

**Proposal Status** | MAIN ▶**Organization:** University of Texas at El Paso**Review #4**

**Proposal Number:** 0953339  
**NSF Program:** Numeric, Symbolic, and Algebraic Computation  
**Principal Investigator:** Ceberio, Martine C  
**Proposal Title:** CAREER: Symbolic-Numeric Constraint-Based Solutions for Real-World Scientific Problems  
**Rating:** Multiple Rating: (Excellent/Very Good)

**REVIEW:**

What is the intellectual merit of the proposed activity?

I very much like this proposal for the following reasons. First, in many practical problems constraints are what should be handled first of all, and even if we find some solution(s) that satisfy our (usually many, conflicting, involved, sometimes not explicit) constraints, this would be what we may really need. The author pursues the most promising and ambitious, in my opinion, path, that is, to deal with cases in which both the symbolic and numeric information may be available (or appropriate), and hence she tries to devise models which can accommodate such cases. Her agenda concerning the objectives is very good, namely to try to develop tools and techniques that provide a compromise between local and global properties, scalable algorithms, make it possible to use symbolic calculations for qualitative aspects and numerical calculations for quantitative aspects. Then, she considers over-constrained problems people face quite often, and which are difficult to cope with. Finally, and this is in particular interesting to me due to my research interests and works, she considers the case of tools and techniques, and software, for symbolic-numeric constraint-based problem solving that can be used in a multiperson, time and space distributed settings. This is very important not only for the advancement of the area as such, but also for the strongly emphasized educational impact at schools and other educational institutions in which agents (students) would cooperate and collaborate while solving the problems considered. I would also expect very interesting results by using elements of interval computations and other computational intelligence tools and techniques.

What are the broader impacts of the proposed activity?

I fully support the PI's view that education is a very good area where these tools and techniques can be of much use. The goal of helping students improve their decision making, and constraint analytic, skills is also very promising. A goal of putting a particular emphasis on women and Hispanics may be quite important, for instance - in my view - in areas where women are under-represented, for various social, traditional, etc. reasons, or where Hispanics should play a more important and visible role, and hence a help in developing all kinds of skills is very important. Moreover, there should be a broad impact by extending the existing models of constraint-based solutions to cases where their solution is distributed over space, time and across multiple agents.

Summary Statement

My very positive review is based upon the following:

1. the proposal is innovative, and combines synergistically many modern approaches, tools and techniques, and proposes a distributed solution setting,
2. the impact of the project on the development of science and technology, and also - maybe even more - on the advancement of some specific social groups,
3. the fact that the author is a already very well known researcher in the area of symbolic-numeric

constraint-based problem solving.

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