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# SEIPS quick reference guide and work system explorer

Version 1, August 2022

# Healthcare is a complex socio-technical system

Healthcare is complex because it is highly variable, uncertain, and dynamic.

Healthcare is a socio-technical system because it is characterised by multiple interactions between various components, both human and technological.:

# What is SEIPS?

SEIPS is a framework for understanding outcomes within complex socio-technical systems.

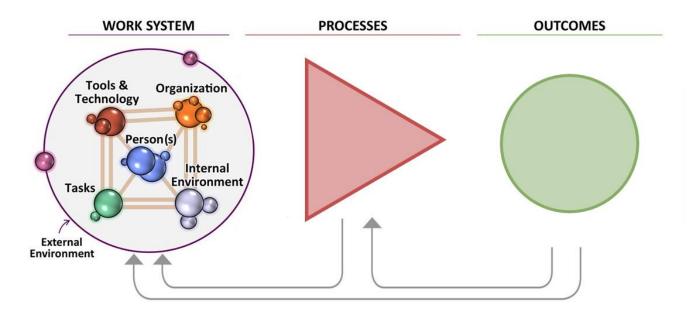
Figure 1 provides an overview of the System Engineering Initiative for Patient Safety (SEIPS) framework, combining SEIPS 2.0<sup>1</sup> and SEIPS 101<sup>2</sup>. The figure It describes how a **work system** (or socio-technical system, left) can influence **processes** (work done, middle), which in turn shapes **outcomes** (right).

The SEIPS framework acknowledges that work systems and processes constantly adapt (see arrows in Figure 1).

<sup>&</sup>lt;sup>1</sup> Holden, R.J., Carayon, P., Gurses, A.P., Hoonakker, P., Schoofs Hundt, A., Ozok, A.A. and Rivera-Rodriguez, A,J. (2013) SEIPS 2.0: a human factors framework for studying and improving the work of healthcare professionals and patients. Ergonomics, 56(11), 1669-1686.

<sup>&</sup>lt;sup>2</sup> Holden, R.J., Carayon, P. (2021). SEIPS 101 and seven simple SEIPS tools. BMJ Quality & Safety, 0, 1-10

Figure 1. Overview of the SEIPS framework



# What are the different parts of the work system?

A 'work system' consists of six broad elements: external environment, organisation, internal environment, tools and technology, tasks and person(s). Figure 2 provides a brief overview of the different elements and potential contributory factors to consider during a learning response.

People cannot be separated from the work system; their deliberate placement at the centre emphasises that design should support – not replace or compensate for – people.

# Using SEIPS to learn from patient safety incidents

SEIPS can be used as a general problem-solving tool (eg to guide how we learn and improve following a patient safety incident, to conduct a horizon scan, and to inform system design).

Figure 3 (the work system explorer) provides questions to help explore different work system elements. Figure 4 provides a blank template; this is also available as a MS PowerPoint.

Patient safety incidents result from multiple interactions between work system factors. SEIPS prompts us to look for interactions rather than simple linear cause and effect relationships. When a learning response thoroughly examines the different work system components and their interactions safety actions can focus on wider system issues, not individuals.

Figure 2. Overview of the SEIPS work system

## Tools & Technology

Characteristics such as:

- Usability
- Accessibility
- Familiarity
- Level of automation
- · Portability and functionality
- Maintenance (outdated, malfunctioning)

#### **Tasks**

- · Specific actions within larger work processes
- Includes task attributes such as:
  - Difficulty
  - Complexity
  - Variety
  - Ambiguity
  - Sequence

#### Person

- · Individual characteristics:
  - · Psychological impacts (e.g., frustration, stress, burnout)
  - · Cognitive factors (attention, memory, confusion)
  - · Preferences, personal goals
  - Knowledge, competence, skills
  - · Physiological factors (illness, dehydration)
  - Physical strength and needs
- · Collective characteristics: team cohesiveness

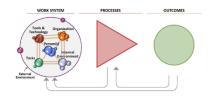
### **Organisation**

- 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 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

#### Internal environment

Physical environment such as characteristics of

- · Ambient environment: lighting, noise, vibration, temperature
- · Physical layout and available space
- · Housekeeping: cluttered, organisation, cleanliness



**Desired Outcomes** 

**System Performance:** 

**Human Wellbeing:** 

# Appreciative inquiry question:

The SEIPS model sets out desired outcomes- what are you aiming to achieve when you deliver patient care?

# **External environment**

Societal, economic, regulatory and policy factors outside an organisation

Figure 3. SEIPS work system explorer questions

## **Tools & Technology**

- Describe the equipment/tools you use
- · Describe the equipment design
- · Share your insights into equipment availability and appropriateness
- Share your insights into equipment reliability
- · Describe how information is presented (eg records/IT systems)
- Describe alarms and alerts
- · Are any tasks automated?
- Describe where equipment is positioned. Is this optimal?
- Are tools/technology maintained and updated?
- Are manuals, procedures and supports accessible?

#### **Tasks**

- · Tell me about the task demands you face
- Describe the tasks which are complex or challenging to carry out
- Talk me through your experiences of the workload
- Are there time pressures? If yes please tell me
- Does task repetition/monotony occur in this work system?
- Do you have to re-prioritise/reorganise?

#### **External environment**

- · Describe any relevant national targets
- Tell me how the following impacts (if at all):
  - Policy and regulatory demands
  - · Accreditation standards
  - Political decision making
  - · Global events

## **Organisation**

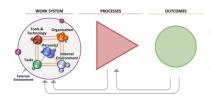
- Tell me about how the patient pathways work
- Describe the information flow (how information is communicated)
- What is the communications workload like?
- Tell me how new information is flagged
- Where is new information held?
- Describe the leadership and supervision arrangements
- Describe how works is scheduled/allocated
- · Describe staffing levels and resourcing
- · Describe the safety/organisational culture
- · Describe how change management works

# Person

- Tell me about the patient mix
- Describe the team who deliver patient care
- Who else is part of the team (eg admin, domestic)?
- · How familiar are team members with care processes/pathways?
- Are roles/responsibilities clearly defined?
- Describe how training is organised to support safe care
- Describe the team dynamics
- Describe the impact of personal factors (eg stress, morale, tiredness)

#### Internal environment

- Does the workspace support safe patient care/task performance?
- Share your thoughts on the layout of the environment
- Is the workspace appropriate for the task?
- · Where are tasks completed?
- · Describe any distractions you experience regularly
- · Do interruptions impact patient care/task performance? If yes, how?
- · Describe the impact of the ambient environment (eg lighting, noise, air quality)



# **Desired Outcomes**

## **System Performance:**

# **Human Wellbeing:**

#### Appreciative inquiry question:

The SEIPS model sets out desired outcomes- what are you aiming to achieve when you deliver patient care?

Figure 4. SEIPS work system template

