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The Moving Frontier Questionnaire

response by

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1. What kind of problems are you currently working on ?

Partitioning algorithms (exact and approximate) and complexity evaluation for combinatorial structures.

Combinatorial optimization for solving: manufacturing problems (material flow management and information flow management), netted systems design and design/manufacturing integration problems.

Analysis of decision processes in system design and manufacturing environments.

2. What problems do you think are the most important to solve in your domain in the nearest future ?

Finding "easy to solve" approximate algorithms and decision rules for factory automation problems, satisfying "good" requirements with respect to global optimality.

Developing a conceptual modelling framework and reliable techniques for integrating models concerning different aspects of a firm.

Developing a conceptual framework and practical techniques for optimization models formulation, in given solution environments.

The problems outlined in the answer to question 3.

3. Which of the recent applications of scientific results from your domain do you consider as most interesting ?

Application of complexity theory (in particular NP–completeness) to the evaluation of real life problems and to the reduction of problems from one format to another.

Availability of new powerful algorithms (both for polynomial and NP–complete problems) to solve many medium–to–large size problems (in a suitable software and hardware environment). In particular:

- partitioning algorithms for job–to–resource assignement;
- scheduling algorithms for flow shop type problems;
- algorithms for difficult cost flow problems on networks (large size, dynamic, multicommodity,...);
- partitioning and scheduling algorithms for project management type problems and new applications in concurrent engineering;
- scheduling algorithms for vehicle routing type and crews scheduling problems;
- smart heuristics and probabilistic algorithms for fast approximate solution of large size decision (combinatorial) problems;
- dynamic programming (or shortest path) type algorithms for complex synchronization problems and, in general, for complex sequential decision processes.

4. To what extent is availability of definite computer hardware influencing your scientific work ?

Very little; the standard computer environment (a personal computer on the desk, a workstation in the next room, a remote standard mainframe and a local network) suits well almost all needs. However, some researchers in my field make extensive use of supercomputer facilities or powerful parallel machines.