Chapter 3

Emergent Behaviours through Multi Agent Systems Technology

3.1 Introduction

Previous chapter reviewed the state of the art of automated 3D game environment designing and identified that current 3D environment generation techniques being specific to one type of environment and the lack of customizable frameworks which are common to many types of environments as the main issue to be addressed. This chapter discusses the applicability of multi agent systems to solve the main issues identified.

3.2 Emergent Behaviours through Multi Agent Systems Technology

It is evident from the literature that using Multi Agent Systems technology complex and interesting global behaviours can arise from simple rules that are followed by number of simple agents operate in an environment. For example the paper "Applications of Self-Organizing Multi-Agent Systems: An Initial Framework for Comparison" [1] which is presented by Carole Bernon and colleagues discusses about the emergent properties that emerge from local interactions within the system and that cannot be deduced by simply observing individual behaviors.

A Multi Agent System (MAS) is a new approach to develop intelligent software and in a multi agent system there are number of agents, which interact with each other. Agents act on behalf of users with different goals and motivations. These agents cooperate, coordinate, and negotiate with each other, like humans do to solve a given problem. In MAS an agent has incomplete information or capabilities for solving the problem. Therefore it has a limited viewpoint. In MAS there is no system global control. The data is decentralized and computation is asynchronous. Also the intelligence is emerged in MAS as a result of interactions between agents and it is considered as a bottom up approach for intelligence rather than a top down approach. The MAS can be used to model problems in terms of autonomous agents, which is proven to be a more natural way of representing task allocation and team planning.

Another advantage of using multi agent systems is the ability to interconnect with existing legacy system by wrapping agents around those legacy systems.

The field of Multi Agent Systems is influenced and inspired by many other fields such as Economics, Philosophy, Game Theory, Logic, Ecology and Social Sciences. Therefore it is known as a one of the most natural approaches to model real world complex problems. The MAS has been used in a wide range of applications such as aircraft maintenance, electronic book buying coalitions, wireless collaboration and communications, military logistics planning, supply-chain management and joint mission planning. In addition to that MAS have been widely used in simulations to model social interactions, natural behaviours of animals and modelling crowd behaviours in movies. Therefore this project postulates that emergent behaviours of multi agent technology can be used to assist the design of 3D game environments.

3.3 Summary

This chapter described about the technology adapted for the project in general. The next chapter describes about our approach to use this technology to solve the main problems identified in the project.