

Using Empirical Modelling to show solutions of Decision- making

Abstract

Decision- making is something we come across everyday at work, home, almost any where, the act of us deciding whether to go home from work or stop by the grocery store is an act of decision - making. Decision- making is an environment in which the process of choosing using cognitive process to weigh options for the benefit of something, decision- making can apply to various domains, management, Finance, Computer systems and much more, the art of decision- making using technology became popular in the 90's companies such as SAP, Sugar Customer Relationship Management, Google have showed the success in these systems. Decision - making has always been presented through Software Development, some features and the facet of some decision making software is based around Observables, Dependencies and Agencies which envelope the Empirical Modelling approach. It will be a different approach using the construal to show how decision can be made between two partner oil companies. The principles of Empirical Modelling will be applied to a situational scenario and it will be compared to other approaches, this paper will cover constructionism and perception as aspects to Empirical Modelling and other approaches.

Introduction and Background information

Through the years, software development and its technologies aim to represent the real world or aim to uncover solutions from the real world, Software development through the years is structured through a software development life cycle, from the requirements to the testing and maintenance of the system built. The growth of the software development in areas of strategies, technologies etc over the years has shown its strength in some projects and some weaknesses, the weaknesses tend to show in waste systems or systems that do not get used to their full potential. (Fletovich et al, 2002) addressed the weakness may arise through building software where the developer represents the real world in the way he sees, the representation of the developer and the user will be entirely different, this is where cognitive aspects will need to be explored. In our today world, people or developers aim to move this cycle, to an environment where change is becoming a huge aspect in terms of requirements, change in technology and change of users preferences over time, constructionism lies underneath this changes, the seventeenth century philosopher Rene Descartes uses the perception as strong basis to sufficient knowledge on what we perceive, this makes it not only necessary but important for the users to be able to perceive what they can interact with. Empirical Modelling(EM) may be a new aspect to software development, Empirical Modelling may not have a classic definition, Beynon &Hartfield(2010) described Empirical Modelling “as an alternative approach to computer- based model- building that suits the constructivist vision of learning”, Empirical Modelling in my own words brings together the cognitive, self interest, flexible and iterative aspect of model- building using the concept of “observables”, “dependencies” and “agents”.

Empirical Modelling gives the flexibility of building models from any kind of interest that can be applied to any domain, EM regulates between the modeller, Artefact and construal; the modeller can also represent the user, the construal also known as the tool of Empirical Modelling, the tools of Empirical Modelling give the modellers an environment to express in relation between observables, dependencies and agency. The intriguing aspect of Empirical Modelling is the cognitive aspect which have been expressed through previously built models such as the nots and crosses, pjawns and Ant Navigator, the tools give flexible and confident environment such that the mistakes made from modelling uncovers other aspect to the model or Empirical Modelling. Empirical Modelling can apply to various domains and can engage interaction with these models, it has also benefits with education technology.

Perception, Constructionism and Empirical Modelling

Having given descriptions of both Traditional software development and Empirical Modelling, Constructionism lies in between them from the diagram below, it shows the link between them, the idea of constructionism encapsulates the aspect of interaction, “perception” and exposure to learning. Beynon & Hartfield distinguished this experience and perception through the sudoku solving model, also constructionism was explored in the area of comparing simple bubblesort software program and a bubble sort model, although they both had the same goal of sorting numbers, there was a huge gap in form of interaction, cognitive aspect, representation and there is a stimuli to provoke your thinking between the program and the model. From my experience with software programs, (Beynon et al , 2000) expressed this difference in the gap between the user expectation, cognitive behaviour and experience within a specific domain, against the interaction and the experience of the user with the tools to support that domain. Perception plays a role in the midst of the constructionism, from the diagram below, perception takes the aspect interaction, human cognition which EM principles aim at, therefore these aspect should be of high priority in both software development and Empirical Modelling.

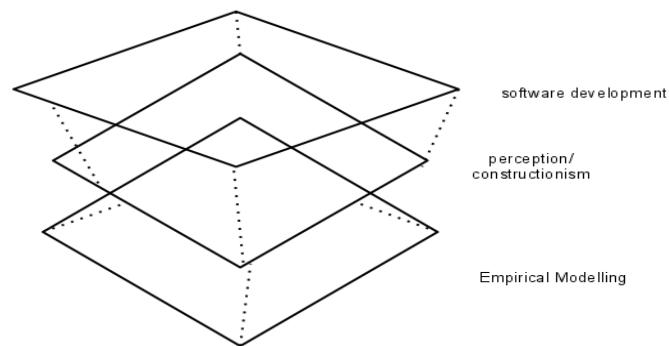


Figure1: representation of constructionism between software development and EM

The concept of my model

My idea was extracted from my environment, personal interest and an undergraduate project. The concept of the decision making model is not totally give Empirical Modelling into traditional software development but to explore the construal with this concept. This concept was originally applied in my undergraduate project using software development life cycle, the concept draws in two oil and gas companies who are in a partnership, both companies are separated by a fair distance and do not get their by-products from the same oil well. The first company(Prestige) possess its own customers which include fuel outlets, manufacturers, Government bodies and Laboratories, these customers order different by products that range in large to small quantities, on the other hand the partner company (Magnol) have their own customers separate from Prestige, a situational scenario is created where Prestige requires a large amount of by-products for a government body customer, prestige is short of this by – product, Magnol will have to step in to share this customer with Prestige. Magnol will deliver the remainder of the quantity required for the Prestige customer, the aim for this scenario is to aim at customer satisfaction, this shared customer becomes a priority to Magnol for a short period, this scenario can be put into three words “Situational Customer Relationship Management”. The situational aspect involves the change that occurs when the Prestige customer is shared to be a temporary customer to Magnol for a short period of time till the needs of the customer is met, there is also a process of decision- making where the act of Magnol might need to put one of their own customers on hold to carry out the transaction for Prestige as soon as possible as the customer becomes high priority for a short period of times. The figure below shows the overview of the scenario

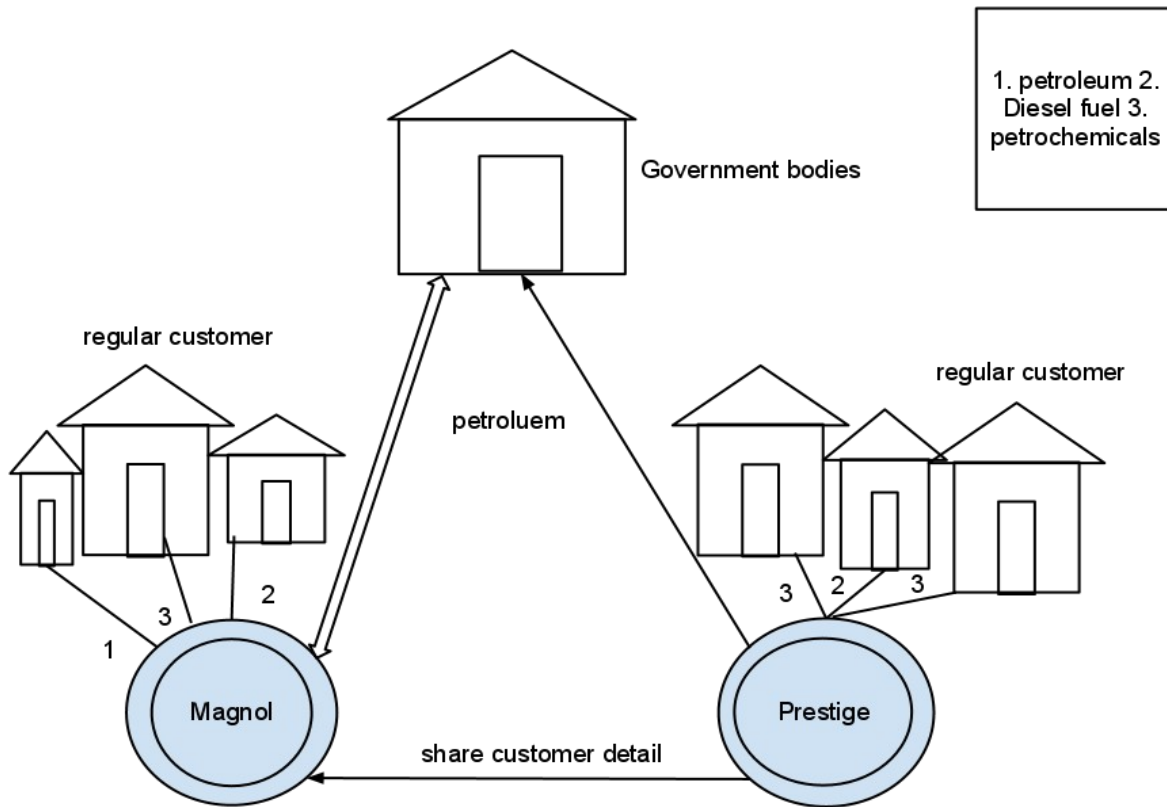


Figure 2: Overview of the scenario

Cognitive study

In this scenario there is a cognitive aspect, firstly users of systems want the systems to act like humans and take control when a situational scenario occurs, we expect the systems to think like a human where the solution should be to call the partner company and give them the responsibility of this customer. We expect the system to make this decision, Decision – making is vital in a business environment, therefore the separation discussed above(Perception, constructionism and Empirical Modelling) can lead to major problems as we as humans can not tell when change may occur or where we may need to make drastic decision. Technologies today are moving towards the area or aspect cognitive technology, this will also significantly remove the separation, interactive situation models aimed at state based models to show how one state describes an experience. In the scenario above states are described when there is a change of customer from one company to the partner company, there is also a state where the customer become a top priority to the partner company for a short period of time, the figure above may give different perspectives to people from various domains.

Modelling Study

The model for this concept started out by looking through previous models and choosing a sufficient technology in which the concept of my model can be represented, the chosen tool of Empirical Modelling was tkEden due to its strength of flexibility. The aim of my model was to model the concept in its simplest form but trigger cognitive aspects to the modelling, looking at previous models such as the Antnavigator, pawns and more, these model helped in showing the perspective of the cognitive aspects to the models and how they were represented in my perspective. The features of the model was the process of decision- making, the model consisted of line drawings to represent the costumers, both companies and graphs were used to represent the quantity levels of the by- products. The unique thing EM encapsulates is that the simplest models can have different perspectives of perception to it, my concept will be represented with a simple model but draws various form of perceptions and draws questions. The model may seem simple in terms of the drawing but think about it a little more, you may need to go back to the scenario especially the diagram and re create the scenario as you visualize the states as they change. The changes also involve time from where the petroleum by- product shows low quantity on the graph which creates dependencies, the movement of the customer to the partner company creates an observable. The model overall expands the concept of the scenario, although other versions may want to represent the model using more agencies to make the interface more attractive and put form of human computer interaction, by changing colours and letters.

The Empirical Modelling principles address this approach in a different dimension to the other conventional approaches, in weighing the pros and cons of both approaches, the principles of Empirical Modelling can be applied greatly to this domain of situational scenarios. The principles of EM draw the line of joining of the interaction and the knowledge of the user, the importance of this joining gives understanding when the change occurs and the “situation” moves from one phase or experience to the other. Having used this same scenario but applied it using a Web2.0 platform(Mashups) , it clearly handle the change but there was less user interaction, this leaves the user the space of allowing the system handle the change but we don't know if that's the decision we want at that certain time. Users want to be in control sometimes and also want know what is going on at each phase, (Beynon et al ,2001) expanded the cognitive aspect to the situational model by engaging both human cognition and the technology to bring a better outcome of understanding within this domain.

Conclusions

In conclusion Empirical Modelling as a whole is has great strength to evolve great models in the area of situational enterprises, in the area of decision – making the situational models may not necessarily aim to solve enterprise problems. The model can also educate people in enterprises on how to clarify requirements, understands the stages of decision – making within the systems, Empirical Modelling covers aspects that Software development is aiming for, in some cases both Software development and EM can complement each other. The model produced has proven to show Empirical Modelling can touch any aspect of various domains, it can stretch across human cognition and technologies which should be the future technologies.

References

- R. R. Hoffman, P. J. Feltovich, K. M. Ford, D. D. Woods. A rose by any other name...would probably be given an acronym [cognitive systems engineering]. *IEEE Intelligent Systems* In Intelligent Systems, IEEE, Vol. 17, No. 4. (July 2002), pp. 72-80.
- W.M.Beynon, Chris Roe, Ashley Ward and Allan Wong. Interactive Situation Models for Cognitive Aspects of User-Artefact Interaction. Proc Cognitive Technology: Instruments of Mind, University of Warwick, August 2001, LNAI 2117, Springer-Verlag, 2001, p356-372, ISBN 3-540-42406-7. [069]
- W.M. Beynon, S. Rasmeyuan and S. Russ. The Use of Interactive Situation Models for the Development of Business Solutions. Proceedings workshop on Perspective in Business Informatics Research (BIR-2000) Rostock, Germany, March 31- April 1, 2000. [055]
- Meurig Beynon and Antony Harfield. Constructionism through Construal by Computer. Constructionism 2010, The American University of Paris, August 2010 [111]
- R Descartes.The origin of subjectivity. 1973 .New haven and London,Yale University Press