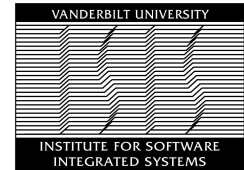


# MAPLANT: Maintenance Planning Tool<sup>1</sup>

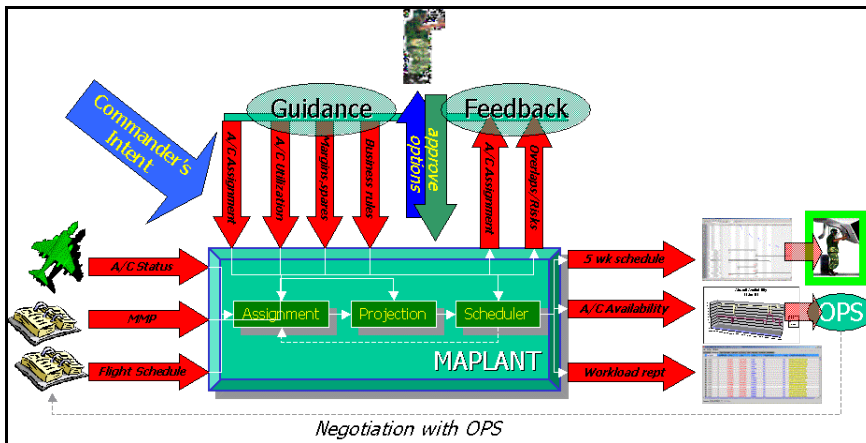
## Summary of Features



MAPLANT is a negotiation-based decision support tool for a Maintenance Control Officer who plans and manages aircraft maintenance in aviation squadrons. The tool currently is tailored towards the requirements of USMC AV8-B squadrons, but could be extended to work with other aircraft types.

The tool generates *aircraft to mission assignments* and *maintenance schedules* that define what specific maintenance actions need to be taken on which aircraft. The assignments determine which aircraft should fly what missions. The maintenance actions scheduled include calendar-based inspections, usage-based inspections, and other repair tasks to keep the aircraft “legal” and flying. The key inventions in MAPLANT are:

- (1) MAPLANT computes its result in consideration to the operational requirements (as expressed by the operation flight schedule: an input to MAPLANT), and
- (2) *both* the aircraft assignment and the maintenance schedule are coordinated with each other, as well as with the operational schedule.



MAPLANT receives the following inputs: (1) Maintenance Plan that specifies what inspections must be done on which aircraft in the squadron, and what their deadlines are, (2) Aircraft Roster that lists aircraft in the squadron with their type information, usage hours, life counts, and status (“up” or “down”), (3) Personnel Roster: the list of maintainers with qualifications, and their availability over time, (4) Inspection Manual Data describing all the maintenance task types:

their expected duration, resource requirements in terms of maintainer skills and special tools, and their sequencing, (5) Operational Flight schedule: a condensed version of the operational flight schedule. It consists of the mission requirements: what type of aircraft is needed, how many, when, and how long, turn-around requirements, and event priority, (6) Commander’s Guidance: work shift specifications, i.e. how many and how long, and holidays, and (7) Support Equipment Data: a description of the support equipment available for use.

MAPLANT generates: (1) Recommended aircraft to mission assignments that show which aircraft is recommended to fly which specific mission(s), (2) Detailed maintenance schedule for the specific maintenance actions, and (3) Aircraft availability report that projects the number of available aircraft, by type, over time during the scheduling period.

MAPLANT ensures that the generated maintenance schedule satisfies all the requirements imposed by the input, namely:

- all the required maintenance actions are performed before their deadline, and all tasks will have the required number of personnel and tools available at the time when they execute,
- all tasks of the maintenance actions are scheduled,
- all flight schedule requirements are met, i.e. there are enough aircraft *not* in maintenance at all times to fly the specified schedule,
- the commander’s guidance is taken into consideration,
- personnel and tools are never utilized over their capacity.

There is a chance that the scheduler fails because it is impossible to schedule all the tasks under the given requirements. In this case it reports the failure, and performs a “best effort” scheduling that estimates aircraft availability numbers, given the maintenance requirements. These can then be sent back into the operational flight scheduler for generating a new schedule that maintenance can support.

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<sup>1</sup>Original research and development was supported by DARPA/IXO ANTS program through USAFRL.