from: MAPPING IN THE AGE OF DIGITAL MEDIA: The Yale Symposium
ed: Mike Silver & Diana Balmori;
GREAT BRITAIN: WILEY-ACADEMY, 2003

NETWORKING MAPS

GIS, Virtualized Reality and The World Wide Web

Mike Silver and Diana Balmori

'We are not cartographers ... we are spatial data managers.'

Joel Morrison, Director of the Ohio State Center for Mapping[1]

'The average American is caught on camera eight to 10 times a day.'

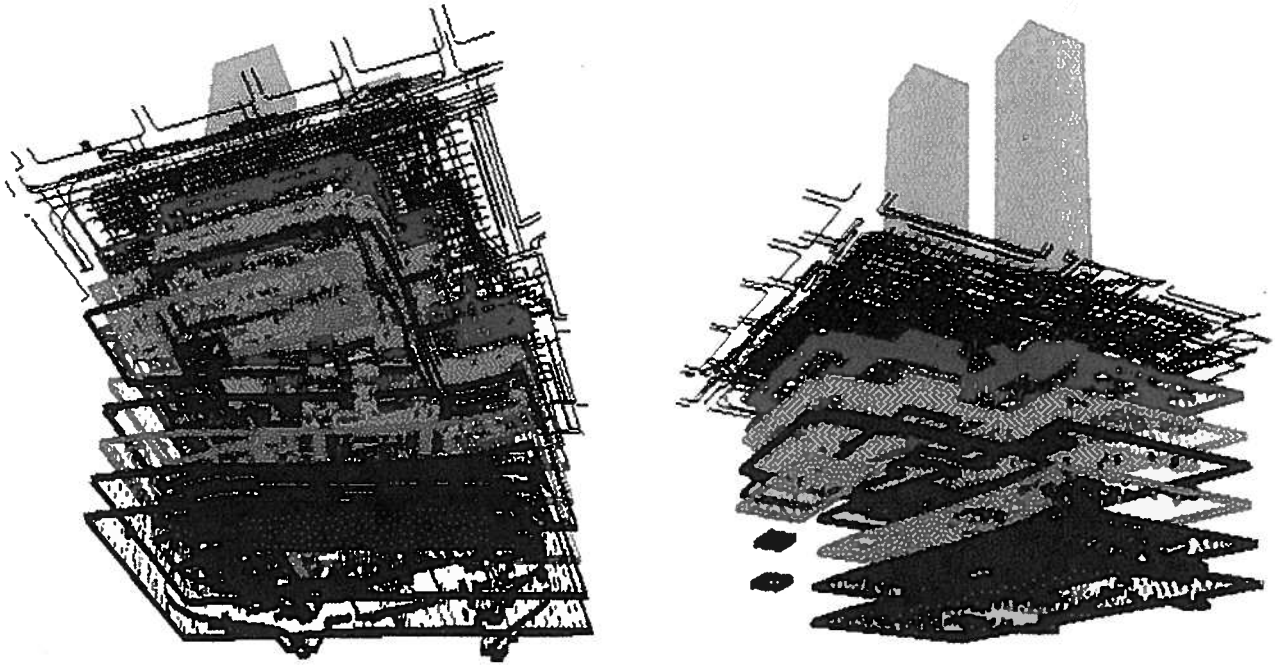
Associated Press[2]

Cartography, a term derived from the word for chart (*charte*) or drawing, has in recent years undergone a radical transformation. Like many other disciplines, the practice of mapping now incorporates a wide variety of information technologies and surveillance tools. The widespread accessibility of the Internet, the rapid proliferation of new data-acquisition devices and fast computers have redefined the map-maker's art in terms very different from those rooted in the history of paper.

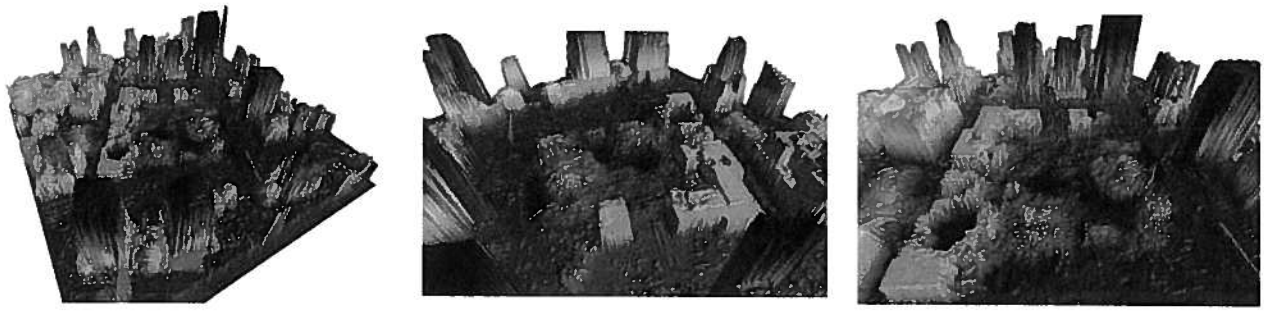
Through the work of John Ziegler, Konrad Perlman, Brian McGrath and Takeo Kanade, this essay explores four aspects of spatial data management: surveillance, collation, interactivity and simulation.

John Ziegler of Spacetrack Inc used geographic information systems (GIS) software to coordinate data owned or produced by groups, government agencies and private companies working on the site of the World Trade Center collapse. As part of geographic information systems mapping operations (GISMOO), he helped produce coherent maps taken from surveys of a rapidly changing context. As the ultimate collating technology, GIS also served as a way to combine different types of information about Ground Zero into a single database of layered files. Ziegler writes:

> We couldn't possibly have redrawn maps of the 9/11 site at the speed they were needed. Time was essential. Every ten minutes you had a changed situation. Information from light direction and ranging (LIDAR) scanners, mapping satellites and photogrammetry surveys all had to be drawn-up and integrated. As the situation kept changing we could track what was unfolding day by day. Very important too was that these maps could be attached to other kinds of data – how many people were in the area, where the hazard zones were located, etc.[3]



**GIS maps of the World Trade Center,
John Ziegler, Space Track Inc.**



LIDAR scans of the World Trade Center.

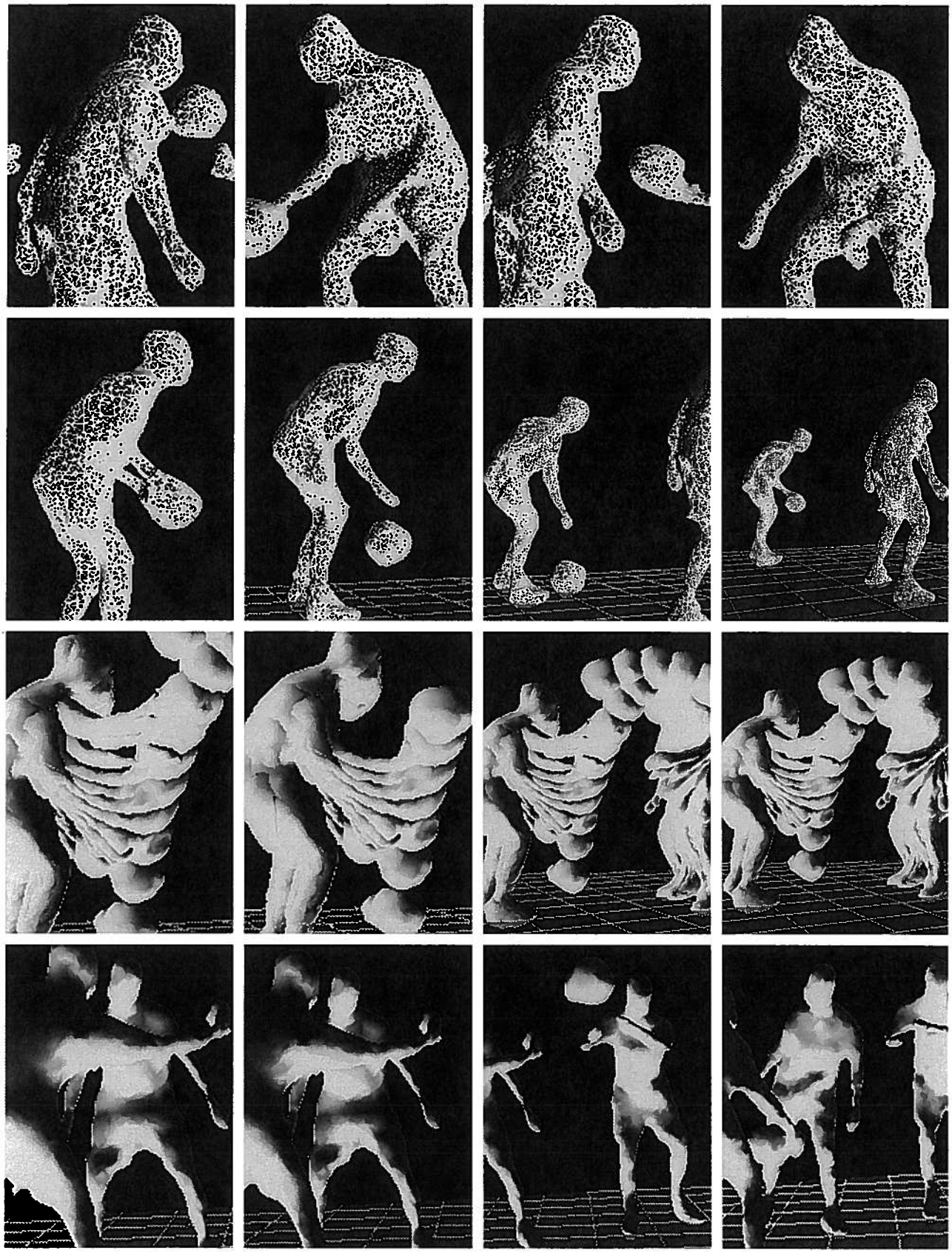
'Manhattan Timeformations', Brian McGrath and Mark Watkins.

Brian McGrath's 'Manhattan Timeformations' (www.skyscraper.org/timeformations), not unlike the layered system of Ziegler's 9/11 GIS, extends the paradigm of networked maps to an extreme, displaying the story of New York City over many years in a 3-D space located on the World Wide Web. While GIS databases tend to be restricted to a network of local users, McGrath's website is globally accessible:

> Techniques of layering, seriality and transparency were complemented by the destabilizing power of interactivity, movement and animation, effects resulting from the modeling tools we used to map the history of office building speculation on Manhattan Island ... The website is both a time-line of office building construction and a layering of historical maps, hybridizing two-dimensional graphic devices into a four-dimensional diagram.[4]

Extending this four-dimensionality even further, Takeo Kanade (a robotics engineer at Carnegie Mellon University) has designed the 'Virtualized Reality' machine – a distributed network of tiny cameras the outputs of which are recalibrated by computers to form a real-time 3-D image of physical space. These networked cameras can monitor events as they happen from any angle or vantage point. Users can transcend the frontality of the traditional video or movie screen and navigate the world from any vantage point.

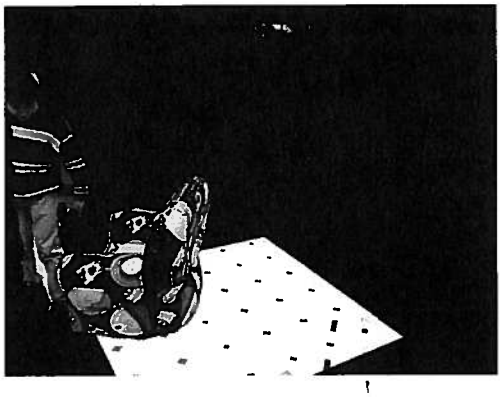
This system, originally designed as a new way to view sports events, destabilizes the hegemonic centrality endemic to the disciplinary regimes studied by



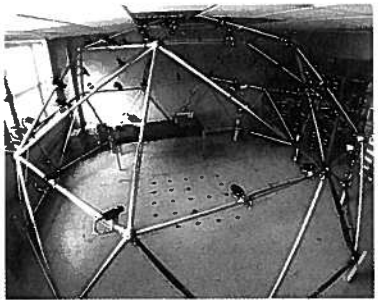
Real-time 3-D captures of a basketball game: surface models, Takeo Kanade.

Real-time 3-D captures of a basketball game: texture-mapped bodies, Takeo Kanade.

Live scene to 'Virtualized Reality', Takeo Kanade.



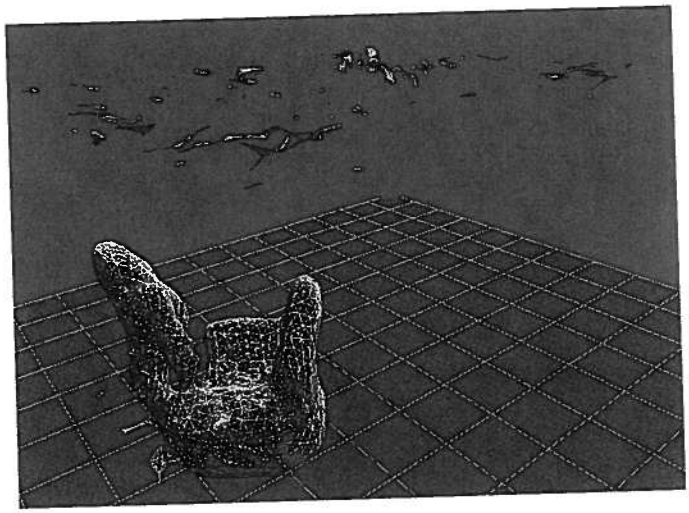
Texture mapped scene, Takeo Kanade.



'Virtualized Reality' stage, Takeo Kanade.

Foucault in his famous work on Jeremy Bentham. The centralized plan of the panopticon is replaced by a network of stations evenly distributed in space. Kanade's 'Virtualized Reality' machine permits a surveillance level unprecedented in the history of architecture. Both the virtualized spectator and those being watched overlap like ghosts haunting an alternate universe. Drifting like specters these eyes and bodies (invisible to each other) coexist in a common space without ever touching. Disembodied by electronic tools, the panoptic centrality key to understanding Foucault's 'carceral' space disappears. The single perspectival view (crows nest, observation tower, command post) is replaced by multifarious eyes that exist everywhere and nowhere simultaneously. Space becomes supersaturated by vision.

While Ziegler, McGrath and Kanade organize the flow of spatial information in their own way, if taken together each adds up to a system that would be more than



Real-time 3-D mesh model, Takeo Kanade.

the sum of its parts. Not yet in existence, this system (a 3-D, real-time, networked map accessible on the World Wide Web) is, according to Joel Morrison, a very real possibility – one that constitutes the ultimate dream of the map-maker. Such a map would operate on-line, receiving updated information in real time from a network of distributed sensors that constantly monitor space. Hyperlinked to this mapping interface are any number of sites containing logistical, demographic or economic information relevant to the site being observed.

This 'spectropticon', assembled from the root words for 'ghost' (specter) and 'vision' (optics), is meant to challenge the centralized paradigm of surveillance defined by panoptic architectures on the one hand while destabilizing the order of tyrannically managed networks on the other. The absolute divorce of data space from physical space is augmented in this model by a mirror universe modified by actions mapped in the world while simultaneously detached from them through the agency of electronic networks. On the Internet, issues of surveillance are complicated and I use the model of the 'spectropticon' here as a way to hybridize the idea of spaces that are electronically decentered yet physically place-bound.

If this map is left open for access by anyone then it becomes a public space that exists both in-situ through surveillance and distributed everywhere as an interactive system. But if the spectropticon becomes the property of a few, a 'false web', then it can be turned, as Foucault has warned us, into an instrument for the exercise of a power, one 'that seeks ideally to reach the most elementary particle – a faceless gaze that (transforms) the whole social body into a field of perception: thousands of eyes posted everywhere, mobile attentions ever on alert, a long hierarchized network'.[5] In this schema the pathways of information exchange are tightly controlled by a central agent or political body so that the possible formation of a true network, one that is intentionally left open, is precluded by the inscrutable operations of a single authority.

It is important to note that complexity in the spectropticon can emerge in only a milieu of freely interconnected users. The idea of the network itself becomes the

3-D interactive GIS model, Konrad Perlman.

infrastructure for a reality that extends well beyond the reach of a single author. The network encourages interaction, thus preparing the way for emergent phenomena and the complex interactions of a variety of forces, entities and subjects. If indeed this map is ever produced, perhaps we will see it as something more than just a surveyor's tool. Rather we might understand it as a parallel universe intimately connected to the vicissitudes and flux of our physical environment.

Of course the benefits of such a map would be enormous. The adaptability and scope of its networked spaces could easily incorporate many of the features currently designed into the most advanced GIS platforms. As Konrad Perlman writes:

> For each alternative scenario that is drawn into a GIS scene, impact models can be generated to show the additional residents, employees, cars, etc that are generated by a proposed development ... GIS completes the integration of planning, architecture, zoning and urban design. Consequently an infinite number of studies can be developed if the data is available.[6]

This interactive space, once connected to the Web, would become the ultimate design simulator functioning both as a system that continuously monitors the city and as a public forum facilitating the experimental exchange of ideas. Here development strategies for the built environment (urban, rural, suburban) could be tested in ways that permit an unprecedented level of public involvement and flexible democratic exchange.

Notes

1 Quoted from an (unpublished) conversation at the Ohio State Center for Mapping.
2 Associated Press, 'Sniper's face still a blank', *New Haven Register*, 17 October 2002.
3 Cited from an (unpublished) interview with Diana Balmori, June 2002.
4 Brian McGrath and Mark Watkins, 'Urban mapping and the Web', unpublished.
5 Michel Foucault, *Discipline and Punish: the Birth of The Prison*, Vintage Books (New York), 1977, p 214.
6 Konrad Perlman, 'Interactive 3-D GIS: Changing perspectives in time and space for architects, city planners, and the community', unpublished.