



## Air Force Requirement

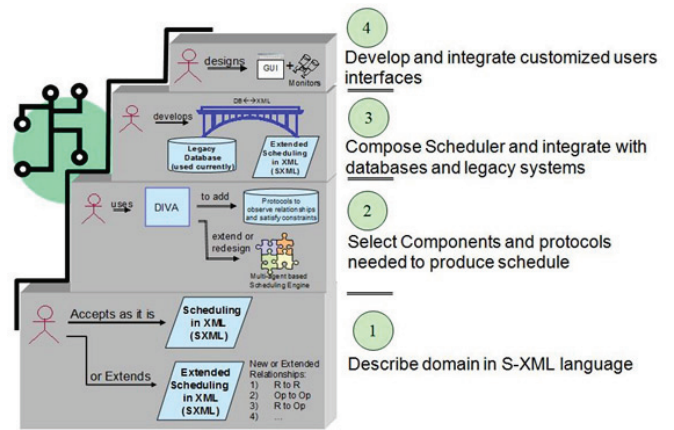
The Air Force has a requirement to develop an advanced capability to rapidly generate custom scheduling engines for variations in operational requirements—custom, computer generated code that is highly efficient, guaranteed correct, and tailored to a particular user’s operational problem. Scheduling is always a critical function in both industry and military operations. Despite the existence of several techniques and commercial off-the-shelf (COTS) scheduling software, development of a customized scheduling solution for a given domain usually requires a long (and costly) formal development process.

In particular, there is a class of domains that requires solutions that can adapt quickly to a very unstable reality. These domains are better served using a technique known as Dynamic Scheduling. Dynamic Scheduling approaches the solution by applying continuous adjustments to the schedule as the environment changes. These adjustments are obtained by selecting possible solutions from an ordered set generated by the application business rules.

## SBIR Technology

Intelligent Automation, Inc. (IAI) developed their agent-based Generic Scheduling Engine Builder (GenSEB) software system under this SBIR program. This tool uses autonomous agents, which are dynamically built to represent the resources and business rules of the domain, to “negotiate” solutions when new requests arrive or when operating conditions change. This system is proactive in that it suggests possible courses of action to operators and allows the visualization of “what-if-scenarios”. During Phase I, IAI demonstrated the feasibility of the framework and methodology by developing a software prototype of the components and scheduling engine and applying it to a simple aircraft maintenance problem.

During the Phase II effort, IAI successfully developed a methodology to perform the composition of a customized scheduling engine using agent-based, pre-constructed components as shown above. This technology was demonstrated with a prototype system for scheduling range support operations on the 45SW Eastern Range with headquarters at the 45th Space Wing, Patrick AFB, FL. Range support for launch operations on the 45SW is a highly customized environment. Despite the basic resource allocation nature of the problem, as in any scheduling system, the amount of informal business rules, specific information in the system, and domain volatility limit the practical application of traditional schedulers.



## Potential Air Force Application

Schedulers are everywhere in military operations. Traditional approaches to scheduling have concrete problems to cope with the scale and dynamics of military systems. The techniques developed in GenSEB are agent-based; hence, they not only guarantee scalability but also provide a robust approach to dynamic schedulers. The ontology-based methodology developed in GenSEB allows the quick customization of a scalable dynamic scheduler to any particular domain with minimum effort. In addition, schedulers developed with GenSEB can coordinate their efforts, allowing for easier coordination between multiple operations centers in the spirit of a true netcentric environment.

## Company Impact

The benefits of the SBIR program in general for a company like IAI are two-fold: First, it allows a window into the needs of the users (through the solicitations) which helps us direct fundamental research to the fulfillment of practical needs. Second, it provides critical early stage development funding to pursue groundbreaking technologies for critical military and commercial applications.

For IAI, the value of this SBIR program was the opportunity to develop GenSEB as a platform technology for scheduling applications. The commercial market for scheduling systems in general, and enterprise resource planning (ERP) systems in particular, is quite large but has a very high penetration barrier. The ability to develop and demonstrate, through this SBIR program, the superior cost and performance advantages of our GenSEB technology, puts us in a strong position to penetrate this coveted market.



# SBIR/STTR

Air Force SBIR Program  
AFRL/XP  
1864 4th Street  
Wright-Patterson AFB OH 45433

AF SBIR/STTR Program Manager: Augustine Vu  
Website: [www.afsbirsttr.com](http://www.afsbirsttr.com)  
Comm: (800) 222-0336  
Fax: (937) 255-2219  
e-mail: [afrl.xppn.dl.sbir.hq@wpafb.af.mil](mailto:afrl.xppn.dl.sbir.hq@wpafb.af.mil)

