

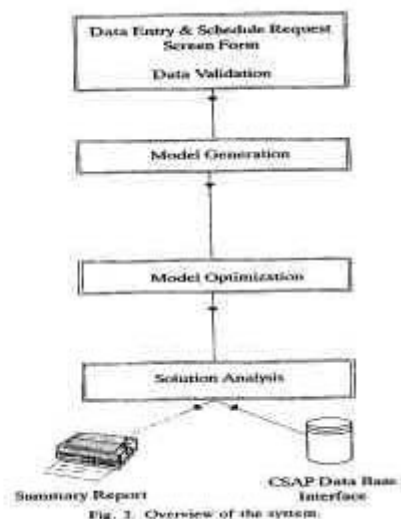
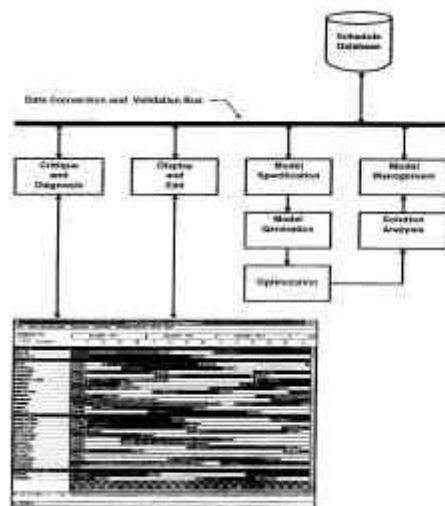
# An Intelligent system for US Coast Guard cutter scheduling

Client: United States Coast Guard (USCG)

**Project Scope:** US Coast Guard undertakes important missions in the maritime regions of USA. These responsibilities include: search & rescue, law enforcement, response to (marine) environment incidents, fishery and custom regulation and vessel safety. A number of vessels (cutters) and aircraft of different types are normally deployed to carry out these missions as appropriate. The main challenge is to deal with the long-term planning and operational scheduling of diversified Coast Guard platforms. The development process from knowledge elicitation through model building to the analysis of computational performance and the position of scheduling within a taxonomy of decision problems with reference to appropriate methodology were dealt with. Tools were designed to ease the human scheduler's capability to handle the scheduling process more efficiently and effectively. The decision model takes into account the routine activities. Optimum scheduling was achieved through workload balancing, maximising cruise lengths, the optimum time to be spent in homeport, and other items that affect the crew's morale.

## Project Achievement:

In the early stages of this project a rule-based expert system shell was used to perform the scheduling. The prototype system did not scale up to process the scheduling requirement of all the cutters available. A discrete optimisation model was developed using a procedural (column generation) schedule. This integer programme was solved efficiently and achieved the necessary "scale up".



**Client Feedback:** USCG in the Atlantic called LANT areas used this software system for planning and scheduling of their fleet of "Cutters".

## References

K. Darby-Dowman, R.K. Fink, G. Mitra, J.W. Smith, An intelligent system for US Coast Guard cutter scheduling, *European Journal of Operational Research* 87 (1995) 574-58