Intelligence Advanced Research Projects Activity (IARPA)

Reynard Program Summary

One of the Intelligence Community's missions is to help our nation's leadership stay abreast of trends and social attitudes in a complex and fast-paced world. Legislators, decision-makers, and law enforcers need to understand how novel communications channels shape events and political agendas.

Virtual Worlds (VWs) and Massive Multiplayer Online Games (MMOGs) are a global communications phenomenon. Millions of people worldwide use these worlds for socializing, commerce, and as a forum for sharing public opinion. The explosive growth in VWs and MMOGs vastly outpaces the ability of the scientific community to study them.

The IARPA Reynard program explored this fascinating phenomenon. The goal of this unclassified social and behavioral science research program was to determine behavioral indicators in the realm of MMOGs and VW that are predictive of Real World (RW) characteristics of the users. The research was conducted under the oversight of human subjects protection Institutional Review Boards. The Government received only data analysis and summary reports that excluded any personally identifiable information.

Facts about the program, which ended in 2012, include:

- The program studied approximately 15,000 players from 9 countries in 12 MMOGs and VWs
- The research found objective behavioral indicators for over a dozen RW characteristics, such as gender and age
- RW characteristics could be predicted from VW behavior with a high degree of accuracy (>75%)
- The program pioneered new multi-disciplinary research methodologies that combine quantitative and qualitative techniques

The Reynard program concluded that individuals' online behaviors are highly consistent with who they are offline. This contradicts the view of other experts, who claim that individuals explore alternative ways of behaving when interacting online.

Five teams were awarded contracts under this program. The five teams were headed by the following organizations: Lockheed Martin, Palo Alto Research Center, SAIC, SRI International, and the University of Southern California.

A list of some of the reports and publications from these research teams is attached.

de Castell, S., & Jenson, J. (2011*). Modeling Play: Recasting Expertise in MMOGs*. SIGGRAPH 2011, Vancouver, BC, August 2011.

Dieterle, E., & Murray, J. (2010). *Virtual environment real user study (VERUS): Design and methodological considerations and implications.* 2010 Games+Learning+Society Conference, Madison, WI.

Martey, R.M., & Consalvo, M.(2010). Through the looking-glass self: Group identity and avatar design in Second Life. Presented at *The Online Videogame: New Space of Socialization. Bilingual colloquium (French/English)* October 28, 29, and 30. Montreal, Quebec, Canada.

Shen, J., Brdiczka, O., Ducheneaut, N., Yee, N., and Begole, B. (2012). *Inferring Personality of Online Gamers by Fusing Multiple-View Predictions.* 20th Conference on User Modeling, Adaptation, and Personalization (UMAP 2012), July 2012.

Shim, K., Sharan, R. & Srivastava, J. (2010). *Player Performance Prediction in Massively Multiplayer Online Role-Playing Games (MMORPGs)*. Proceedings of the Pacific-Asia Conference on Knowledge Discovery and Data Mining (PAKDD-10). Hyderabad, India, June 21-24, 2010.

Shim, K. & Srivastava, J. (2010). *Behavioral Profiles of Character Types in EverQuest II*. Proceedings of the IEEE Conference on Computational Intelligence and Games (CIG-10).

Stromer-Galley, Strzalkowski & Small. (2011). Multi-modal annotation of quest games in Second Life. Presented at *49th annual meeting of the Association for Computational Linguistics (ACL): Human Language Technologies.* June, 2011. Portland, Oregon. Published in *Proceedings of the 49th Annual Meeting of the Association for Computational Linguistics*, pages 171–179, Portland, Oregon, June 19-24, 2011.

Yee, N., Ducheneaut, N., Shiao, H-T., Nelson L., (2012). *Through the Azerothian Looking Glass: Mapping In-Game Preferences to Real World Demographics.* 30th Annual CHI Conferenceon Human Factors in Computing Systems (CHI 2012), May 2012.