This dissertation describes a novel technique to creating a simulated team of agents through observation. Simulated human teamwork can be used for a number of purposes, such as expert examples, automated teammates for training purposes and realistic opponents in games and training simulation. Current teamwork simulations require the team member behaviors be programmed into the simulation, often requiring a great deal of time and effort. None are able to observe a team at work and replicate the teamwork behaviors. Machine learning techniques for learning by observation and learning by demonstration have proven successful at observing behavior of humans or other software agents and creating a behavior function for a single agent. The research described here combines current research in teamwork simulations and learning by observation to effectively train a multi-agent system in effective team behavior. The dissertation describes the background and work by others as well as a detailed description of the learning method. A prototype built to evaluate the developed approach as well as the extensive experimentation conducted are also described.