Chapter 11
The AGILE Design of Reality Game AI

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ABSTRACT

This chapter investigates the use of agile program design techniques within an online game development laboratory setting. The proposed game concerns the prediction of early Paleo-Indian hunting sites in ancient North America along a now submerged land bridge that extended between Canada and the United States across what is now Lake Huron. While the survey of the submerged land bridge was being conducted, the online class was developing a computer game that would allow scientists to predict where sites might be located on the landscape. Crucial to this was the ability to add in gradually different levels of cognitive and decision-making capabilities for the agents. We argue that the online component of the courses was critical to supporting an agile approach here. The results of the study indeed provided a fusion of both survey and strategic information that suggest that movement of caribou was asymmetric over the landscape. Therefore, the actual positioning of human artifacts such as hunting blinds was designed to exploit caribou migration in the fall, as is observed today.

INTRODUCTION

Agile software design methodologies are a response to traditional plan-based approaches such as the waterfall model and others. There are a number of different agile methodologies. These support short term increments in the development of a software project. These increments reflect short rather than long-term planning decisions. Iterations are done in short time frames known as “time boxes”. These boxes range from 1 to 4 weeks in duration. Within each time box aspects of a full software development life cycle can take place which include planning, requirements analysis, design, coding, unit and acceptance testing. At the end of each time box, there is an available release which may still not contain all of the intended functionality.

Work is done by small groups of 5 to 9 individuals whose composition is cross functional and self-organizing without consideration of organizational structure or hierarchy. The goal is to encourage face to face communication in preference to written communication. Associated with a team is a customer representative who makes a personal commitment to being available for development questions. The production of working software is the prime indicator for progress. Due to the emphasis on face to face communication the number of written documents produced is often less than other methods, although documents are viewed to rank equally with the working product and other produced artifacts.

Recently an agile approach has been applied to the development of a game to support research in locating Paleo-Indian occupation sites and hunting camps along a land bridge that spanned Lake Huron from what is now Michigan to what is now Ontario, Canada. This project received a 2008 NSF High Risk grant in order to generate evidence for possible occupation of the ancient land bridge which is now under hundreds of feet of water. Figure 1 below provides the bathymetry, or deep profile of Lake Huron, with the lighter regions being of higher elevation. The target of the project is a stretch of land labeled the Alpena-Amberly Ridge. This runs from the Alpena region of Michigan on the west to the Godderich region of Canada on the east.

The goal of the project was to perform a sonar-based underwater survey of the area in order to see if there was evidence for human modification of the landscape. This was conducted through the University of Michigan-Ann Arbor by Dr. John O’Shea. More detailed underwater surveys would be predicted on acquired knowledge of where specifically to look. These devices can be manned or robotic but by their nature required a small area to search. With this in mind we developed a software game as part of the Computer Science Game Programming class at Wayne State University, CSC 5430. The class had a lecture and a laboratory and was both in-class and on-line. The goal of the game was to simulate the movement of animal and human hunting and foraging agents over the land bridge. In particular, we focused on spring and fall where it was expected that flocks of Caribou would use the bridge as part of their annual migrations. It was felt that such movements would attract hunters who would restrict aspects of the bridge in order facilitate the hunting of Caribou.

Therefore, the amount of social intelligence allocated to the caribou and the human hunters in the game will affect their movement and the number of caribou taken. In the game, the objective was to place hunters, their encampments, their hunting stands, and purposefully placed obstacles such as fence-like rock configurations in order to maximize the count of caribou taken. Those configurations of components that produced an above average yield would suggest to the underwater team where to most profitably perform further search.

Since underwater surveys are conducted in late August and September at the same time as the onset of the gaming class it was felt, that each avenue of research can provide data about human