Stroke management: defining and assigning goals to stakeholders

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Abstract

In Trying to elicit and assign goals to the right actors; Chan, A., Fernandes Pires, A., and Polacsek, T., International Conference on Conceptual Modeling (ER) 2022 *[2], we proposed a methodology and an algorithm to support business experts in eliciting concrete goals from high-level objectives, assigning them to the right actors and identifying possible organisational needs. We presented an application of this work in aeronautics, but since then, as we present in this article, we have been able to apply it in a medical context.*

1. Introduction

Based on Bryl *et al.* work [1], we proposed a method for refining a *High-Level Goal* (HLG) into goals that can be processed by actors [2]. We also presented a first application of our method in aeronautics. In this article, we will focus on a new application in medical context. We were interested in the HLG: *optimal management of stroke in adult patients*. The experiment involves:

- one model expert (one of the authors of this article),

- one domain expert. She is a doctor specialising in Physical medicine and rehabilitation with 4 years' experience.

Note that this HLG was chosen by the expert in the field. The organisation studied is composed of the French public health system and the patient's relatives. It's a pretty big organisation because it's broader than just hospital resources and by patient's relatives we mean family and friends.

Our objectives for this experiment were: (obj1) to test the algorithm defined in [2] on a non-aeronautical organisation and (obj2) obtain goal model validated by an expert domain.

The domain expert also has her own expectations that motivate her to take part in this experiment. She will verbalise his objectives at the beginning of the second working session, when an initial model is presented to her. The domain expert aims were: (1) obtain a clear graphical model of a patient's journey and (2) identify the range of care needed to manage a stroke.

2. Working sessions

We organised three workshops with the expert in the field. The first session lasted 30 minutes. The aim of this session was to apply the algorithm while minimising the number of times the model expert spoke. At the end of this session, the first model was built.

The second session, also 30 minutes long, was aimed at reviewing and consolidating the model obtained in the first session. The focus was on improving the wording of the objectives and clarifying some medical domain aspects. At the end of this session, the initial model was complete and the goals were clear and unambiguous for all participants.

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The third and last session, lasting 10 minutes, was dedicated to the final validation of the model. This session provided an opportunity to reach a consensus on the final model, taking into account any suggestions for improvement made by the domain expert.

Between sessions, questions were exchanged by written message. At the end of the three sessions, the expert was interviewed to gather her impressions of the models obtained. The three sessions were conducted via videoconference. For the first session, the model expert use a free format and the domain expert did not have access to this model during the session. After this first session, the model was structured only by the model expert in goal model language (same as use in [2]). During the next two sessions, the domain expert has access to the model, but cannot modify it directly; she has to go through the model expert.

3. Resulting model

By applying our algorithm, at the end of the three working sessions, we obtain the model given Figure 1. The actors in our organisation are: *Rehabilitation*, *Relatives*, *Emergency*, *Social Workers* and *Other medical teams*. Actor *Rehabilitation* is a hospital department made up of various health professions, including physical medicine and rehabilitation doctors, physiotherapists, speech and language therapists, prosthetists, clinical psychologists and, of course, nursing staff[1]. *Relatives* represents family and friends, patient's social circle. *Emergency* is in fact emergency medical services in France. It is a mix of organizations under public health control. In our case, it is made up of emergency doctors, anaesthetists, nurses, ambulance staff and firefighters. We also need a stakeholder that's a bit of a catch-all, *Other medical teams*, which includes the different medical services that may be involved in the patient's care, such as neurology, geriatrics or general medicine. Finally, actor *Social worker* represents all the care teams that intervene once the patient is stabilised.

4. Feedback from the domain expert

The domain expert appreciated the *delegation* mechanism. In her opinion, it highlights the importance of each player in the care pathway, while emphasising the notion of continuity in their role. In addition, delegation also highlights the responsibility transfer for goals between different actors. In this application, the responsibility delegation is the responsibility of patient management. These two aspects of delegation were seen by the expert as strengths of the modelling approach used. They highlight the integration of each stakeholder in the care process and the importance of their ongoing collaboration to achieve the common goal (the HLG).

However, the domain expert points out that the method *"segments things that are not so segmented in real life"*.

Regarding the usefulness of the modelling sessions, the domain expert mentions that in her opinion the method is useful to improve people's understanding of the system. Furthermore, the use of the algorithm enabled her to elicit goals. She has therefore fulfilled its second aim: identify the range of care needed to manage a stroke.

About her first objective, obtain a clear graphical model of a patient's journey, at the expert's request, we provided the goal diagram model Figure 2 (without the delegations).

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[1] *World Health Organization* definition `https://www.who.int/news-room/fact-sheets/detail/rehabilitation`
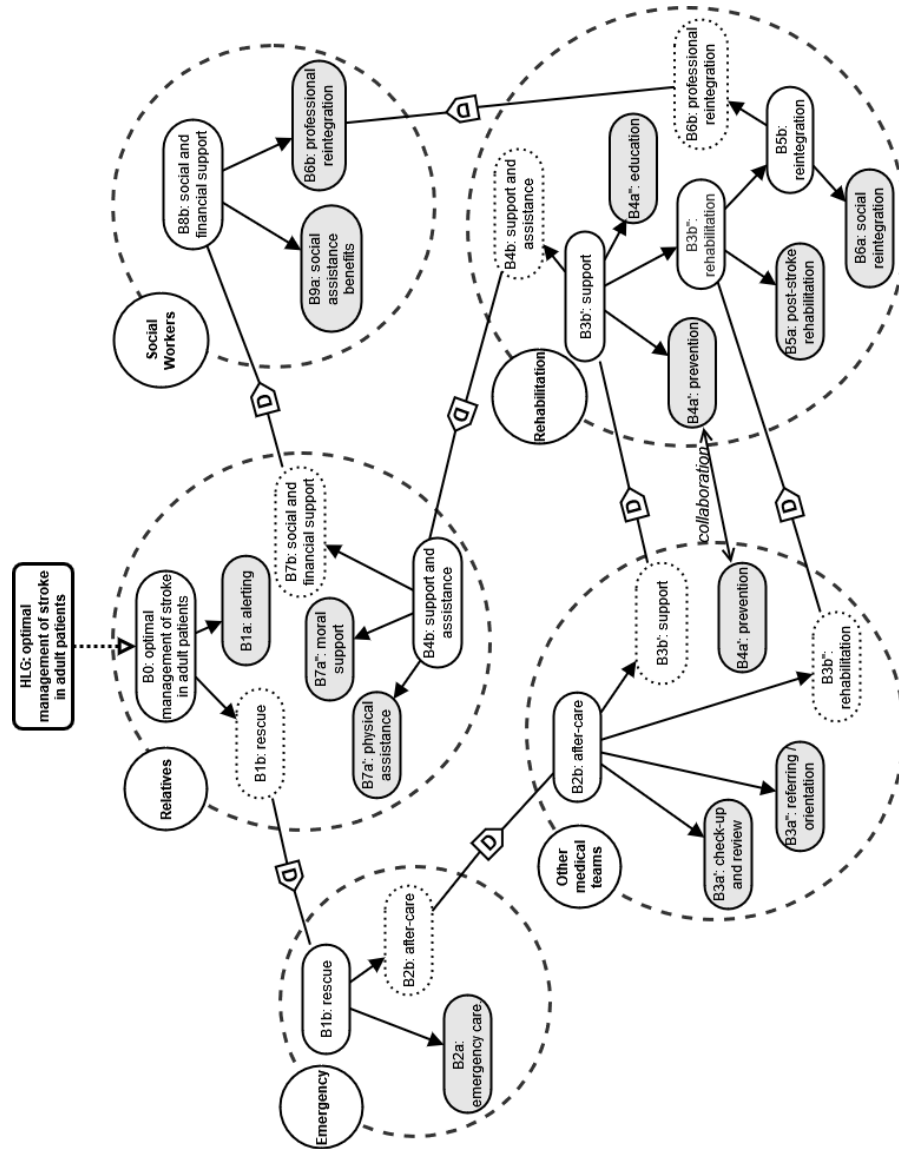
Figure 1: *Translation in english of the final model obtained for the HLG* optimal management of stroke in adult
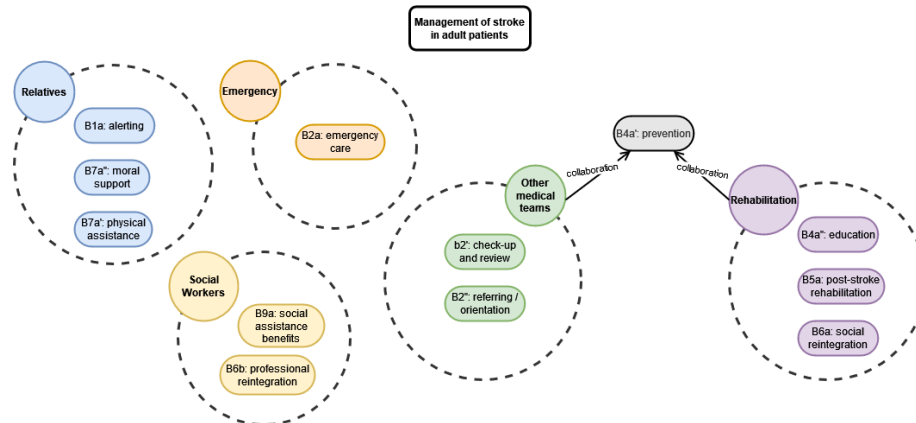patients.

Figure 2: *Translation in english of the goal models given to the expert domain.*

5. Conclusion

This experience enabled us to test our algorithm in a medical context, the management of strokes, in the context of a real organisation (objective *obj1*). The model obtained was validated by the domain expert (objective *obj2*).

During the sessions we deviated slightly from the original algorithm. We also saw the need to signify temporality, which is not unrelated to a form of temporal dependence. We need to explore these points further in order to develop our method and algorithm.

Acknowledgments

References

[1] Volha Bryl, Paolo Giorgini, and John Mylopoulos. Designing socio-technical systems: from stakeholder goals to social networks. *Requir. Eng.*, 14(1):47–70, 2009.

[2] Anouck Chan, Anthony Fernandes Pires, and Thomas Polacsek. Trying to elicit and assign goals to the right actors. In Jolita Ralyté, Sharma Chakravarthy, Mukesh K. Mohania, Manfred A. Jeusfeld, and Kamalakar Karlapalem, editors, *Conceptual Modeling - 41st International Conference, ER 2022, Proceedings*, volume 13607 of *Lecture Notes in Computer Science*, pages 413–422. Springer, 2022.