PhillydotMap

The Shape of Philadelphia

CARTOGRAPHIC MODELING LAB

University of Pennsylvania

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PREFACE

"You really like this stuff, don't you."

The comment was that of a student several years ago whose words now mean little when taken out of context but whose timing, expression, and twinkle in the eye at that time all conspired to convey a between-the-lines message that still remains quite clear. What he might just as well have said was this.

"You don't really care about my results, do you?
All you actually care about are the tools
that were used to generate those results."

And, to some extent at least, the guy was right. While geographic information system (GIS) technology must ultimately be regarded as a means to an end, it does remain for many of us an important end in itself – not the message but the medium. Having spent a number of years making use these tools and even more years building them, we have come to truly appreciate the benefit of combining those two activities – or at least attempting to look at each from the perspective of the other. This was in fact one of our primary motives for serving as participants in the academic initiative for which most of the material included in the present volume was developed.

That initiative was a project sponsored by the University of Pennsylvania's Institute for Urban Research. Entitled "Modeling Urban Environmental Impacts on Health, Development, and Behavior," its purpose was to engage faculty from across campus and to encourage their collaborative use of GIS technology in the modeling of urban form and function. Much of this work involved Penn's Cartographic Modeling Lab [www.cml.upenn.edu], of which we are the faculty co-directors. The Cartographic Modeling Lab (CML) has grown over the past fifteen years or so from a fuzzy notion on the part of several doctoral students to the University's most active center for geospatial research. Most of our work at the CML has focused on Philadelphia, and much of it has been conducted in collaboration with a a young Philadelphia GIS software development firm called Avencia. PhillyDotMap represents an attempt to celebrate this collaboration by highlighting projects that exemplify the productive use of GIS technology to model urban phenomena. All of these projects do so by way of examples drawn from the City of Philadelphia.

So what are some the more promising prospects for the use of GIS technology in the area of urban mapping? Furthermore, what are some the more promising prospects for the influence of urban mapping on the development of GIS technology? Consider the toolmaker's perspective: a glimpse at the road ahead from under the hood.

It used to be a familiar admonition that a newly-developed tool should never have to go searching for its practical application. Our own experience suggests that, on the contrary, carts should sometimes precede their horses and tool building should be proactive. After all, who knows what kind of serendipity might result when a good idea goes searching for its audience? To be fair, those warnings about tools preceding their applications were loudest at a time when popular computer programming was still in its infancy, and they have steadily diminished since. In the case of data-processing tools, it is not at all uncommon today for new ideas to be broadly disseminated in hopes of having them utilized in ways that couldn't possibly be anticipated by their original developers. This is certainly true for several of the GIS applications that are presented in the current volume. Chapter 3, for example, describes a project in which the urban landscape is characterized in terms of the threat of junk food, while Chapter 7 explores that same landscape in terms of the threat of gunshots. Both employ data-processing methods initially intended for neither.

If tools must sometimes be proactive in finding and developing their own applications, so must those applications sometimes be proactive in finding and developing their own tools. One way to organize opportunities and challenges in this regard is to draw distinctions among tools and techniques that are respectively associated with the preparation, the presentation, and the interpretation of urban maps.

It was T.S. Eliot who asked "where is the wisdom we have lost in knowledge" and "the knowledge we have lost in information." In somewhat more pragmatic terms, one might also ask "where is the information we have lost in data" and "the data we have lost in experience." The task of translating experience into data is fundamental to any science and, in urban mapping, the preparation of geographical data is a task that can encompass activities ranging from the field surveying and remote sensing to file conversion and cartographic

drafting. Ultimately, however, the purpose of those activities is to record disparate facts in a manner that enables them to be productively combined. This task is reflected in all of our chapters. It is perhaps most explicitly addressed, however, in Chapter 6, which describes a project reexamining of the work of W.E.B. Du Bois, and in Chapter 8, which describes the development of an historical database for the streets of Philadelphia.

If data preparation can be characterized as the task of translating experience into data, then data presentation is the reverse. While the general requirements for presentation of geographical data in urban mapping are not unlike those in other fields, there is one area in which urban mapping offers a great opportunity to explore and exploit new technology for spatial data visualization. For decades now, we've seen steady progress in our attempts to bring more realism to the display of virtual environments. Recently, however, we've also begun to see progress in a different direction. Instead of attempting to bring more and more of the real world into the lab, we are now able to bring more and more of that lab into the real world. In Chapter 1 is a compelling example of this, where the Internet is used not only to make historical images available to those walking the streets of Philadelphia but also to actively engage and facilitate interaction among those users. The same is true of the project described in Chapter 10, where Web-based mapping techniques are used for political mobilization.

Data interpretation is the task of translating data into information: converting recorded facts of a general nature and potential utility into those of a more specialized nature and actual utility as the result of deliberate intent. This may involve any of a number of analytical and/or synthetic techniques to make explicit those subjective meanings that would otherwise remain implicit in a set of objective observations. In urban mapping as elsewhere, a useful distinction can be drawn between those interpretive methods that are essentially positive or descriptive in nature, focusing on "what is," and normative or prescriptive methods focusing on "what should be."

In terms of description, urban applications of GIS call for an interesting usage of interesting methods in two particular areas, the first of which is spatial pattern analysis. Getting a machine to "see" spatial patterns in the characterization of urban environments often involves primitive measurements (of things like narrowness or rectilinearity, for example) that are similar to those employed in optical character recognition, fingerprint searching,

robotic vision, and so on. What makes urban pattern recognition special are the ways in which those primitive measurements are then aggregated into more complex forms and associations that can only be understood in terms of particular knowledge about the urban environment. One example of this in the pages that follow is in Chapter 2, which presents an effort to characterize a portion of Philadelphia in terms of its ability to accommodate an aging population. Another is in Chapter 4, which describes a specialized cartographic language used to model urban heat.

The second set of descriptive methods that are likely to prove both interesting and useful in interpreting maps of urban conditions are those associated with what has come to be referred to as "exploratory data analysis." This is a methodology that has been integrated into statistical software over the past several decades and more recently incorporated into GIS as well. It is a statistical approach that starts without any preconceived hypotheses or assumptions but works instead in an incremental and heuristic manner, relying heavily on evocative graphics and intuitive tools to move from one step to the next. Chapter 5 presents a project that employs this sort of technique in order to target patrons for a local theater.

In terms of prescription, urban applications of GIS also call for particularly interesting usage of interesting methods. These are generally associated with "spatial allocation," the task of selecting geographical locations to satisfy stated criteria. Among the chapters presented here, it is Chapter 9 that most explicitly deals with spatial allocation in its description of tools for decision making in the area of urban real estate.

GIS is a field in which significant advances have always been influenced by its on on-the-ground applications. While the increasing influence of advances in more general areas of information technology (such as database management, computer-human interaction, graphics processing, and even video-gaming) is evident, the role of these on-the-ground applications remains as important as ever. With this volume, our intent is to celebrate and encourage that influence.

C. Dana Tomin, Charles Branas
Amy Hillier, Dennis P. Culhane
Philadelphia, September 2009

ABOUT THE CONTRIBUTORS

Avencia, Inc. is an award-winning GIS software development firm specializing in web-based geographic analysis, visualization and modeling applications. www.avencia.com

Cartographic Modeling Lab (CML) is a service center specializing in GIS and spatial analysis affiliated with the Schools of Medicine, Design, and Social Policy & Practice at the University of Pennsylvania. www.cml.upenn.edu

Charles Branas is an Associate Professor of Biostatistics Epidemiology in the University of Pennsylvania School of Medicine and the lead faculty co-director of the CML.

Robert Cheetham is the President and CEO of Avencia, Inc..

Rachel Cheetham-Richard is the Vice-President of Avencia, Inc.

Rachel B. Cohen is a planner and housing specialist for the Philadelphia Corporation for Aging.

Joan K. Davitt is an Assistant Professor at the University of Pennsylvania Social Policy & Practice.

Joan Decker is the Commissioner of the Philadelphia Department of Records.

Megan Heckert was the Business Development Manager at Avencia, Inc.

Amy Hillier is an Assistant Professor of City + Regional Planning in the University of Pennsylvania School of Design and a CML faculty co-director.

Jason Hutchins worked on the PhillyHistory.org project.

Lucy Kerman served as the special projects coordinator to University of Pennsylvania President Judith Rodin and is currently the Vice President, Policy and Planning for the Greater Philadelphia Urban Affairs Coalition.

Zachary L. Lechner is a Ph.D. student in history at Temple University and worked on the PhillyHistory.org project.

Michael McLarnon is a software developer for Avencia, Inc.

Heather Newlin worked on the PhillyHistory.org project.

Dina Scholssberg served as an Associate Practice Professor of Law at the University of Pennsylvania Law School and currently Of Counsel to the law firm of High Swartz LLP.

Harris Steinberg is the Executive Director of PennPraxis.

Eileen Sullivan-Marx is the Shearer Term Associate Professor for Healthy Community Practices, and Associate Dean for Practice and Community Affairs at the University of Pennsylvania School of Nursing.

C. Dana Tomlin is a Professor of Landscape Architecture and Regional Planning at the University of Pennsylvania School of Design and the founder of the Cartographic Modeling Lab.

Stella Volpe is an Association Professor and the Mirian Stirl Term Endowed Professor of Biobehavior and Health Science at the University of Pennsylvania School of Nursing.

Douglas Wiebe is an Assistant Professor of Biostatistics Epidemiology in the University of Pennsylvania School of Medicine and the lead faculty co-director

Diane-Louise Wormley served as the Managing Director at the Cartographic Modeling Lab and is currently the Deputy Director for NeighborhoodsNow.

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