

# APPLICATION OF FUNCTIONAL RESONANCE ACCIDENT MODEL (FRAM) FRAMEWORK TO UNDERSTAND ALARM FATIGUE

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## DESCRIPTION

Alarms are incorporated into the design of medical devices that monitor physiological processes to alert healthcare professionals about possible adverse events. At Humber River Health (HRH), ASCOM phones are used to promote efficiency in alarm management and are expected to be carried by nursing staff. Alarm fatigue occurs as numerous alerts result in additional tasks for healthcare providers.

A background analysis was completed on alarm frequency in the emergency department. Over 2000 alarms were identified during a 12-hour shift. With up to 300 alarms occurring per hour, it was hypothesized that nurses might experience alarm fatigue, which can impact patient safety.

## OBJECTIVE

To understand differences in practice for alarm management.

## ACTIONS TAKEN

The FRAM framework elements were applied to three types of alarms: simple alarms, complex alarms, and ASCOM phones.

- Simple alarms ring from medical devices (e.g. feeding pumps)
- Complex alarms ring from medical devices, but alerts are also sent to ASCOM phones (e.g. call bells)
- ASCOM phones may ring when a healthcare provider is being reached.

Instead of modeling interactions based on a hierarchical structure, the FRAM framework was utilized to illustrate interactions between users and alarms by decomposing a complex system into functions.

## SUMMARY OF RESULTS

The FRAM framework processes are defined by functions, which depict how daily work is completed. When analyzing HRH's alarm management process, there were five functions identified for simple alarms, nine functions identified for complex alarms, and eight functions identified for ASCOM phones. As this alarm system is complex, the combined number of functions was 14. Each function was explored using five aspects: input, resources, control, preconditions, and time. Based on the five FRAM framework aspects, 75 interview questions about various ASCOM alarm components were designed.

## LESSONS LEARNED

By using the FRAM framework, daily tasks can be highlighted to comprehend alarm management and to find opportunities to reduce alarm fatigue.

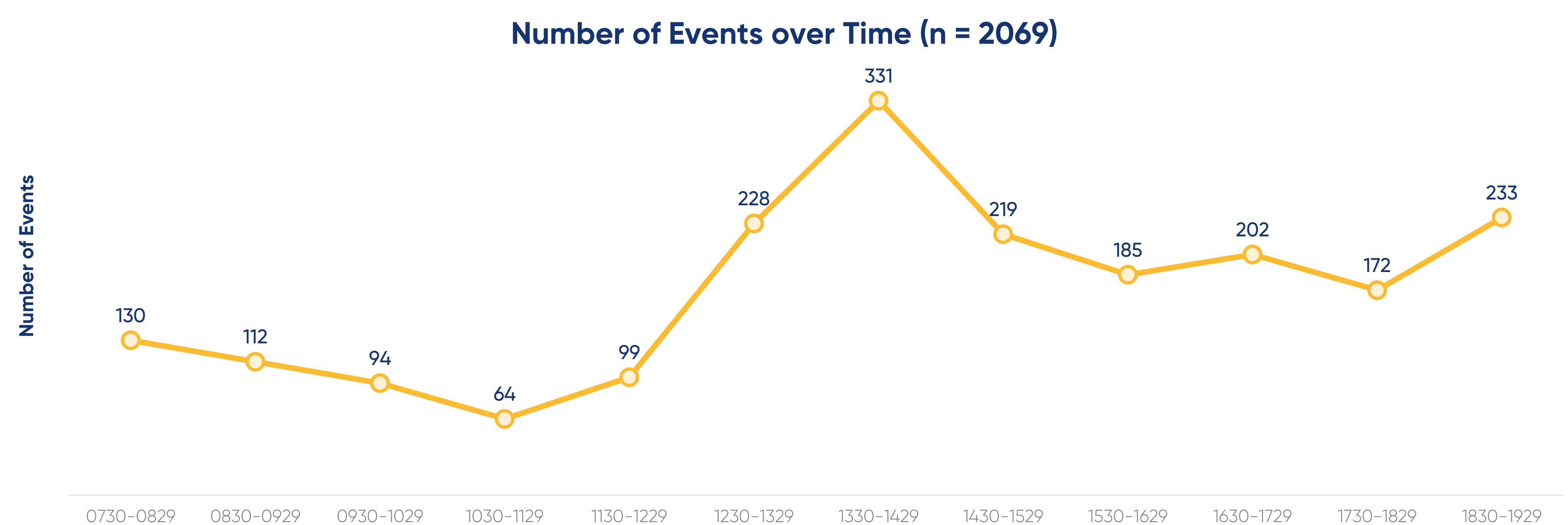


Figure 1.

A spot audit in December 2022. 2069 alarm events occurred in a 12 hour period.

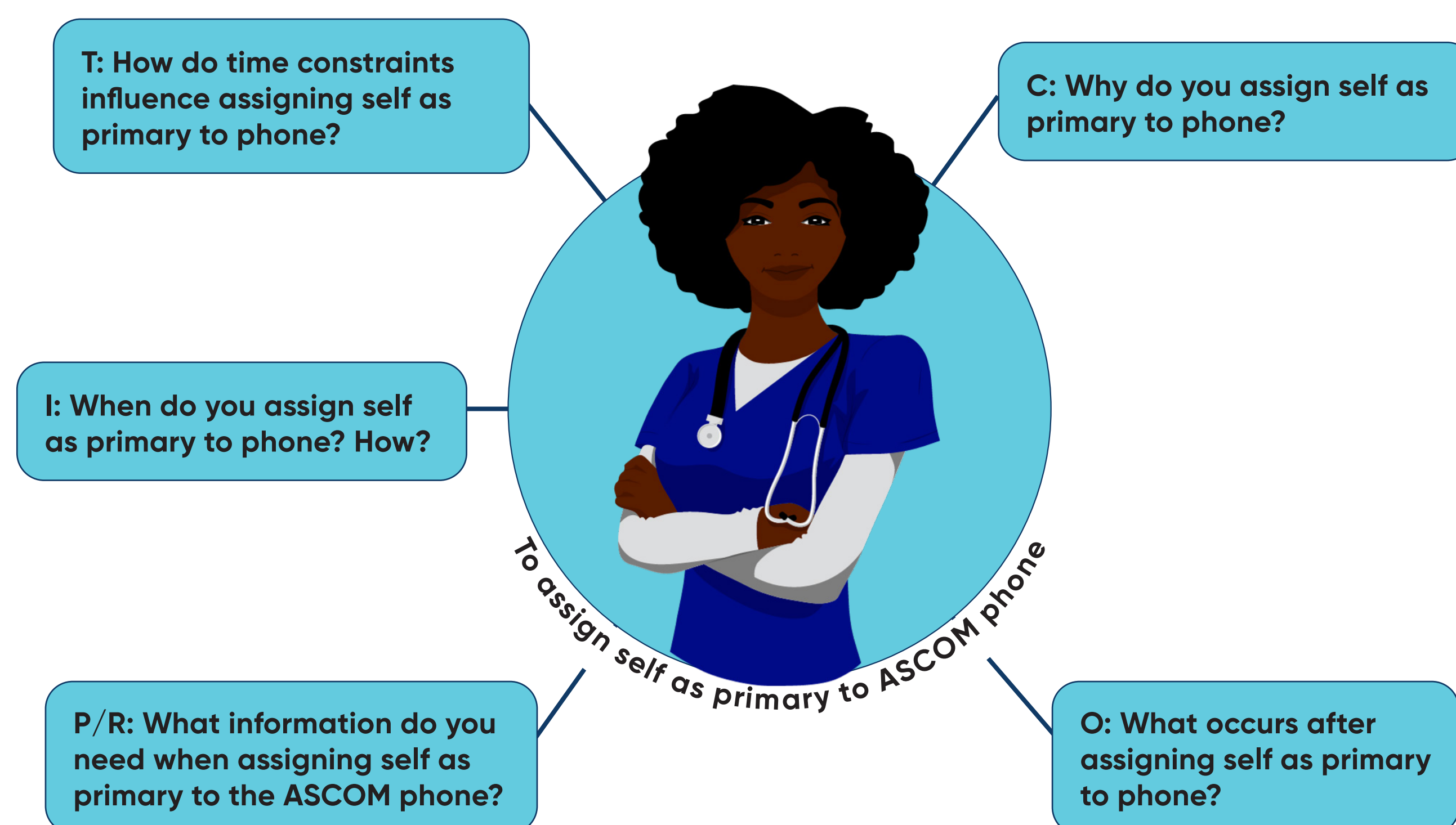


Figure 2.

The questions "What resources do you need when assigning yourself as primary to the ASCOM phone?" and "What information do you need prior to assigning yourself as primary to the ASCOM phone?" correspond to the function of assigning oneself as a primary user to one's ASCOM phone while taking into account the aspects of Resources and Preconditions. Since the answers to both questions could be identical, they were integrated into a single interview question.