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Chapter 3

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Use of ICT in Agriculture Domain

3.1 Introduction

For thousands of years people have tried to understand the mechanics of human thinking, how humans understand things and how they convey knowledge and experience to future generations. People found the ways of preserving their knowledge as write-ups and transferring the tacit knowledge to the next generation. However they have faced the difficulty of teaching most of the experience based knowledge they have gathered during their life span. People came up with various approaches for modelling the knowledge in different ways and forms. However with the development of computer technology, people wanted to represent human knowledge in to software systems and they wanted to make those software systems working in more rational ways instead of logical ways.

3.2 Complex domain

Everything around us could be considered as a combination of complex systems. Although it is very competitive and challenging to adapt and live with this complexity, humans could be considered as the most promising living being that can adapt to any situation and work with complexity.

3.3 Use of traditional technologies

An expert system is a classic technology which can be used to solve this problem. But when it comes to expert system usually it will consists of IF–THEN rules and parameters that store facts. Although this approach is less complex and give successful test results, the development is exhaustive process and tedious to expand.

3.4 Modern approaches

Agent oriented programming (AOP) is relatively new concept for software engineering domain. It can be considered as a paradigm shift for the concepts and

theories of artificial intelligence. AOP models system as a collection of components called agents. It is essential that those software components should have the basic properties like autonomous, proactive and specially being able to communicate. In this terms communication could be considered as the problem solving approach and being communicative, they can interact with other agents and depending on their knowledge (domain knowledge) they can come to a conclusion through the negotiation among each other. This domain knowledge representation is crucial for multi agent systems.

One biggest challenge with the knowledge representation is that the possibility of changing the domain knowledge itself. When it comes to traditional expert system like knowledge based approaches, it is very difficult to facilitate these changes with the traditional rule based approach. However with the ontological approach, it is possible to facilitate the changes of existing knowledge, learning new things and validate existing knowledge.

Nowadays ontologies have become the well recognized knowledge representation model for complex matters. In recent year's development of the ontologies, defining the knowledge representation specifications and finding the relationship between ontologies has become the main research topics. Sharing common understanding and defining the common vocabulary is one of the fundamental benefit of creating ontologies. Apart from these benefits ontology creation enabled the re usability of domain knowledge and separation of domain knowledge with the operational knowledge of the system. This will enable the re usability of the ontology across different domains. Therefore these properties of ontological approach ensure it as the most recognized and the future of the knowledge representation scheme with Multi Agent Systems.

3.5   Accessibility

Resource accessibility is one of the primary requirements with the information systems hence this is directly related to the usability. If users cannot access the system it cannot be considered as useful. When compared with stand-alone applications, web based solutions could be considered as the best approaches which enable the usability

and accessibility. Nowadays in Sri Lanka lot of initiatives has been taken to provide Internet facilities to rural areas. However it is not practical to develop a system presuming the accessibility through the Internet. Therefore it is required to use more practical approach like enabling accessibility through mobile technology.

Therefore proposed solution makes use of agent technology as the AI approach with the aid of ontological based knowledge representation. At the same time access to the system provisioned through Internet and Short Message Service.

3.6   Summary

Objective of this chapter was to summarize the technologies which are possible to utilise in designing an Agriculture Information System. When choosing a technology for a given problem it is essential to validate the technology according to the depth of the complexity of the problem.