding Step

1. **As a team, use the worksheet as a prompt to highlight the system-wide factors that contribute to the issue at hand**
2. **Seek to understand how these factors influence processes and interact to produce outcomes (wanted or unwanted)**
3. **Link this new knowledge to making improvement recommendations**

Examples of Performance Influencing Factors (PIFs)

Person Factors

e.g. Physical, psychological capabilities, limitations and impacts (frustration, stress, fatigue, burnout, musculoskeletal, satisfaction, enjoyment, experiences, job control); personality or social issues; cognitive ; competence, skills, knowledge, attitudes; risk perception; training issues; personal needs and preferences; psychological safety; performance variability; personal goals; adaptation to work conditions.

Care team e.g. roles, support, communication, collaboration, supervision, management, leadership

Patient/client e.g. complexity of clinical condition, physical, social, psychological, relationship factors

Others e.g. families and carers, and other health and social services colleagues

Tools & Technology

e.g. design interaction and device usability issues; familiarity; positioning, accessibility; availability; access; mobility; operational /calibrated /maintained; device usability; various IT design issues.

Task Factors

Specific actions within larger work processes, includes task attributes such as:

- level of task difficulty /complexity;
- time taken;
- hazardous nature;
- variety of tasks;
- sequencing of tasks
- workload, time pressure, cognitive load,

Physical Environment

e.g. Layout; noise; lighting; vibration; temperature; humidity and air quality; design of immediate workspace or physical environment layout; location; size; clutter; cleanliness; standardisation, aesthetics; crowding

External Influences

e.g. Societal, government, cultural, accreditation and regulatory influences e.g. funding, national policies and targets, professional bodies, regulatory demands, legislation and legal influences, other risks and influences

Organisation of Work Factors

e.g. Structures external to a person (but often put in place by people) that organise time, space, resources, and activity.

Within institutions:

- Work schedules/staffing
- Workload assignment
- Management and incentive systems
- Organisational / safety culture (values, commitment, transparency)
- Training
- Policies/procedures
- Resource availability and recruitment

In other settings:

- Communication
- Infrastructure
- Living arrangements
- Family roles and responsibilities
- Work and life schedules
- Financial and health-related resources

Outcomes

Outcomes – System Performance
e.g. Safety; productivity; resilience; efficiency; effectiveness; care quality

Outcomes – Human Wellbeing
e.g. Health and safety; patient satisfaction and experience; enjoyment; staff turnover; staff welfare; job satisfaction

SEIPS Explained

- **SEIPS is the Safety Engineering Initiative for Patient Safety. It is based on a Human Factors systems approach to understanding care systems, processes and outcomes to inform better design and improvement.**
- **SEIPS can be used by anyone as a general systems analysis and problem-solving tool e.g. safety investigations & learning reviews.**

Guiding Steps

How to use this worksheet

- The questions are simply SEIPS-based prompts to support you in developing a semi-structured interview schedule, largely for use with professionals who were involved in an incident or have knowledge about the work systems where an incident took place.
- Use the **bold** question at the top of each system element first, then use the other questions if you need to dig a little deeper.

Safety Investigations: Examples of Systems-Focused Questions

People & Teams

Patient and Family: Is there anything about the condition of the patient that made the process more challenging?

- Please describe the clinical condition of the patient
- How are patients/families usually involved in their care at this step in the process?
- Were there any particular factors you had to consider when dealing with this patient? E.g. language, culture, lifestyle? (was translation available?)

Professional: How do you feel about this incident?

- (if involved in the incident) Do you need any additional support following the incident?
- (if involved in the incident) Is there anything personally that we need to take into account the incident investigation?

Task Factors

Does everyone do this process the same or slightly differently?

- Is this process/task the same as described in the guideline?
- What do you need before starting to make sure this goes well?
- Are there any time pressures around completing this task?
- Can you tell me about the training that you/others have had to complete this task?

Physical Environment

Is this area well suited to what you need to do for this process?

- Are you always in the same place to complete this job?
- Does the noise/light levels affect your ability to complete your tasks?
- What is the infrastructure like here? E.g. office space, theatres, wards, work areas

Equipment, Tools & Technology

Is the equipment, tools & technology fit for purpose and easy to use?

- Is it available when you need it?
- Where is all the information held? Does it alert you to new information?
- Do the different pieces of technology 'talk to each other'?
- Was there equipment/technology you were meant to use but did not?
- Are there any checklists/SOPs/job aides? If so, are the liked and easy to use?

External Influences

Are there any factors, external to the organisation, that may have affected this incident?

- Is there any National guidance that relates to the process?
- Have there been any changes to national guidance on this?
- Is there any increased external scrutiny over the process?

Organisation of Work Factors

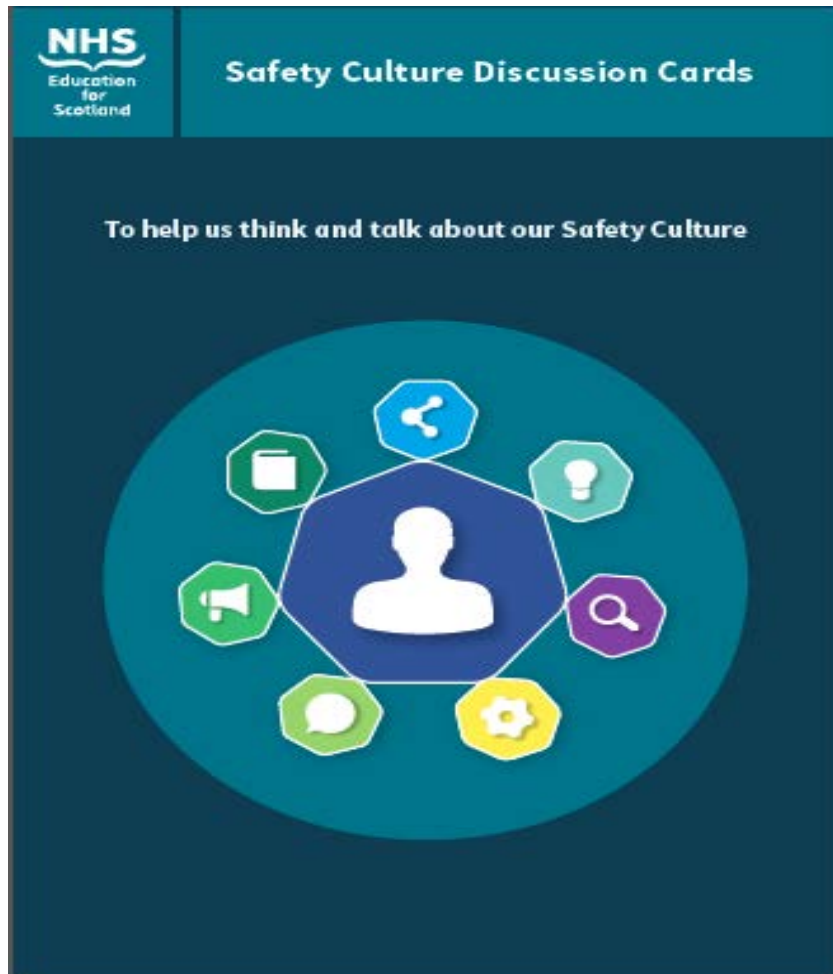
Is this process of care running well normally?

- Is there any indication that staff are feeling overwhelmed with workload?
- Do you feel you have enough staff on your team/unit?
- Is the skill mix appropriate at all points on shift?
- What is the process for escalation of concerns? Does this work well?
- Describe how you manage a patient through their care pathway?
- What are you most concerned about for this process, what's the next thing that you think might happen?
- Was this a known complication of this task/process, or was everyone surprised?
- Does the process require the patient to transfer between areas of care, e.g. from community to hospital, and how does this work?

Practical Human Factors Approaches

3. Safety Culture: Reflection and Learning

Safety Culture Discussion Cards



- Get people talking!
- No answers, but raise questions!
- Build on what care teams already know and experience
- Encourage discussions to learn about and improve SC
- c80 Cards, c10 guiding/explanatory, 70 discussion cards, 8 themes
- Flexibility to compare views, safety moments, choose a specific theme in-depth – highly flexible
- Aim to be straightforward and practical

Reflection & Learning – Everyday Work

NHS
Education
for
Scotland

Safety Culture Discussion Cards

To help us think and talk about our Safety Culture



NHS EDUCATION FOR SCOTLAND

Introduction



What Is Safety Culture?

Safety culture can be described as our:

1

Values
What is important

2

Behaviours
The way we do things around here

3

Beliefs
How things work

Safety culture has been shown to be a key predictor of safety performance in several industries. It is the difference between a safe organisation and an accident waiting to happen. Thinking and talking about our safety culture is essential for us to understand what we do well, and where we need to improve.

These cards are designed to help us to do this.

0a

SAFETY CULTURE CARDS

NHS EDUCATION FOR SCOTLAND

Introduction



Organisation of the Cards

There are several individual cards for each of the following 'safety culture elements'. Each card introduces a different issue for reflection or discussions by the Care Team.

- Leadership and Management Commitment
- Resourcing
- Just Culture, Reporting and Learning
- Risk Awareness and Management
- Teamwork
- Communication
- Responsibility
- Involvement

0b

SAFETY CULTURE CARDS

NHS EDUCATION FOR SCOTLAND

Introduction



How to Use These Cards

You can use these cards in any way that helps you and your colleagues to think and talk about safety culture. If you are using the cards in a group, one person may need to act as discussion facilitator. You can use as many or as few cards as you like.

Five possibilities are described in the following cards:

Option 1: Comparing views	Option 2: Safety Moments	Option 3: Focus on...	Option 4: SWOT Analysis	Option 5: Influences
Compare similar and different views between groups	Discuss just one issue for 10-15 minutes	Discuss all of the cards in a particular element	Sort the cards into Strengths, Weaknesses, Opportunities and Threats	Organise cards into patterns to show how the issues relate to one another

0c

SAFETY CULTURE CARDS

Practical Human Factors Approaches

4. Designing Work Procedures

User-Centred Design of Work Procedures

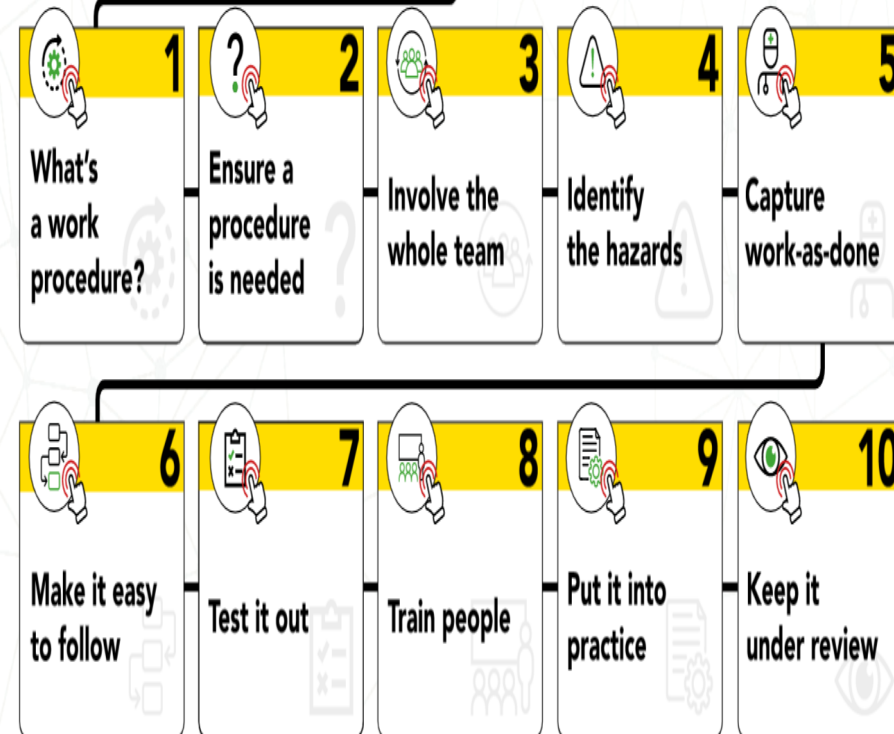
Guidance to help design effective
and usable work procedures for
health and social care teams



Ten key steps to design work better

Make your work procedures **safe** and **easy-to-use** for person-centred care

The work procedure process journey



3 Take Home Messages

1. HF is a profession and applied science (not a collection of 'factors about humans')
2. HF is about evaluating and improving the design of work to optimise both system performance and human wellbeing
3. HF always takes a Systems Approach – you can apply this to all aspects of your care work, problem-solving and learning activity

Take Home Messages



Thank You Very Much!

Q&A

Email: paul.bowie@nhs.scot