A Context Modelling Approach to Requirements using Context-Maps

Ziyad Alshalah1
Clive Boughton2

Context of Influence and Perception

The Context Dynamics Matrix (CDM) approach manages context connections based on two dimensions resulting in four states based on influence and perception. Each dimension is based on a conceptual model which produces context parameters which populate the CDM. Contextual parameters are the result of joining two conceptual models: an influence conceptual model and a perception conceptual model. First we will present each conceptual model then show how the two models are joined to produce contextual parameters.

1.1 Influence Conceptual Model

The influence conceptual model is based on force. Four forces are identified as a basis of the model, each force represent a degree of elasticity or tolerance to change. The four forces are as follows:

- Force of fact: is a response to the need for precision or a demand to meet a certain measure. An example of such a force is the demand to meet hard deadlines in safety critical systems.
- Force of function: is a response to the need of performing a certain task. An example of such a force is then need to send a document.
- Force of taste and passion: is a response to a personal preference. An example of such a force is the preference of reading documents in paper format rather than in electronic format.
- Force of culture: is a response to tradition which demands things to be done a certain way. An example of such a force is the collective norms and values that demand a person to be dressed in a certain way for an occasion.

1.2 Perception Conceptual Model

The perception conceptual model is based on six sources. Sources of perception are:

- Truth and Reality: objects or events which are self-evident which exist in nature and history like the time of the day and objects like trees and buildings.
- Theology and laws of nature views that are based on or expressed through known theories or laws of nature have higher perception levels, like the law of gravity.
- Ethical and moral values views which are based on morals supported by culture and legislated by a governing body in the form of civil laws or company policies.

1.3 Context States

Context states could be classified in view of contextual parameters. Yet, each state is a result of the force applied on an object and their perception of the object of that force. An explanation of context states is presented as follows: 1. Contextual-Explicit: In this state the force applied on an object is strong, a force of fit or function, and the perception of this force is high.
2. Contextual-Implicit: In this state the force applied on an object is strong, however for some reason, not highly perceived.
3. Non-contextual-Explicit: In this state the force applied on an object is weak and this fact is highly perceived.
4. Non-contextual-Implicit: In this state the force applied on an object is weak, while the perception of this fact is low.

Final Remarks

The use of Context-Maps, which has arisen from established ideas from different disciplines, provided a way for reasoning effectively about context - as demonstrated through the case-study. During the case study we found that the stepwise process provided a fine-grained approach to define context. It also allowed for requirements to be clarified in a systematic fashion, enabling a general view of requirements in a wide context using context maps and a focused local view using context models. We believe that context models could also be elicited to specific functional and quality concerns, all of which can then be shared and refined. The approach is now being applied to analyse the requirements for building architecture, in addition to architecture and design requirements for software.

1 PhD candidate at School of Computer Science, Software Intensive Systems Engineering Group
2 Senior lecturer at School of Computer Science, Software Intensive Systems Engineering Group

ANU College of Engineering & Computer Science
Software-Intensive Systems Engineering Group

ANU THE AUSTRALIAN NATIONAL UNIVERSITY

Software-Intensive Systems Engineering Group

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