A Persona-based Modeling for Contextual Requirements

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Introduction

- *"A persona is a fictional character that represents a group of users of a given system and renders the product development more effective and accommodative to diversity"* [Cooper, 2004].
- ...and can add a human-centred facet to RE practice

A Persona Example

Mary Collins (Persona 1)

Age: 70 years
Profession: Retired

Attributes

- Live alone in a small house;
- Does not have a houserkeeper, only diarist every 15 days;
- Does other household chores;
- Fell at home once, but did not fracture any bone;
- Has osteoporosis type 2 at an early stage;
- Has diabetes, high blood pressure and heart problems;
- She is diurnal but wakes up twice at night to go to the bathroom;
- Has 2 childrens who lives in their homes;
- Don't have Wi-Fi at home.

Goals

- To avoid frustating experiences with technologies;
- To not to worry with her children;
- To feel safe by not falling down at home;
- To have quality of life.

Introduction

Goal models (GM) provide the goals for which the system should be designed and a set of ways to reach those goals in prescriptive and pragmatic manners [Guimarães et al., 2015].

Contextual Goal Model (CGM) makes explicit presentation of the relationship between a goals and their achievement strategies and *the context*: "a partial state of the world in which the system operates and is relevant to its goals." [Ali et al., 2010].

A Goal Model Example

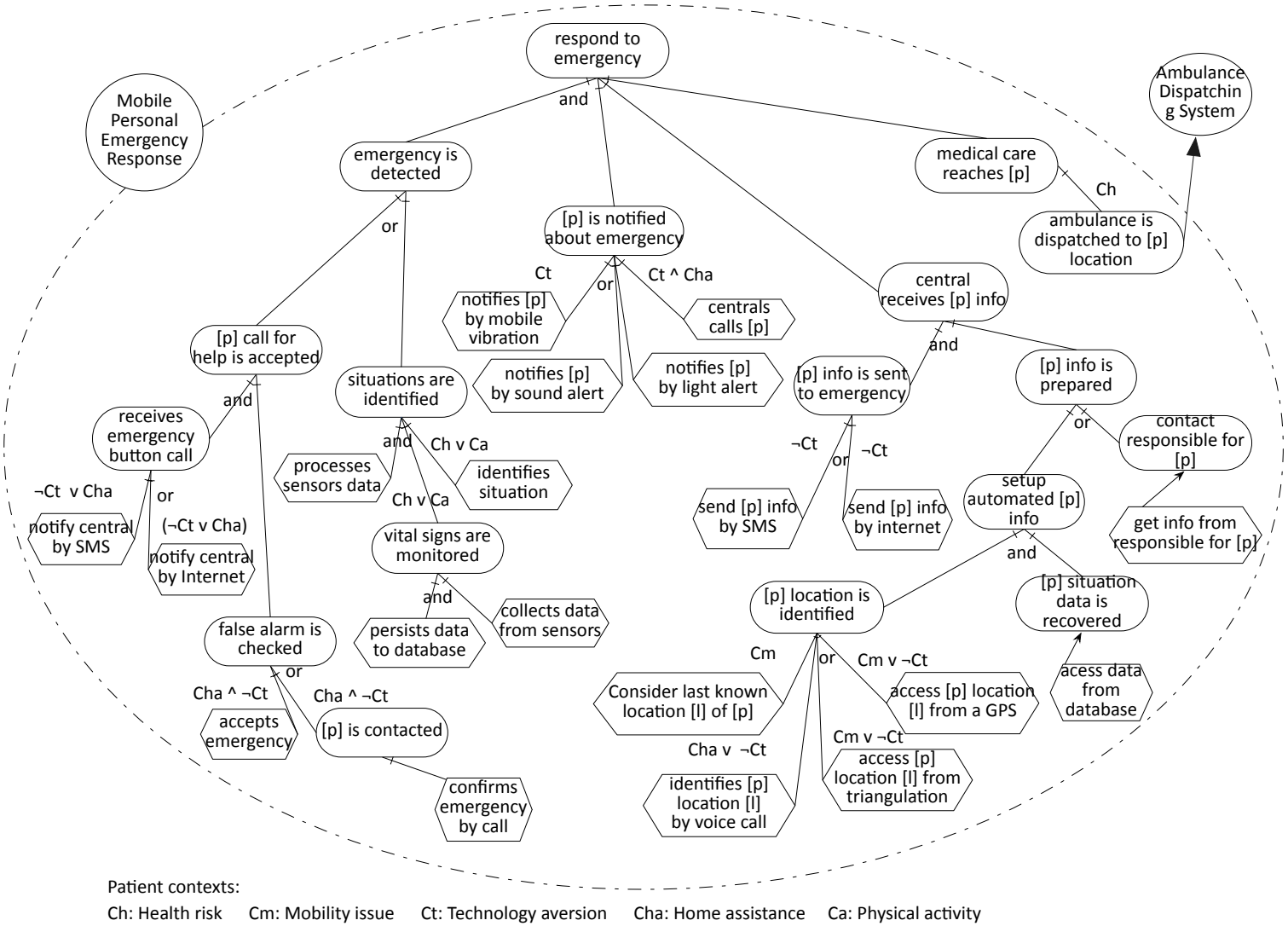


Figure : CGM's Emergy Response in AAL (adapted from [Guimarães et al., 2015])

Motivation

Goals and capabilities are core and also shared constituents for both goal modelling and personas making the integration of power between both techniques easier and natural!

Problem

- In traditional GORE, people roles, responsibilities and permissions need to be normalized to fit in a general model.
- However, in reality people play different roles in different ways!
- And a case by case basis would add infeasible overhead to the engineers by personalizing the requirements [Sutcliffe et al., 2005].

A Persona-based Modelling for Contextual Requirements

How can we empower GORE modelling practice with personalization and human-centred design facets? In addition, how to devise a goal achievement sensitive to their actual set of personas?

Persona Attribute Formalization

We formalize the description of the persona attributes into contextual facts as follows:

1. i is the id of the persona in the population of interest.
2. $A_i \in \{A_1, A_2,...,A_n\}$, where A is a set of attributes as nominal categorical variables of i.
3. Each attribute A_i may have a corresponding contextual fact F_j, where $i \leq j$.
4. $i = \bigcup_{n=1}^{j} F_n$, the persona i is characterized as the union of F_j contextual facts.

The Personas Contexts

- Context as a predicate formula of and/or combinations of statements and facts [Ali et al., 2010].
- Contextual facts in our work map only those relevant and verifiable persona information.

Structuring the Contextual Facts into Contexts

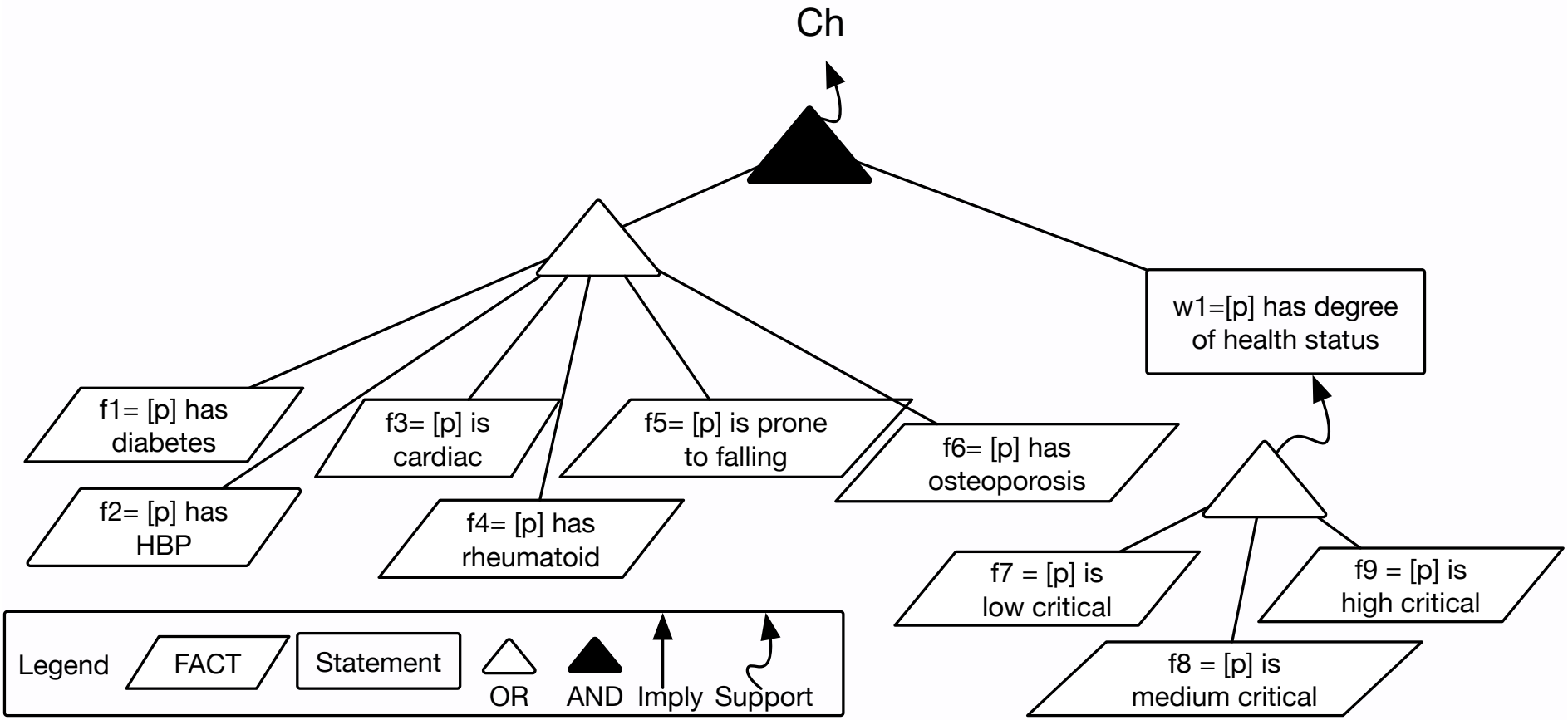


Figure : Excerpt of the Health Context Structure.

Formalization of a Persona's Context Set

Definition (Persona Context Set)

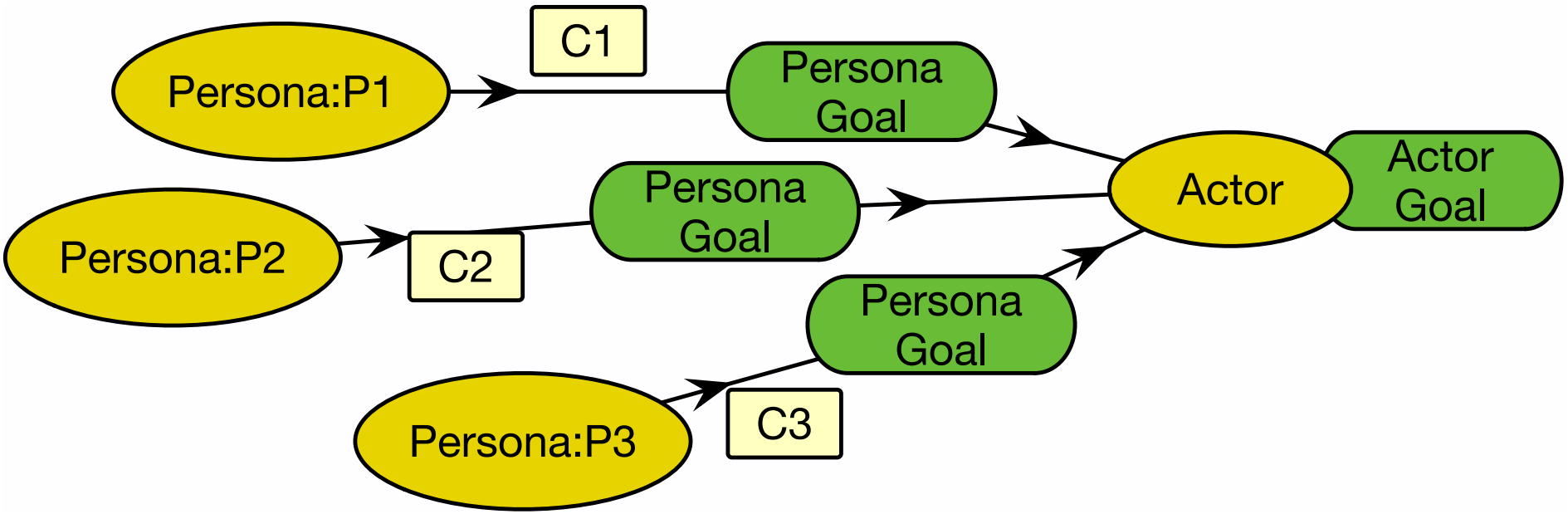
Let the mapping function C: i $\xrightarrow{C_j}$ {T, F} which returns true or false for the facts of persona i applied to context C_j. If $C_j(i) = \mathsf{T}$, it means that $C_j \in \Omega$, where Ω is the set of contexts triggered by persona i.

A Context Set Example

Based on the Persona Mary Collins attributes and goals, Mary's context set follows:

- Facts: (F1,F5,F6,F14,F19)
- Health Context (Ch): (F1 & F5 & F6)
- Home Assistance (Cha): (F14)
- Technology Aversion (Ct): (F19)
- Therefore, Mary's Context Set = {Ch, Cha, Ct}

The Relationship Between Actors and Persona Goals



Achievability of a Persona Goal Satisfaction

Definition (Persona Goal Satisfaction)

Let the context set Ω triggered by persona i, the actor goal Γ, which the persona goal is link dependent, and the target system CGM. The persona goal satisfaction property Φ_i is achieved when $(\Omega, \Gamma, \text{CGM}) \models \Phi_i$

Goal Achievement Check

- Persona goal satisfaction via the goal achievement check algorithm (further details on the paper).
- CGM goals achievability facing personas context sets.
- Enables richer adaptation decisions for:
  - Achievability analysis in explicitly modelled user context
  - The effect of the user context on a goal fulfillment criteria

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The achievability of a goal is a selection and enactment of a suitable alternative to reach a goal under a certain or multiple persona contexts criteria.

Feasibility Study on MPERS

- 19 distinctive facts for the considered personas.
- Eight distinctive contexts: five for the patients and three for the medical doctor.
- Four modelled personas: 3 patients and 1 doctor

Feasibility Study on MPERS – The GQM

Table : GQM devised plan

Goal: Analysis of the achievability of the goals	
Question	Metric
Q1. Is the algorithm efficient to come up with an execution plan?	Execution time
Q2. Does the algorithm allow testing and explaining persona-based goal achievability?	Yes/No
Q3. Are the plans provided by the algorithm correct?	% of correct plans

Results

- Q1 - Is the algorithm efficient to come up with an execution plan?
  - Algorithm's complexity for the goal achievement check is linear on time (further details on the paper).
- Q2 - Does the algorithm allow testing and explaining persona-based goal achievability?
  - Only Mary did not have the MPERS goals achieved!
  - Mary has technology aversion to some degree since she fears having frustrating experiences with technology.

Results

- Q3. Are the plans provided by the algorithm correct?

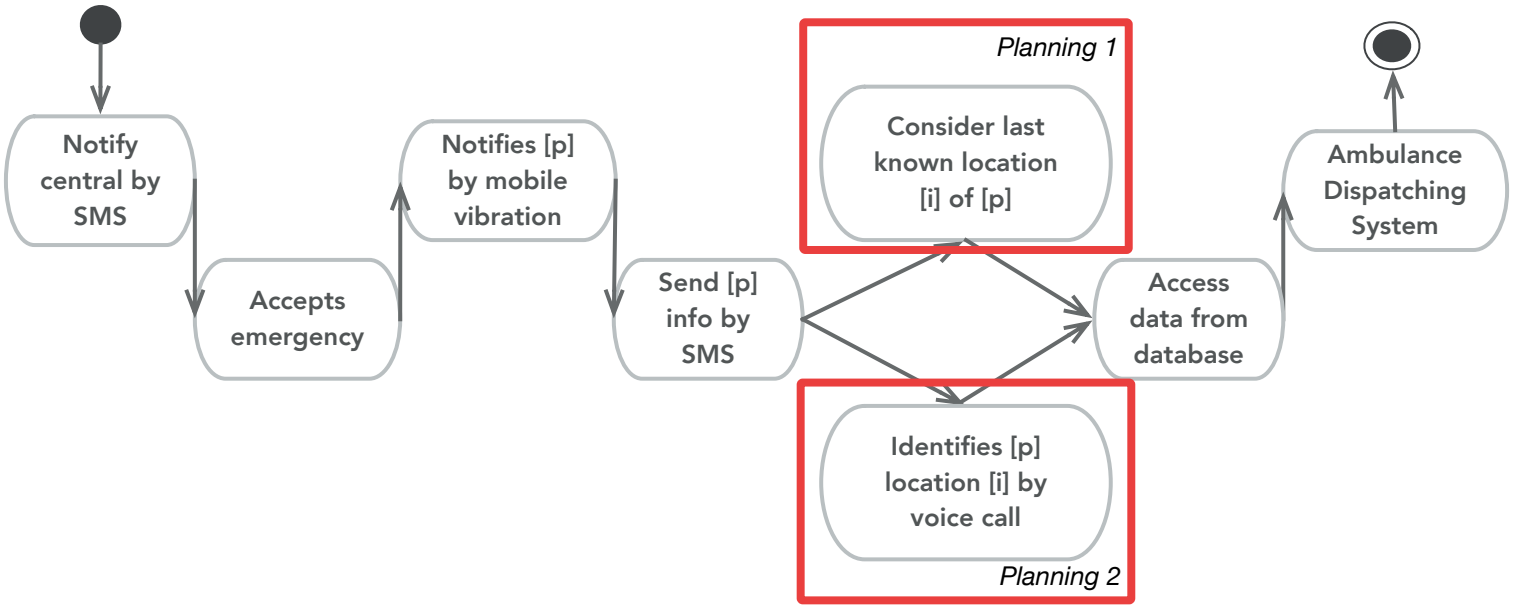

Figure : Achievable Plans for the provided personas contexts.

Conclusions and Future Work

- Persona-based structuring and impact analysis on goals achievement
- Alignment between personas intentions and capabilities as context information in a goal oriented perspective.
- Feasibility studies performed on MPERS.
- In the future:
  - Analyse in the presence and perspective of multiple actors
  - Analyse the impact of the personas on NFR analysis

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References I

Alan Cooper. *The Inmates Are Running the Asylum: [Why high-tech products drive us crazy and how to restore the sanity]*. Sams Publishing, US, 2004. ISBN 0672326140.

Felipe Pontes Guimarães, Genaína Nunes Rodrigues, Daniel Macêdo Batista, and Raian Ali. Pragmatic requirements for adaptive systems: A goal-driven modeling and analysis approach. In *ER*, volume 9381 of *Lecture Notes in Computer Science*, pages 50–64. Springer, 2015.

Alistair Sutcliffe, Stephen Fickas, and McKay M. Sohlberg. Personal and contextual requirements engineering. *13th IEEE International Conference on Requirements Engineering (RE'05), páginas: 19-28*, 2005.

Raian Ali, Fabiano Dalpiaz, and Paolo Giorgini. A goal-based framework for contextual requirements modeling and analysis. *Requirements Engineering*, 15(4):439–458, July 2010. ISSN 0947-3602. doi: 10.1007/s00766-010-0110-z.