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A markers framework for assessing and monitoring patient safety

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Scope

Ongoing work
- Managing safety
- The need for practical methods

Planned topics for investigation include
- compensatory strategies people adopt to manage work load
- capture errors when transferring between similar devices
- just-in-time cues for error recovery

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Every IV infusion pump at the Cancer Centre of South Eastern Ontario will be replaced with a new ALARIS infusion pump with Guardrails Safety Software

- Computer-based decision support
- **Adding complexity and ignoring the mundane**

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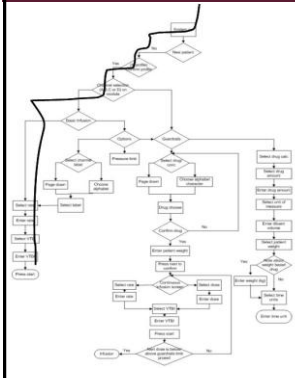

Example of a sequence of tasks in IV medication administration for basic infusion (Carayon)

Some actions have properties that make them hard to remember, especially during high workload conditions or when resuming a task after an interruption.

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"On average, a member of staff is interrupted every three and a half minutes" - Nursing Times

Can individuals reduce sequence error rates if they invest time to retrace their steps after being interrupted?

1. Enforced lockout and task surrogates

2. Self-imposed resumption delay

3. Attentional markers

4. A 'pause' button

This pump does not review calculations. It just repeats the exact same numbers.

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Safe by design

Interventions that are shown to assist interruption management, for example, will be added to a generalisable account of device interaction patterns, rather than one that only explains issues specific to a particular device.

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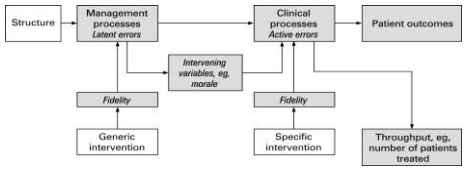
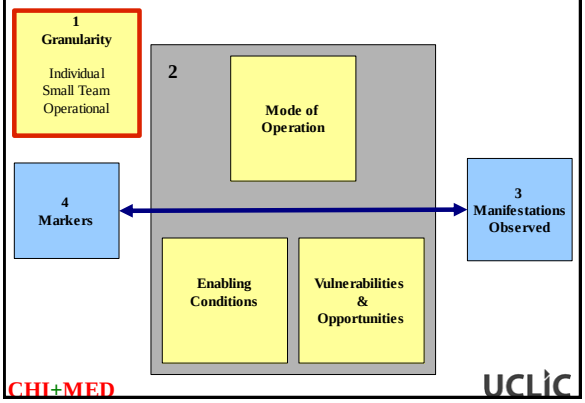


System model from Brown et al. (2008)

Not all safety practices are the result of intervention (generic or specific), some are hidden since they are heavily dependent on tacit task knowledge and implicit assumptions associated with the situated use of technology.

Markers Framework

- Provides a tractable representation of manifestations of safety and resilience during everyday performance.
- Need for a collective language to articulate knowledge of safe and resilient practices, within and across domains.
- Developed in response to the confusion caused by reporting findings, when categorising observations, without having a common frame of reference to make cross-study comparisons.

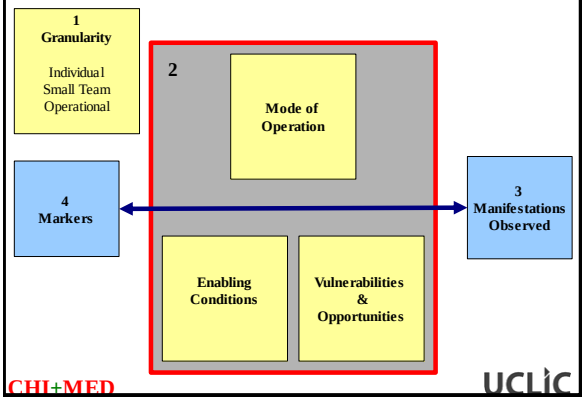


Part One: Granularity

Individual Level: Individuals can develop work management strategies to mitigate against errors and tools can be designed to facilitate these strategies.

Small Team Level: There are many different things to 'see' in socio-technical contexts, often too many, and so it is helpful to have approaches that can facilitate our perception in the 'noise' of real world contexts. Adaptive team coordination, for example, is clearly important for safety and resilience.

Operational Level: The system of operators, procedures, equipment is expected to perform reliably for design-base incidents. It is the successful interaction between these system components that creates safety.

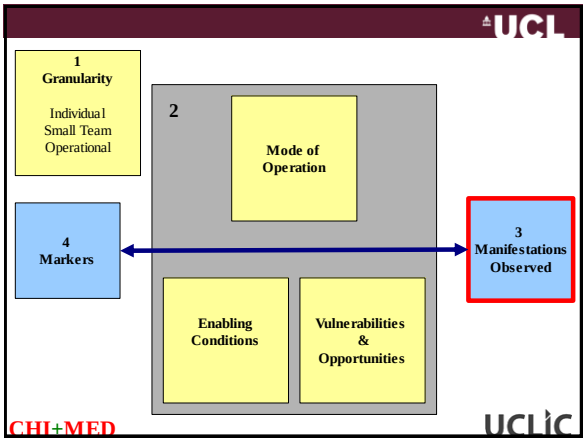


Part Two: Shaping safety practice

Mode of Operation: This refers to the way that the system has organised itself. Different modes may be apparent in some contexts. The mode of operation will impact on the enabling conditions (see below) e.g., when a major incident is declared a separate team is located to a dedicated control room.

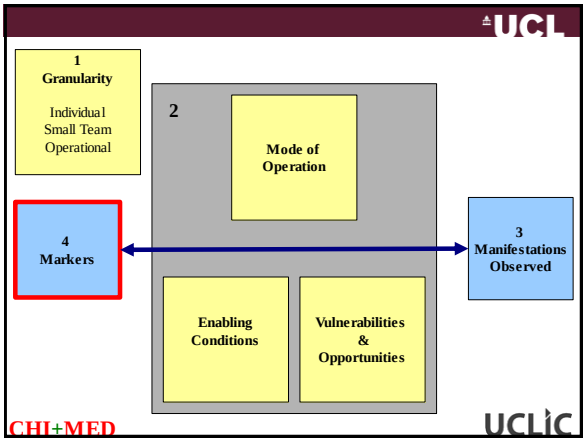
Enabling conditions: These are the hard and soft constraints that influence whether safety practice can be enacted (e.g., a paper-clip!).

Vulnerabilities and opportunities: Vulnerabilities associated with the limitations of human cognition, breakdowns in communication and poorly designed equipment, for example, are ever present within a system. However, recognition of these factors provide an opportunity for performance improvement, e.g., observing better coping strategies / workarounds in others might lead to the adoption of those strategies in oneself.



Part Three: Manifestations

Manifestations are the behaviours that you would actually observe in context. These are dependent on the factors that shape performance practice. They are behaviours that highlight vulnerabilities in the system but can also lead to new safety practices.



Part Four: Markers

Markers are abstract, they can be generalised across levels of granularity, and are associated with a group of manifestations. Examples of markers include: admitting failure, managing workload, maximising information extraction, preparation, etc.

Fictional Example

A risk to patient safety: increased cognitive demands and new task procedures

A small team works too slowly due to not being able to coordinate activities using the IT system [*granularity of analysis*]. The likelihood of this failure is increased during a transition period between old and new IT systems [*mode of operation*]. An experienced team may recognise that new team member roles are sometimes needed to maintain performance [*enabling condition*]. Recognising that the group is not coordinating well [*vulnerability*] may result in a consultant being supported by a nurse during less busy times to prepare for upcoming work [*opportunity*]. The culture of reluctance to learn new technology (i.e., the new IT system) [*manifestation*] may result in an admission of failure (i.e., slow work) [*marker*] and result in a temporary solution (i.e., support from colleague).

Conclusion

When surveying case studies we see that they do not share a common framework, which is a prerequisite to comparing safety practice within and across domains.

Our framework tries to be much more specific about recognising markers and manifestations and specifies important elements that affect practice.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