



datamanagementgroup

2014 DMG Annual Report

Prepared by:

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INTRODUCTION

The Data Management Group (DMG) was established in 1988 on the basis of a proposal from the University of Toronto's Joint Program in Transportation for an autonomous research group with the following objectives:

- (a) to establish a common, centrally-accessible database containing information on transportation activities, zone systems, transportation networks and land use activity,
- (b) to provide a transportation data retrieval service to the participating agencies,
- (c) to monitor the adequacy of available data and propose approaches for adding to or updating the data as mutually agreed upon by the agencies,
- (d) to promote greater interaction between university researchers and practitioners in the field of urban transportation planning,
- (e) to promote the communication of transportation information and data obtained or administered by the Data Management Group to interested agencies and to the public, and
- (f) to further the improvement of transportation demand analysis, research, and forecasting in the Greater Toronto Area.

Although the administration of the group has changed to the Department of Civil Engineering at the University of Toronto, the DMG continues to be guided by these objectives into this its 26th year of continuous operation.

Program approval and funding of the DMG is the collective responsibility of members of the Transportation Information Steering Committee (TISC) with the following membership:

City of Hamilton
City of Toronto
Metrolinx
Ministry of Transportation, Ontario
Regional Municipality of Durham
Regional Municipality of Halton
Regional Municipality of Peel
Regional Municipality of York
Toronto Transit Commission

Each participating agency appoints a member of their technical staff to the Transportation Research and Data Management Group (TRADMAG), which is a

standing committee of TISC, and is responsible for coordinating the needs of the funding agencies and the activities of the research project.

This report provides a brief profile of the staff employed and a description of the activities undertaken by the DMG during the calendar year 2014.

STAFF AND LOCATION

Director

Gerald N. Steuart, Professor Emeritus, Department of Civil Engineering, University of Toronto

Technical Staff

Reuben Briggs, B.A.Sc. (Civil Engineering), M.A.Sc. (Civil Engineering) University of Toronto, P.Eng.

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Urban Transportation Planning Intern

Gordon Hui, B.A.Sc. (Civil Engineering) University of Toronto

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Summer Students

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TRANSPORTATION TOMORROW SURVEY

Under the guidance of TISC, a series of urban travel surveys have been conducted every five years since 1986. The 2011 Transportation Tomorrow Survey was managed by the Data Management Group in a manner similar to all previous TTS surveys since 1991. This arrangement facilitates the coordination of the two projects (TTS and DMG) with the added advantage that the DMG staff becomes conversant with all aspects of the data they subsequently administer for the funding agencies.

The 2011 TTS includes a total of 23 local, regional, provincial and transit operating agencies in South Central Ontario. A web component was developed for the survey and added to the existing software for respondents to complete the questionnaire using a web browser. The survey collected approximately 159,000 and 94,000 households using both the traditional telephone and the new web browser methods.

During the data validation process in the 2011 TTS, an age distribution bias was discovered showing that certain age cohorts such as 18 to 32 were under-represented whereas others were over-represented and a two-step expansion procedure different from that used in previous years was applied. TISC is reviewing the issues and studies on various possible alternate survey methods are underway.

The following 2011 TTS reports have been published and can be found on the DMG web site under “TTS Reports”.

| Report | Publication Date |
|---|------------------|
| 2011 TTS Data Expansion & Validation | November 2013 |
| 2011 TTS Data Guide Version 1.0 | November 2013 |
| 2011 TTS Data Presentation | March 2014 |
| 2011, 2006, 1996 & 1986 Travel Survey Summaries | May 2014 |
| 2011, 2006, 1996 & 1986 Travel Summary Report for the Greater Toronto and Hamilton Area | May 2014 |
| 2011 TTS Summaries by Ward | May 2014 |
| 2011, 2006, 2001, 1996 & 1986 Origin-Destination Matrices | June 2014 |
| 2011 TTS Design & Conduct of the Survey | October 2014 |

Due to the absence of a principal investigator from the University of Toronto, the DMG cannot undertake the overall administrative responsibility for the 2016 TTS. TISC has considered the possibility to issue one contract to a selected consultant for the delivery of the 2016 TTS through the Ministry of Transportation’s procurement process. The DMG prepared the draft 2016 TTS survey plan in 2014 and continues to assist the Ministry in the issuing of the request for proposal.

INFORMATION PROCESSING

The term ‘information processing’ is used in this instance to describe a set of activities supporting the management, storage and distribution of urban travel information. The principle components of this information are the results of the Transportation Tomorrow Surveys and a collection of all Cordon Count Surveys.

Transportation Tomorrow Surveys and iDRS

The DMG administers the data files on urban travel contained in the 1986, 1991, 1996, 2001, 2006 and 2011 Transportation Tomorrow Surveys (TTS) in the form of a set of relational databases with various methods of access. Direct access to the original files is restricted to DMG staff to ensure that information on a particular household cannot be identified. Currently, data files available to iDRS users contain the following information:

TTS Number of Records

| Year | Households | Persons | All Trips | Transit Detail |
|------|------------|---------|-----------|----------------|
| 1986 | 61,453 | 171,086 | 370,248 | 56,615 |
| 1991 | 24,507 | 72,496 | 157,349 | 14,896 |
| 1996 | 115,193 | 312,781 | 657,971 | 70,295 |
| 2001 | 136,379 | 374,182 | 817,744 | 85,095 |
| 2006 | 149,631 | 401,653 | 864,348 | 87,244 |
| 2011 | 159,157 | 410,404 | 858,848 | 86,703 |

The increasing size of the databases reflects not only growth in the area but also changes in the size of the area surveyed.

Originally, a staff member at the DMG processed every request for travel information and stored the results in a computer file that was then forwarded to the end user. In the mid 1990s, in an effort to improve access, staff at the DMG developed a text-based data retrieval system (drs) as the original method for external users to gain access to the data files and complete the data extraction themselves. This retrieval system was very effective when a modem was used as the principle method of remote access to the DMG’s computer system. Over the years, as the demand for travel data grew and the Internet became the preferred method of remote access, a data retrieval system specifically designed for Internet access was developed (iDRS). All the features of drs were incorporated into the browser-based iDRS and the drs process was phased out. In order to meet the changing needs of the data, the DMG continues to improve the functions of iDRS and is in the process of developing a new version of the software.

The initial release of iDRS was restricted to use by the funding agencies. As the DMG gained more experience with the procedure and continuous improvements were made, more users were allowed access. In 2002, access to iDRS was made available to any individual that requested access. The individual is required to sign an agreement form and system security is maintained by giving each user a unique login and password. This procedure has the added benefit that agencies outside the Greater Toronto and Hamilton Area that participated in the Transportation Tomorrow Surveys can access their data without the need to set up their own database system.

The iDRS procedures are reasonably complex, therefore, the DMG staff compiled a user's manual, which is available to all existing and potential users at:

http://www.dmg.utoronto.ca/pdf/idrs/idrs_manual.pdf

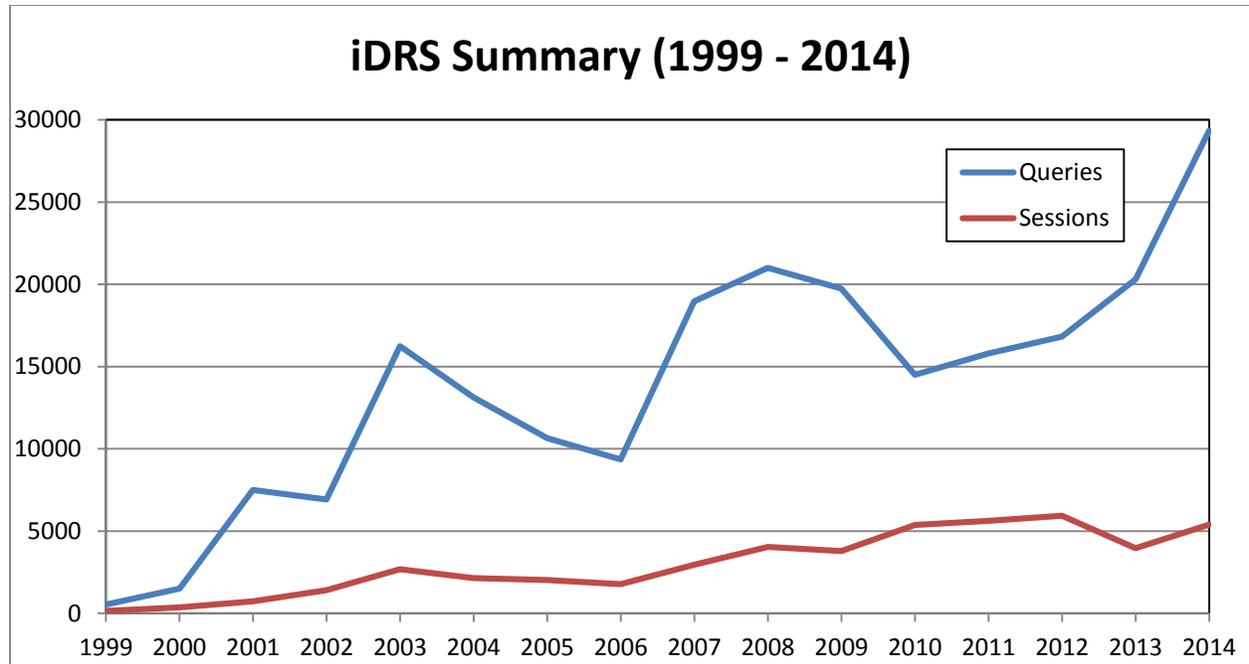
A majority of data requests processed by iDRS use one of the several zone systems that have been defined by the participating agencies over the years. In 2009, the DMG assembled a new 2006 zone system from files submitted by the 2006 TTS participants. Only the 2006 and 2011 TTS data set have been assigned to the new zone system. In order for users to trace historical trends using a consistent spatial definition, travel data for all TTS are linked to the 2001 zone system.

Access through iDRS needs to be used in conjunction with the latest description of the data files, which is documented in the publication '2011 Transportation Tomorrow Survey: Data Guide', available at:

<http://www.dmg.utoronto.ca/reports/ttsreports.html>

A History of iDRS Data Requests

When the browser based data extraction procedure (iDRS) was first released in 1999, the users were registered users of the DMG's computer system. The initial use of iDRS was encouraging. Subsequently in late 2000, the Steering Committee gave approval for use by anyone registering and providing information on their affiliation. The growth in use of TTS data is reflected in the growth of the use of iDRS for data extraction. The following chart shows the growth since iDRS was first introduced in 1999. The 'Number of Sessions' reflects the number of times registered users, including DMG staff, have initiated a data retrieval session. The 'Number of Queries' reflects the number of times an output was generated during a session. Almost without exception, many queries are generated during a given session. Note that the iDRS usage peaked at the year after a new TTS dataset was released in 2002, 2007 and 2013.



Summary of iDRS Data Requests in 2014

In 2014, there were 29,337 iDRS queries within 5,403 sessions. The following table shows the monthly summaries.

| Month | Queries | Sessions |
|-------------------|----------------|-----------------|
| January | 3171 | 685 |
| February | 3152 | 531 |
| March | 2399 | 448 |
| April | 1720 | 388 |
| May | 3005 | 473 |
| June | 2870 | 449 |
| July | 4707 | 683 |
| August | 1644 | 334 |
| September | 1463 | 310 |
| October | 1728 | 399 |
| November | 2052 | 406 |
| December | 1426 | 297 |
| Total 2014 | 29337 | 5403 |
| Total 2013 | 20308 | 3969 |

Affiliations of iDRS Users in 2014

The following is a list of 92 different agencies and groups that extracted the data through iDRS in 2014.

| | |
|--|--|
| AECOM | Genivar Inc. |
| Altus Group Ltd. | GHD Inc. |
| Artsape | GO Transit |
| Arup Canada | GreenUP (Peterborough) |
| Autodesk Canada Co. | Hatch Mott MacDonald |
| BA Consulting Group Ltd. | HBA Specto Inc. |
| C.D.Howe Institute | HDR Inc |
| Caliper Corporation | IBI Consulting Group |
| CBRE Ltd. | LEA Consulting Inc. |
| CBS Outdoor Canada | Lee-Gosselin Associates |
| CC Tatham & Associates | McGill University |
| Centre for Sustainable Transportation | McMaster University |
| Centre for Urban Transportation Research | Meliane Inc. |
| CF Crozier & Associates | Metrolinx |
| City of Brampton | Ministry of Transportation Ontario |
| City of Brantford | MMM Group Ltd. |
| City of Burlington | Mohawk College |
| City of Guelph | Neptis Foundation |
| City of Hamilton | Paradigm Transportation Solutions |
| City of Mississauga | Parsons Brinckerhoff Halsall Inc. |
| City of Peterborough | Pembina Institute |
| City of Pickering | Poulos & Chung Ltd. |
| City of Toronto | Princeton University |
| City of Vaughan | Queen's University |
| City of Waterloo | R. J. Burnside & Associates |
| Cole Engineering Group Ltd. | Region Municipality of Durham |
| Community Development Halton | Region Municipality of Halton |
| Consumer Policy Institute | Region Municipality of Niagara |
| County of Simcoe | Region Municipality of Peel |
| Creative Urban Projects | Region Municipality of Waterloo |
| Darmstadt University of Technology | Region Municipality of York |
| Delcan Corp. | Ryerson University |
| Dillon Consulting Ltd. | Sernas Group Inc. |
| Entra Consultants | Social Planning and Research Council of Hamilton |

| | |
|-----------------------------------|-----------------------------------|
| Environics Analytics | Social Planning Toronto |
| EXP services | St. Michael's Hospital |
| Stantec Architecture Ltd. | Town of Richmond Hill |
| Steer Davies Gleave | Tri-cities Transport Action Group |
| Tedesco Engineering | Trimap Communications |
| The Arland Group Ltd. | UEM Consulting |
| The Bartlett School of Planning | University of Cambridge |
| The Hospital for Sick Children | University of Toronto |
| The Record | University of Waterloo |
| Toronto Cycling Think and Do Tank | WhatIf? Technologies |
| Toronto Transit Commission | WSP Canada Inc |
| Town of Ajax | York University |

TTS Special Data Requests

The interactive procedures available with iDRS satisfy the majority of data needs. However, some data needs are too complex and require the intervention of an experienced analyst to formulate a custom query from the database. In addition, the DMG staff can often help define the most relevant data for the problem at hand. One of the typical data requests involves assigning the x-y coordinates of households or trip ends to a specified spatial aggregation different from the predefined traffic zone system as these coordinates are not available to any non DMG staff in order to protect the privacy of the survey respondents. There is also a growing interest in using disaggregate data for travel forecasting among academic researchers. Here is a list of agencies that have made a special data request in 2014:

City of Toronto
Metrolinx
McMaster University
Ministry of Transportation, Ontario
Queen's University
Regional Municipality of Waterloo
Ryerson University
St. Michael's Hospital
University of Cambridge
University College London
University of Toronto

Cordon Counts and CCDRS

The City of Toronto (then the Regional Municipality of Metropolitan Toronto) began collecting detailed information on the type and volume of traffic crossing selected points on the road system as early as 1975. The counting locations were selected such that screen lines or cordon lines could be defined and the counting program has continued on a regular basis since that time, usually twice in a five year cycle. Subsequently, other Regions began similar programs. Given the number of Regions with a similar program, they began coordinating their count programs and defining a common set of data standards. In 1998, the DMG collected these traffic counts in a common database structure and developed a Cordon Count Data Retrieval System (CCDRS). CCDRS is now widely used by a variety of public and private agencies.

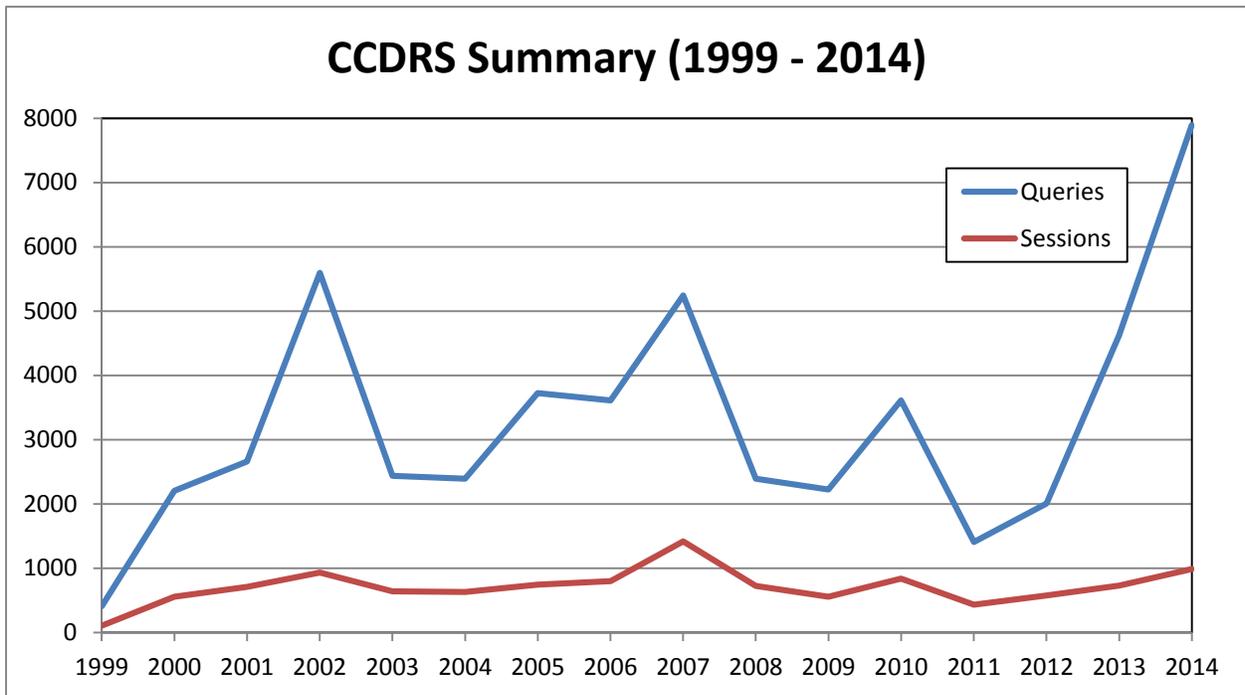
In addition, participating agencies now use CCDRS as a tool in verifying their cordon count results. The approved procedure is to place new cordon count data directly into the CCDRS database with a disclaimer notice to all users that the new information is preliminary. The last Cordon Count was undertaken by the participating regions in 2014 and the information will be available in CCDRS.

The CCDRS procedures are reasonably complex and new users should refer to the user's manual. The manual is available to all existing and potential users at:

http://www.dmg.utoronto.ca/pdf/ccdrs/ccdrs_manual.pdf

A History of CCDRS Data Requests

The growth in access to the CCDRS data is reflected in the increased number of data extractions. The following chart shows the growth since CCDRS was first introduced in 1999. The 'Number of Sessions' reflects the number of times registered users, including DMG staff, have initiated a data retrieval session. The 'Number of Queries' reflects the number of times an output was generated during a session. Almost without exception, many queries are generated during a given session. The busiest years were just after restrictions on access to the data were removed. An increase in activity is usually associated with the release of a new cordon count.



Summary of CCDRS Data Requests in 2014

In 2014, there were 7,892 CCDRS queries within 988 sessions. The following table shows the monthly summaries.

| Month | Queries | Sessions |
|-------------------|-------------|------------|
| January | 401 | 88 |
| February | 469 | 74 |
| March | 1951 | 83 |
| April | 565 | 45 |
| May | 816 | 130 |
| June | 771 | 206 |
| July | 2195 | 168 |
| August | 291 | 83 |
| September | 147 | 41 |
| October | 111 | 21 |
| November | 114 | 29 |
| December | 61 | 20 |
| Total 2014 | 7892 | 988 |
| Total 2013 | 4624 | 729 |

Affiliations of CCDRS Users in 2014

The following is a list of 28 different agencies and groups that extracted the data through CCDRS in 2014.

| | |
|---------------------------------|-------------------------------------|
| AECOM | Metrolinx |
| Autodesk Canada Co. | Mikeal Abramoff Consulting |
| City of Brampton | Ministry of Transportation Ontario |
| City of Mississauga | MMM Group Inc. |
| City of Toronto | Municipal Property Assessment Corp. |
| Cole Engineering Group Ltd. | Peter Dalton Consulting |
| David Kriger Consultants | Region Municipality of Durham |
| Delcan Corp. | Region Municipality of Peel |
| Dillon Consulting Ltd. | Region Municipality of York |
| Fleming College | Ryerson University |
| Florida Institute of Technology | Stantec Consulting Ltd. |
| Genivar Inc. | University of Toronto |
| HDR Inc. | University of Waterloo |
| IBI Consulting Group | Valcoustics Canada Ltd. |

CCDRS Special Data Requests

The interactive procedures available with CCDRS satisfy the majority of data needs. However, some data needs are too complex and require the intervention of an experienced analyst to formulate a custom query from the database. In addition, the DMG staff can often help define the most relevant data for the problem at hand. Although special data requests are an important function, an objective of the DMG is to reduce the number of such data requests in favour of users processing their request through CCDRS. There were no special data request related to the cordon counts in 2014.

Open Data

In March 2011, the first generation of Open Data Portal was launched by the Government of Canada. "Open Data is defined as structured data that is machine-readable, freely shared, used and built on without restrictions." The data must be available as a whole and at no more than a reasonable reproduction cost, preferably by downloading over the internet. It must also be available in a convenient and modifiable form and must be provided under terms that permit re-use and redistribution including the intermixing with other datasets. Everyone must be able to use, re-use and redistribute. There should be no discrimination against fields of endeavour or against persons or groups. For example, 'non-commercial' restrictions that would prevent 'commercial' use, or restrictions of use for certain purposes (e.g. only in education), are not allowed.

In 2014, with the approval from TISC, the DMG has opened up the TTS and Cordon Count data to the public. Unlike the online data retrieval systems, users can download the pre-generated text files from the DMG web site without registration. There are 103 TTS data files and 135 Cordon Count data files stored in the Open Data Portal at the DMG. Each TTS data file contains household, person, and trip information for a specific survey year, geographic area and spatial aggregation. Each Cordon Count data file contains different types of vehicle and person counts for a specific year, geographic area and time period. The files are in comma-delimited text format and readily import into Excel or other spreadsheet software.

COMPUTER RESOURCES AND TECHNICAL SUPPORT

The DMG computer system has been redesigned in order to improve performance and system migration. It comprises of several servers including the DMG main server, the data retrieval server, an EMME2 server, an EMME3/EMME4 licence server, a backup server and a file server where the data files of the funding agencies are stored. All these servers are located behind the DMG firewall for security reasons.

The DMG main server is a Dell R620 running Windows Server 2012 R2 with Hyper-V application. This application allows the DMG server to run multiple virtual machines, i.e. operating systems emulated within another operating systems by imitating dedicated hardware. There are three virtual machines running on the DMG server. The first one is the mail server using Microsoft Exchange Server 2013 to handle daily DMG emails. The second one is the DMG website created in WordPress. Linux, Apache, MySQL, PHP and Lamp stack are running on this machine. The third virtual machine is the beta version of the new iDRS developed using the MEAN stack, a free and open source JavaScript software stack for building web application running in Debian. The data are hosted in PostgreSQL which is an open source relationship database management system. The use of open source software allows free access, modification and sharing of the software.

The data retrieval server hosts the TTS, Cordon Count, 1964 MTARTS and GO Transit survey (prior to 1997) databases. These data are stored in Oracle, a relational database system, on a SUN Ultra Sparc server running Solaris and can be accessed through the two interactive data retrieval systems iDRS or CCDRS. All years of the TTS and Cordon Count Data are compiled and stored in a consistent way, and the TTS and Cordon Count data are frequently used together in regional planning projects or traffic impact studies. A summary of the use and the users of these services is contained earlier in this annual report.

The EMME2 server allows funding agencies and their consultants to run an older version of EMME2 remotely on a Sun server running Solaris. EMME2 is no longer supported by INRO, the developer of the EMME software and most of the agencies have already migrated their modelling efforts to EMME3 or EMME4.

The newer EMME3/EMME4 software is run locally on a personal computer with all relate files stored locally. This results in much faster operation. Each local machine requires access to an authentication key to operate the software. Rather than each agency purchasing a licence from INRO to use the software locally, DMG negotiated a concurrent licence for authentication of several machines operating at the same time. The DMG then dedicated a server to provide remote authentication to the participating

partners. The DMG is in the process of migrating the current suite of supporting hardware and software to more recent and cost effective alternatives.

The DMG continues to maintain and improve the computer system to meet its funding agencies' changing needs.