FOREWORD

William J. Mitchell
The School of Architecture and Planning
Massachusetts Institute of Technology, Cambridge, USA

The following pages tell the strange tale of a glass chair.

At first glance, creating a glass chair seems a perverse — maybe impossible — enterprise. After all, chairs are normally held together by connections that resist bending, such as those joining the legs to the seat. (Architects and engineers know these as moment connections.) Glass is a notoriously bad material for forming moment connections; it is brittle, and quickly snaps if you subject it to bending. And the consequences of a glass chair's structural failure would be particularly direct and painful.

But there are advantages to such startling formulations of design problems. They force you to challenge conventional wisdom, to ignore standard prototypes, and to ask interesting new questions. How might you design a chair *without* moment connections? How might you do so without making the result impossibly heavy? How would you build it? And what interesting qualities might such a chair have? These were questions investigated in a design project pursued jointly by students at MIT and IST.

The students explored many possibilities, and in doing so learned a great deal about chairs and about the properties and potentials of glass. The project shown here is a particularly elegant outcome of their investigations. It is created from just two curved pieces of glass, which are formed by slumping glass sheets, in an oven, on to metal forms. In both pieces, the essential structural action is that of an arch — such that bending stresses in the material are minimized. To prevent the arches from spreading, metal tension members tie the ends together.

The students also learned about cross-disciplinary, cross-cultural collaboration — a process in which each team member has something unique to contribute, and in which the result is far more interesting than that which could have been produced by any member working alone. The MIT part of the team contributed adventurous design thinking, and skill in the use of curved-surface modeling and visualization software to represent possible designs. The IST members brought their own design sensibilities to the task, made many useful suggestions, and provided essential expertise in the technical properties of glass and in the finite-element analysis of glass structures. The fabricators were active participants throughout, and contributed their special knowledge of glass fabrication equipment and processes — particularly the limits of these processes. Electronic telecommunication — videoconferencing, electronic mail, and the World Wide Web held the collaboration together, and enabled the work to be done quickly and efficiently.

In the end, the finished glass chair looked just like the initial computer visualizations; it is hard to distinguish the digital images made *before* production from the photographs taken *after*. And sitting in the actual chair confirmed, as the finite-element modeling had predicted, that it was structurally robust. With the help of sophisticated computer-aided design, telecommunications, and fabrication technology, an imaginative idea had been converted first into a precise digital model, then into beautifully crafted physical reality.