8 Experiences with FRAM in Dutch Hospitals

Muddling Through with Models

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> FRAM offered us a completely new perspective on our anticoagulation management; for years a 'headache file'. We simply never looked at it this way before. Instead of mainly focusing on whether or not we followed the guidelines, we now discussed the process from a daily practice point of view. By doing so, we were able to come up with improvement initiatives that actually improved our work process.
>
> **(Cardiothoracic surgeon)**

Safety-II offers a very promising and welcome new perspective on quality and safety, but it remains a great challenge as to how hospitals can translate this theory into specific research plans and improvement initiatives. We reviewed the Functional Resonance Analysis Method (FRAM) to visualise and analyse complex processes as they occur in everyday clinical practice. This tool seemed exactly what we were looking for as it provides a practical means to apply Safety-II principles in patient safety work in hospitals.

Since 2017, we conducted FRAM analyses on various health care topics, such as preoperative anticoagulation management (Damen, et al., 2018), critical results in radiology, postpartum haemorrhage, thrombosis prophylaxis, and the triage process at the Emergency Department. All applied FRAM analyses revealed valuable insights into Work-as-Done which provided the base for further process optimisation. In this chapter, we will elaborate on our experiences and provide some recommendations for the practical implementation of FRAM. In addition, we suggest a practical framework to structure the interpretation of the results of a FRAM analysis, to help gain a better understanding of the intricacies of everyday work carried out by health care professionals.

APPLICATIONS OF FRAM

FRAM can be applied for various purposes in the hospital or broader health care setting, such as:

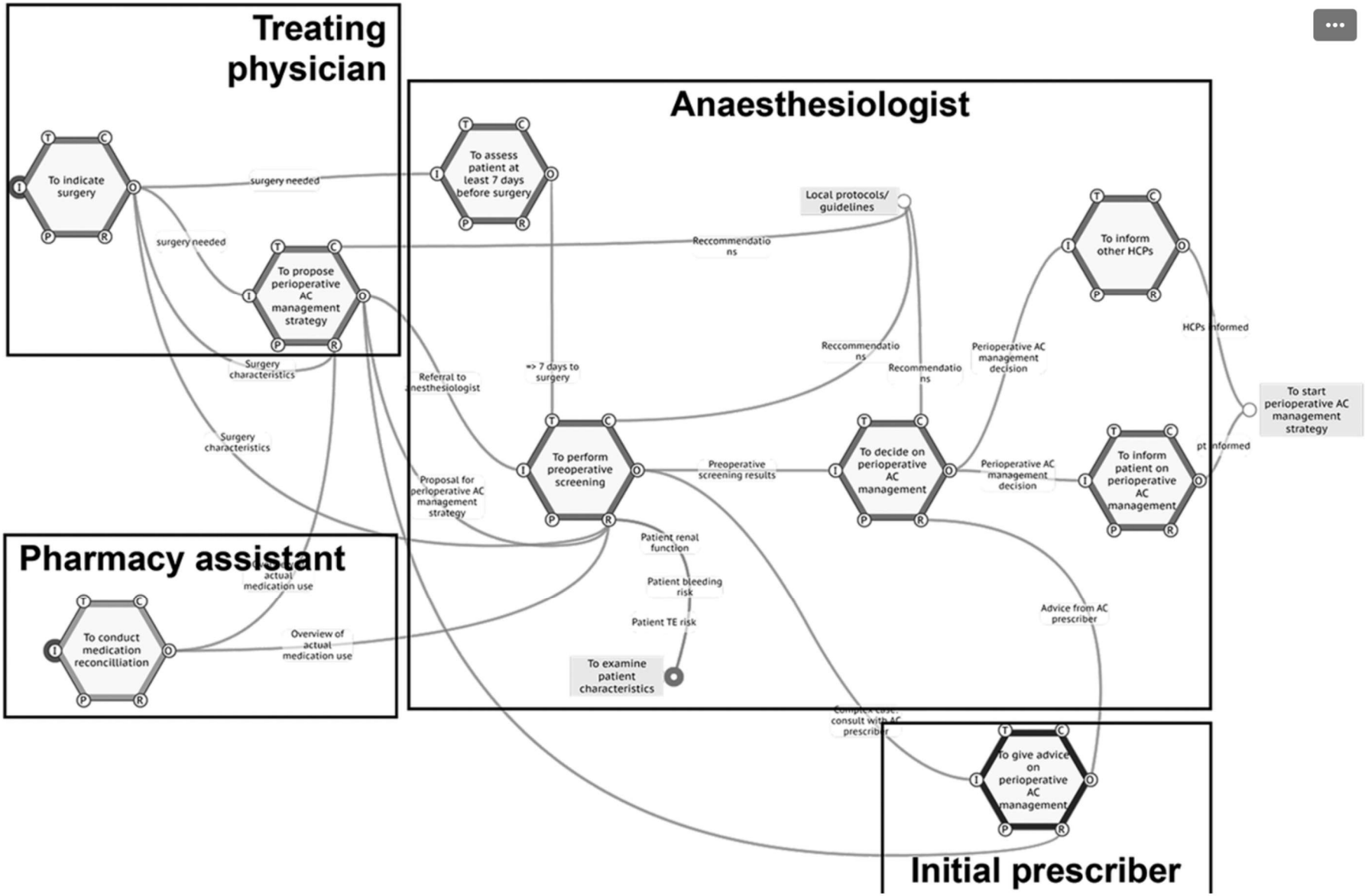
- *Process optimisation*: often this concerns the so-called 'headache files'; complex, multidisciplinary processes where traditional improvement initiatives appeared to be insufficient. This was nicely illustrated by recent studies on transitional care following hospital discharge and sepsis detection combining perspectives from the various professionals involved (O'Hara, Baxter & Hardicre, 2020; Raben, et al., 2018);
- *Incident investigations*: FRAM could also be used as a support tool for incident analysis as it allows studying how an event (a specific 'instantiation' or scenario within the FRAM model) emerged in relation to Work-as-Done rather than only comparing such events with expectations of a process (e.g., protocols). Information on how work normally goes well can then be used to understand why things sometimes go wrong;
- *Guideline development and implementation*: information on Work-as-Done aids critical assessment of available guidelines in relation to real everyday practice, revealing how it may not always be feasible to implement certain steps. Vice versa, FRAM can be used to foster guideline implementation, as insight into Work-as-Done reveals strengths as well as points of concern in the implementation phase, enhancing successful implementation. This was shown in a prior study by Clay-Williams et al. (Clay-Williams, Hounsgaard & Hollnagel, 2015);
- *Intervention development and implementation:* similar to guideline development and implementation, information on Work-as-Done aids understanding of how an intervention is carried out at the actual workplace post-implementation. Based on this, strengths and weaknesses can be identified, providing the base for further improvement. Also, when designing an intervention, it will be helpful to know Work-as-Done beforehand, enhancing the chance of successful implementation (in an attempt to reconcile Work-as-Imagined and Work-as-Done, as described in previous books);
- *Prospective risk management*: when the Emergency Department of one hospital location merged with that of another location, we made a FRAM analysis on the triage process to examine strengths and risks of the current triage process. These findings provided the base for the design of the triage flow in the new setting.

WHERE TO START?

When introduced to the FRAM theory and the FRAM models for the first time, an often-heard question is 'it looks impressive, but is it not very complex and time-consuming?' This was also our first impression, but once you have muddled through your first analysis, you are confident to take on the next. The FRAM handbook (Hollnagel, Hounsgaard & Colligan, 2014) and website (http://functionalresonance.com) explain the basic principles of the method. Another useful reference on FRAM is the Master Thesis by Jeanette Hounsgaard (Hounsgaard, 2016). In the following paragraphs, we will elaborate on the phases of building the FRAM model and using the definitive model as a tool for discussion with involved professionals.

Modelling Work-as-Imagined and Work-as-Done

In a FRAM model, the main process steps or activities are illustrated in hexagons. The lines between the hexagons reflect interactions and dependencies between activities and hence between the various involved professionals. FRAM provides a useful means to visualise Work-as-Imagined as well as Work-as-Done, triggering a discussion on how to reconcile the two. As the starting point for a FRAM analysis, a model of Work-as-Imagined can be used to visualise what is expected of the process according to (inter)national or local guidelines, protocols and task descriptions. Second, semi-structured interviews with involved frontline professionals can be conducted to obtain insight into Work-as-Done. Having finished the Work-as-Imagined model helps to understand the scope and focus of the interviews, but should not lead to suggestive questions such as whether the professional uses certain protocols. Local observations can also be used to obtain information on how the work is actually carried out. Based on this input, a Work-as-Done FRAM model is made, visualising the process as it is conducted in daily practice. This can be done in an iterative process, in which the model is extended after each interview or observation. In addition to the visual model, it is useful to write a narrative text on how the process is carried out (Hounsgaard, 2016). Figures 8.1, 8.2 and 8.3 show examples of FRAM models on preoperative anticoagulation management for thoracic surgery patients; Figure 8.1 shows an example of a Work-as-Imagined and Figures 8.2 and 8.3 are of Work-as-Done in Australian and Dutch hospitals, respectively (Damen et al., 2018).


Treating physician
To indicate surgery
surgery needed
surgery needed
To propose perioperative AC management strategy
Surgery characteristics
Surgery characteristics
Anaesthesiologist
To assess patient at least 7 days before surgery
Local protocols/ guidelines
Reccommendations
Referral to anesthesiologist
=> 7 days to surgery
Reccommendations
Recommendations
Perioperative AC management decision
To perform preoperative screening
Preoperative screening results
To decide on perioperative AC management
Perioperative AC management decision
To inform other HCPs
To inform patient on perioperative AC management
HCPs informed
pt informed
To start perioperative AC management strategy
Proposal for perioperative AC management strategy
Patient renal function
Patient bleeding risk
Patient TE risk
To examine patient characteristics
Advice from AC prescriber
Pharmacy assistant
actual medication use
To conduct medication reconcilliation
Overview of actual medication use
Complex case: consult with AC prescriber
To give advice on perioperative AC management
Initial prescriber

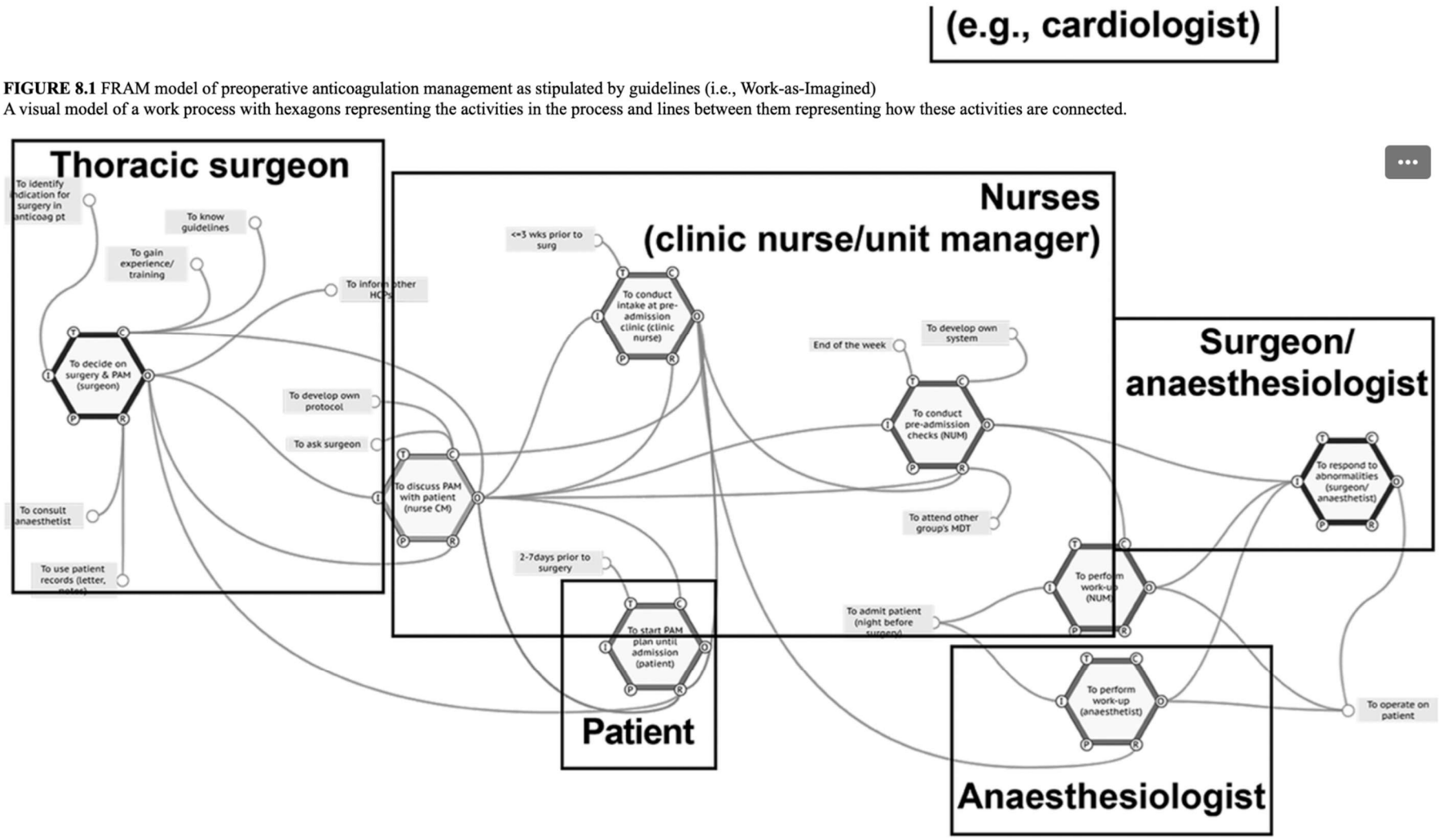


FIGURE 8.1 FRAM model of preoperative anticoagulation management as stipulated by guidelines (i.e., Work-as-Imagined)
A visual model of a work process with hexagons representing the activities in the process and lines between them representing how these activities are connected.

FIGURE 8.2 Work-as-Done FRAM model of preoperative anticoagulation management in the Australian hospital
A visual model of a work process with hexagons representing the activities in the process and lines between them representing how these activities are connected.

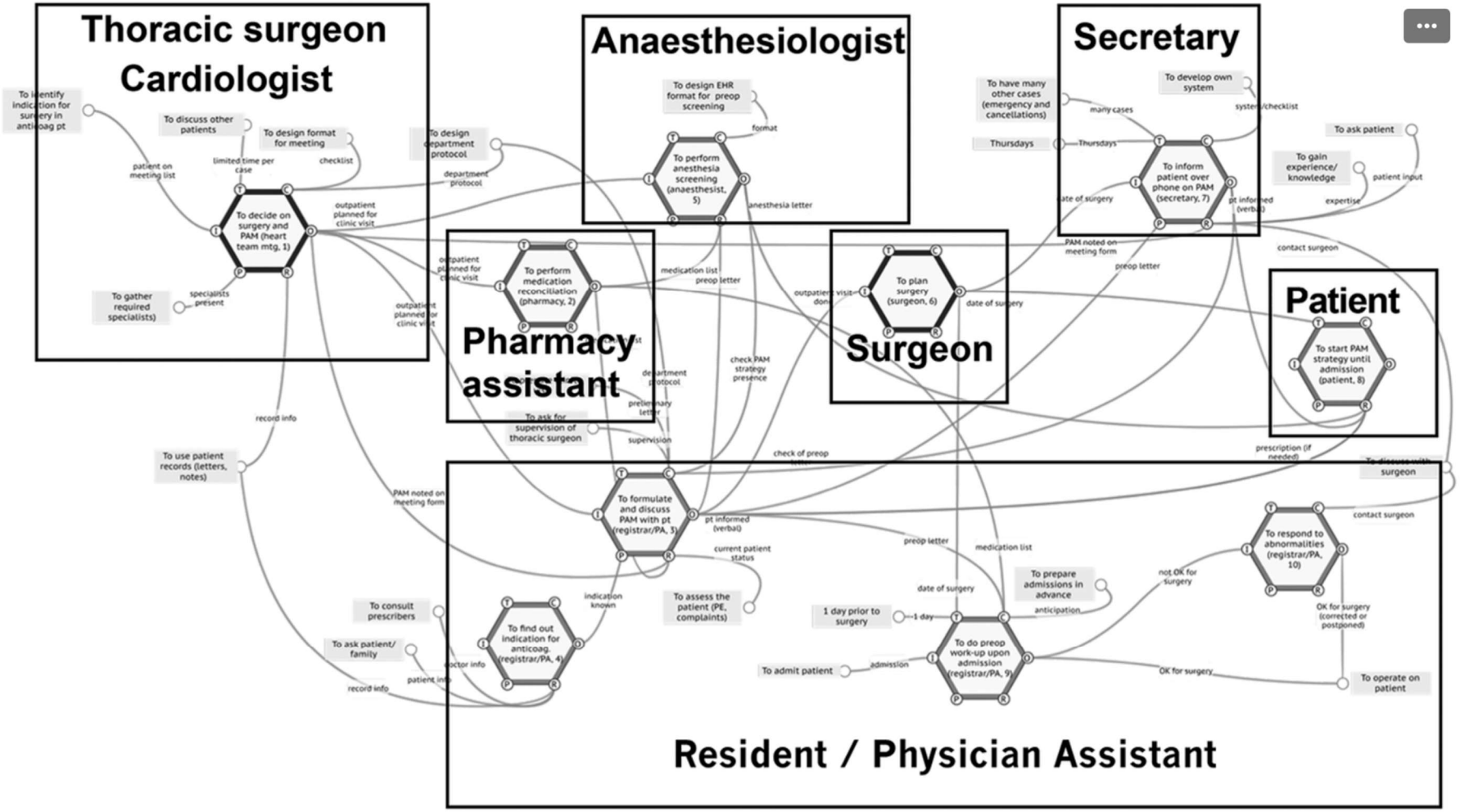


FIGURE 8.3 Work-as-Done FRAM model of preoperative anticoagulation management in the Dutch hospital
A visual model of a work process with hexagons representing the activities in the process and lines between them representing how these activities are connected.

Stakeholder Meetings and Improvement Initiatives

Finally, the models are presented to involved staff for validation and discussion. Differences between the process as-imagined and the Work-as-Done can be discussed. In dialogue, involved stakeholders explore to what extent good practices in the process can be strengthened and which improvement initiatives – feasible and suitable in the eyes of those actually carrying out the work – can be thought of to make everyday success more likely.

USING FRAM TO REVEAL MUDDLING THROUGH-LIKE BEHAVIOUR

In our view, one of the main reasons for FRAM being a powerful tool is that it enables to identify muddling through-like behaviours of professionals. Exactly this muddling reflects adaptive, resilient behaviours and flexibility, which often ensures that a process goes right despite challenging and ever-changing circumstances. To illustrate, we provide some examples of muddling behaviours we encountered in our FRAM analyses.

Muddling Through with Workarounds

In daily practice, professionals tend to adapt to unexpected situations all the time, hereby coming up with creative solutions to ensure safe care. For example, one of the junior clinical doctors in our study on preoperative anticoagulation management (Damen et al., 2018) explained that he would always provide patients with a prescription for bridging therapy covering a much longer period of time than initially required. He did so because, in his experience, planned surgeries are often postponed, resulting in patients needing to get a new prescription to cover the additional waiting time. Another example in the same study included the fact that the surgeon and cardiologist chose to not fill in the 'anticoagulation field' in the electronic form specifically designed for their meeting, unless the patient case would require something out of the ordinary. They were unaware of the fact that this behaviour conditioned those using the form later on in the process, to not look at this specific field because it was never filled in anyway. In our experience, professionals very easily reveal these workarounds in a FRAM interview. This may be related to the fact that a FRAM analysis is aimed at assessing everyday practice, rather than a specific case with a negative outcome, which comes with a lot of negative emotions for the interviewee, such as shame and self-blame. In addition, workarounds often become 'common practice' for interviewees as they carry them out everyday, so they might no longer be aware of the fact that these behaviours differ from what was originally imagined.

Muddling Through Using Personal Aids

Almost every analysis of Work-as-Done reveals control mechanisms to ensure successful behaviour, such as critical review of colleagues' decisions and documents or individual systems to enhance efficiency and thoroughness. In interviews, it turned out that professionals who come up with these methods often do so on their own initiative, hence the term 'naturally developed'. For example, in our FRAM analyses we often encountered self-developed checklists, protocols, or notebooks to get a grip on complex processes. Because these methods are often considered 'personal aids', they are not likely to be shared with other (new) staff members. Therefore, these otherwise useful aids can pose problems when key persons are absent or replaced and colleagues are unfamiliar with these personal methods. To illustrate, the secretary we interviewed in our study on anticoagulation management mentioned that she did not plan on handing her self-developed checklist for planned surgeries over to her successor because she considered it 'an old woman's habit' (Damen et al., 2018).

Muddling Through with Unclear or Unpractical Roles

Guidelines represented in Work-as-Imagined models often suggest specific disciplines to play a central role in a process, while in the Work-as-Done other key figures often carry out these tasks. This exchange of roles may have practical purposes, such as a person who needs to carry out a certain process step will get involved in the preparation phase. Some illustrative examples from our FRAM analysis on preoperative anticoagulation management:

- According to the guidelines and hence our Work-as-Imagined, physicians – and especially anaesthetists – are supposed to play a central role in anticoagulation management around surgery. In practice, however, this appeared to be the responsibility of surgical staff rather than anaesthesia staff, with key roles assigned to (specialised) nurses, registrars and/or physician assistants, who were not mentioned in any guideline but in fact coordinating most of the process;
- Interviewed surgeons felt responsible for formulating and documenting the preoperative anticoagulation strategy for each patient, but other staff reported that this was often omitted in practice, in which case they made the decision instead;
- In contrast to the guidelines, the Dutch hospital did not communicate with out-of-hospital anticoagulation services, usually responsible for outpatient anticoagulation management in the Netherlands. Instead, the department temporarily took over this responsibility until postoperative discharge, in an attempt to prevent confusion for the patient about who was in charge of anticoagulation therapy management.

These examples illustrate how studying Work-as-Done does not only help to identify potential differences between local practices and guidelines, but also the pragmatic, practical reasons behind it.

USABILITY OF FRAM

FRAM appeared to be a promising tool that can be readily applied to study a (complex) health care process, such as medication management, and identify functions that are important for success. We estimate the workload of a FRAM analyses to be about 47 hours per analysis, which is comparable to the workload associated with traditional methods, such as a root-cause analysis (RCA) (Taitz, et al., 2010). Further, clinicians seem to easily understand the relevance, background, and design of FRAM. Reflection meetings with staff are considered insightful and raise awareness of interdependencies between activities of colleagues. Staff also uses the models to discuss opportunities for improvement. This way, FRAM may be used to reconcile and improve the synergy between the world of guidelines and systems design (Work-as-Imagined) and the world of everyday clinical practice (Work-as-Done). Moreover, FRAM models can trigger a discussion on how the fact that each team member 'muddles through with purpose' ensures that the system performs resiliently and successfully.

SUGGESTED FRAMEWORK FOR FRAM MODEL INTERPRETATION

As aforementioned, FRAM models are easily understood by involved professionals, who often recognise the models' visual representation of their daily work. However, after model validation in a staff meeting, the in-depth analysis of the model remains a difficult process, for which the FRAM handbooks provide only little guidance. Based on our experience, we propose a few steps to aid the translation of FRAM models to plans for practical improvements.

Because of the fact that the same 'themes' and muddling behaviours emerged in all FRAM analyses that we have conducted so far, we suggest a framework with four perspectives to interpret and structure FRAM findings:

1. *Task division and role clarity*
   This theme explores professionals' perceptions of who is responsible for what step (function) in the process, and whether this is clear to and the same for everyone involved. For example, if a cardiologist and cardiothoracic surgeon together decide that a shared patient requires surgery, who is responsible to make sure that the list of medications in the patient's file is accurate and up to date?
2. *Multidisciplinary collaboration*
   How do involved professionals collaborate in the process? Do they for example have multidisciplinary meetings, or does consultation arise spontaneously?
3. *Efficiency*
   How efficient is the process? Our FRAM analyses showed various workarounds that ensured safe care but could hamper process efficiency. For example, involved professionals in our anticoagulation study were carrying out the same step in the process at the same time, without knowing this from each other (Damen et al., 2018). Another example includes process features specially designed to optimise the process that were not being used by people on the sharp end.
4. *Guidance and support*
   Are there any protocols/procedures/work agreements used to guide the process? Does everyone use these in the same way (or not at all)? How is supervision of juniors arranged?