Panel Discussion:
Collaboration Between Academia and Industry: A Case Study

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Background

Creating complex AI applications and creating games involves many of the same problems. Both AI applications and games are often simulations, both must coordinate multiple agents, deal with real-time issues, and ensure intelligent and efficient control of the involved units. In the Experimental Knowledge Systems Laboratory, we have created a number of complex simulators. Examples are: PHOENIX (Cohen *et al.* 1989), a system to combat forest fires; ACS, an air campaign simulator; and CtF, a testbed based on a variant of the game "Capture the Flag" which deals with the problems of designing and evaluating military land-based campaigns (Atkin, Westbrook, & Cohen 1999; Atkin *et al.* 2000; Atkin, Westbrook, & Cohen 2000; Atkin & Cohen 2000). We are interested in applying our agent design technology, specifically our agent control architecture, HAC, and our real-time planner, GRASP, to actual commercial games. In this panel, we would like to share our experiences establishing ties to game companies, and discuss some of the issues that came up in the process.

We have been working primarily with two Activision games, Dark Reign and Battlezone. We have designed and implemented a socket-based communication protocol that allows HAC to send basic commands to units in the game. HAC also receives information about the state of the game world and the map. This information will be used by GRASP to control units in both these games.

Discussion Questions

- Protecting intellectual property rights turned out to be a much larger issue than we had expected. Although the individuals we dealt with did not usually have major problems with exchanging code and ideas (a non-disclosure agreement was sufficient), there is

the question of what their supervisors and our university thinks of such an exchange. What are the university policies regarding collaboration between industry and academia? How can intellectual property rights be protected? To what extent *should* they be protected? How should one go about approaching the university about a collaboration? Does it make a difference if you are dealing with a large or small company? (We found that smaller game developers imposed less "red tape" than larger ones.) Are policies similar across universities and across countries?

- Making a profit was not much of a factor in our talks with game companies. Our main motivation was to see our technology used in commercial games, resulting—we would hope—in better games. However, the question arises if it would be possible to fund a university laboratory through collaboration with an industry partner. Is this a productive model or would it hamper the dissemination of knowledge? Will there still be interest from industry if they have to pay for the technology?

- One of the issues discussed at previous symposia was the possibility of creating an "AI Engine," a general purpose software library to solve commonly occurring problems in game AI. Since we view HAC as the beginnings of such an engine, we were interested in using one protocol to control units in both Dark Reign and Battlezone. We were largely successful in doing so, although we will have to see to what extent the abstractions we made compromise AI performance. What are the pros and cons of our interface? Is a general purpose AI Engine possible and useful? Would there be a market for such a product?

- Our model for collaboration has been very informal. We sign a NDA, receive source code for a game, and try to hook up the game to HAC and GRASP. We benefit from this arrangement in that we are able to work in an interesting and challenging application domain. We are able to evaluate how general our technology is and have the potential to see our ideas

come into widespread use. An unexpected benefit was that we had to generalize and expand our network code, which turned out to be useful for other projects ongoing in the lab. The company benefits from our research on the domain and from the exchange of ideas. Is this a good model for collaboration? Is a more formal collaboration feasible, particularly if it would mean placing a research lab in a company's game development cycle? Possibilities are exchanging personnel for a limited time, spinning off a university-affiliated company to do the actual development, licensing our technology as part of an AI Engine, or having lab members consult for companies.

- A large part of our collaboration effort was understanding the game's source code. Many games now ship with "tweakable" AI's, and some even allow outside programs to control game units (Quakebots, for example). In many ways the ideal situation for us is to have access to the game's control procedures to the extent that we can plug in an "external AI" to make strategic and tactical plans for the units in the game. This involves being able to issue commands to the units, but also requires having access to game data such as the map and the state of the units. A particularly intriguing possibility would be to make versions of a new game available as the game is being developed so that selected labs could create "pluggable" game AI's in tandem. These AI modules could be made available to the public at or soon after the game's release. We would like to discuss the idea of an "AI API" with symposium participants and whether or not they agree with this model.

Acknowledgments

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