Minnesota 3-D

Technology Opportunities Program (TOP) grant evaluation report

SEPTEMBER 2007

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September 2007

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Acknowledgments

The Center for Urban and Regional Affairs (CURA) at the University of Minnesota and Wilder Research thank survey respondents and interviewees for generously contributing their time and insights.

The authors wish to thank Kris Nelson and Jeff Matson of CURA and Oriane Casale and Jessica Fendos of the Labor Market Information Office of the Minnesota Department of Employment and Economic Development's (LMI/DEED) for their assistance with this report.

We also gratefully acknowledge contributions from the following Wilder Research staff members: Joanne Arnold, Cheryl Bourgeois, Benjamin Bushee, Jacqueline Campeau, Marilyn Conrad, Philip Cooper, Louann Graham, Bryan Lloyd, April Lott, Ryan McArdle, Lynda Merkens, Nam Nguyen, Margaret Peterson, Alexandra Pierce, and Deborah Sjostrom.

Introduction

Overview of Minnesota 3-D

The Center for Urban and Regional Affairs (CURA) at the University of Minnesota was awarded a federal Technology Opportunities Program (TOP) grant in October 2004 to address the growing distance between workers' residences and jobs brought on by development patterns.[1] With TOP resources, the Minnesota 3-D project brought together key actors from geographic information systems, economic and community development, and neighborhood planning to envision how spatial mismatches could be alleviated through better use of information. It was CURA's belief and its partners' that a robust analytical tool – one capable of highlighting interdependencies between jurisdiction and program areas – was needed to overcome certain barriers to economic growth. CURA's primary partner, the Labor Market Information Office of the Minnesota Department of Employment and Economic Development's (LMI/DEED), took on the technical responsibilities of developing and maintaining the analytical tool.

The Minnesota 3-D website (M3D), which can be found at http://map.deed.state.mn.us/M3D/, is the result of CURA and LMI/DEED's effort to provide the Twin Cities area with an accessible and unique analytical tool. Built on geographic information system (GIS) technology, M3D spatially integrates geographic layers at large and small scales with a warehouse of data. Users interact with the site through a combination of menus and a mapping interface, and they can draw information from M3D in the form of maps or data tables.[2]

In an effort to make M3D a valuable and unique tool, the Minnesota 3-D project focused on incorporating relevant information and data not readily available elsewhere. A central component of M3D is information on economic travel patterns called laborsheds and commutesheds.[3] Laborsheds indicate where workers in particular area live, and commutesheds indicate where residents of an area go to work. Data on these travel patterns are obtained from the U.S. Census Bureau's Longitudinal Employer-Household Dynamics (LEHD) program. Additional data have been obtained through local partnerships with the following organizations and others: Federal Reserve Bank, HousingLink, Metropolitan Council, Minnesota Child Care Resource and Referral Network, Minnesota Department of Employment and Economic Development, Minnesota Department of Human Services, and Minnesota Department of Revenue.

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1 See http://ntiaotiant2.ntia.doc.gov/top/details.cfm?oeam=276004024 for the M3D entry in the TOP grantee database.

2 See Appendix A1.

3 See Appendix A2.

Evaluation purposes

This evaluation report is the second produced as part of the evaluation of the Minnesota 3-D project. The first or baseline report, released in May of 2006, identified communities exhibiting the greatest spatial mismatches and reported findings from interviews of local economic and community development professionals who were considered likely users of the M3D website.[4] The second report was originally intended to replicate the first in order to measure community outcomes of the project. However, because the website was launched a year ago and most of the information examined in the baseline study was drawn from the 2000 decennial census, replication of the baseline report has been deferred in favor of a descriptive analysis of how M3D was developed and has been applied since being launched.

Key evaluation questions

- To what extent has the Minnesota 3-D project succeeded at meeting its technical and partnership objectives during development?
- To what extent is the M3D website accessible, integrated, and a useful tool for planning and decision making, especially with regard to addressing spatial mismatches?

Evaluation methods

Three general approaches were used to answer the above questions. Readily available information, including webpage statistics and hands-on observation of the M3D website, was examined and brought to bear on the evaluation questions as appropriate. A sample of M3D users was interviewed by phone using a structured survey instrument. Respondents were asked about the purposes for which they used M3D and about their experience with the website. In-person interviews were conducted with three M3D users who had used the website extensively. The users are profiled in case studies to illustrate some of the specific uses, strengths, and limitations of the M3D application.

The survey sample is comparable to the geographic distribution of M3D visitors located in Minnesota (see Table 5). However, the true representativeness of the survey cannot be estimated since the sample was not randomly drawn from a frame that approximates all M3D users. The sample is considered purposive since it consists of all individuals identified by CURA as likely M3D users (e.g., workshop attendees) and an additional subset of likely users who were identified by respondents (i.e., snowball sampling). Out of 89 individuals in the sample, 57 responded to the phone survey for a response rate of 64 percent.

[4] A summary of the report can be found at http://www.wilderresearch.org.

M3D development

Timeline

Table 1 summarizes key milestones in the Minnesota 3-D project. Shortly after receiving the TOP award, CURA began engaging partners and working with LMI/DEED to build the M3D application. Subsequent milestones included data acquisitions, practitioner trainings, community development projects, and technical accomplishments culminating in the March 2006 beta release of the M3D website. M3D was promoted in its beta form and feedback was gathered through conference presentations and trainings prior to its public launch in October 2006. Ongoing technical improvements, data acquisitions, and dissemination have followed M3D's full release.

1. Milestones in M3D's development

	Month
Technology Opportunities Program (TOP) grant awarded to the University of Minnesota's Center for Urban and Regional Affairs (CURA)	October 2004
Steering, technical, and data committees formed by CURA	November 2004
Collaborations initiated with communities and with planning and economic development practitioners	November 2004
Longitudinal Employer-Household Dynamics (LEHD) data aggregated for neighborhood level analysis by the Labor Market Information Office of the Minnesota Department of Employment and Economic Development's (LMI/DEED)	December 2004
Initial data sets for application identified by practitioners	December 2004
Staff for database and GIS development identified and hired by LMI/DEED	March 2005
Design of integrated database completed by LMI/DEED	April 2005
Trainings on economic data analysis conducted by CURA for practitioners	June 2005
Trainings on internet mapping applications conducted by CURA for practitioners	July 2005
Three M3D community development projects initiated with assistance from practitioners	September 2005
Database development completed by LMI/DEED	September 2005
Baseline information on partnering and non-partnering communities captured by Wilder Research	September 2005
CURA staff attended regional GIS conference to disseminate information about the Minnesota 3-D project	October 2005

1. Milestones in M3D's development (continued)

	Month
Development of M3D internet GIS application began by LMI/DEED	October 2005
Beta version of M3D released to partners	March 2006
Testing and feedback of M3D conducted by practitioners	May 2006
Trainings on use of M3D conducted by CURA	May 2006
Community GIS Expo hosted by CURA features M3D	June 2006
Final M3D refinements identified by LMI/DEED	June 2006
Initial projects completed in six partner communities with assistance from CURA	September 2006
M3D website launched	October 2006
Parcel data and demographic data integrated into M3D by LMI/DEED	October 2006
Revenue data added to M3D by LMI/DEED	January 2007
CURA staff attends national community development conference to disseminate information about the Minnesota 3-D project	January 2007
Minnesota 3-D project responds to accelerating foreclosure rates by obtaining foreclosure data from counties and incorporating it into M3D	May 2007
Partner communities initiate three M3D community development projects	June 2007
New interface and additional functionality unveiled following user feedback	June 2007
CURA staff attends national GIS conference to disseminate information about the Minnesota 3-D project	September 2007
Updated LEHD origin-destination data added to M3D by LMI/DEED	September 2007

Partnerships

One goal of the Minnesota 3-D project was to build upon CURA's legacy of partnering with practitioners at local and regional levels and across a variety of program areas that affect communities. Additionally, as a condition of receiving the TOP grant, the project was asked to seek out in-kind contributions. One of the ways in which these objectives were addressed was by forming three committees to steer the project, to build the application, and to obtain relevant data. The Minnesota 3-D project also engaged communities and practitioners in short-term projects and working groups related to M3D's development (see Table 1).

Table 2 summarizes in-kind contributions to the Minnesota 3-D project in the form of voluntary committee participation. A total of 20 partners committed to working on the Minnesota 3-D project for an estimated total of 1,226 hours. On average, each committee member contributed approximately 61.3 hours to the project from October 2004 through July 2007. If committee members earn the median community service manager hourly wage of $28.15, then committee participation can be valued at approximately $34,498.[5] Information on committee participation was gathered from an email survey of committee members. Nonmember support in the form of regular data contributions and ongoing involvement in the project was not measured, although CURA estimates that informal support was similar in magnitude, commitment and value to that provided by committee members.

2. In-kind contributions to the M3D project

	Number of partners	Total number of hours	Mean number of total hours per person
Steering committee	6	482	80.3
Technical committee	6	492	82.0
Data committee	8	252	31.5
Total	**20**	**1,226**	**61.3**

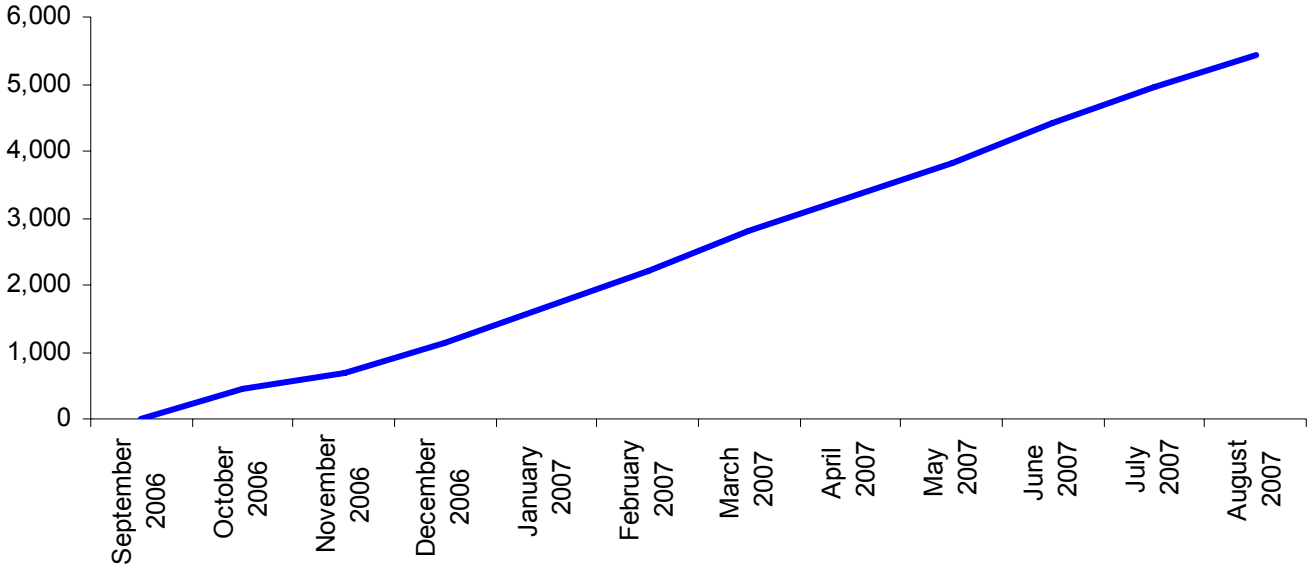
Webpage visits

Since its launch in September 2006 through July 2007, the M3D website received 4,953 visits, or 16 visits per day. Table 3 shows the accumulation of visits over time and indicates that the site is on track to reach 6,000 visits by October.

The ability to accurately determine the number of unique visitors to the website depends on users accepting cookies that uniquely identify them when returning to the site. For about 46 percent of all visits, cookies were refused, while the remaining 54 percent became recognizable visitors. Among the visitors, 36 percent visited once and 64 percent visited more than once.

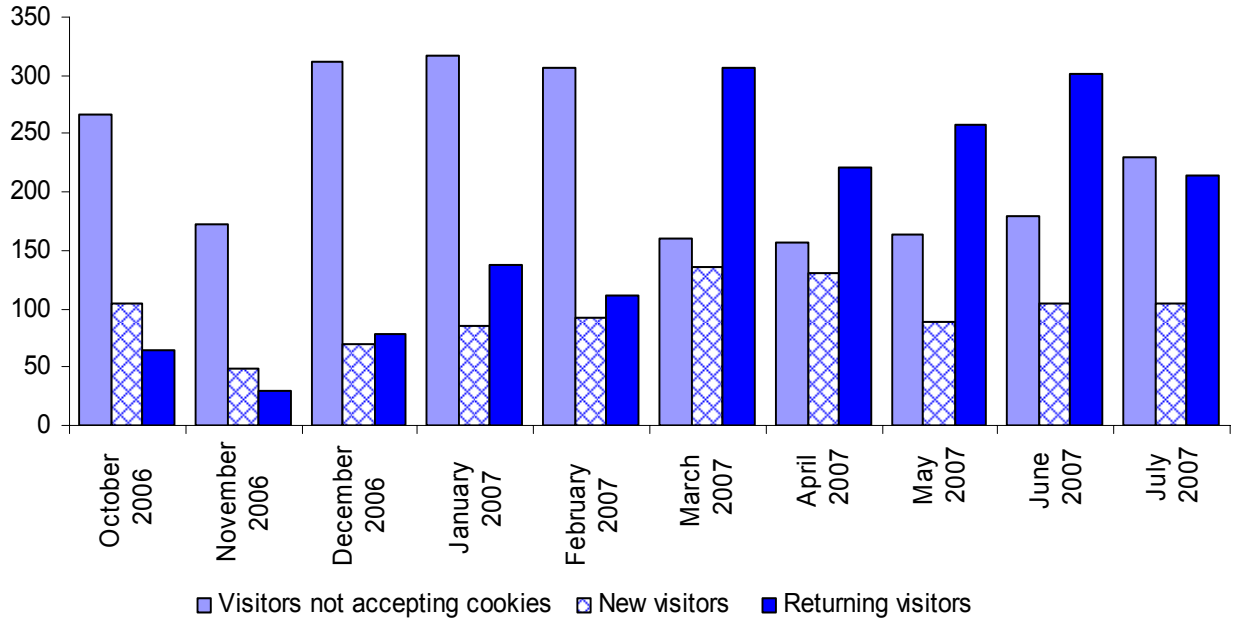
[5] Hourly wage estimate obtained for the second quarter 2007, code 11-9151, from the Minnesota Department of Employment and Economic Development: http://www.deed.state.mn.us/lmi/tools/oes.htm.

3. Cumulative frequency of M3D website visits



Note: *Horizontal axis labels correspond to the last day of the moth. Month of August projected based on mean of all prior months.*

4. Monthly visits to M3D website



Profile of M3D users

User locations

The M3D website relies on geolocation technology to determine the physical location of a visitor's Internet Protocol (IP) address. Developed by Akamai, the geolocation technology uses a combination of methods. A visitor's location is sometimes surmised from location of the internet service provider, and in some cases the visitor's location is determined from internet content requests and how the information is routed to that user from servers with known locations. Akamai claims its technology is "highly accurate," but Muir and van Oorschot (2006) point out that accuracy declines from about 90 percent of visitors at the country level to "most" visitors at the city level.[6] Therefore, user location should be interpreted with caution due to the unknown accuracy of geolocating, and even if a user is accurately pinpointed to a particular city, their location may not indicate their area of interest. State government employees, for instance, are typically located in Saint Paul even though they usually serve statewide interests.

Out of all M3D website visits, about half (54%) originated from either Minneapolis or Saint Paul (see Table 5). Another 8 percent of visits originated in one of the suburban or rural cities in the metropolitan area. A small portion of visits (3%) originated in greater Minnesota; a quarter (26%) originated in other states; and 10 percent were international.

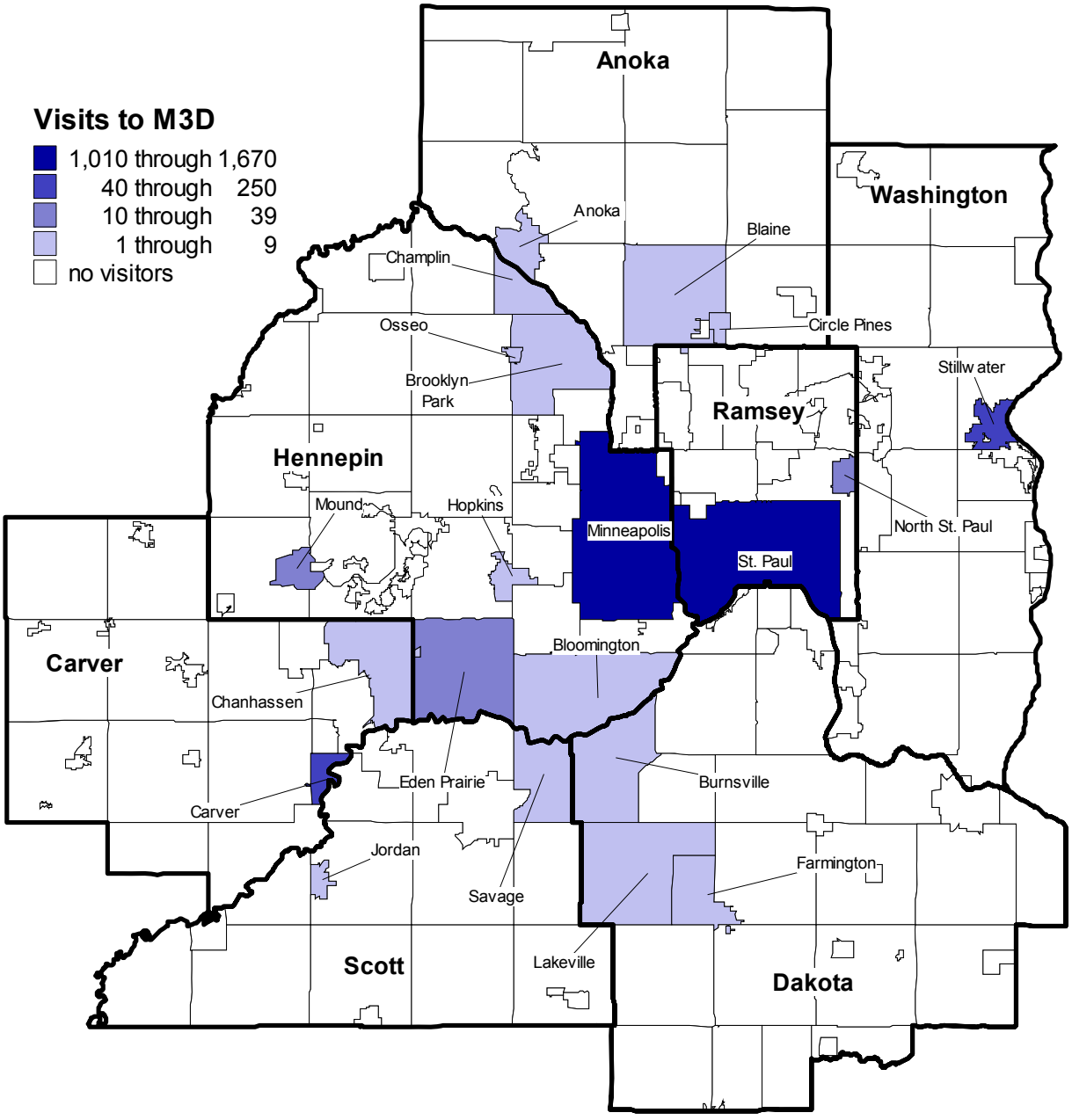
5. Comparison of website user locations and survey sample locations

	All website visits (N=4,953)	Minnesota webpage visits (N=3,197)	Survey sample (N=89)
Minneapolis or Saint Paul	54%	84%	73%
Suburban or rural Twin Cities metropolitan area	8%	12%	18%
Greater Minnesota	3%	4%	0%
Other states	26%	N/A	0%
International	10%	N/A	0%
Undetermined location	1%	N/A	9%

Note: *Website visits reflect the time period of September 2006 through July 2007.*

[6] For more information on geolocation accuracy, see http://www.webtrends.com/Support/WT/GeoTrends.aspx and Muir, J. A., & van Oorschot, P. C. (2006). Internet Geolocation and Evasion. (Working paper). Ottawa: Carleton University. Retrieved August 7, 2007 from http://www.ccsl.carleton.ca/~jamuir/papers/TR-06-05.pdf

6. M3D website visitors located in the Twin Cities metropolitan area: September 2006 through July 2007



Survey respondent job roles

As shown in Table 7, phone survey respondents represent a variety of jobs, roles, and titles. The most frequently identified title was city or regional planner (40%), followed by policy analyst (18%), neighborhood organizer (11%), and economic or community developer (11%). Other roles include managers (7%), students (5%), and engineers (2%). Overall, the list of job titles indicates that public service professionals are common users of M3D, with some representation of private sector and education users.

7. Job, role or title (multiple responses allowed)

	N=57
City or regional planner	40%
Policy analyst	18%
Neighborhood organizer	11%
Economic or community developer	11%
Administrator or manager	7%
Teacher or faculty member	5%
Student	5%
Commercial developer	2%
Consultant	2%
Researcher	2%
Engineer	2%
Other	5%

How users first learned about M3D

Respondents were most likely to learn about M3D while at work or from co-workers (26%). CURA's efforts to promote M3D are evident from the 22 percent who said they learned about M3D through a CURA staff contact or client relationship, 11 percent who learned about M3D during a CURA presentation or publication, and 9 percent who identified CURA in general terms. The University of Minnesota and Metropolitan Council were two other specific sources of introduction to M3D.

8. Manner in which respondent first learned about M3D (grouped into categories)

	N=57
At work/co-workers	26%
CURA – staff contact, one-on-one contact, email	18%
CURA – general	9%
University of Minnesota – general	7%
CURA – presentation/workshop	7%
Never heard of it/you were the first I had heard of it	7%
Conference/workshop (not specified)	5%
General response – someone sent it to me in an email, etc.	5%
University of Minnesota – presentation	4%
CURA – publications	4%
CURA – client relationship	4%
University of Minnesota – Idea Institute website	2%
Publication – general	2%
Metropolitan Council	2%

M3D applied

Amount of use

Frequency of use

The M3D phone survey asked respondents how frequently they had used the website and how frequently they had used information that someone else produced from the website. Table 9 summarizes frequency of M3D use, with the two types of use overlapping (i.e., respondents could respond that they used the website and received information from it). Six percent say they use the website frequently (i.e., almost every day to about weekly); 9 percent use the website monthly, and 5 percent receive information monthly. About half (49%) use the website infrequently (i.e., rarely to at least quarterly), and 54 percent receive information infrequently. About a third report they had never used the website (37%) and a third had never used received information from it. Excluding those who had never used the website, "about twice a year" is the middle response. For those who had received information from M3D, "rarely" is the middle response.

9. Frequency of using the M3D website or information from it

	Use of the website directly (N=57)	Use of information someone else produced (N=57)
Almost every day	2%	0%
About once a week	4%	0%
About once a month	9%	5%
At least quarterly	16%	11%
About twice a year	14%	11%
Rarely	19%	32%
Never	37%	33%
Do not know	0%	9%
Median value (excluding "never" and "do not know")	**About twice a year**	**Rarely**

Note: *Results include users of the beta version released in March 2006 and those who began using M3D after its public release in October 2006.*

Respondents who had either used the M3D application or received information from it were asked their experiences with M3D (i.e., they were screened out for the remaining questions). Out of 57 respondents, 14 had never used the website nor received information from it. Among the remaining 43 respondents, some refused or did know how to respond to various questions, which is why reported sample sizes fluctuate slightly in the tables. Hereafter, "respondents" refers to those who were screened to be users of the website or information from it, and "use" refers interchangeably to the website and received information.

Number of projects for which M3D was used

On average, respondents had used M3D for about two projects each. About three-fourths (74%) of respondents had used M3D for one or more projects, with 10 being the highest number of projects.

10. Number of projects per user using M3D website or information

	N=42
0	26%
1	14%
2	24%
3	7%
4	21%
6	2%
7	2%
10	2%
Mean	2.2
Median	2

Respondents were asked to briefly describe how they had used M3D for a project. Below is a selection of project descriptions chosen to show the variety of projects.

> Grant applications that show area building locations. To have housing that would be in a good location for transportation due to existing commuter patterns.
>
> To conduct a housing analysis looking at a combination of demographic data and foreclosure data and looking for correlations.
>
> To better understand a neighborhood that we are partnering with to provide technical assistance and resources.
>
> To describe housing patterns in the Twin Cities.

> For business financing purposes, we wanted to know where workers in our city are living.
>
> Projections of employment in our city.
>
> To find out where workers live along our transit routes.

Types of uses

Website features

Among those who had used the M3D website directly, nearly all of the respondents used the mapping feature, about half (53%) generated reports, and a third (36%) compared their area or project to a regional context. Less than 10 percent looked specifically at commutesheds and laborsheds, accessed data about a specific area, or compared neighborhood data.

11. Key website features used by respondents who had used the website directly (multiple responses allowed; grouped into categories)

	N=36
Mapping	92%
Reports	53%
Comparing one's area or project to a regional context	36%
Commuteshed	8%
Data about a specific area	6%
Different data sources	6%
Laborshed	6%
Comparing neighborhood data	3%

Addressing spatial mismatches

When asked if they had used M3D specifically to address spatial mismatches between community needs and community assets, 44 percent of respondents had used M3D in that manner, and 19 percent said the had not. About a third (37%) did not know or respond to the question, which reflects some unfamiliarity with the term "spatial mismatch," even after being provided a specific example by interviewers.

12. Use of M3D to address spatial mismatches

	N=43
Yes	44%
No	19%
Do not know or no response	37%

Respondents were asked to specify how they used M3D to address spatial mismatches. The selection below consists of some representative examples.

> People who live in our neighborhood don't always get jobs in here. We would like to turn that around.
>
> Looking at the need to get from point A to point B and if the transit route is in the right place, if the route is connecting to the right places.
>
> I was looking at job profiles and how much money was earned versus how expensive or inexpensive housing was in a particular area.
>
> Cost of living versus the average wage earned in an area. Also, transportation and how it could be better aligned with commutesheds.

Perceived value of M3D

Importance of M3D aspects

Respondents were asked, "How important would you say the following aspects of M3D are to you?" and presented with the characteristics shown in Table 13. The wording of this question implies that M3D has aspired to incorporate each given element while still allowing room for respondents to identify qualities they desire. Free access is considered the most important aspect (98% saying it is somewhat or very important), followed by easiness to use and analyzing information on a small area basis. Every aspect is considered important by at least 90 percent of the respondents, and over half think each aspect is very important.

13. Importance of M3D aspects

	N	Not important	Somewhat important	Very important
Free access	43	2.3%	7.0%	90.7%
Easiness to use	43	2.3%	14.0%	83.7%
Can analyze information on a small area basis	43	4.7%	27.9%	67.4%
Many types of data are consolidated in one place	43	7.0%	25.6%	67.4%
Provides a visible picture of a community	43	7.0%	25.6%	67.4%
Provides data not available elsewhere	42	9.5%	23.8%	66.7%
Data layers are integrated	40	5.0%	30.0%	65.0%
Helps disadvantaged groups access information	40	7.5%	37.5%	55.0%
Reporting feature	38	5.3%	42.1%	52.6%
Other	7	0%	0%	100%

Ease of use

Nearly every respondent (98%) feels that ease of use should be an important aspect of M3D, but as Table 14 shows, over a third of respondents who had directly used the website found it difficult. More than half (56%) report that it was easy to use, and 6 percent found it to be very easy.

14. Ease of use reported by those who had used the website directly

	N=32
Very easy	6%
Easy	56%
Difficult	38%

Abilities and accomplishments as a result of M3D

M3D was designed to enable users to examine one type of data or one local area in great detail and to facilitate comparing multiple data and areas. Over three-fourths of direct users of the website report that M3D enabled them to examine data and locations on large and small scales (see Table 15). Respondents were also asked if M3D enabled them to accomplish something they were not able to do before and to name that accomplishment. Two-thirds report that it had enabled them to examine

information in new ways, 37 percent identified being able to focus on one or more geographic areas or scales, 33 percent accomplished a task with greater ease or quality, and 9 percent generated reports that were used for decision making.

15. Abilities and accomplishments as a result of M3D (multiple responses allowed)

Intended abilities	**N=34-38**
Examine one type of data at a time (N=37)	89%
Examine combinations of data at once (N=34)	79%
Examine your work in a regional context (N=36)	75%
Examine your local area or neighborhood (N=38)	87%
Accomplishments as a result of M3D (grouped into categories)	**N=43**
Examined information in new ways	67%
Focused on one or more geographic areas or scales	37%
Accomplished a task with greater ease or quality	33%
Produced and used reports for decision making	9%

General benefits of using M3D

Table 16 summarizes responses to the question, "How would you describe the benefits or value of M3D to your work?" Mapping or visualization of data is the most frequent response (33%), followed by having multiple types of information (23%), having generally useful information (14%), and providing economic information on employment and employers (14%).

16. General benefits of using M3D (multiple responses allowed; grouped into categories and sub-categories)

	N=43
Information	**70%**
More than one type of information	23%
Jobs/employment/employer characteristics	14%
General/useful/not specified	14%
Transportation	9%
Regular updates to data sets	9%
Housing patterns/characteristics/housing	9%
Unique/not available elsewhere	7%
Economic data	7%
Where people live in relation to where they work	5%
Sales tax data	5%
One type of information	5%
Commuteshed	5%
Spatial mismatch	2%
Mortgage/foreclosure	2%
Laborshed	2%
Demographics	2%
Changes over time	2%
Features	**56%**
Mapping/provides visual representation of data	33%
Easy to use	14%
Provides information quickly/saves time	12%
Convenient	12%
Purpose	**21%**
To determine the impact of investments or programs	5%
Planning	5%
Decision-making	5%
To understand the relationship between social and economic data	2%
To look at data in new ways	2%
Reports	2%

16. General benefits of using M3D (multiple responses allowed; grouped into categories and sub-categories) (continued)

	N=43
Levels	**19%**
Community/neighborhood level	9%
City level	9%
Region	5%
Area	**16%**
Two or more areas	9%
One specific area	7%
Nothing specified	**14%**
Haven't used it much yet/don't know enough about it	7%
Great overall view, but doesn't provide detail I need	5%
It has not been of great value	2%
Potentially beneficial	**9%**
Important to business	**2%**

Note: *Sub-categories are unduplicated in major categories.*

Intended uses of M3D in the future

Eighty-five percent of respondents report they intend to use M3D in the future for other purposes, most commonly to access multiple types of information and, in particular, housing and economic information. Three out of the four respondents who did not intend to use M3D for other purposes identified the availability of other sources of information as their reason for not intending returning to the website.

17. Intended uses of M3D in the future (only those who report they intend to return to the website; multiple responses allowed; grouped into categories and sub-categories)

	N=35
Information	**71%**
More than one type of information	31%
Housing patterns/characteristics/housing	20%
Jobs/employment/employer characteristics	17%
Economic data	14%
Changes over time	11%
Demographics	11%
Mortgage/foreclosure	11%
Regular updates to data sets	11%
Transportation	11%
Commuteshed	9%
Where people live in relation to where they work (unclear)	9%
Laborshed	6%
Sales tax data	6%
Spatial mismatch	6%
Combination of data sets	3%
One type of information	3%
Area	**31%**
Two or more areas	17%
One specific area	14%
Levels	**23%**
Community/neighborhood level	17%
Region	6%
Features	**17%**
Mapping/provides visual representation of data	11%
Convenient	3%
Easy to use	3%
Provides information quickly/saves time	3%

17. Intended uses of M3D in the future (only those who report they intend to return to the website; multiple responses allowed; grouped into categories and sub-categories) (continued)

	N=35
Purpose	**17%**
Planning	9%
For student research project	6%
To determine the impact of investments or programs	6%
Decision-making	3%
Grant applications	3%
Nothing specified	**14%**
Haven't used it much yet/don't know enough about it	14%

Note: *Sub-categories are unduplicated in major categories.*

Benefits to planning and development

Sixty-five percent of the respondents report that M3D had benefited planning and development decisions in their community. Reasons given include facts being more readily available for decision making (45%), M3D's ability to provide information about more than one area (20%), and visualization/mapping of data (20%). Among those who reported that M3D had not benefited planning and development decisions in their community, about half (45%) said it had not been used yet or widely enough to result in that type of benefit.

18. Benefits to planning and development decisions (multiple responses allowed; grouped into categories)

	N=31
Yes	**65%**
Reasons (N=20, multiple responses allowed)	
To make decisions – more facts are easily available	45%
Provided information – about more than one area	20%
Provided a visual display of data	20%
To make decisions – used new sources of information	15%
Provided information – at city level	15%
To make decisions – illustrates multiple layers of data	5%
To make decisions – useful analytical tool	5%
To make decisions – makes it easy to understand	5%
To make decisions – allows a stronger consensus	5%
Provided information – about a specific area	5%
Provided information – at community level	5%
Provided information – at the regional level	5%
Provided timely information	5%
M3D project involved key stakeholders	5%
I'm still learning how to use the application	5%
No	**35%**
Reasons (N=11, multiple responses allowed)	
Haven't used the application in that way/it's new/not widely used	45%
Nothing specified	27%
M3D is difficult to use but it has potential	18%
Some of the information didn't line up correctly	9%

Relationships between use and perceived value

If the Minnesota 3-D project was successful at building a valuable tool for planning and economic development, then one might expect greater use of M3D to follow. Conversely, frequent users may find more value in M3D. From a project management standpoint, observing a relationship between a particular aspect of M3D and a particular type of use could guide the selection of strategies for promoting greater use or recognition of M3D.

An analysis was conducted to see if correlations were evident between survey responses that indicate the amount a respondent used M3D and their perceived value of the application.

As Table 19 shows, the frequency of using information produced by someone else is significantly and negatively related to ease of use, although the association is moderately weak. This suggests that users who found M3D difficult were more likely to rely on others to retrieve information for them. Providing data not available elsewhere is significantly and positively related to using the website and applying M3D to work projects. Enhancing the ability of users to analyze information on a small area basis and to generate reports are also significantly and positively associated with greater use.

19. Correlation between indicators of amount of use and indicators of perceived value

	Frequency of using website directly	Frequency of using information someone else produced	Number of projects
Overall, how easy is it to use the M3D application?	0.13	-0.39*	-0.02
How important would you say the following aspects of M3D are to you?			
Free access	0.24	0.04	0.17
Easiness to use	-0.17	0.24	-0.02
Provides data not available elsewhere	0.39*	0.16	0.46**
Data layers are integrated	-0.22	0.27	0.08
Many types of data are consolidated in one place	0.04	0.30	0.24
Helps disadvantaged groups access information	0.05	0.14	0.06
Can analyze information on a small area basis	0.18	0.38*	0.36*
Provides a visible picture of a community	0.01	0.14	0.09
Reporting feature	0.33*	0.10	0.34*

Note: *Coefficients calculated using Spearman's rank correlation; * indicates significance at the 95 percent confidence level (2-tailed); ** indicates significance at the 99 percent confidence level (2-tailed).*

Opportunities for improving and sustaining the M3D

Suggestions for improvement

In response to the question, "How could M3D be improved to add value to your work?" users offered suggestions that fell into 9 categories. Table 20 shows the frequency of suggestions and provides illustrative quotes.

20. Suggestions for improving M3D (multiple responses allowed; grouped into categories)

	N=43
Make the application's interface and functions easier to use.	49%
> The user interface could be improved and made more intuitive. It's not obvious how to do use more layers versus one at a time how to save data. It would be nice if they could make the selection tool easier for selecting block groups and other areas manually. The centroids aren't visible, and can select multiple census block groups only if centroids fit in rectangles. You end up with some information that you don't want.	
Ensure data in the application is as up-to-date as possible.	16%
> Please use the most up-to-date data. I want 2006-07 instead of 2003-04. The information needs to be more current and updated consistently.	
Expand the amount and variety of data in M3D.	16%
> We would like to see more natural resource data. Add more data layers into the whole thing, such as state and local administrative data and data on public sector jobs.	
Provide an instruction guide, templates and user-produced examples to illustrate how to use M3D to its fullest extent.	14%
> I think an instruction book or tutorial or is needed. For example, the HUD GIS application, Community 2020, had a good tutorial. A consequence of M3D is that people think that everybody else has the information. Users should be encouraged to share their findings and output from the application.	

20. Suggestions for improving M3D (multiple responses allowed; grouped into categories) (continued)

	N=43
Provide hands-on training because seeing M3D demonstrated is not enough to learn it.	12%
> You need some individual tutoring and training for people. Increase person-to-person training. Four hours would be good. > We need a person to come out, help us, and show us all the features we are not capitalizing on.	
Expand M3D to other areas beyond the Twin Cities.	7%
> Cover the entire state. It's great data for the metro but it doesn't allow you to look at rural areas along the Interstate 94 and 35 corridors that are developing. > I would like it to be more applicable to my teaching needs. If I teach general GIS software skills, my students will have opportunities in other locations besides the Twin Cities.	
House archival data in M3D and add features to illustrate trends over time.	7%
> Please maintain a historical record of change. Have the ability to go back and look at how trends are changing would be important.	
Marketing M3D more aggressively would be helpful.	7%
> Market the M3D tool and the training more broadly.	
Address details that could cause users to misinterpret data.	5%
> I have found that the percentages are not clearly labeled. It's unclear what the percentages in the rows are referring to.* > I feel that the affordable housing information is either inaccurate or missing. Make sure it's accurate and more complete.	

* *See appendix A3.*

Strategies for sustaining M3D

As shown in Table 21, respondents offered a variety of suggestions for sustaining M3D when asked, "What strategies or partnerships do you think should be implemented to ensure the long term availability of the M3D mapping tool?"

21. Suggested partners and sources of support for sustaining M3D (multiple responses allowed; grouped into categories)

	N=38
Metropolitan Council	42%
State government	37%
County government	34%
City government	29%
Minnesota Department of Employment and Economic Development (DEED)	24%
Local or neighborhood groups, the public	21%
University of Minnesota and other post-secondary institutions	21%
Foundational or private support	13%
Federal government	11%
Fees or membership association	11%

Below is a selection of quotes to illustrate results shown in Table 21.

> There should be some partnership between the University, Metropolitan Council, and DEED to pay for this.
>
> Continue to partner with the state. Increase their presence or availability at the county level so they can show how their information can be enhanced using the tools. Some testimony from neighborhood groups that have used it would help, too. Partner with groups already trying to improve the mismatch between transportation and housing. Align with a group that already has that mission.
>
> I would like to see the Department of Employment and Economic Development (DEED) continue to host and develop it. The University of Minnesota could because it is an excellent planning and learning application for students. And since they do planning information for communities and disadvantaged groups that don't have resources.
>
> Do a membership basis to support it. Have a fee for entities that use it. Also, the Metropolitan Council or area foundations should help neighborhood groups get more access to information.

County and City governments should be contributing resources because M3D has regional implications. There could be a nominal fee for community groups. Keep it small, $50- $100. There should be foundational support for this regional thinking.

Some way of wrapping it into the Metro GIS system to promote a long-term financial strategy for funding it.

Target a broader audience. Professional GIS community has information they need. Educational institutions, libraries, private citizens, or smaller governmental units lack access to GIS and the ability to manipulate them. Look for a broad use and outside traditional mapping. Information inquiries is a nice resource to have to direct people toward,

Try to go to different colleges since it could be integrated into their classes.

Profiles of M3D in action

In-person interviews were conducted with three M3D users to highlight their experience with M3D in greater detail than could be done with a phone survey. These examples were chosen to represent a variety of dimensions, including urban and suburban locations, government planners and community advocates, and economic and natural resource interests.

The Edge Project

Communities on the edge of the Twin Cities metropolitan area have grown rapidly in recent years, attracting new residents, businesses and industries. This growth can make the comprehensive planning process, undertaken by Minnesota cities every ten years, a difficult task if traditional and modern views collide. Moreover, if stakeholders are uninformed about the economic, housing, and transportation changes underway in their community and around them, the planning tools at their disposal, such as ordinances and the comprehensive plan, may prove ineffective at retaining a high quality of life and economic opportunities.

Jim Solem and Dan Marckel, Edge Project leaders with expertise in land use and transportation planning, worked with community members, planners, and elected leaders as they updated their comprehensive plans. They attempted to apply best practices of community engagement and to supply participants with up-to-date information about the trajectory of their edge community in order to transform what can be a banal task of updating a comprehensive plan into an authentic, collective visioning process. What Solem and Marckel observed and learned from the communities is being shared with technical assistance providers, such as extension offices, to build their capacity as well.

M3D applied

The Edge Project used M3D to establish rapport with communities and rapport between parties in the comprehensive planning process. When the Edge Project began meeting with edge communities, it needed to overcome its outsider status and gain the trust of participants in the planning process. Additionally, it needed to help participants forge a plan that reflects common and forward-looking interests, as opposed to individual or out-dated interests. Commuteshed and laborshed maps illustrating where residents work and where workers live were especially well-received. The maps were perceived as "maps of their lives" that established credibility for the Edge Project and brought participants to the realization that they share a common desire to experience fulfilling lives at both home and work.

Following initial "aha" moments and preliminary discussions that resulted from M3D-produced maps, the Edge Project returned to M3D as questions arose and information was needed to solidify decisions. In some instances, Solem or Marckel would generate tabular reports from M3D prior to a meeting and then ask the group whether the statistics about the number of local jobs were correct. Asking participants to confirm or refute information was a facilitation technique that had the effect of encouraging involvement, honoring local knowledge, and fostering consensus. In other instances, community members, planners, and elected leaders were encouraged to use M3D themselves so they could experience the "democratization of data" offered by M3D. In other words, the Edge Project believes that long term improvements in the planning process and in communities can be achieved when community members can obtain information on their own and interpret it for themselves rather than exclusively through the lens of a technical expert.

Evaluative insights

The Edge Project needed an inexpensive solution for producing maps at large and small scales, and edge communities were found to be lacking up-to-date information relevant to their circumstances. According to the Edge Project, M3D has filled these needs and become an important component of its technical assistance toolbox. M3D enables communities to come to grips with their interdependence on surrounding areas and to see themselves in the data. Moreover, it has made data more accessible to those who have a stake in the community planning processes. In summary, M3D has helped the Edge Project bridge the human and technical aspects of the planning process, which they believe will equip edge communities with the both the know-how and the imagination to rightfully sustain their reputations as great places to live and work.

Through using M3D, the EDGE Project also identified ways that M3D could be improved. Though the current interface is functional, it could be easier to use, thereby shortening the time that it takes for people to learn how to use it. M3D offers more types of data and in a more integrated way than many other applications, but it would be an even more useful planning tool if its data inventory was even larger and if the steps for layering data were made more intuitive for novice users. The M3D project could also expand its partners to include organizations that advocate for issues. Advocates now seem to be under-represented among M3D committees and users.

Fort Road Federation

Fort Road Federation serves the West End community of Saint Paul, which consists of neighborhoods along the West Seventh Street corridor parallel to the Mississippi River. Since 1973, Fort Road Federation has organized residents and businesses to influence decisions that affect their community and to collectively implement community improvements.

According to Ed Johnson, Executive Director of the Fort Road Federation, timely and accurate information about community development on the West End is central to their success. Good information can mobilize residents around issues and help them make credible arguments to decision makers. Moreover, community development is inherently focused on making continual improvements by tracking trends in the community. In this manner, Fort Road Federation seeks long term sustainability for the West End in terms of social, physical and economic development.

M3D applied

Consistent with one of the original intentions of M3D, Fort Road Federation has been able to see where West End residents work using commuteshed mapping. They noticed that very few residents work in downtown Saint Paul and that many work in one of the over 500 businesses on the West End. Approximately 300 of those businesses are limited liability companies (LLCs) in residential neighborhoods, which indicates a strong entrepreneurial presence within the community. The M3D survey revealed that several communities would like to be in the West End's position – maintaining *and* growing the number of local jobs instead of struggling to build a base of economic opportunities in proximity to its residents.

Building on the West End's confirmed identity as a mixed residential/small business community, Fort Road Federation has promoted several mixed use and mixed income property developments on the West End. Mixed use development is believed to enhance livability (e.g., reduced time in traffic) and local spending, and mixed income development helps ensure an economically diverse labor supply to fill a variety of jobs. M3D has enabled Fort Road Federation to forecast the potential net benefits of such developments by examining the outcomes of similar projects in other communities in the Twin Cities. In particular, data on changes in sales tax revenue over time enables forecasting with M3D.

Related to mixed income development, Fort Road Federation consulted with a major health care employer regarding their plans for expansion in the context of available housing. M3D-generated housing reports and maps showing characteristics of the West End residential workforce, including the percentage employed in the health care industry, helped frame the discussion and illuminated development options.

Lobbying is yet another way in which M3D has been used by Fort Road Federation. The Federation has shared maps and demographic information with public officials to build support of a proposed development. In some cases, they need to make credible arguments against a decision that could adversely impact West End residents and businesses.

Evaluative insights

According to Fort Road Federation, it is the variety and timeliness of data in combination with the ability to compare different areas that has made M3D a regular contributor to their work. Demographic information, including education, income and ages of West End residents, has better acquainted Fort Road Federation with their constituency, but they acknowledged that this information is available elsewhere. Updated housing data and economic data, including sales tax revenue and commute- and labor-shed data, integrated in the application with demographic data are what regularly (but not always) make M3D a preferred alternative to other options, such as the U.S. Census Bureau's website and geographic information systems (GIS) software. Additionally, Fort Road Federation has found that few planning tools provide information on very small areas and that few tools make it as easy to compare one area to another as M3D does.

Fort Road Federation would like to see M3D made easier for users with novice computer skills. CURA staff were praised for demonstrating M3D's capabilities and being responsive to questions, but some Federation personnel have found it too difficult to figure out and rely on others to provide them with information from the website. Fort Road Federation has not promoted M3D broadly to their constituents, but they feel that, with improved usability, the free and on-line access could prove beneficial to the public.

Other suggestions for improving M3D relate to allowing users more discretion and flexibility. Some personnel would like the ability to change labels on maps, to choose and combine different types of boundaries for analyses, and to easily change years for specific longitudinal comparisons.

City of Chaska

The City of Chaska, located on the Minnesota River in Carver County, embraces both its small town character and its ongoing expansion. As a community around which the Twin Cities metropolitan area has grown, Chaska's development activities encompass a mix of preserving historical structures, luring high technology industries, and ensuring housing opportunities for an economically diverse workforce.

According to Kevin Ringwald, Chaska's Director of Planning and Development, geographic information system (GIS) technology is essential for local level governance and service delivery. Its value is heightened when a city embarks on strategic planning to guide decisions, as Chaska has done. The City of Chaska has added M3D to its GIS portfolio, using it to assess planning and development options and to more confidently make decisions that align with its strategic goals.

M3D applied

Concerned that traffic congestion and long commute times could erode residents' quality of life, Chaska has examined commuteshed and laborshed maps in combination with other data sources to improve commuting experiences. Noticing that their laborshed was strong relative to inbound bus ridership, the city has begun working with SouthWest Transit to increase return ridership after buses drop off morning commuters in Minneapolis. Additionally, Chaska has begun partnering with neighboring communities to press for improvements to the transportation infrastructure in those cities, whereas in the past, city leaders may not have felt a stake in the infrastructure beyond their own borders.

City planning has also been carried out with assistance from the M3D website. The City of Chaska uses M3D to catalog housing and industrial strategies in other communities and to decide if any of those approaches are worthy of emulation. In particular, Chaska seeks out evidence of developments that enable citizens to live and work locally, and conversely, it avoids development that might degrade local sustainability. Chaska also uses M3D to assess whether its housing stock is sufficient to meet the needs and preferences of all income earners, using other communities as criteria for gauging its own success in this area.

The development of the Chaska Biotech Center, a cornerstone of the city's efforts to ensure local economic vitality, is a noteworthy example of Chaska's city planning with M3D. The Chaska Biotech Center is a planned 800 acre site that is expected to host over 5,000 biotech and medical device workers, mostly in manufacturing roles. Recognizing that the city would find it hard to lure employers and workers to Chaska without adequate and attractive housing options for workers, the Chaska Biotech Center development encompasses not just the manufacturing site but also a plan to develop new housing in the community. M3D has been used by the City of Chaska to forecast housing needs and move forward with new developments. Additionally, M3D has been used to entice biotech employers by communicating, visually and in reports, how the labor pool will meet their needs.

Evaluative insights

The Minnesota 3-D project was commended for engaging a variety of partners to ensure a functional and broadly applicable product and for making the application accessible over the internet. The City of Chaska's experience is a testament to M3D's usefulness at different stages in the planning and economic development process, from brainstorming options to enacting policies and projects with regional consequences. Moreover, Chaska is using M3D to "look over the horizon," beyond the city's own borders, adding value to the planning process. Chaska's experience suggests that GIS use in cities may not typically include inter-city analysis and that M3D's warehouse of integrated data enhances this ability. Subsequently, inter-city analysis can enable planners and elected officials to deduce and confidently pursue strategies that will help their city stand out positively.

Based on Chaska's experience, some improvements to M3D would further benefit its users. Adding more data, in general, and data at the smallest possible level, in particular, would further enhance city planning. In other words, M3D is perceived as unique for its volume of integrated data and its emphasis on displaying detailed information at the local level, but its usefulness is bound by data volume and a lack of precision at the largest scale. Chaska could also benefit from a larger community of M3D users in which ideas could be shared and collaborations pursued. Continued marketing and creating templates to guide users were suggested as ways to grow the community of M3D users.

Conclusion

Evaluation findings

To what extent has the Minnesota 3-D project succeeded at meeting its technical and partnership objectives during development?

The Minnesota 3-D project accomplished the major tasks it set out to do with support from the federal Technology Opportunities Program (TOP). The M3D website launched in October of 2006 and is now on its way to 6,000 visits in the first year. The project progressed with considerable input and in-kind contributions from planning and economic development practitioners. Crucial partnerships were established with the Labor Market Information Office of the Minnesota Department of Employment and Economic Development's (LMI/DEED) and other organizations to develop the application and populate the database. Data partners include the Federal Reserve Bank, HousingLink, Metropolitan Council, Minnesota Child Care Resource and Referral Network, Minnesota Department of Human Services, and Minnesota Department of Revenue. Considering that over 1,000 hours were voluntarily contributed to the Minnesota 3-D project and that the project was able to respond to changing issues with new and relevant partnerships, namely with county governments to incorporate mortgage foreclosure data, the project seems to have maintained CURA's tradition of applying collaborative strategies to community issues.

To what extent is the M3D website accessible, integrated, and a useful tool for planning and decision making, especially with regard to addressing spatial mismatches?

Free access to the M3D mapping application and its online availability make it a valuable resource, according to phone survey respondents and case study interviewees. However, it has proven less accessible in terms of the user interface, which has limited instructions, few prompts and is not immediately clear on how to proceed, making it time consuming and difficult to master for novice computer users.

The Minnesota 3-D project's focus on the Twin Cities metropolitan area and its emphasis on simplicity over fully customized maps and reports qualify the website as a complement to GIS software and other analysis tools, rather than a full substitute. Respondents and interviewees generally feel that M3D excels by integrating relevant data not available elsewhere and by providing a means for readily comparing different areas at different scales.

Users have not applied M3D in a uniform way or for one particular purpose. Users have examined commutesheds and laborsheds to alleviate spatial mismatches, the foremost purpose described in the TOP grant proposal. However, for the most part, users have addressed spatial mismatches in more general terms. Some have sought a deeper understanding of their own community; while others have engaged in regional thinking by examining and comparing the realities faced by nearby or similar communities in the Twin Cities. Some users have sought guidance in decision making; while others have used M3D for scholarship. In sum, M3D is advancing the understanding of spatial mismatches and helping communities make informed decisions that potentially could narrow the gap between community needs and community assets in the near future.

Recommendations

- The Minnesota 3-D project should continue striving to provide unique and timely data in order to set M3D apart from other tools and to promote greater use. This recommendation can be accomplished by nurturing the project's reputation as a willing collaborator, a welcoming home for data, and a solution for maximizing the utility of local information.

- Further enhance the ability of users to analyze information on a small area basis and to generate reports in M3D. Delegating a task force or the Minnesota 3-D technical committee to review suggestions and oversee improvements to the user interface is an option that should be considered.

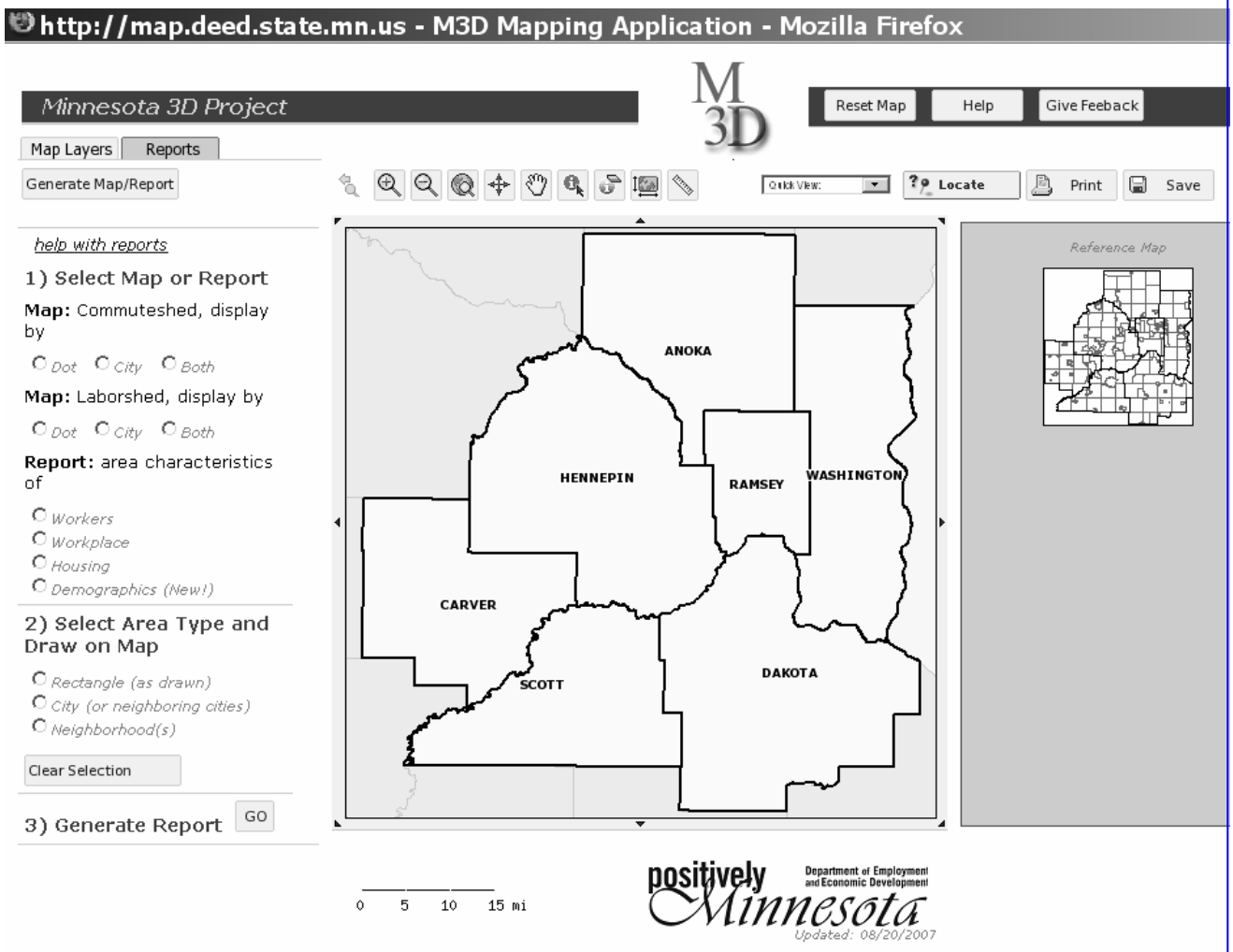
- As part of efforts to improve usability of M3D, create an online learning and sharing community where users can ask questions of each other and show off their productions. This would document the many uses of M3D and would create a feedback loop whereby M3D developers could strategically address demands and emerging needs. It would also generate, in effect, an instruction guide written by users for users.

- CURA should continue promoting and demonstrating M3D, a role affirmed by respondents and interviewees, but demonstrations are not enough to ensure proficient users. CURA should also see to it that hands-on training opportunities are offered in a computer lab setting and/or at users' workplaces.

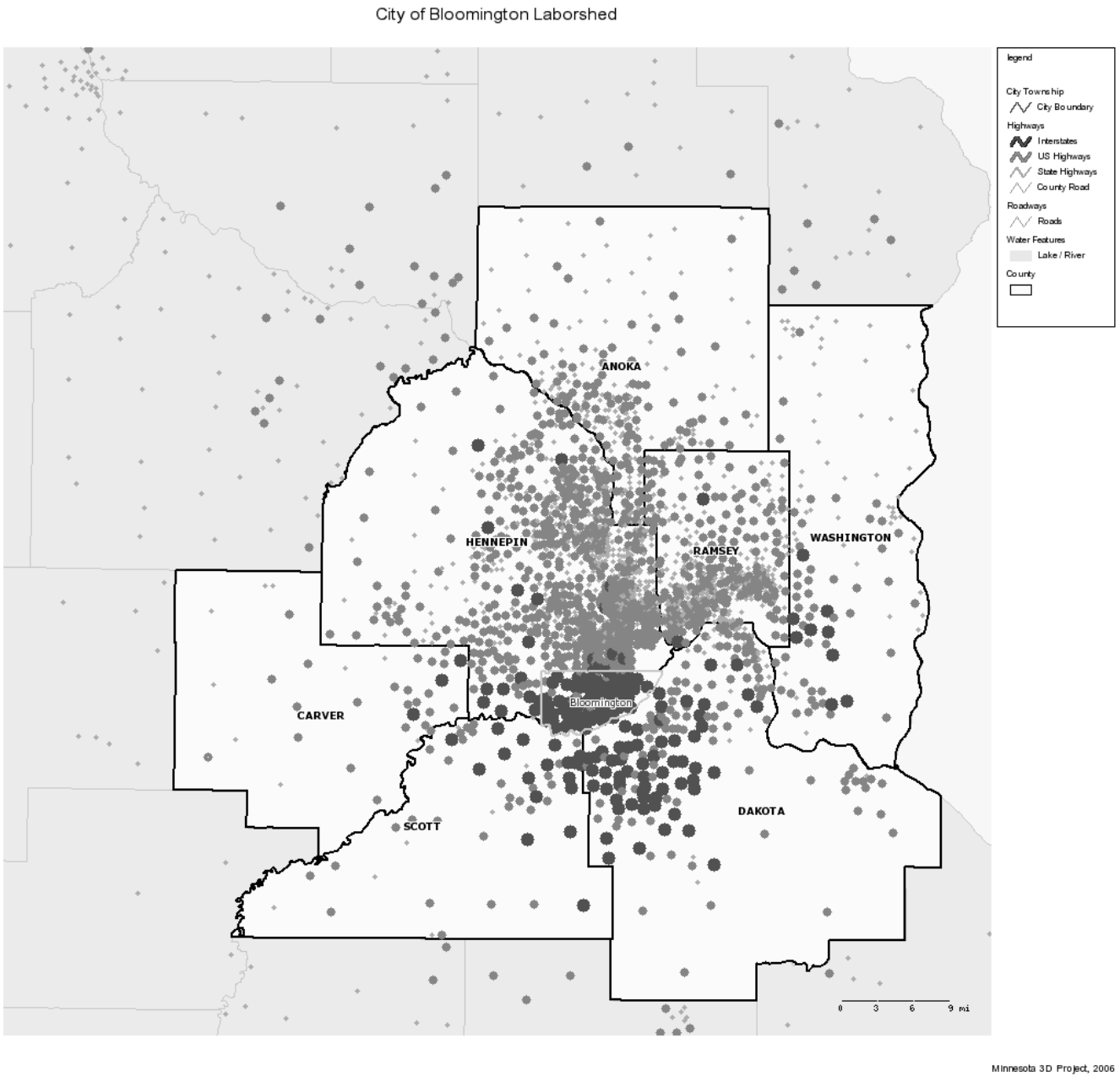
- Sustain M3D by diversifying its sources of support and partnerships. Metropolitan Council stands out as a potential key partner and a source of support on par with LMI/DEED. Pursue additional federal funding, but the time is right to also approach city and county governments since many have become familiar with M3D and its benefits. Step up promoting M3D to colleges, libraries, small neighborhood groups and advocacy organizations to expand its public benefit and pool of support.

Appendix

A1. M3D interface



A2. Example of M3D generated map: City of Bloomington laborshed centered on Hennepin County



A3. Example of M3D report: City of Bloomington workplace area characteristics report

	Percent	Number	*Metro %*	*Metro #*
Annual Average Earnings by Job				
<$14,400	27.7	25890	*26.6%*	*349,901*
$14,400-$40,800	36.0	33610	*36.5%*	*480,050*
>$40,800	36.7	34229	*37%*	*486,494*
Age of Job Holder				
30 and under	31.8	29693	*28.1%*	*369,569*
31-54	56.5	52776	*59.6%*	*783,782*
55 and over	11.7	10960	*12.4%*	*163,575*
Jobs by Industry				
Agriculture, Forestry, Fishing and Hunting	0.0	0	*0.1%*	*1,821*
Mining	0.0	0	*0%*	*436*
Utilities	0.0	0	*0.4%*	*4,667*
Construction	2.4	2240	*5.1%*	*66,459*
Manufacturing	9.0	8373	*13.4%*	*175,982*
Wholesale Trade	9.6	8941	*7.7%*	*101,002*
Retail Trade	9.6	8952	*11%*	*144,290*
Transportation and Warehousing	4.6	4257	*4.1%*	*53,555*
Information	6.9	6427	*3.1%*	*40,677*
Finance and Insurance	13.3	12404	*7%*	*92,586*
Real Estate, Rental, and Leasing	2.3	2120	*2.2%*	*28,278*
Professional, Scientific, and Technical Services	6.9	6456	*7.1%*	*93,328*
Management of Companies and Enterprises	2.5	2324	*4.5%*	*59,670*
Admin, Support, Waste Management, Remediation	10.4	9724	*6.5%*	*85,650*
Educational Services	1.5	1373	*1.7%*	*22,838*
Health Care and Social Assistance	6.1	5715	*12.5%*	*164,140*
Arts, Entertainment, and Recreation	1.4	1327	*1.7%*	*22,835*
Accommodation and Food Services	11.7	10913	*8.2%*	*108,037*
Other Services (Except Public Administration)	2.7	2523	*4.1%*	*53,602*
Public Administration	N/A	N/A	*N/A*	*N/A*
Total Private Sector Jobs		**93332**		*1,315,036*

Laborshed (cities where workers live who are employed in the selected area)

	Private Jobs	*All Jobs*
Bloomington	10163	11659
Minneapolis	10057	10407
St. Paul	5589	5726
-Outside of Minnesota-	4227	4254
Burnsville	3581	3752
Eagan	3248	3326
Eden Prairie	2656	2762
Richfield	2572	2692
Apple Valley	2506	2587
Lakeville	2323	2415

Source: LED Worker Origin/Destination, Quarterly Workforce Indicators, 2003. Bureau of the Census.
*Note that Characteristics are based on **private** jobs only while sheds are based on all jobs.*