

## Preface

Digital manipulation of landform is revolutionizing how our built environment is designed and constructed. On a technical level, three-dimensional geometric modeling of topography has its origins at the interface of geographic information systems (GIS) and computer aided geometric modeling (CAD): the former with its representations of spatial attribute information with digital terrain in several representations (Triangulated Irregular Networks, contour lines, etc.); the latter focusing primarily on the parameterization and combination of geometric primitives. The broadening of these two disciplines to embrace new surveying and navigation advances, e.g. global positioning systems (GPS), together with developments in engineering on the application side, are leading to powerful new suites of functionality. There has been a pronounced need for a forum where these traditionally separate parties can interact.

These proceedings contain the technical papers selected and formally presented as part of the scientific program of the First International Symposium on Digital Earth Moving, 2001 (DEM 2001) held September 5-7, 2001 at the CIM Institute for Computing Science and Industrial Technologies of the University of Applied Science of Southern Switzerland (SUPSI-iCIMS) in Manno (Lugano), Switzerland. It is the first volume published on this explicit theme. Thirty-six submissions were received, from fifteen countries, with thirteen select papers and posters presented in the official program and in this publication.

DEM 2001 gathered for the first time in one place key representatives from commercial, academic, public, and private sectors who are driving the use and development of these new earth moving capabilities. The disparate domains of civil, petroleum, mining, and construction engineering, landscape architecture and planning, computer science, telecommunications, computational geometry, military, and geomorphology were represented. New commercial software, hardware, research innovations, and application solutions and data requirements were prime topics featured and open for discussion and scholarly debate. All approaches weighed the concerns:

1. Geometric manipulation - editing 3D geometric surfaces,
2. Visualization - seeing a 3D image or model, and
3. Accuracy - correct quantitative information for analysis and construction purposes.

DEM 2001 submission presentations were divided into the following themes:

- Automated Construction
- Topographic Form Parameterization
- "Off-the-Shelf" Software
- Digital Terrain Data
- Real-Time Representation

In addition, a workshop day with the theme, "The Digital Construction Process", was held on September 4 at the Unique Airport Renovation construction site in Zürich. The goal was to provide participants with hands-on access to the tools that currently comprise the new digital earth moving construction cycle – from surveying

using GPS, to bulldozer selection and operation, CAD/CAM integration and use, and follow-up quality control. Contractors for the Zürich International Airport Renovation Project have systematized state-of-the-art technology, and participants were treated to direct access to the equipment, together with a detailed project overview.

It was a key objective of DEM 2001 to engage both the technical and the cultural dimensions to new ways of working with digital earth. Traditions within the heretofore industrial cultures involved, must remain open to evolve abreast of innovations if they are to be fruitfully put into action and profited from. The panel discussion held at the conclusion of the symposium laid out an agenda for follow-up meetings and future research and instruction. It is our wish that DEM 2001 will serve as the first of several further international initiatives that bring active parties together in this emerging sub-speciality area. SUPSI-iCIMS I has demonstrated its continuing desire and commitment to facilitate and serve the needs as expressed by participating industrial partners.

The General Co-chairs of the symposium wish to gratefully acknowledge the participation of all of the presenters of papers and posters, the official sponsors of the symposium and their generous support in bringing together key aspects of the technology both to the symposium venue and workshop, and members of the Scientific and Organizing Committees. We also gratefully acknowledge the competent administrative support of Eric Jaminet, Giuseppe Morzanti, and Cinzia Dolci all staff at SUPSI-iCIMS I.

September 2001

Bernardo Ferroni  
Caroline Y. Westort

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The CIM Institute for Applied Computer Science and Industrial Technology (iCIMS) at the University for Applied Science of Southern Switzerland (SUPSI)



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**SGPBF** Schweizerische Gesellschaft für Photogrammetrie  
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Digital Earth Moving

First International Symposium, DEM 2001, Manno,  
Switzerland, September 5-7, 2001. Proceedings  
Westort, C.Y. (Ed.)

2001, XII, 124 p., Softcover

ISBN: 978-3-540-42586-1