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## ABSTRACT

The Human Systems Center of the United States Air Force is developing and fielding a new generation of computer based training systems. These Intelligent Tutoring Systems (ITSs) capitalize on knowledge engineering, cognitive learning theory, system simulation and advances in artificial intelligence to rapidly teach expert troubleshooting strategies to F-15 and F-16 aircraft maintenance technicians. Laboratory testing with ITS prototypes indicated that the development of troubleshooting expertise on complex systems was dramatically accelerated. The current program is developing a series of 11 ITSs for the United States Air Force Air Combat Command. Each will be fielded as a software application for 486 class PC platforms.

8-10 month intervals over the next several years. A detailed description of the ITS development program will be provided at the conference.

## INTRODUCTION

A dichotomy between two current societal trends serves to make the advent of Intelligent Tutoring Systems (ITS) appealing to a diverse population of potential users. First, the learning that typically takes place during the formalized education process is becoming continually more abstracted from the manner in which that knowledge is applied in the "real" world. Second, as our technological sophistication increases, more specialized knowledge is demanded of the individuals responsible for using and maintaining this new technology.

The early answer to this problem seemed to lie in Computer Based Training (CBT). In theory, CBT would bridge the gap between technology and education by allowing many individuals to experience the benefits of an expert's knowledge in a particular domain. Designers were able to encode a static representation of an expert's knowledge of a particular domain allowing the student to follow along a well-defined, procedural, decision-making process. However, use of computers in computer-based training is in many ways similar to the presentation of information via traditional text books. Both can be sophisticated and offer the student useful features to facilitate the learning process. Unfortunately, neither CBT nor traditional text books have the ability to answer unexpected questions, draw relevant and novel inferences or adapt their presentation to adapt to a particular student's learning style (Wenger, 1987). Computer-based

The development of these tutoring systems addresses a critical need in today's military environment. Weapon systems are becoming increasing complex and sophisticated. While these advances often lead to reduced normal maintenance, unusual or uncommon problems do develop which require very high levels of diagnostic skills. Development of excellent diagnostic skills traditionally occurred through the on-the-job training and mentoring technicians received over years of service. However, because of force downsizing and other concerns, the traditional approach to troubleshooting skill development is no longer acceptably efficient. The ITSs supplement normal on-the-job training with a high technology learning environment. The use of artificial intelligence, within an instructional framework reflecting cognitive learning theory, custom tailors instruction to the specific needs of each technician as he gains an