Preface

The Conference on Spatial Information Theory – COSIT – grew out of a series of workshops / NATO Advanced Study Institutes / NSF specialist meetings concerned with cognitive and applied aspects of representing large-scale space, particularly geographic space. In these meetings, the need for a well-founded theory of spatial information processing was identified. The COSIT conference series was established in 1993 as a biennial interdisciplinary European conference on the representation and processing of information about large-scale space, after a successful international conference on the topic had been organized by Andrew Frank et al. in Pisa, Italy, in 1992 (frequently referred to as 'COSIT zero'). After two successful European conferences with strong North-American participation (COSIT '93, held on the Island of Elba, Italy; COSIT '95, held in Semmering, Austria), the conference became a truly international enterprise when COSIT '97 was held in the Laurel Highlands, Pennsylvania, USA. COSIT '99 will take place in Stade, Germany.

All aspects of large-scale space, i.e. spaces too large to be seen from a single vantage point, are addressed in the COSIT conferences. These include spaces of geographic scale, as well as smaller spaces in which humans, animals, or autonomous robots have to find their way around. Spatial information theory also deals with the description of objects, processes, or events in spatial environments and it forms the foundation for the construction of Geographic Information Systems (GIS) and for spatial information and communication system design in general.

The contributions to COSIT report empirical investigations, their theoretical implications, formal models, technical realizations, and applications of spatial information technology. The research is motivated by basic research issues and by application-oriented work. In this way, COSIT becomes a marketplace for the communication of theory-driven ideas and new approaches and of application-driven requirements for spatial information systems.

The aim of COSIT is to bring together researchers from all disciplines involved in large-scale space information processing for an intensive scientific exchange. The objective is to present and discuss a restricted number of papers – the most innovative and significant recent contributions – rather than to cover all advances in the field. The conference is designed as a single-track meeting with no concurrent sessions, to ensure that all conference participants can be involved in the discussions of the papers presented. As a consequence, many participants do not present their own research in an oral presentation but play an active role in the discussions of the selected papers or present their work as a poster.

The disciplines that have contributed to COSIT include geography and geographic information science, computer science, cognitive and environmental psychology, artificial intelligence and cognitive science, architecture and design, engineering and administration, cognitive anthropology and psycholinguistics, biology, history, linguistics, and philosophy of mind.

For COSIT '99, three outstanding scientists have been engaged to deliver keynote lectures on three exciting topics: spatial cognition in animals, ontology of space, and visual reasoning in design. These topics form a special focus of this year's conference. The keynote speakers were also invited to contribute papers to these conference proceedings. Seventy full papers were submitted to the conference in response to the electronically distributed Call for Papers. Each paper was reviewed by three members of the scientific committee and by one member of the program committee. In a five-day 'virtual program committee meeting' held over the Internet, the program committee selected 27 papers for plenary presentation at the conference and for inclusion in the conference proceedings. Twelve additional papers were selected for presentation in a poster session.

The conference began with a day of tutorial sessions on *Cognitive factors in design*, on *Relation algebras and their applications in spatial reasoning*, on *Errors in human spatial knowledge*, and on *Cognitive robotics*. A three-day presentation-and-discussion program formed the core of the conference. At the end of the conference, a doctoral colloquium was held to provide an opportunity for Ph.D. students to interact with faculty and students from other institutions and to discuss their thesis research.

COSIT conferences have been held at somewhat remote yet easily accessible locations. The participants stay together for the full period of the meeting to promote intensive interactions without distraction. The 'Birds-of-a-feather dinner' promotes discussions of selected topics. A joint excursion helps conference participants to physically move in the surroundings of the conference and to mentally link their interactions and discussions to the specific outdoor spaces of the conference environment.

For the first time, COSIT was organized entirely by means of electronic communication: all contributions were distributed, reviewed, judged, and revised through the exchange of electronic documents. This set a high demand on the authors, the program committee, the reviewers, and – last but not least – on the crew producing these proceedings, as we still have to cope with substantial incompatibilities between different hardware and software systems and with different versions of the same systems. We thank all individuals for their successful efforts in getting this technology to function across different disciplines and different working styles.

We thank all contributors, the scientific committee, the program committee, the organizers of the tutorials and of the doctoral colloquium, the organizing committee, and the conference participants for their help in making COSIT '99 a successful conference. We thank Christopher Habel for proposing the vicinity of Hamburg as a site for COSIT '99 and for supporting the organization of the conference. Reinhard Moratz found an ideal conference site, the 1000 year old town of Stade, and he coordinated a competent and efficient organizing committee. Rike Lamb corresponded with the authors tirelessly and patiently, and made sure all requirements were fulfilled on time. Diedrich Wolter provided technical support and made unreadable files printable. Annette v. Wolff provided editorial support and Thomas Barkowsky provided wayfinding support. Hans-Joachim Mück and Reinhard Zierke provided networking and computer support. Finally, Hildegard Westermann helped whenever the foreseen solutions to unforeseen problems failed. We thank Alfred Hofmann and

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Related Book Publications

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