

# Using an Advice Language for Schedule Communication in a Flexible Manufacturing Automation Cell

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## 1 Introduction

The need for quick adaptation to rapidly emerging scheduling/execution requirements has led to the development of an architecture supporting pluggable 'execution advising' modules. Central to the 'pluggability' of the architecture is an *advice*-metalanguage.

This capability allows us to optimize the Executor's performance for each individual customer without compromising the overall system modularity.

## 2 Characteristics of the Domain

**Complexity** : The objective of the system is to provide complete information but components of the system need to deal with information which is out of date.

**Dynamism** : The system is dynamic in that its model of resources and activities is limited. In particular, human activities cannot be monitored at the same level of detail as the other processing resources. Activities can be unexpectedly introduced or performed at unexpected times.

**Uncertainty** : A number of uncertainties exist: estimates of processing speeds are unreliable, the time between assistance being required is

variable (stochastic), the time between repairs is variable (stochastic), and the duration of setups is variable contingent on the material qualification tests.

**Interruptability** : The processing steps are uninterruptable.

**Concurrency** : Coordination is required to deal with concurrency issues which occur at various levels of the system.

- synchronisation is required between components of the execution system
- synchronisation is required between components of the planning/scheduling system
- synchronisation is required between scheduling and execution system components
- synchronisation is required between the user, and the scheduling and execution system components

**Changing Objectives** : Objectives may vary across sites. Key objectives are: maximising throughput and expediting hot lots. These objectives conflict with each other and the one objective may be treated as primary in one context and not in another.

**Goal Variability** : The goals of the system involve both constraint satisfaction and optimisation.

In addition, there is the requirement that the system should be both modifiable and extendible. New customers bring new requirements, existing customers change their requirements, and technical developments bring changes to the manufacturing equipment and processes. This dictates that a sound engineering approach be adopted in which modules with clear interfaces are defined.

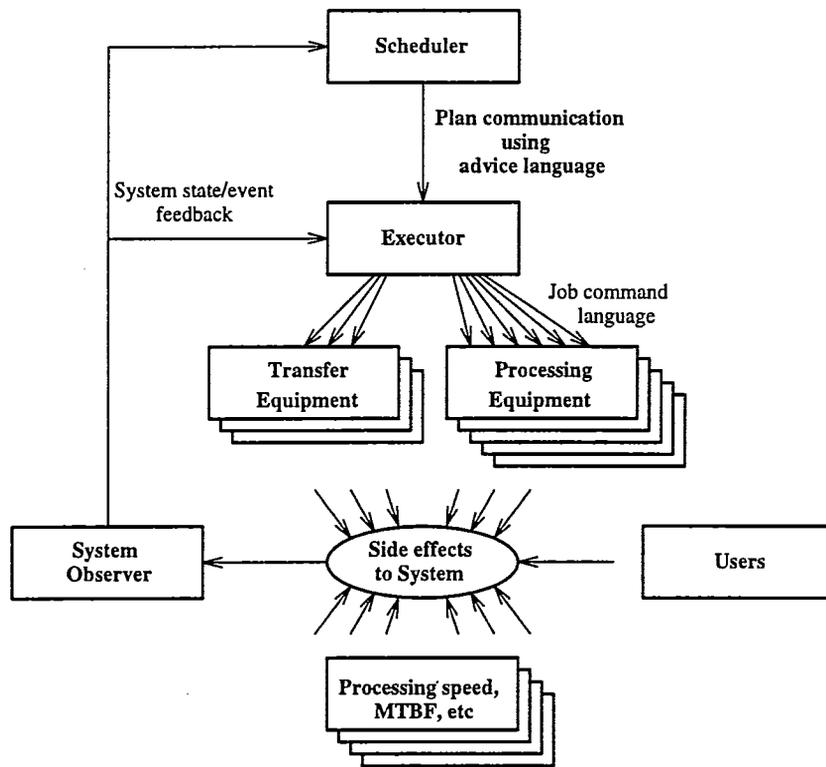


Figure 1: System overview