

Notes for NSF Cyberinfrastructure-OR Workshop

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This is a position statement requested by the organizers of the NSF Cyberinfrastructure-OR Workshop to be held 30-31 August 2004. It contains suggestions on two areas: what effects the workshop should have, and some ways in which it might proceed in order to bring about those effects.

In order to succeed, the workshop should help to bring about increased generation and increased use of cyberinfrastructure (CI) tools to enhance implementation of operations research (OR) methods in application domains. In turn, such CI-OR tools should yield benefits including:

- More realistic and larger-scale applications in application domains such as transportation, logistics, energy supply and distribution, and homeland security. A principal reason for this is the fact that if the people building these applications have access to CI-OR tools, then they will need to spend less time and money in building custom tools for their particular applications. As a result, they can put more resources into the application effort itself.
- Increased collaboration within and possibly across disciplines using OR methods. The availability of a common framework and an array of CI-OR tools should provide incentives for people to structure their specific applications in ways that can easily be shared with others. An obvious analogue is the opportunity for document exchange brought about by Microsoft Office and Adobe Acrobat software.

I doubt that anyone at this stage knows how the CI development process will or should evolve. Thus, rather than try to make detailed plans I would like to see the workshop help to develop a sense of the directions in which the field should move, together with some next steps. This should include development not just of tools, but also of resources and incentives for publicizing, learning about, and sharing those tools.

As to process, one method I have found helpful in structuring ill-defined problems is the four-quadrant technique of Roger Fisher and his colleagues at the Harvard Project on Negotiation [1, 2]. This involves generating ideas and classifying them into four categories:

- What do we see that shows a need for change? (Facts)
- What seems to be going on? (Analysis and diagnosis from the facts)
- How could we change this situation? (Prescriptive plan from the diagnosis)
- What should we do next? (Specific steps to start implementing the plan)

Practically any relevant idea fits in one of these four areas. With several good ideas in each of the four, one has enough material to write an assessment of the situation and a plan for changing it.

References

- [1] Roger Fisher and Alan Sharp. *Getting it Done: How to Lead When You're Not In Charge*. HarperBusiness, New York, 1999. ISBN 0-88730-958-5. Originally published 1998 by HarperBusiness.
- [2] Roger Fisher, William Ury, and Bruce Patton. *Getting to Yes: Negotiating Agreement Without Giving In*. Penguin Books, New York, 2d edition, 1991. ISBN 0-14-015735-2. Originally published 1981 by Houghton Mifflin Co.