

27 July 1995

Release of V5.10 TNT products

Introduction

Status of Client Base.

MicrolImages is pleased to distribute **V5.10** of the **TNT** products and the 36th consecutive quarterly release of the Map and Image Processing System. During the past quarter one of the oldest outstanding **DOS MIPS V2.0** was upgraded to become **TNTmips 5.1**, a jump of about 6 years. MicrolImages is also pleased to report that it shipped more **TNT** products during this quarter in May 1995 than in any previous month since 1986. **TNT** products are now installed in 73 nations.

The following paragraphs have been extracted from a document prepared by the **Maryland State Government Geographic Information Coordinating Committee (MSGIC)**

The document is entitled

MSGIC GIS SURVEY REPORT 1995

Prepared by the Technical Assistance Users And Application Subcommittee (TAUAS)

To obtain the complete report and/or verify the information below please contact MicrolImages. MicrolImages had no role in the preparation of this survey and the summary report was written by individuals on the TAUAS group who use other **GIS** systems than the **TNT** products.

"INTRODUCTION"

*"This report provides the results of the first User Requirements Analysis survey conducted by the Maryland State Government Geographic Information Coordinating Committee (MSGIC). This is an important milestone in coordination of the **GIS** efforts throughout State Government."*

*"The Survey was sent to a total of thirty (30) Maryland State Agencies [assumed to be the membership of MSGIC]. The response rate was excellent with all agencies responding and many sending in more than one form. Of the total 33 forms received, 30 respondents (91%) indicated that they used or needed **GIS**."*

"There are some notes about the survey readers should be aware of. Most of the questions asked allowed multiple responses, therefore, the percentages often add up to more than 100 percent. For example, if an agency used more than one database management system, that agency would check off more than one database in their response. Also, some large departments such as the Department of Natural Resources and the Department of Transportation are composed of many administrations and have submitted more than one completed survey."

[The body of this report covers the many questions, tabulations, and interpretations of the survey related to the topics of Data Descriptions, Data Sharing, Applications, Personnel/Training, Hardware/Software. The first four of these categories do not

have direct connection to MicroImages or our products. The response to the last category of Hardware/Software questions contain results of interest to MicroImages' clients and prospective clients and are reproduced below directly from this report without interpretation as they are self explanatory.]

"HARDWARE/SOFTWARE"

"A. What software products, or groups of products do you currently use?"

"GIS software"

Autodesk	17%	GeoVision	0%	Strategic Mapping	13%
Caliper	4%	IBM	4%	Tydac	4%
ComGrafix	0%	Intergraph	8%	Ultimap	0%
ERDAS	0%	MapInfo	21%	UNISYS	0%
ESRI	25%	Microlimages	42%	Other	4%
Genasys	0%				

"DBMS"

ACCESS	8%	FoxPro	21%	Oracle	13%
DB2	4%	INFO	8%	Paradox	17%
DBASE	71%	INFORMIX	13%	SQL	17%
Clipper	4%	INGRES	0%	Others	29%

"B. What type of hardware do you currently use?"

Personal computer	100%	Mainframe computer	21%
UNIX or other W/S	33%	Other	0%

"C. What media type do you currently use to share geographic data with other users?"

Hard copy	79%	External network	21%
Portable media	83%	Other	13%
Internal network	38%		

Memory Requirements.

Microlimages equips all in-house **PC** computers with 16 Mb of memory. The **TNT** products will thus continue to be checked out to run properly in this amount of memory. However, Please remember that MicroImages does not perform production oriented operations.

On several occasions clients have pointed out that **TNTmips** operates significantly faster if 24 Mb of memory is provided in the **PC**. The additional memory above 16 Mb would often be used by **TNTmips** when a second major subprocess is started and you have a number of other utility programs running concurrently (for example, network support). This condition would frequently happen when display process and the network processes are active and another major operation is started without quitting or closing the display operation. Under these conditions, and with only 16 Mb of real memory, the additional memory for the second process is provided by the **MSW3.1** virtual memory swapping process which slows down your operations. Those who have only 16 Mb of real memory soon get in the habit of closing each operation before starting another.

Improved Reliability.

Overview. Prompt client support from technically knowledgeable software engineers has always been a priority at MicroImages. Hundreds of client assistance requests are received each week by voice, **FAX**, and email. How many companies do you know that supply detailed written responses to your inquiries for assistance? Over 90% of these inquiries are answered directly by voice or in writing by the next day, but some questions require additional research on the part of the software engineers who supply your support and those who write the code. Over 98% of these requests (not counting defects reported more than 1 time) are now for advice on how to accomplish a specific task. When defects are reported they are fixed as rapidly as possible with corrections for over 80% available by the next day. The major portion of these defects are now cured by corrected processes which clients obtain immediately via **FTP** over Internet.

However, some defects are elusive and take time to cure as evidenced by the following received from an international client under the banner of Pin Mapping and Bouquets.

"Thanks for sending me the latest PRINTRVC.EXE and DISP2D.EXE. They solved all of the problems which I had been experiencing recently. What should have been a simple task, but which had occupied many hours of fruitless work over 2 months, was completed in an afternoon. While I would, of course, have preferred that the problem had not arisen in the first place, it is satisfying in the end, to enjoy everything functioning in the way expected, and most importantly to achieve what I had set out to do quickly and efficiently. It wouldn't have happened without your assistance."

Software Planning System. The **TNT** planning and control system (a pseudo-database) instigated approximately 9 months ago continues to assist MicroImages to gradually improve the reliability of the **TNT** products with each successive new quarter. It provides the basis for the weekly review of the progress and assignment of staff resources for the addition of the new features and the repair of defects. During the period of active preparation for each quarterly release (several weeks prior to duplication of the CDs) it provides the basis for daily prioritization of the completion of features and the correction of known defects.

While it is impossible to eliminate all defects from any software product, especially one with as broad a scope as **TNTmips**, diligence can minimize them and their effects. MicroImages' approach is actually enhanced by the quarterly release concept and the new widespread use of Internet to immediately transfer corrections of defects subsequently encountered by clients.

A recent comment on Internet (30 June 95) by Ray Bentley, one of the founders of Bentley Systems which creates and markets MicroStation addresses this same issue.

"I won't bother posting Jason's message, but I would be interested in knowing if other users find MicroStation to be unstable. We have done a lot of work to improve MicroStation's stability, but like anything created by humans, MicroStation is not perfect."

"In particular, we need test cases that can help us to reproduce problems. Without them it is difficult to correct problems."

"I personally talk to hundreds of users a year and I use a lot of software packages. I think MicroStation is relatively stable and reliable."

"If Jason has a point here, please let us know. If it is just a lot of electronic hot air (my vote)., then we can get back to listening to customers with valid concerns."

Clearly all software has these base or DC levels of defects more or less proportional in number to the size and complexity of the software. However, MicroImages then adds that *"it is how they get fixed that really counts in the end"*!

Software Support System. Another step in MicroImages' planning, quality control, and support operations is just being designed and tested whereby all the technical support operations at MicroImages will also be recorded, tracked, and summarized by a pseudo-database system. Some of you may already have noticed that you are being supplied with a "case-code" when you report a defect. It will take a couple of quarters for this new activity to become fully operational. However, it will provide a mechanism whereby each incoming request for software support by voice, FAX, or email will be encoded, assigned a case number, tracked, completed, and then summarized for weekly and quarterly review. This is much the same as the procedure already fully in place for the tracking of defects and new feature requests from clients and internal MicroImages staff as noted above and will operate in parallel to it.

As noted above, preliminary use of this system has pinpointed that more than 98% of the voice, FAX, and email requests for technical support are now concerned with obtaining advice on how to accomplish a task. The remaining 2% are client reports of defects in the products. MicroImages' technical support engineers deal with many requests for assistance each day (some exceptionally busy days this approaches 30 requests). Knowledge of the areas in which clients consistently request advice and help (not the correction of defects) will begin to provide the necessary feedback loop to identify confusion and defects within the on-line documentation. However, many of those seeking advice have not consulted the on-line documentation. Thus, an even more valuable feedback is possible which will identify where the user interface and ease-of-use of the **TNT** products are counter-intuitive and can be improved. After all, the overall selfish goal of the critical review of such information is to use it as the basis to improve the ease of use of the **TNT** products, thus reducing the number of free software support questions to be answered!

MicroImages has always claimed that the most important thing in the management of defects in large scale software is the management of their correction at which MicroImages' staff works very hard on your behalf. However, being imperfect human beings we occasionally slip up in our support activities as well.

On-line Upgrades. Unfortunately, due to a shortage of staff time and equipment problems, MicroImages has been as yet unable to initiate the weekly posting of all **TNT** versions for every platform at microimages.com. The necessary additional hard drives were purchased 8 weeks ago but MicroImages has the same problems as you trying to get "strange" drive parameters for their **UNIX** / workstation installation

and use. However, the necessary parameters now seem to be at hand and this new support service can now be placed on line probably by the time you receive this MEMO. It is very surprising to MicroImages how fast most of our world-wide clients have gained access to Internet to immediately download (**FTP**) corrections and new features added during the quarter. Access to Internet seems to have become an overnight necessity for most professionals involved in high technology applications outside the United States.

Summary of New Features.

The first significant change you will find in **V5.10** is that a new, separate **MSW3.11** point and click process is available to install **TNT** products for that platform. Most existing clients had no trouble reinstalling **TNTmips** for a subsequent quarterly upgrade. However, the first time user had difficulty with the previous installation procedures.

More **V5.10** processes now automatically produce a pyramided raster object.

Another significant user interface change has been added where any process and each individual import or export format can be assigned a large 32 by 32 cell icon, title, and tooltip in one or more custom toolbars. These custom toolbars can show or hide at your request and be used as push buttons to launch that process or import/export activity in addition to whatever other process you may already have underway. Small icons on fixed toolbars have been added into many more processes effectively doubling the number in current use.

The position and scale of the image layers of the View window can now be selected in any process from the View Position window which now automatically shows a view of the entire raster object if it is pyramided.

Contrast enhancement can now be applied to 16- and 32-bit raster objects.

TNTview is now exactly the same compiled process as the **TNTmips** display process with groups, layouts, legends, and so on. Only the actual process of printing the resulting map is switched off and remains an exclusive feature of **TNTmips**. You will also find that **TNTview** is now automatically available from within **TNTmips** from the View menu since no additional software is required on a **TNTmips** system.

Quick sketching has been added to the display process and is available in both the **TNTmips** and **TNTview** products. It provides simple, fast drawing and annotation tools for creating, saving, and restoring a new **CAD** layer over the top of any View window already displaying any normal mixture of layers.

MapInfo ***.MIF/MID** datasets can be linked to Project Files in a fashion similar to that previously available for most stranger raster files (e.g. ***.TIF**, ***.TGA**, ***.LAN**, ...). It is no longer necessary to import these MapInfo files into a **CAD** object for **TNT** processes to read them.

A Tabular Database window has been introduced into the display and edit processes. It allows the setup and viewing of multiple database or attribute records in a single scrollable window and the interactive selection of associated elements in the display. Interactive controls are provided to hide fields, control field appearance,

and other cosmetic parameters. This new feature is part of new and planned features related to multiple element selection and display and transfer between object using a new Region-of-Interest concept.

The new multi-object = multi-layer editor has approximately doubled in capabilities. It now allows the display, selection, editing, and saving of any vector or **CAD** layer in any complex normal view containing all object types (raster, vector, **CAD**, or **TIN**). A Save All option will save all layers (objects) which have been altered in the current edit session.

Appropriate edit tools are presented if a **CAD** or vector layer is selected as active layer or editing (many tools are common to both). The new Tabular Database window and associated functions are available. Multiple elements can be selected for simultaneous editing in the active layer (e.g. delete the polygons selected by multiple mouse clicks or from the new Tabular Database window). The line style of any **CAD** element can be assigned or edited. Labels and text style (font, size, angle, ...) can be created or edited. Auto label generation is available. Splines can be used in vector or **CAD** element types. **X-Y** digitizing is supported for both **CAD** or vector active layers.

The vector merge process converts the various projections of objects selected on the “fly” and writes the new object in any selected projection.

The vector filter process now supports the “batch” closing of undershoots by the same methods as the object editor.

A new standard linear combination process is available for raster objects. This process was previously only available in the **DOS MIPS** product. Its reincarnation in **TNTmips** provides means to edit and reapply the linear coefficients obtained from other processes to new sets of multi raster objects.

What just missed V5.10?

Transparency. The concept of raster and polygon fill transparency during display has been created for the introduction into the **TNT** products. However, this will not be released with **V5.10** as its introduction affects many processes which can not be thoroughly checked at the end of a release cycle. This feature will be available within the first couple of weeks immediately after you receive **V5.10** for those who have access to upgrades via Internet. It requires the introduction of a full 24-bit image memory map (called a pixmap) of your current view in place of your current 8-bit memory based pixmap. This 24-bit pixmap is then used to build-up the composite of all the layers (just as the 8-bit version) but allows overlay of new layers in transparent fashion. However, considerable separate additional software development is required to create an equivalent of this concept to allow the transparent overlay of layers or objects during printing. Transparent printing is not likely to make it even into **V5.20**.

TrueType. The TrueType rendering engine is now complete but was not incorporated at the last minute as it also risks breaking many features. It should be available in the processes on the Internet server by the time you read this memo.

Mac X Server. There has been significant progress and the MIX for the Mac now sort of works but was not ready for **V5.10**.

Other V5.20. The software engineers at MicroImages have now been at work on **TNTmips 5.2** for several weeks. With a current database of over 1200 requested and planned new features (some big, some small) it's choosing the right ones to do next that counts. To quote Borland and I am sure many others (and paraphrasing) "it's not hard to think of many things to add to software, what counts is sorting out those which are important!". Looks like Borland may have guessed wrong several times in a row. Mike and I spend some time almost every day on this sorting out process taking in all inputs, assigning and adjusting priorities, and then calling it tactical and strategic planning. For the next couple of quarters (i.e. until 1996) we are most likely to choose those items from the list which help glue together and make the various parts of the **TNT** products more useful and easier for **GIS** and desktop mapping. We are not likely to choose those activities which involve the specific application of **TNTmips** to a particular discipline or problem area.

Windows NT 3.51

Several unique defects in the MicroImages X Server for Microsoft **MSNT3.5** and **MSNT3.51** have been cured providing improved performance. They concern operations with the vertical scroll bars and the jerky, slow response of windows being moved by the mouse.

MicroImages' code for application processes is simply recompiled for each platform. However, the source code for each **X** Server is unique and defects can vary between platforms and require individual attention.

IMPORTANT NOTICE: As announced in the MicroImages MEMO which accompanied the release of **V5.00** of the **TNT** products, Microsoft **NT3.1** is no longer supported by the **TNT** products or the software support engineers. Please invest the small amount of money needed to upgrade to Microsoft **NT3.51** to eliminate the defects in version **NT3.1**.

Windows 95

V5.10 for **MSW3.11** of the **TNT** products including the **MIX** Server installed normally and operated immediately under **W95** without alteration. The speed of the user interface is approximately the same as operating directly under **MSW3.11**. Simply install and use the **MSW3.11** version of **V5.10** if you are already experimenting with **W95**.

Most of the **TNT** 32-bit application processes will recompile without alteration for direct use within **W95**. The changes to the **MIX** Server for **MSNT3.51** needed to make it native operational within **W95** are being implemented now as minor differences do exist in the graphics functions of these two systems (not supposed to be different). When these modifications are complete, there will be a single **MIX** server for both systems which is simply recompiled separately for **MSNT** and **W95**. The other remaining tasks for providing a native release for **W95** involve the adjustment of the support of the hardware keys and other related **I/O** port functions.

MicroImages is beginning to believe that **W95** may actually ship in late August as scheduled unless delayed further by the U.S. Justice Department. Thus it is possible that **V5.20** of the **TNT** products released in late September or October will also provide a native version of the **TNT** products for **W95**. Please also make a note that, as has been the case with the **MSNT** versions of the **TNT** products, the **W95** version will only run with new gray hardware authorization keys or the blue or red universal serial keys. The older black keys which still may be used with the **MSW3.1** systems are not useable with **W95** and must be exchanged with MicroImages for \$50 plus return shipping.

IMPORTANT NOTICE: The recompilation of the **TNT** products for **W95** uses the Microsoft Visual **C++ V2.2** sold for use with the **W95** operating system. This is the same Microsoft compiler that has been used for the previous releases of the **TNT** products for use with the **MSNT**. Those planning to use the **TNTsdk** will need to use this **C** to compile native applications for **W95** platform. Watcom **C V9.0, 9.5, or 10.0** will continue to be the compiler used with the **MSW3.11** versions of the **TNT** products and is thus still required for the use of the **TNTsdk**. While **TNTsdk** lets you create portable source code for use on each platform, you must compile that code using the specific compiler required for each platform.

MI/X (MicroImages' X Server)

X Server for MSNT3.51. As noted above, several defects have been cured in the operation of this **X** Server.

X Server for Apple Mac. The MicroImages **X** Server for use with the Apple Mac and Power Mac is now working in rough form. It continues to absorb a lot of effort and it should be completed for use with **V5.20** together with a simplified Mac installation program (similar to the install program being released for **MSW3.1** in **V5.10**). MicroImages continues to postpone intensive efforts to speed up the operation of the **TNT** products on the Macs until this server is available. MicroImages simply is not in control of the Mac situation until the **MIX** server for the Mac is available.

Independent written confirmations of the sources of the significant slowdowns on the Power Mac as reported in the **V5.00** MEMO are now available. Direct contact with Power Mac users running products under the **IDL** graphics system on the Power Mac have experienced significantly slower results than with Quadras.

TNTmips[®] 5.1

Please note that the use of **TNTmips[®]** as the name of a software product is now registered by the United States Government. Applications for the official registration of the other product names in this series (**TNTview**, **TNTatlas**, ...) are pending approval.

Installation Changes.

New MSW3.1 Installation. A new, separate **MSW3.1** SETUP program is available to install the **TNT** products on this platform. A README.TXT file is provided. Its use is

also described in more detail below in the New Features section and its operation is described on an attached page.

The previous install program operated at the **DOS** level and is still temporarily available. Please try the new **MSW3.1** based process as it will eventually replace the **DOS** program. Since the new process runs within **MSW3.1** it allows checking of the characteristics of your **MSW3.1** setup so that future versions will test your setup and recommend changes in it to optimize the performance of the **TNT** products. MicroImages still finds that almost every **MSW3.1** system encountered has some sort of setup problem causing performance losses.

Installation for Other Platforms. This **MSW3.1** SETUP program will be adapted this quarter to provide for similar installation of **V5.20** for **MSNT3.51**. It also provides the basis for a similar installation process for use with **W95**. A similar Mac based installation process is nearing completion allowing easier installation and the maintenance and upgrade of authorization keys. The scripts used to install **TNTmips** on **UNIX** workstation already follow the standard installation procedures on these platforms and require only incremental changes to improve them.

General Install Procedures. If you have subscribed to **TNTmips 5.1**, please proceed to install it from the **V5.10** **TNT** product **CDs** following the instructions provided by the **INSTALL** process on either disk, in the Detailed Installation and Optimization Manual, or on the attached sheet for the new alternate **MSW3.1** SETUP approach.

Installed Sizes. Loading a full installation of **TNTmips 5.1** onto your hard drive (exclusive of illustrations) requires the following storage space in megabytes. The illustrations will add another 18 megabytes to these values.

PC using WFW3.11	89
PC using MSNT3.51 (Intel)	117
DEC using MSNT3.50 (Alpha)	129
Mac using Mac OS 7.1 (680xx)	67
Power Mac using Mac OS 7.5 (Power PC)	70
Hewlett Packard workstation using HPUX	98
SGI workstation using IRIX	123
Sun workstation using Solaris 1.x	89
Sun workstation using Solaris 2.x	74
DEC workstation using OSF/1	137
IBM RS/6000 using AIX	144

Missing Platforms. There are no **V5.10** **TNT** products on these **CD-ROMs** for the **DEC** 3000 or 5000 workstation platforms using **ULTRIX** or for the Data General workstation platforms using **Aviion**. These versions were temporarily deleted to make room on the 2 **CD-ROMs** for the 2 new Macintosh versions. **V5.10** of the **TNT** products for the **Aviion** or **ULTRIX** platforms are not widely used and are being provided on individual, custom made **CD-ROMs**. Subsequently, to accommodate these lower use products, a reduction in the size of all the executable files may be effected or a third **CD** will be added, particularly if support for one more new platform is added.

Upgrading.

If you did not order **TNTmips 5.1**, and wish to do so now, please contact MicrolImages by **FAX**, phone, or email to arrange to purchase your quarterly upgrade to **V5.10**. MicrolImages will immediately supply you with an authorization code by return FAX. Entering this code when running the installation process will allow you to complete the installation and immediately start to use **TNTmips 5.1** and the other **TNT** products.

If you do not have an annual subscription to **TNTmips**, you can purchase **V5.10** under the elective upgrade plan at the cost in the table below. Please remember that new features have been added to **TNTmips** with each quarter. Thus, the more quarters you are behind **V5.10**, the higher your upgrade cost, up to a fixed limit. Upgrades from all previous versions of **MIPS** and **TNTmips 4.6** or earlier are the same, fixed cost shown below. As usual, there is no special additional charge for the upgrade of your special peripheral support features, **TNTlink**, or **TNTsdk** which you may have added to your basic **TNTmips** system.

Within the **NAFTA** reselling area (Canada, U.S., and Mexico):

Product Code	Price to upgrade from TNTmips :					MIPS: any version
	V5.00	V4.90	V4.80	V4.70	V4.60	
D30 to D60 (CDs)	\$250	450	600	700	750	750
D30 to D60 (floppies)	\$300	560	750	875	940	940
D80	\$375	675	900	1050	1125	1125
M50 (replaces U45)	\$250	450	600	700	750	750
U100	\$450	800	1000	1200	1300	
U200	\$780	1400	1875	2200	2350	
U300	\$1030	1850	2475	2900	3100	

For all other nations:

Product Code	Price to upgrade from TNTmips :					MIPS: any version
	V5.00	V4.90	V4.80	V4.70	V4.60	
D30 to D60 (CDs)	\$300	560	750	875	940	940
D30 to D60 (floppies)	\$350	600	800	925	990	990
D80	\$425	800	1050	1225	1300	1300
M50 (replaces U45)	\$300	560	750	875	940	940
U100	\$500	850	1050	1250	1350	
U200	\$830	1450	1925	2250	2400	
U300	\$1080	1900	2525	2950	3150	

M50 is the new product code for the Apple Macintosh **Mac OS 7.x** versions and replaces their older designation as **U45** for the Mac using **AUX**.

TNTsdkTM 5.1 for TNTmips 5.1

TNTsdk can now be easily installed on **MSW3.1** based platforms using the new **SETUP** program described elsewhere and in the attached sheet.

IMPORTANT NOTICE: The recompilation of the **TNT** products for **W95** uses the Microsoft Visual **C++ V2.2** sold for use with the **W95** operating system. This is the same Microsoft compiler that has been used for the previous releases of the **TNT** products for use with the **MSNT**. Those planning to use the **TNTsdk** will need to use this **C** to compile native applications for **W95** platform. Watcom **C V9.0, 9.5, or 10.0** will continue to be the compiler used with the **MSW3.11** versions of the **TNT** products and is thus still required for the use of the **TNTsdk**. While **TNTsdk** lets you create portable source code for use on each platform, you must compile that code using the specific compiler required for each platform.

TNTview™ 5.1

MicroImages is pleased to announce an increase in sales of this **TNT** product to clients using it as a network display tool in conjunction with **TNTmips** or as a portable field tool. As a result, a sketching feature is being released in **V5.10** to support these clients and their applications. Other new features are planned to expand the utility of this product.

Installation.

TNTview can now be easily installed in **MSW3.1** using the same new installation procedure described above for use with **TNTmips**. See the attached instructions and simply select to install **TNTview** from the appropriate list. Similar simple installation procedures will be available in **V5.20** for **MSNT3.51** and probably **W95**.

All TNTmips Display Features.

All of the features in the display process within **TNTmips** are now in **TNTview** except the ability to print out hardcopy. This does not change your previous operation of this product but simply expands it to support layouts, group placement, and so on. Display layouts created in **TNTmips** and saved can now be opened and viewed in **TNTview**. All the other new display features added in **V5.10** also immediately become available such as the Tabular Database window, View Position window changes, and so on.

These and future expansions of **TNTmips** display capabilities now automatically become available in **TNTview**. **TNTmips** display and visualization process (2D Display) has been restructured so that it is exactly the same process as **TNTview** with the addition that its final printing capability is enabled by the hardware authorization key. **TNTview** thus has the same display capabilities as a **TNTmips** system purchased without a printing support feature (which also can not print in color).

Sketching.

A simple sketching feature has now been added into the 2D Display process for use in **TNTview** and **TNTmips**. This particular feature was added specifically for use in **TNTview** and is designed for use in a portable field setting such as for field interpretation of airphotos or slides. Sketching does not allow the selection or alteration of any layer in the current view - this is the function of the object editor in **TNTmips**. However, sketching can be used to draw lines, circles, polygons and fill, add annotations, and then save these all as a simple **CAD** object. This **CAD** object

created in sketching (and only there) can also be reloaded later for adding elements (not editing). Or more likely, this simple **CAD** object can be accessed elsewhere in the **TNTmips** system for clean up in the object editor, attachment of attributes, conversion into a vector object, use in a Map and Poster Layout, and so on.

A color page entitled Photointerpretation Using the Sketch Tool illustrating the use of sketching within **TNTview** to interpret a color-infrared airphoto for hypothetical wetland areas is attached. Sketching in **TNTview** is, and will continue to be kept as a simple, easy to use tool for fast and efficient capture of line data in the field. The ability to select, edit, and delete **CAD** elements created by previous sketching will be added in a future version of **TNTview**.

Many, many software packages allow a wide variety of levels of simple **CAD** drawing capabilities. The power and usefulness of the addition into **TNTview** of simple sketching as a standard feature is created by the power **TNTmips** to prepare the layout that is actually taken into the field. **TNTview** can now provide for the on-site interpretation of complex layouts of many layers of raster, vector, **CAD**, **TIN**, database and other materials from a wide variety of sources and other products. For example, sketching added to the speed and flexibility of **TNTview** in managing huge rasters now makes practical high-resolution field photo-interpretation possible, as well as the rapid updating of changes to existing interpretations (i.e. layers).

MicroImages is not currently aware of other low cost **IPS** or **GIS** "view" products which can easily and efficiently manage other vendors' huge map and image materials in the field or other data upgrade setting. This application is particularly useful with the rapidly expanding availability of digital orthophotos for creating or upgrading **GIS** layers. Similarly, the near future availability of 1 to 4 meter single band satellite images and their ortho-like derivative digital products from several sources pinpoint the need for simpler, cheaper human photointerpretation processes.

Since sketching was just added to **TNTmips** and **TNTview** its operation is outlined in draft form in the 5 page printed supplemental documentation enclosed.

Data Warehousing.

Large collections of project materials from many other sources can be organized by **TNTmips** into Project Files. These materials can now be accessed by your **LAN**, Internet, **CD**, or other media for updating or reinterpretation for other purposes using **TNTview** and sketching. Subsequently these simple **CAD** sketches can feedback into the central operation for verification, editing, validation, and eventual addition or replacement in the on-line Project Files. This general procedure defines a process now suddenly being popularly referred to by Oracle, MapInfo, and others as data warehousing to distinguish it from other database management activities which must operate in near real time (for example, bank transactions, credit card transactions, and related operations).

The following was extracted from a document being circulated by MapInfo entitled Q&A: ORACLE DATA WAREHOUSING ANNOUNCEMENT and dated 23 June 1995

"What is Data Warehousing"

“Data Warehousing is a strategic application of database technology and analytical tools to support decision making. Generally, a data warehouse is the collection of many databases. Unlike the operational data which is on-line, business-critical and transaction-oriented, a data warehouse is off-line, is not critical to day-to-day business operations, and is query oriented. Usually, the data warehouse is a snapshot of operational data, which is refreshed hourly, daily, weekly.”

“The data warehouse answers the question: how can I take scattered operational data and use it for strategic advantage? Many companies spend considerable resources to run their businesses. As part of this process, lots of data is generated. Creating a data warehouse is a key step in leveraging the resulting data.”

“Data in a spatial data warehouse includes location information that can be analyzed geographically. Spatial and non-spatial data are often stored in the same data warehouse.”

“The usefulness of a data warehouse can be measured by the flexibility and power of the client-side analytical tools (i.e. MapInfo) available to the end user.”

[If all of the above sounds like Project Files and the **TNT** products, it should come as no surprise that others have the same ideas and are forming strategic alliances to meet similar objectives]

“What are the challenges in implementing a Data Warehouse”

“Throwing a lot of data into a data warehouse is easy. Getting it out is hard. In building a data warehouse there are two key considerations: warehouse design and the tools to analyze the data.”

“Design considerations include:

- *deciding which data sets to include*
- *how to restructure unrelated data sets to appear as one*
- *how to move the data into the warehouse*
- *how to refresh the data*
- *who needs to see which data*
- *how to add spatial coordinates to the data.”*

“Analytical considerations include:

- *which tools will be used to analyze the data*
- *what standard reports should be printed*
- *how to make retrieval easy and fast*
- *which tools will help me drill down through the layers of information.”*

[Based upon your extensive communications with MicroImages, many of you are now moving into the data warehousing business with **TNTmips**. This ranges from setting up data warehouses over a wide range of organizations from states to mining companies. It appears to be driven by your own personal or organizational needs or those of your clients.]

Planned New Features.

Since the **TNTview** is now finally exactly the same process as **2D Display**, the pending additions to the display process in **TNTmips** will simultaneously become

available for use in **TNTview**. These can be outlined with their probable release versions as follows:

Transparency (V5.20). Transparent display of layers will allow such visualization options as transparent polygon fills to “show-through” the underlying image.

3D Displays (V5.20). The separate **3D** Display will be rewritten and disappear into the 2D Display process which will become a general visualization process and the **TNTview** product.

Stereo Viewing (V5.20). The expansion of the stereo viewing processes being expanded in **TNTmips** will also become available as part of the expanded visualization capabilities needed in **TNTmips**.

Snapshot Printing (V5.30). Snapshot printing will be added into **TNTmips**, **TNTview**, and **TNTatlas** when an interface to the generic Microsoft Windows print driver is available. This will allow the contents of the display = View window to be printed in color to scale or to size on a single page up to 8.5 by 11 inches in size. It will also allow this same view to be pseudo-printed into an appropriate, external **TIFF** file format. This printing capability will become a feature of **TNTmips**, **TNTview**, and the **TNTatlas**. However, it will only be available for platforms and printers which are sold with a Postscript or Microsoft Windows printer driver (not supplied by MicrolImages).

GPS Position Inputs (V5.??). Eventually you will be able to use **GPS** positional inputs in **TNTview** as it is a natural part of a product designed for field use. At present MicrolImages has no priority assigned to this extension of the **TNT** products.

TNTatlas™ of San Francisco

It was noted above that a new installation process is available to install **TNT** products on **MSW3.1** platforms. This is now being adapted to provide for an easy installation of the next version of the stand-alone sample **TNTatlas** of San Francisco. Similarly the improved installation processes will provide for easier installation of the **NT** and eventually for the Mac and **W95** versions of **TNTatlas**.

MicrolImages has purchased several additional volume duplications of the original prototype1 sample **CD-ROMs** and is about to run out again. Thus it is likely that a new prototype2 of the sample **TNTatlas** of San Francisco will be published “as practice” during the next quarter with this and other improvements including pyramiding. Furthermore, several clients now have **TNTatlas** products nearly ready for distribution as follows.

Geological Survey of Finland (a MicrolImages European Reseller) has two contracts to produce **TNTatlas CDs** for controlled distribution of client data. They are also considering the internal publication of a sample **TNTatlas**.

The Maryland Department of Natural Resources (**MDNR**) has prepared and is nearing publication of a sample **CD-ROM** to illustrate the extensive **GIS** and image datasets assembled for use by Maryland taxpayers. It will cover a specific sample subarea of the state with a wide variety of layers and database materials. It is anticipated that the first publication of this sample disk will be for 10,000

copies and will be distributed widely to state and county agencies, engineering firms, high schools, libraries, and related sites. Copies of this sampler will be provided to all clients when it is available.

An agency in Argentina is reviewing the use of a **TNTatlas** to distribute educational materials.

The MicrolImages' Representative in Chile is planning a **TNTatlas** to demonstrate the kinds project materials they have prepared in **TNTmips**.

The Maryland Historical and Cultural Program has a contract to prepare a **TNTatlas** of all heritage buildings and similar sites in the state. This atlas is being prepared as research project with the results to be distributed to other state archeological agencies.

If you are preparing a **TNTatlas** project please let MicrolImages know about it.

As noted above in the section on **TNTview**, MicrolImages will eventually be providing a snapshot printing capability within **TNTatlas**. Until it is available next year, it is important to remember that printing what is on the screen during the operation of a **TNTatlas** is easy for those using it on a **MSW3.1** platform. The instruction on how to do this are repeated again below.

Those clients familiar with Microsoft Windows have pointed out that it is quite easy to print any of the San Francisco **TNTatlas** screens at any point in the operation of this HyperIndex® stack without purchasing the separate Pizzazz Plus color printing product. Simply start the clipboard (**MSW3.1**) or clipbook (**MSNT3.5**) program. At any place in **TNTatlas** (or any **TNT** product) capture the contents of the display screen to the clipboard by pressing the Print Screen key. Then suspend the **TNTatlas** and access the clipboard / clipbook with the other software within which you wish to use the screen and trim, annotate, insert, and print it (Paint Brush works well). Finally, simply reactivate and continue using **TNTatlas** from the point of its suspension. If you can use the clipbook program (in **MSNT**), then you can capture multiple screens at various points during the operation of a **TNT** product and similarly access and use all of them later.

TNTdemo™ 5.1

No changes have been made in the **TNTdemo** software or program for this quarter except that purchasers will not automatically receive the **DEC ULTRIX** or Data General Aviiion versions unless they specifically request them.

On-Line Documentation

As noted in the MicrolImages MEMO accompanying the **V5.00** products, MicrolImages is short on experienced scientific writers. Furthermore, the recent radical changes in the interface of **TNTmips** has made extensive rewriting necessary. Initial draft documentation is available for the new processes released in **V5.10** (except the **DEM/ortho** process) and the size of the printed version has increased to 1900 single spaced pages plus the 89 supplemental pages on new processes. However, many other sections still require upgrading to reflect the

changes to the explanations and many illustrations caused by the incorporation of icons and related changes.

Five last minute documentation sections were completed for **V5.10** after the master **CDs** were created for the reproduction process. These 89 additional pages are included in supplemental, printed form as follows.

- Adding Legends (18 pages)
- User-Defined Linear Combinations (7 pages)
- More About the Sketch Tool (5 pages)
- Custom Toolbars (6 pages)
- Object Editor (53 pages)

Apple Macintosh via System 7.x.

No special effort was expended during the this quarter to enhancement the speed and performance of the **TNT** products for **V5.10** on the Mac platforms. Performance thus remains as set forth in the Microlimages MEMO accompanying **V5.00**. It was decided that any effort in this direction prior to the completion of the Microlimages **X** Server for the Mac would not be productive. Microlimages must have control of all the code used in the **TNT** products for the Mac before optimization efforts can be expected to produce results.

Microlimages explanations for the poor relative performance of products on the Power Mac were recently verified from other sources. A client site has noted that any process run under the commonly used **IDL** shell runs slower on the Power Mac than the Mac Quadras due to its 16-bit disk **I/O** access carried over into **Mac OS** even using the new version **V7.52** just released with the latest PowerPC 603 processor based Macs (e.g. the 9500 series). A recent article in InfoWorld describing the technical details of these new Macs also pinpoints this problem as significant and notes that it will not be resolved until the release of Copeland = **MacOS 8.0** next year. It specifically notes that this I/O problem still exists in the new **Mac OS V7.52** just released with the latest PowerPC 603 processor based Macs (e.g. the 9500 series).

The status of efforts on the completion of the **X** Server for the Mac and Power Mac were reviewed above. They can be summarized by stating that they have reached the testing and debugging phase.

A number of defects in processes associated to the unique file handling on the Mac and reported by users are corrected in **V5.10**.

At the present time Microlimages is compiling the **TNT** products and **X** Server using a **C** from Metroworks called CodeWarrior **6** for \$400 (works for both Mac and Power Mac). Microlimages has tried all the popular **C** compilers for the Mac over the past year and find them all to be weak in one area or another compared to those for other platforms and operating systems. As of this time (subject to change) the **TNTsdk** for the Mac versions of the **TNT** products will require the use of this CodeWarrior **6** compiler.

New TNTmips Features

* Paragraphs or main sections preceded by this symbol "*" introduce significant new processes, or features in existing processes, which are released for the first time in **TNTmips 5.1**.

System Level.

* The automatic creation of pyramid tiers has been added to many processes that create raster objects.

A "Preferences" option has been added to turn on "extended" menus via Support / Setup / Preferences. Some features which are of specialized use are only shown if this option is on. Consult the documentation for a list of options enabled by selecting "extended" menus!

Project File Maintenance.

The Maintenance File dialog boxes are now "modeless" so other main menu options can be selected while they are open.

Headers for the available styles/patterns within a style object can now be viewed via the Info button on the Project File Maintenance dialog box (via Support / Maintain / Project File). The new information provided is the names and attributes of the style elements contained in the style object you select from the Project File (i.e., style type information for point, line, polygon, and text element and pattern information for bitmap, line, and symbol patterns). This allows you to check to see if a style/pattern is available without running the style editor.

*** User Interface.**

Fixed Toolbars. The fixed toolbars introduced with **V5.00** with 16 by 16 pixel small push button icons and associated tooltips have been added to more processes. You will find them particularly useful for tool selection in the new object editor. There are now a total of 114 of these icons in **TNTmips** (increased from 64 in **V5.00**). A 2-page color reference chart of the **V5.10** icons is attached. They can also be directly viewed with more expanded description in Appendix 2 of the on-line documentation.

Custom Toolbars. A new class of moveable toolbar has been added to allow you to customize and streamline your **TNTmips**. These toolbars are designed by you to contain 32 by 32 pixel large process icons used to directly start processes and directly access specific import and export processes.

Custom toolbars are established by selecting Toolbar / Edit. This exposes the Toolbar Editor window. It is illustrated in the color print attached entitled Creating Custom Toolbars. The icon button on this window will expose the Select Icon ... window showing all the large icons available for selection. Additional new icons not available in the **TNT** icon set can be added to this window for selection using a procedure described below in the section on Fill Pattern Editor. It allows you to import the 32 by 32 cell icons from the ***.ICO** files of other commercial **MSW3.1** products (e.g. their startup icons, data file icons (for representing imports or exports), etc.).

You may not like some of the initial large icons and some are absent. Icon design is an art and a MicroImages graphics specialist has been assigned to expand and improve the collection for future releases. In the meantime, an "empty" icon can

always be selected and given an appropriate descriptive label and tooltip or you alter, design, or import your own icons if you choose. Many inexpensive **MSW3.1** design tools are available to create ***.ICO** icons and also provide large collections of icons in this format. Note that **W95** varies from **MSW3.1** in that it requires a 32 by 32 cell and an equivalent 16 by 16 cell startup icons for every application. This will ensure that both sizes are available and provide for much more compact toolbars usually without labels (simply replaced by tooltips).

You can establish a vertical or horizontal moveable toolbar window using the orientation button and give it an identifying name. You then select any available import, export, or main menu process and the icon you wish to use to start this process, the label text to occur below or beside it, and its tooltip text. The suggested label and tooltip text can be edited to be anything, even another language. One or several icons can be placed in a particular moveable toolbar to present direct access to those processes you frequently use for a particular project. Many named moveable toolbars can be established to support various kinds of common activities.

A moveable toolbar can be exposed by selecting its name from the list appearing on the toolbars menu is moused. When selected it will then appear and can be positioned anywhere on the desktop with the mouse. It will remain open for direct use at that position during any process and even if you restart **TNTmips**. It can be hidden by using the reverse procedure of closing it via the list. Multiple custom toolbars can be open at one time and positioned and used independently.

Sample uses of custom toolbars would be to set up one that contains icons for the 2 or 3 export formats which you commonly use and call it "Export". A second could be set up for "Importing". Another could be set up to provide the icons needed for a specific project and call it "Airphoto Interpretation" (this might contain four icons: Import (from TIFF), Feature Mapping, (Auto)Bounds, and Export (to ***.E00**). Another might be called "Multispectral Classification" and provide direct access to the needed major processes.

A more advanced use of a moveable toolbar would be for rapid communication with some other commercial product running concurrently with **TNTmips**. For example, suppose you are running both MapInfo and **TNTmips** via **MSW3.1**. Assume you are frequently using the new object editor to create and alter a **CAD** object for use in MapInfo with reference to a new orthoimage. When **TNTmips** is the active process you can show a moveable toolbar with a single icon representing the direct export to the MapInfo ***.MIF/MID** format (you will find the general MapInfo large icon in the set as imported from their **MSW3.1** version). Selecting this MapInfo icon will jump you to the export control dialog and allow the creation of these files. If you now activate the concurrent MapInfo process these edited files are available for immediate use.

It will not be necessary to create the reverse MapInfo import icon to use the ***.MIF/MID** files as **V5.10** now allows direct linking to and use of these format. This will be discussed in more detail below in the section on Hot Links. However, it is clear to all, including MicroImages that this direct toolbar export would be more efficient if the file created were in MapInfo native format (***.TAB** and associated files)

and thus immediately useable in the concurrent MapInfo. However, documentation for this MapInfo proprietary format is not available to MicrolImages.

Since custom toolbars support was just added to **TNTmips** and **TNTview** its operation is outlined in draft form in the 6 page printed supplemental documentation enclosed and entitled Custom Toolbars.

*** Hot Link to MapInfo.**

This fancy title is now applied to an activity which is rather unique and powerful in the **TNT** products and has been previously available for raster data only. Linking means using some other products format without actually importing it into an internal object in the **TNT** Project File. However, for all **TNT** processes which select objects for reading (not writing), this linked file is equivalent to a native **TNT CAD** object. **V5.10** now introduces linking to **CAD** objects by providing a direct link to MapInfo ***.MIF/MID** files. It is also likely that **V5.20** will similarly link to AutoCAD ***.DXF** files and **ESRI** Shape files. At this time no commitment is being made to link to MicroStation's ***.DGN** files due to the complexity of the format and its many undocumented features. Yes, it is also possible that links could be established in the future from vector objects to other topological file formats with the well documented and widely used **USGS *.DLG** format being the most likely first candidate, followed by at some time in the future by **ESRI's Coverage**, and ***.E00** formats.

Links can be directly established between any Project File and raster objects to ***.TIF**, ***.TGA**, ***.LAN**, ... files and **CAD** objects to ***.MIF/MID** files in the appropriate import process. Alterations are now underway to the object selection process so that these external or "stranger" files can be immediately linked up and used on demand and whenever object selection is provided. If you subsequently alter any linked file in any way with its parent software this will be automatically detected (using its data/time stamping) and the next time it is selection from the Project File is attempted the link will no longer exist. However, it is a simple matter to immediately relink the altered file at that point. This ensures that the **TNT** products know precisely what is in the linked files.

Emphasis is placed on the fact that linking is for use in processes which read objects. Any **TNT** process which creates an object (e.g. the object editor) will always write the object directly into the Project File. For example, you can link to a MapInfo ***.MIF/MID** file in the object editor and alter it, but the altered dataset must be saved into a **CAD** object and the toolbar icon used to export it back to the ***.MIF/MID** format when all alterations within the **TNT** products are complete. Why is this restriction imposed so that you can not write over the external linked data sets - there are several important reasons.

- 1) A sequence of operations upon an object within the **TNT** products add characteristics to the object which do not have place in the external stranger file. This reservation could be overcome by future alterations.
- 2) Multiple read/write process steps within **TNTmips** can add significant control material to an object. For example a linked ***.TIF** raster object can be georeferenced and then saved as a raster object. MicrolImages maintains that you need to be

aware of the fact that external strange file formats often have no place for many of the modifying characteristics you may laboriously added with **TNTmips**. By the deliberate act of selecting and exporting an object to another format you become conscious of this alteration. You are thus made aware that you may wish to perform additional operations within **TNTmips**, save the Project File for possible future use, and so on.

3) The format in which an object is stored internally in the Project File is optimum for the general mix of the **TNT** processes. For example, tiling is an efficient way to store rasters for the display oriented processes which dominate all the **TNT** products. It is unlikely that a linked raster file format will be tiled (*.TIF can be). [However, since the pyramid tiers created for a linked raster file are created and tiled within the “stub” object so only that processing (e.g. a 1:1 display) which reads the original 1:1 linked file will be slowed by the lack of the tile structure.] As a result it is more efficient to get external or strange datasets into the internal object structure if they will require frequent use or will be operated upon by several processes. Linking is most useful in situation where you wish to use a strange file in a display overlay without altering it, use it in just 1 or 2 processes and then immediately export it, simply forgot to import it in advance, and so on - in other words for casual and immediate use of external strange files.

4) Finally, everyone, especially you, will get unhappy when a dataset created and used in one commercial software package is suddenly changed by some other commercial software. Managing such an operation becomes a very complex issue when such external strange files are in shared use by the other products in a network situation. The safest approach is to “internalize” all changes which you make to other’s data sets from within the **TNT** products.

So what is “hot” about it? Again we revert to the MapInfo example discussed in the user interface section above. Again assume that **TNTmips** and MapInfo are running concurrently on a **PC**. While using MapInfo you detect an update is needed in a graphical or database entry which must be interpreted from an available airphoto. You activate **TNTmips** and link to the appropriate *.MIF/MID data set. You then select the new object editor and select and display the airphoto and the MapInfo data set via the link. After the alterations are complete you save the new **CAD** object and immediately select the MapInfo export icon from the moveable toolbar. You then reactivate MapInfo and use the altered datasets.

TNTview does not support any linking or related activities. It is possible that **TNTview** could be altered specifically for use with MapInfo in the following fashion. Import, export and linking to the internal MapInfo *.TAB and related files will be added to both **TNTview** and **TNTmips** if MapInfo is willing to make their formats available to Microlmages. This would avoid the inconvenience of having to create intermediate *.MIF/MID files in MapInfo. Correspondingly, **TNTview** with, its powerful multiple layer and object type visualization and new sketching capability, would provide an even hotter link for the use of images in conjunction with MapInfo.

2D Viewing.

* Sketching. Sketching is described in detail in the earlier section describing new features added to **V5.10** for use in **TNTview**. Its operation in **TNTmips** is exactly the same. Since this new feature was just added to **TNTmips** and **TNTview** its operation is outlined in the attached color illustration entitled Photointerpretation using the sketching tool and in the 5 page printed supplemental documentation enclosed.

Locator Window. For almost all 3 years since the View / Locator window (position window) was provided, there have been requests to show a snapshot of the total raster object within it to assist in locating particular features. This feature is now available so that if a pyramided raster object is selected a sampled view of the whole object is derived from the appropriate tier and almost instantly appears within View / Locator window. This provides an immediate overview of the total raster object being displayed and assists in selecting the desired subarea.

Miscellaneous.

A "Remove All" option has been added to the Layer menu.

An "Unhide All" option has been added to the Group menu.

New groups will now be added "above" the currently selected group instead of always on top.

The "Arbitrary" projection may be selected on the Group Controls dialog box. When this projection is used no projection conversion is performed. Any extents entered will be used against whatever projection the object in the group are georeferenced to.

When attempting to remove a group which has other groups attached to it, a warning will appear with the option to cancel the removal operation.

User-defined contrast enhancement may now be performed on all numeric types of raster objects. Previously only 8-bit raster objects could be used.

Vector labels can now be displayed using style "By Element". The reference to the style is stored with the vector label, unlike other vector elements. With **TNTmips 5.0** you could not control text color/size/font for labels - you could only specify a color, font/size for all labels. Now each label can be set-up individually in the new object editor with its own style which can then be used in displays.

There is now an option to "Override Label Heights" on the Vector Object display controls. This option is useful if it is desirable to show the labels at a different size than what were originally created at.

An option has been added to save layouts as **ASCII** text files. This allows the layout to be duplicated and changed with any text editor.

The Enhance / Edit Colors dialog now allows quick selection from a standard set of color palettes via a menu. In addition, additional palettes can be easily added to this menu for immediate use. This allows custom color stretches and other color schemes to be created, stored, retrieved, and applied to enhance grayscale images.

The Vector Object Display Controls have been extensively redesigned to use drop-down panels. An option is now available to disable polygon filling for the entire

object (this feature was available in **DOS MIPS**). There is also an option on this dialog to select the style object to use.

The “All Same” drawing style for vector elements may now use all styling options previously available when style “By Attribute” was used. This includes setting line width, patterns, symbols, and whether or not to fill polygons.

Binary rasters may now be selected in Examine / Raster Histograms.

The Examine / Extents dialog box now has an option to save its contents to a text file. The raster cell size or object scale is now shown in this dialog.

Options have been added to zoom to the “extents” of the currently selected layer or group.

While the mouse cursor is in the view window the + and - keys may be used to zoom in and out centered at the current cursor location.

Merge.

Color Merge now allows all output types (8-, 16-, 24-bit composite) with all combinations of input raster types.

Georeferencing.

When a reference object is selected the output projection being used for georeferencing will default to the projection selected from the reference object if no control points have yet been defined.

Apply Contrast to Raster.

* All numeric raster types may now be used as input to this process. This has been asked for by many users. However the output raster is restricted to 8-bit signed integer. The default option will pyramid the new raster object being created and can use the Auto-Name selection for copying multiple rasters.

Create Raster.

A new process is available called Create Raster. It allows the creation of a new raster object of any size which contains the default values for both null and initialized fill. New raster objects can be designated to be of any numeric data type as well as **RGB** or **BGR**. The process immediately displays the current value of all input parameters in the Create Raster window. The raster object you create will not be pyramided as it is not logical to attempt to display it as it will immediately be used in some other process whose results will be pyramided.

Copy Rasters.

The older orientation icons have been removed and replaced with a standard toolbar, icons, and tooltips.

The subportion of this process used to create new rasters objects has been separated into another process called Create Raster as described above. As a result the majority of the user interface in the Copy Raster process was redesigned to simplify it, group operations that belonged together, and improve understanding of its operations. The clip window tool now only requires one push button to save the selected area for copying. In the past, the multiple buttons were a source of misunderstanding for many. The default option will now pyramid the new raster

object(s) being created and can use the Auto-Name selection for copying multiple rasters.

Trend Removal.

The Auto-Name selection is available for to assist in selecting the collection of input raster objects for processing.

Combine Rasters.

Logical “OR” and “AND” operations have added. These are very useful when designing, creating, and manipulating masks for application during other processes.

The Modified Normalized Difference function has been modified to accept 3 new input parameters. These parameters are the minimum Euclidean distance, path radiance for band A, and the path radiance for band B.

The scale and offset operations have been combined into one step.

The default option will now pyramid the raster object(s) being created and can use the Auto-Name selection to assist in selecting multiple raster objects to copy.

*** Linear Combinations.**

This new process can select, read, edit, and apply a text array file (*.ARR) containing linear interobject coefficients computed elsewhere by the Principal Components, Multiple-Linear Regression, and Progressive Transform processes for the same or a similar collection of raster objects. It provides for the quick selection and preparation of these linear combinations of raster objects whose linear interobject coefficients are already available.

The linear coefficients now saved by the three different transforms into this array file can be modified in three ways before application to the original raster objects or new, similar, but different collection of raster objects. 1) A program can be used to alter the array file. 2) A text editor can be used on the array file. 3) This new process allows the coefficients in the selected array file to be viewed in matrix form, edited, and then applied.

The user can select any output data type for the new linearly combined raster objects created by this process independent of the data type of the input raster object. The data type of the new raster objects being created will automatically be scaled to the data type specified. For example, each of the input raster objects being combined might be 1-byte integer but the combined new raster objects can be created as 32-bit real numbers.

Since this a brand new feature just added to **TNTmips**, its operation is outlined in draft form in the 7 page printed supplemental documentation enclosed.

The default option will pyramid the raster object(s) being created and can apply the Auto-Name selection to assist in selecting the multiple raster objects for processing.

Principal Components.

This process has been altered to save its interobject coefficients along with input and output object names in a text array file (*.ARR) for use in the new process outlined above for preparing Linear Combinations. As a result it is no longer necessary to create **SML** scripts to apply the coefficients created by Principal

Components to other sets of rasters objects. This evolution illustrates how **SML** is useful in **TNTmips**. Often it is used to create very specialized processes. However, it is also used to breadboard potentially useful features which are subsequently added as standard features.

The default option will now pyramid the raster object(s) being created and the Auto-Name selection is available to assist in selecting multiple raster objects for processing.

Multi-Linear Regression.

This process has been altered to save its interobject coefficients along with input and output object names in a text array file (*.ARR) for use in the new process outlined above for preparing Linear Combinations. As a result it is no longer necessary to create **SML** scripts to apply the coefficients created by Multi-Linear Regressions to different sets of rasters objects.

The Auto-Name selection has been added to assist in selecting multiple raster objects for processing.

Progressive Transform.

This process has been altered to save its interobject coefficients along with input and output object names in a text array file (*.ARR) for use in the new process outlined above for preparing Linear Combinations. As a result it is no longer necessary to create **SML** scripts to apply the coefficients created by Progressive Transform to different sets of rasters objects.

The Auto-Name selection has been added to assist in selecting multiple raster objects for processing.

*** Hough Line Transform. (experimental process)**

A new Hough Line Transform is available strictly for the experimentalist. There are Hough Transforms defined for circles and other shapes. At present there is not inverse or other application provided for this transform. In **V5.10** it can only be used at present as a means of inspecting the transform matrix for the patterns it creates related to the linear features in the input raster. Applications for this Hough Transform might eventually include line location and enhancement (such as in fault lines), connecting lines (such as dashed lines), the location of lines bounding shapes (edge finding), and so on. Microlmages would appreciate input from clients who have knowledge of written materials on the practical application of this transform. Further work on this process is of low priority unless client interest, feedback, and ideas are available.

V5.10 of the Hough Transform accepts a single raster object as input and outputs a new raster object containing the transform of theta and rho in columns and rows respectively. Theta is an angle of edges in the input raster object and rho is the distance to them from a corner of the input raster object. The theta and rho parameters describe the slopes for all significant lines in the input raster object. The output raster created by the Hough transform is unique to the input and with effort can be used to identify objects.

This Hough Transform raster object can then be viewed as a grayscale image. It contains the theta and rho angular properties of the input raster object as follows. The 181 columns in the raster are the theta (angle of line) values which vary from zero degrees in column 91 to - and + 180 degrees in columns 0 and 181 respectively. The 255 lines in the raster are the rho (distance to line) values which are scaled from zero to maximum to fit into rows 0 to 255 respectively. The raster contains cells of 16-bit integers whose value is equal to the number of "hits" or times that the Hough Transform finds that particular theta and rho combination in the input raster.

To operate the Transform, upper and lower threshold values are applied to the input raster. All the possible combinations of cells which remain after the threshold are then paired to form lines and their theta and rho properties computed and tabulated for frequency of occurrence into the Hough Transform raster object. Remember that spatial filters such as the Gradient filter can be used to sharpen up edges in the input raster object.

The "inverse" of this Hough Transform would not be a new and revised image with new properties (as in an Inverse Fourier Transform). It would more likely be some form of overlay over the original input raster or as one of the tools in other processes which extract features from a raster object (e.g. to guide dash jumping in smart line following, raster to vector conversion, linear feature extraction as in fault maps and rosettes, and so on).

A conceptual use of the Transform might be as follows. Apply a significant threshold to the Transform Raster called A to eliminate most cells with low values giving raster object B (i.e. very few if any line segments plotted at those particular theta and rho values). Only a few positions in the theta / rho space will remain with non-zero values in B. Reprocess the input raster object exactly as before but for each theta and rho check the previously computed B transform raster object. If a non-zero value exists in B for that recomputed theta and rho, then plot a line back into the original input raster. This line plotted could be the current segment or go completely across the input raster object. Color code the line as follows: red equals highest range of non-zero, 16-bit values in B, yellow is the medium range values, and green the lowest range of non zero values. Now display the modified input raster in grayscale with color lines imbedded (call it the inverse raster) and see if new linear features and trends can be detected.

A few pages of the book William K. Pratt, Digital Image Processing, 1991, 2nd edition, Wiley and Sons are included with **V5.10** to better describe the concepts of the Hough Line Transform. Please note that this book has been cited in previous MicroImages MEMOs and is an excellent current, modern reference for every client interested in image processing.

SML.

The following functions have been added to the Spatial Manipulation Language.

- DeleteSubobjects()
- DeleteGeoref()
- DeletePyramid()
- DeleteHistogram()

DeleteContrast()

Each of these functions takes a raster or vector variable and deletes the subobjects under it.

FocalMedian()

FocalMode()

These functions work the same as all the other focal functions (see documentation) but return the median or mode of the area. [A focal function computes some statistic on an MxN (user specified) area of a raster at a given location].

Import/Export of Rasters.

Export to **TIFF** file (*.TIF) now has an option to create **ESRI's** unique georeference world file (*.TFW).

The multiple file selection feature has now been added to the import of **ESRI's** *.BIL/BIP formats. It requires that the raster data type and the *.BIL/BIP file have matching extensions.

Raster Morphology.

The old icons have been replaced by the new more intuitive tool bar, color icons, and tooltips.

A new, illustrated reference on the use of morphology tools and image process in general is available: Digital Image Processing - Principles and Applications, Gregory A. Baxes, 1994, John Wiley and Sons, Inc., 452 pages. Chapter 5 pages 123 to 178 deals with morphology and related topics.

The default option will now pyramid the raster object being created.

Filtering Rasters.

The interface which allows you to quickly test any filter before applying it to a complete raster has been restored. A set of tools are also available to limit the extents of filtering via a clip window. Clipping can be done via a polygon or a rectangle. Thus any area of a grayscale raster object (for example a face) can be outlined by a polygon and filtered in place.

*** DEM/Ortho.**

The complete rewrite of all three steps in this process has been completed. The software engineer will now continue on part time to add enhancements. He is also available to immediately address the defects and shortcoming which might appear in these processes as you use them. You will no longer be put off with the explanation that these processes are being rewritten and that defects are hard to repair.

The original three separate steps are still represented by individual processes: 1) computing new epipolar images from the known image geometry, 2) producing a relative DEM by image cross-correlation, and 3) computing a restitution of the original image via the DEM to produce an orthophoto or orthoimage (from SPOT) . It is likely that the three processes will be integrated into a single process for **V5.20**. This will provide more efficiency in combining code and for allowing more than one step to be set up for execution in a single run.

Unfortunately these new, complex processes were completed and tested at the very last minute so that no documentation of any kind is available. The on-line manual

section for these processes will be revised first and will be available sometime during August. It is likely that the original application note will be revised during this quarter.

The airphotos used to test these new processes were scans of historical, low-quality black and white airphoto prints (not transparencies) of a hilly, non-descript South American landscape covered with brush (not trees or other more distinct items). These airphotos and the inaccurate control provided with them represent about the worst conditions under which these processes might be applied. However, the new processes provided an acceptable DEM and orthoimage. Better transparent images and scanning and more accurate control will only serve to improve the expected results.

Relative Orientation (step 1 via Prepare / Raster / Stereoscopic Modeling / Stereo to DEM).

The new step 1) or epipolar geometry solution was discussed in detail in the MEMO for **V5.00** and will not be repeated here.

DEM Extraction (step 2 via Prepare / Raster / Stereoscopic Modeling / DEM Extraction).

The new DEM (Digital Elevation Model) extraction process is the area-based image matching program what uses the left and right epipolar images produced in step 1. It creates a 8, 16, 32, or 64-bit DEM raster object which is georeferenced.

This process uses a multi-resolution (nested cells) image matching scheme with some heuristics that speed up image cross-correlation calculations. It has been specially designed to produce good results even with low-quality input images. Thus it contains special algorithms for noise suppression and elevation prediction in areas with weak or no cross-correlation between left and right images. The preliminary testing of this process on black and white airphotos of low quality produced reasonable correlation and elevation results in subareas where the human eye is unable to find any corresponding image match points.

The DEM extraction process can perform matching on different regular grids (sampling rates of 1, 2, 4, 8, and 16) with different correlation windows (7x7, 9x9, 11x11, 13x13, 17x17, and 21x21). The time to complete this process is directly related by these options. The coarse sampling grid of 16 by 16 is reasonable for preliminary testing - it yields a good estimation of the DEM in a very short time relative to the time required for the 2 by 2 or 4 by 4 sampling options. The new DEM process also has some additional control parameters relative to the V5.00 process which it replaces.

This process now incorporates a surface smoothing algorithm (using orthogonal polynomials) that runs over the resulting DEM to produce a locally smooth surface with reducing random surface noise. There are several smoothing levels available for selection depending upon the quality of the input images and the desired surface smoothness. This smoothing process doesn't blur the output DEM even when "heavy" smoothing levels are applied, but it has a large impact on high frequency noise and elevation artifacts (e.g., it may smooth out trees, small building, and other real local surface surface features).

The image matching algorithm in this new process applies a widely used cross-correlation technique enhanced with some heuristics that help minimize calculations.

These use 4 control parameters: Minimum Cross Correlation, Minimum Difference, Reliable Point Correlation, and Minimum Texture Value. The process sets reasonable default estimates for all 4 parameters based on statistical information extracted around the available tie points locations. Thus the impact of the tie point selection on this process is something like providing a training set for other types of raster classifications. All four parameters can also be changed, based upon past experience and results to “tune” this process for special images. The two most important parameters are: 1) Minimum Cross Correlation which defines the minimal acceptable cross-correlation level based upon the statistical distribution of the cross-correlation coefficients for all the tie points and 2) Reliable Point Correlation which defines a special subset of “reliable” or bench mark correlation points found automatically within the image by the process. This collection of bench mark points will have a large impact on the final surface quality in areas with weak correlation. The Reliable Point Correlation coefficient is always greater than the Minimum Cross Correlation coefficient and may significantly impact the speed of the process. The Minimum Texture Value assists in eliminating areas with low texture from the correlation process and has a physical meaning as the mean difference between adjusted pixels within the correlation window multiplied by 2.

Restitution (step 3 via Prepare / Raster / Stereoscopic Modeling / Restitution).

The new step 3 or restitution processes now offers 3 possible methods for producing the final orthoimages. The “Pixel-by-Pixel” method uses a DEM as source of information about terrain elevations. This DEM may have been produced by Step 2) or obtained from some other source. The other two methods: “Anchor Points” and “Transformation” use only the available georeference control points and are intended for producing orthoimages for areas with low elevation relief and where a **DEM** is not available for the study area.

The “Anchorpoints” method applies a low-order polynomial approximation of the elevation based on ground control points information.

The “Transformation” method assumes that elevation for the whole area is equal to average height computed from ground control points. This method transforms original image to the plane.

Another significant change is ability to compute and adjust exterior and interior orientation parameters of camera before running this process using ground control points. This is a good way to check the accuracy of control points and camera parameters without wasting time generating unwanted low-quality orthoimages. The desired accuracy can be specified for determining exterior orientation angles and for the interior calibration process. Two possible orientations options are available: 1) use only exterior orientation or 2) use exterior and interior adjustments together. Option 2) is recommended if ground control points are available with high position accuracy in all 3 dimensions.

The new orientation statistics’ report displays exterior orientation angles, estimated survey height, RMS error of orientation in pixels and other useful information.

The default option will now pyramid the raster object(s) being created.

Time and Storage Requirements.

The following is an initial appraisal of the drive storage and time to process on a 586/60 equipped with 16 Mb of memory and processing airphotos of with about 3500 by 2500 common pixels.

Step 1) The epipolar solution now takes only a few minutes (less than 15). It requires drive space to store both original raw scanned image rasters and the two new resampled raster objects. Thus the drive storage space needed at this steps is at most 4 times the size of one of the raw input images. After the step is complete the original raw images can be moved archived off the system to free up drive space for Step 2).

Step 2) The cross-correlation to produce the DEM is the real workhorse of this activity. To operate it requires drive storage for the left and right epipolar images, a single temporary 32-bit raster object of the common area being correlated at the sampling rate selected, and an 8, 16, 32, or 64-bit raster object for the final DEM. The 32-bit temporary raster is deleted at the end of the successful completion of the process. If a 1 by 1 sampling interval is selected then the storage space required is less than 7 times the size of input photos (for an 8-bit DEM raster object). This might be quite a bit less if the common area of the photos is a small but then you should trim down their size to equal the common overlap area before starting this process and the 7 times factor would then apply correctly to the smaller input raster objects.

Using a 1 by 1 sampling to produce the DEM took a long time (10 hours) for the test images and is really unnecessary for most applications and subsequent orthoimage productions.

When an 8 by 8 sampling is used the cross-correlation is still solved at around these points for the original 1 by 1 resolution cells producing equally accurate elevations for these cells as the 1 by 1 solution. It simply produces these elevations for cells spaced 8 by 8. The time to prepare this DEM raster object is short (less than 15 minutes). The storage requirements are still the same as above but the 32-bit and DEM raster objects are much smaller. Thus the total storage space to complete this step with 8 by 8 sampling is less than 2.5 times the size of a single input image.

It is suggested that you experiment with 2 by 2 and 4 by 4 sampling for a specific application. If the application is to provide a DEM for the step 3 production or an orthoimage then 8 by 8 or 4 by 4 may work well. However, if the objective is to obtain a detailed representation of the surface for use in a 3D portrayal at large scale then a higher sampling rate of 2 by 2 may be appropriate.

Step 3) The restitution process also now takes only a few minutes (less than 15). It requires drive space to store both a single epipolar image raster, the DEM, and the computed orthoimage raster.

Mosaic.

Contrast matching between a pair of rasters can be turned off.

Fill Pattern Editor

The Bitmap Fill Pattern and Icon Editor have been combined into a single tool as they perform similar operations.

The following provides a temporary method by which you can use this process to import any *.ICO file for use internal to **TNTmips** such as on a moveable toolbar. A simple and direct method will be added for **V5.20** to allow interactive section, creation, and addition of icons to the internal **TNTmips** collection. If you have trouble with the following instructions please call software support for further assistance.

- 1) Copy ICONS.REF from your **TNT** install directory to a file called ICONS.RVC.
- 2) Bring up the Prepare / Raster / Edit ... process
- 3) Open any raster. (Size and color depth are unimportant).
- 4) Use the Style ... button with the Style Controls window to select ICONS.RVC and then select the style named "processes32".
- 5) Use the Bitmap Pattern ... button within the Style Controls window to bring up the Pattern / Symbol dialog box.
- 6) Use the New button within the Pattern / Symbol Select dialog box to bring up the Bitmap Pattern Editor dialog box.
- 7) Draw a new icon or use the Pattern / Import ICO File ... to import an existing icon from a Microsoft ICO format file. (Widely used to distribute Program Manager icons.)
- 8) Use Pattern / Save As ... to add your new icon to the "processes32 style".
- 9) Use Pattern / Close to close down the Bitmap Pattern Editor dialog box.
- 10) Use OK button to close down the Pattern / Symbol Selection dialog box.
- 11) Use File / Exit to close down the Prepare / Raster / Edit ... process.
- 12) Replace ICONS.REF in your **TNT** install directory within the contents of ICONS.RVC.

Import/Export of Vectors.

The multi-file selection and processing capability has been added for imports from the MapInfo *.MIF/MID format.

An *.ATT database file is automatically imported into database tables if it has the same file name and directory location as the associated *.DLG file.

Map and Poster Layout.

An option has been added at Support / Print to load and use a layout which was previously saved and then edited as a text file. This allows simple changes, such as map names and text blocks to be made externally in any text editor.

Supplemental documentation entitled Adding Legends of 18 pages was completed too late to be placed on-line is also included in printed form.

NOTE: When printing **CAD** or vector objects that have polygons filled with multi-color bitmapped fill patterns, it is recommended to use the Halftone 1 dither pattern as your Non-Raster Dither Pattern in the Page Setup window. The default dither pattern (Vector Pattern) is optimized for thin lines of the same color. When the Vector Pattern dither pattern is used for the filled polygons with multi-color

bitmapped fill patterns, the amount of time required to print increased greatly. In the next quarter the Vector Pattern dither pattern will be changed so that it will not be as slow for multi-colored fill patterns.

The following **TNT** Advisory windows may now appear in this process depending upon how the layout has being prepared.

Printing will be faster if the rasters(s) for this layer are rotated to the orientation in which they are being printed. Use Prepare / Raster / Resample / Automatic or Prepare / Raster / Resample / Manual to do this.

Printing will be faster if the raster(s) for this layer are resampled to the specified map projection for the group the layer is in. Use Prepare / Raster / Resample / Automatic to do this.

Validate Topology.

* The concept of a topological tolerance has been introduced into the separate “first aid” process and its internal equivalents. The tolerance is computed as one billionth of the minimum extent of the vector object. Lines smaller than this tolerance will be removed in any validation activity. The topology of the vector object will also be reestablished by combining the nodes at the ends of these tiny lines. Such tiny lines might be created by floating point errors in the vector objects created by other **TNT** processes. They can also be inherited from imported datasets. This tolerance is set so small that the round-off errors in display would prohibit viewing these tiny lines at any zoom factor.

Z values for polygons are now maintained.

Database record attachments for lines, points, and polygons are now validated.

Standard line attributes records are ignored when the process identifies redundant nodes.

*** Tabular Database Views. (a prototype process).**

Previous versions of the **TNT** products provided the ability to view the attributes of vector or **CAD** elements from database tables for one record at a time. A new alternate method is now available to view attributes in tabular form showing multiple records for multiple graphical elements. Two color pages at the end of this MEMO illustrate the use of this new window: 1) Tabular Database View by Element and 2) Tabular View of a Pinmap Database. It is suggested that you consult these illustrations while reading the following introduction to this powerful new feature. Instructions on the use of this new capability can be found in the on-line documentation for the visualization (2D display) process and in the enclosed printed supplemental documentation on the object editor.

The tabular view window has two principal objectives: 1) providing another means of organizing, viewing and editing multiple records for a collection of graphical elements selected by any other selection method: query, mouse, region (= circle, box, or polygon), or the attribute dialog control boxes and 2) adding another powerful new interactive procedure of selecting elements for subsequent use. Satisfying this second objective provides a significant new feature, but also introduces a easily

understood control interface for many future interactive **GIS** functions planned for the **TNT** products.

The option for the tabular view of attributes is immediately available anywhere that the attributes of vector and **CAD** layers can be viewed, edited, or created (visualization (2D display), Map and Poster Layout, object editor, and so on). It is accessible in the same manner as the alternate, previous single record viewing. You simply select between the single record and tabular record methods. Choose either method by mousing Table / View As / Tabular View or Table / View As / Single Record from the menu in table selection dialog box.

The following features have been implemented in **V5.10** for use in the new tabular view mode.

Controlling Fields.

Scrolling. A complete attribute table can be viewed in this tabular view window. Thus the number of columns = fields and rows = records displayed can be very large. As a result the tabular view has scroll bars to scroll it horizontal for columns = fields and vertically for rows = records and can also be resized.

Show/hide. Which columns = fields are shown from all the available fields can be interactively controlled. First select a field by mousing on the column title (e.g., wheat). Then use Field / Hide to hide or delete that field from the tabular view window and the remaining columns will adjust and close up. To expose or show a previously hidden column = field use Field / Show to bring up a scrolling list of the titles of the hidden fields. Select those fields to be show and they will be reexposed in their original style and position. Field / Show All will re-expose all hidden fields. Unfortunately you can not yet save this tabular layout and its associated graphical element selections for automatic reuse but this is planned for **V5.20**.

Appearance. The appearance of a column = field can also be controlled. First select a field by mousing on the column title (e.g., wheat). This will select that field. Then use Field / Format to expose a dialog box which can be used to set both the number of decimal points for the display of that field and the width of the column within which the field values will be displayed. Subsequently this dialog box will also allow the specification of the units of a numeric field (e.g. re-scale the display of the fields values from acres to hectares, feet to meters, and so on); change the format of latitude and longitude fields (45 15 00 to 45.25); and other cosmetic controls.

Record Control.

Selection and control of the records in this tabular view window provides the basis for the initial interactive **GIS** application of this window. It can be toggled between viewing all rows = records in the selected attribute table or just those records attached to the currently selected element(s) in the visualization (display) window.

Selecting records. Choose Table / Show All Records to view all records in the table. If any graphical elements are, or have been selected by any method, then all attributes = records = rows corresponding to them will show the red indicator. When using views with many records it may appear that no red indicators are on until you scroll the rows up or down to the records = attributes which correspond to the currently selected elements. As an alternate, simply toggle off the Table / Show All

Records to view only those attributes which correspond with the currently selected graphical elements. In this mode rows will be added to or deleted from the tabular view as graphical elements are selected by any of the other selection methods. For example, in this mode the tabular view might not show any records and they will then appear as the graphical elements are selected.

Selecting graphical elements. The tabular database view window also provides a new method to easily select graphical elements in the visualization (display) window for display, editing, and so on. As a selection tool it is equivalent to the previously available selection methods: query, mouse, region (= circle, box, or polygon), or attribute dialog control box. Simply check the square record select button at the beginning of the row(s) = record(s), mouse the "Select Element" toolbar icon, and that record or records will be "turned on", the red indicator will appear, and the corresponding graphical elements will be selected.

In the new object editor the record select button can be used to select or deselect multiple records and their corresponding graphical elements prior to any subsequent operation as shown in the attached color print entitled Tabular Database View by Element. **V5.20** will activate this multi-record selection process for use with any display window. This will provide interactive mouse selection of multiple rows = records in a tabular view of attributes to control how a specific vector or **CAD** layer will be displayed. For example, select an object to become a new layer, expose one of its attribute tables, use the record select button to designate records (e.g. soil types), and then display. In this example the multi-record selection functions similar to how an attribute query currently operates to control a layers appearance but provides a more graphically oriented approach.

Editing records. Anywhere a tabular database view is available, the fields it contains can be edited using the Edit menu option. Mouse any data cell in the table to select it and then edit its contents.

Future Plans.

Some of the ideas for features which could be added to the control of this tabular database view window might be as follows.

Table Layout. As noted earlier, the saving and reuse of the layout of tabular views is of high priority. For example, just like a query, it is an excellent way to design how an object might be displayed as a layer.

Field Statistics. Simply ask for a statistics row at the bottom to be exposed with empty cells. Then click and select a cell in this row and designate what it should contain: text such as a label = "Totals", "Mean", ...; a total of the column; and so on. Perhaps multiple statistical rows could be shown: one for means, one for standard deviations, and so on.

Field Sorting. Allow selection and sorting of one or more columns. First select the school district field and sort on it. Then select the family income field and sort on it within the school district sort. Successive sorts of this type will allow reorganization, grouping and presentation of attributes. It also sets up the records for the computation of sub-column statistics.

Sub-column Field Statistics. An option could be provided to group records after sorting and to insert “subtotal” row(s) for displaying statistics for all above rows subtended to the top of the table or to the next above subtotal row. For example, after sorting by school district, a subtotal row(s) might be inserted separating the groups of records for each school district. Then the family income column = field could be selected and a mean family income statistic computed and shown in each subtotal cell in that column. Various choices for the subtotal values could be provided: mean, variance, standard deviation, and so on. The square selection box provided for each subtotal row might also be used for the selection of that entire group of records (e.g., to select all the property or parcel records within a school district).

Histograms. 2D and 3D histogram windows could be displayed for 2 and 3 column selections.

X-Y Graphs. The new **X-Y** plot window and its associated statistics generator could be used to plot the values in a column(s) anywhere a tabular view is exposed.

Legends. The contents of the associated style fields could be graphically shown or hidden at the front of the records. This would insert graphical or legend columns showing a small sample of the fill pattern, line style, and/or point symbol for that record (e.g. graphically show the current styles from the style assignment table - little color churches, windmills, schools, and so on). This would immediately and visually tie each record in this tabular database window to its graphical presentation in the associated visualization (display) window and provide interactive display legends.

This kind of feature would be very useful in setting up the appearance of a display layer for any view operation. For example, simply show the graphical point field = column at the head of the record, use the record select box to choose from among these point symbols, and they display.

Significance. It should now be more apparent where this development will eventually lead. It begins to look more and more like a specialized graphical or **GIS** spreadsheet providing the basis for easy and interactive **GIS** activities (as contrasted with running “batch” **GIS** processes within other commercial **GIS** systems).

Those clients with large **TNTmips** display modes (products **D50** or **D60**) or Macs, large virtual desktops (e.g., Number Nine display boards), or dual display boards and monitors and can expose a large tabular database view with many records and fields while still viewing a large visualization (display) window.

* **Object Editing** (a prototype process).

This new object editor is now complete and checked for the editing both vector and **CAD** layers and associated objects to the point that Microlmages recommends its use in place of the older, separate Edit Vector and Edit **CAD** processes. **V5.00** showed raster, **TIN**, and **CAD** objects as reference layers (could not edited). Vector layers could be edited or designated as a reference layer. **V5.10** now allows **CAD** layers to be designated as editable layers.

The older edit processes remain on the menu for use by those who do not yet have the time to learn the new process. The software engineer who has created this new

process over the past year now has it sufficiently perfected and under control so that he can promptly correct most defects encountered. In the meantime he will be adding the many new features which have accumulated on our planning list over the past several years.

Since advancement and testing on this editor proceeded right up to the last day in this release cycle, a printed supplemental 53 page draft of its documentation has been provided. As a result, only specific comments on general additions to its operation are provided below.

Topology. Remember that when a vector object or layer is being edited in this new process that its topology is being continually, internally maintained and validated. MicrolImages believes that maintaining vector topology while editing them is a relatively unique feature for **GIS** vector editors and most certainly is not provided by Arc/Info! It is also MicrolImages' claim that many Arc/Info shops would profit significantly by adding **TNTmips** to their systems just to use this editor to update and correct their coverages relative to orthophotos, airphotos, video, satellite images, and especially the pending new high-resolution, monochrome satellite images from many sources (see table enclosed with **V5.10**).

Interface. The creation or editing of **CAD** or vector objects uses a similar interface. If you are already viewing a set of **CAD** and vector layers overlaying images simply select the vector or **CAD** layer and the proper toolbar will be displayed. If you want to create a new layer simply designate that you wish it to be a **CAD** or vector layer and the appropriate toolbar will be displayed.

The particular layer interactively selected for editing may cover only a small subportion of the complex view of many layers (e.g., a small vector area on the view of a large raster). Use Layer / Zoom to Extents to enlarge the layer to be edited to fill the visualization (edit) window.

It is possible that you wish to limit the area in which you are drawing to a specific region of the current view. For example, you only want to interpret the roads for a 7.5' area from a larger satellite image. When creating this new vector or **CAD** object an option is available to insert a polygon which frames the object and which shows the extents entered for that object. If you subsequently draw outside this area the extents of the object will be automatically enlarged when the new object is saved.

Layer / Edit will now let you change your mind during an edit session and change a **CAD** or vector layer from a reference status (not editable) to an edit layer.

Saving. The ability to "Save" over the original vector or **CAD** object is now available. The process will only halt once and warn or question this action, the first time that a save is attempted over that original object in that edit session.

"Save All" is now available and works the same as "Save As" for a single object. It differs in that it will save all of the layers you have changed or created in the current session to the new objects you specify. Remember, this editor has been designed from the onset as a multi-object editor so you may have jumped between layers = objects and made changes to several without saving. This means that a number of

new kinds of save operations have to be introduced and their actions understood to protect against losing work.

Editing Elements. Selected vector polygons can now be deleted all at once. However, this operation will only delete those selected polygons which have a border section which is not common with another polygon (i.e. they have access to the “unknown” world to which they will then be consigned). Remember that this collection of polygons can be selected by several methods: by query, mouse, region (= circle, box, or polygon), attribute selection, or tabular view.

X-Y digitizer setup and support has now been added into this process for editing or creating **CAD** or vector layers.

The style of each individual **CAD** element or collection of elements can be edited. Simply select the element by any of the selection methods available and then edit its style. This feature was previously available in **DOS MIPS** but was limited to editing a single element at a time. This feature is particularly useful if you want to change the font, angle, style, ... of a selected group text elements.

Splines can now be fit to, and replace **CAD** and vector line elements selected by any of the available selection procedures. This will smooth jagged lines and increase the number of points required to represent that line. Smoothing will not invalidate the topology and will not change the number of polygons in the layer or object.

Tabular View. This new feature now imbedded in the editor and elsewhere was described in detail above in the section Tabular Database Views. Its integration into existing processes has proceeded farthest in this editor since it is actively being created and extended.

One unique use of the tabular view in the editor is to attach and unattach attributes to the graphical elements being created and edited. Use Table / Show All to display all the records and fields in a table. Then use the square select button in front of each record to select it (showing its red indicator). Correspondingly use any of the other available methods to select those graphical elements to which it will be attached: query, mouse, region (= circle, box, or polygon), or the attribute dialog control boxes. Then use Record / Attach to attach the selected records to the selected graphical elements. To unattach simply select graphical elements or records in the tabular view and then use Record / Unattach.

The following is an example of this new edit feature (please refer to the attached color illustration entitled Tabular Database View by Element to review the visual components of this example). First display a vector layer. Then use Examine / Attributes to show tables and select a table. Use the check boxes to select 1 or more records. Use the “Select Element” toolbar icon to select the graphical elements which correspond with those records. Then select Record / Attach to attach the selected records to the selected graphical elements.

Auto label generation. Labels can now be attached to vector elements by this process. These labels will display if the element they are attached to is being displayed and label display is selected.

Vector Labels. Any available text style can be selected for labels for the elements being created or altered during the use of the add and edit tools. Auto label generation and generic label attributes assignment can also select any available text style. This allows the assignment of font type, height, angle, rendering style (outline, bold, ...) to single or a selected collection of elements.

Missing Features. Smart-line following has not yet been provided in this new process and **CAD** blocks can not be edited.

Vector Merge.

* Correctly handles merging vectors which are in different projections. Now none of the objects selected for merging need to have the same projection and any projection can be selected for the output vector object. The default projection for the output is the projection of the first vector object selected.

* Polygon Properties.

This new process computes new properties of the polygons in a vector object based on their **X-Y** coordinate information. It can be found at Interpret / Vector / Fuzzy Properties. These properties describe the shape and spatial orientation of vector polygons and can be used for subsequent analysis as discrimination signatures, classification of polygons, fuzzy property searches, and related. Subsequent to producing the **CDs** for **V5.10** it has been decided that these properties, taken individually, are not so fuzzy after all. Thus the term “fuzzy” applies to their subsequent use in queries, searches, computations, and so on.

At the end of this process each polygon in the specified vector object will have a new database record attached that contains these new polygon properties. Any subset of the following properties can be selected for computing and incorporation within the new record: form ratio, grain shape index, compactness, thinness ratio, circularity, normalized dispersion, simplicity, shore line development index, correlation, orientation, elongation. A page describing each of these properties is attached.

Why so many new shape measures? Because shape is an extremely difficult property to measure or even to define in a precise manner. Various polygon properties are already used in combination or individually in earth science and cartography. Geomorphologists have been especially prolific in the creation and application of shape measures to the study of drainage basins, drumlins, and coral atolls among other land forms. There are applications in structural analysis of oil field's shapes. The shore line development index is used in cartography as part of the method for measuring distances on the maps at different scales? However, some of the polygon shape properties in this **TNT** set are also new and reflect special properties of digital representation of curves in **GIS** (e.g., simplicity).

Once the data base records containing the shape and orientation parameters has been computed, it can be used just as any other attribute table in a query, tabular view window, etc. to select polygons from the vector object for display, editing, pan-by-query, and so on. Any number of these polygon parameters together with the standard properties (area, circumference, etc.) could be combined and tested in a query as a kind of fuzzy description of the desired shape, size, orientation, etc. of specific polygons hidden in a large complex of polygons. For example, a query

might be written to define breccia of a certain size and shape among polygons representing all the rocks on a talus slope; sliver polygons could be differentiated from small but real polygons; ecological significant corridors could be located; outcrops displayed of a selected shape and size range; and so on. Remember, as an integrated **GIS/IPS** system, **TNTmips** has many ways to create large collections of polygons from images such as feature mapping, multispectral classification, autobounds, raster to vector conversion, etc. Thus many unusual types of fuzzy polygon searches can be imagined for locating natural and man-made shaped embedded within images.

Clients using **TNTmips** as an integrated **GIS/IPS** system will also know of, or invent other useful descriptive polygon properties to combine with those already provided. The way this new process has been designed, it is very easy for MicroImages to add new properties as options to the list noted above. When requesting the addition of a new polygon property, please provide the equations or a written technical definition and the new generic descriptive name to represent it (e.g., a name equivalent to circularity, simplicity, ...).

Additional information on the use of shape properties can be found in Measurements from Maps. D.H. Maling. Pergamon Press. 577 pages and on pages 342 to 353 in Statistics and Data Analysis in Geology. John C. Davis. 2nd edition, John Wiley & Sons, 1986. 646 pages

Vector Filtering.

* Undershoots. The vector filter process will now identify and correct undershoots where a dangling line does not quite close up creating a polygon(s). Undershoots are usually created when a **CAD** program has been used to digitize a map which is then imported into **TNTmips** and converted to a vector object. The original preparer of this drawing may not have intended it for use in a topological application and thus had no particular reason to snap lines up to avoid tiny undershoots and overshoots during its preparation. Similarly, the use of the line drawing tool in the new sketch feature introduced with **V5.10** might create a reasonable interpretation of areas in an image but does not provide any snapping option. Often during the subsequent conversion of **CAD** objects into vector polygons it is necessary to employ both these filters.

The maximum length of the gap to be closed is the principal input parameter. It must be very carefully selected as the maximum distance to be defined as a gap but not so large such that a culdesac road or some other real line feature will not be closed.

Automatic snapping is provided in the filter for closing undershoots in a vector object. One of three automatic closing modes may be selected: add-a-vertex, move-a-vertex, or extend-a-vertex.

The add-a-vertex mode adds a new line segment to the end of the dangling line which is perpendicular to the crossing line. The new vertex is on the crossing line.

The move-a-vertex mode moves the last vertex in the dangling line into the crossing line. This last or dangling vertex is moved by the shortest distance to the crossing

line (i.e. along the perpendicular from its original position to the crossing line). Thus, the orientation of the last line segment in the dangling line is changed.

The extend-a-vertex mode also moves the last vertex in the dangling line into the crossing line. However the orientation of the last or dangling line segment is not changed and it is merely lengthened.

All these line snapping modes will change the last or new vertex into a node if the object being edited is a vector object and lines are selected for snapping. If you select to snap only to nodes then the last vertex will be snapped to the nearest node and the extend-a-vertex mode is not allowed.

Sliver Polygons. A new **X-Y** plotting window has been created for future use in **TNT** processes. Its first test use is in the sliver filtering process where it can be used to inspect a vector object to determine if it contains sliver polygons which can be described and deleted from a vector object. This plot window is accessed via the **X-Y Plot** button on the dialog box if the Thinness Ratio ratios (i.e., area divided by perimeter) filter mode is selected. It is a versatile plotting tool which will now be embedded in other **TNT** processes as needed.

In this process use it to plot the area versus perimeter of all polygons in the vector object. In many cases sliver polygons can then be visually identified as those points near the origin which have very small thinness compared to all the other polygons. Visual inspection of this plot will often help select the thinness ratio of the sliver polygons in the vector object being filtered.

Database Reports.

New options are available for the control of the appearance of a database report file via its specification file (*.RPT). These provide for column = field sorting, summary statistics, right border control, left border control, and other new specifications. A complete list of the options can be found in the on-line help for this process. The syntax of the specification file has also been improved so that it is less restrictive.

Thai, Japanese, and Chinese Localization.

The Thai and Japanese Representatives of MicroImages have now identified, reported, and rechecked adjustments to every known defect identified to date in the use of their languages in preparing maps in Map and Poster Layout. No one has reported any specific problems in the use of Chinese.

TrueType.

MicroImages' rendering engine for the direct use of TrueType fonts in **TNT** products was completed during the quarter. However, it is not being released in **V5.10** as its implementation would have impacted many processes with temporary problems. It was thus determined that this engine would be added immediately at the beginning of the **V5.20** quarter allowing time for mitigating any adverse effects. It will be found in the **2D Display** process very early in this next quarter, probably before this memo is read by those clients who obtain frequent upgrades via Internet.

When the direct use of TrueType is available access to the current text rendering engine and *.**OF** fonts will remain available in parallel for some time. This will avoid difficulties with layouts and other results which may have used these fonts.

Changes in Distribution of TNT products

Why.

MicrolImages has continued with the changes planned for the distribution channels by which the **TNT** products can be purchased. The old **DOS MIPS** product was principally an image processing product which had taken on some **GIS** characteristics by the time of its final release as **MIPS 3.33**. Now, the world market is beginning to accept **TNTmips** as a competitive **GIS** system accompanied by complete image processing and other capabilities.

The methods and organizations needed for the distribution, installation, maintenance, and support of a **GIS** product are not the same as those for the simpler, earlier **MIPS** product. **GIS** products and prospective clients are more broadly distributed and educated. They are not specialists such as scientists and educators as was often the case with image processing clients, but are generalists as evidenced by the rapid popular spread of MapInfo, Atlas **GIS**, ArcView, and so on. Correspondingly they are less tolerant of the difficulty in learning and defects of what they view as a popular commercial product. Selling **TNT** products to this kind of prospect requires quite a different marketing skill and approach. Thus, MicrolImages has decided to diversify its distribution channels to incorporate several different kinds of specialized resellers since few yet cover the wide breath of the **TNT** products.

Several of MicrolImages' Exclusive Representatives were selected 4 to 6 years ago for their expertise in marketing image processing products and services. They remain experts in this area but are not necessarily interested in expanding their professional activities into **GIS** and other areas of application of the **TNT** products. Under these circumstances it is not suitable for anyone (MicrolImages, distributor, or client) to continue these earlier exclusive arrangements. Thus, a new distribution program has been initiated in Europe and Southern Africa to allow for the addition of other **TNT** product access channels in these marketplaces via non-exclusive resellers.

European Territory.

The European market consists of the following nations:

Albania	Austria	Belgium	Bosnia / Herzegovina
Bulgaria	Croatia	Czech Republic	Denmark
England	Estonia	Finland	France
Germany	Greece	Hungary	Iceland
Ireland	Italy	Latvia	Liechtenstein
Lithuania	Luxembourg	Portugal	Macedonia
Malta	Moldova	The Netherlands	Norway
Poland	Romania	Scotland	Slovakia
Slovenia	Spain	Sweden	Switzerland
Turkey	Yugoslavia		

All existing MicrolImages' Exclusive International Representatives operating within Europe were offered the opportunity in June to sign new agreements to continue to function much as before as non-exclusive resellers. As resellers the area within

which they can market the **TNT** products expands to the new and larger boundaries of the European territory defined above. They may also market **TNT** products within any other nation not already assigned to another market territory (**NAFTA**, European, or Southern Africa) or an exclusive MicrolImages Representative.

It is with pleasure that it can be announced that all former Representatives in Europe have signed these new agreements with MicrolImages to become European Resellers and continue with business as usual. Three new European Resellers, all experienced TNTmips clients were also signed as follows.

geo-konzept, GmbH.

geo-konzept is located at Gut Wittenfeld in Adelschlag 85111 which is a small town located about 60 kilometers north of Munich. Ask for Thomas Muhr at (498)424-89890 or **FAX** him at (498)424-898980. geo-konzept specializes in consulting, data preparation, and the creation of software for precision agriculture and large scale agricultural management in Austria and Germany.

PSC, GmbH.

PSC is located at 18-20 Ursulum in Giessen D-35396 about 60 kilometers north of Frankfurt. Ask for Karl Tiller at (496)414-8598 or **FAX** him at (496)414-92785. **PSC** specializes in consulting in land-use planning, farm management, ecology, economics, and related areas with special reference to **GIS** and **IPS** applications in international development.

IGwU, GmbH.

IGwU is located at 22 Bahnhofstrasse in Markt Schwaben 85570 about 20 kilometers east of Munich. Ask for Barbara Sperling at (498)121-45937 or **FAX** her at (498)121-45923. Barbara formerly actively sold MicrolImages products when she was employed at AVENA until this company was relocated elsewhere in Germany. **IGwU** specializes in groundwater and hydrologic consulting projects.

The complete list of the current European Resellers is enclosed with **V5.10**. MicrolImages invites inquiry from others who might be interested in becoming European Resellers, especially existing clients who already understand the use advantages, and shortcomings of the **TNT** products in Europe.

Southern Africa Territory.

The Southern Africa market consists of the following nations:

Angola	Botswana	Burundi	Kenya
Madagascar	Malawi	Mozambique	Namibia
Tanzania	Rwanda	Uganda	Zambia
Zimbabwe			

South Africa and its territories those other nations included within its current boundaries or having a common boundary with it.

The MicrolImages' Exclusive International Representative previously responsible for marketing **TNT** products within a lesser number of Southern Africa nations has been offered the option of signing a new agreement to continue to function much as before as a Southern African Reseller. The area within which non-exclusive Southern African Resellers can market the **TNT** products has expanded to the new

and larger boundaries of the market territory defined above. They may also market **TNT** products in any other nation not already assigned to another market territory (**NAFTA**, European, or Southern Africa) or an exclusive Microlimages Representative. Currently this includes all nations in Africa.

Microlimages will now solicit and review applications for additional new non-exclusive resellers in nations located within these new territories. Resellers will be sought who have interest and skills in the service use and marketing of one or more of the multiple foci of the **TNT** products. All resellers in each territory will sign an identical agreement with Microlimages, charge the same international prices, and receive the same commissions. As in the past, it has been decided that new resellers will first need to become a client and active user of **TNTmips** before or concurrent with applying to become a reseller. This provides Microlimages and future clients with some assurance that the organization which sells them a **TNT** product is committed and knowledgeable about its use. Current European or Southern Africa clients interested in the possible distribution of **TNT** products within these territories should contact Microlimages for more information.

New maps and lists of **NAFTA** (yellow paper) and European Resellers (buff) and International Representatives (gold) and nations covered are enclosed with **V5.10**.

Other Nations.

All nations not listed as part of the European, Southern Africa, **NAFTA** market territories continue to be the territories of their Exclusive International Representatives. Since no new Representatives were signed during the past quarter these now include Russia, Australia, Israel, Argentina, Chile, Bolivia, Peru, New Guinea, Indonesia, Malaysia, Thailand, and Japan.

Effective 1 June 1995 the United States Government placed an embargo on the sales of products to Iran. As a result it is illegal for the **TNT** products be sold, shipped, or transshipped by any route for use in Iran. Thus, Microlimages has suspended the status of the Exclusive International Representative for Iran until this embargo is lifted.

Clients or potential clients in other nations not listed above or embargoed can purchase the **TNT** products directly from Microlimages or any Reseller or Representative. Microlimages would also be pleased to receive applications from clients who would like to be considered as Exclusive International Representatives for any nation not listed above as part of an existing Representative or Reseller market area.

Prices.

Microlimages Prices Unchanged

The new price lists just distributed with the **V5.00 TNT** products remain unchanged under the new distribution program outlined above. The International Price List applies to all nations except for the **NAFTA** members (U.S., Mexico, and Canada). The new product reference folder (yellow cover) contains the appropriate **NAFTA** or International prices lists which are identical to those you have previously received.

MicrolImages continues to have clear and published product prices. As a result MicrolImages would be pleased to receive and publish as has been done below, any other current price lists and associated information for any other related commercial products. Please continue to send in copies of any such pricing and features material for our competitors which you might obtain. How can MicrolImages continue to be the most powerful at the least cost if we do not have written information about the competition? It might even be possible to maintain and eventually provide everyone a compendium of the published prices of a variety of such products. Unfortunately, our competitors do not respond well to requests from MicrolImages for their published price lists (several do not have them clearly set forth). Thus we must rely on you to keep us supplied with such information.

PCI Price Increases.

PCI from Canada has announced new, higher prices effective 1 August for the base package of the **PC** version of their software. The following prices in U.S. dollars are taken directly from the new **PCI** order form. MicrolImages does not have available the prices for the **PCI** products on **UNIX** platforms but would be happy to receive and publish them.

module	product description	PCI price	TNT price
DT-IPK	EASI/PACE Image Processing Package	\$4250*	\$5100\$
	DT-PK	EASI/PACE Kernel w/	inc
	DT-IW	Imageworks	inc
	DT-IP	Image Processing	inc
	DT-GC	GCPworks	inc
	DT-GC	Geometric Correction	inc
	DT-VU	Vector Utilities	inc
	DT-GL	GIS Links	inc
	DT-UDOC	User Documentation	inc
DT-AD	Airphoto Ortho	\$2000	inc
DT-IMK	Image Mapping Kit	\$1000	inc
DT-TA	Terrain Analysis	\$1000	inc
DT-MA	Multispectral Analysis	\$1000	inc
DT-SD	Satellite Ortho	\$2000	inc
DT-FL	FLY!	\$2000	na
EU-SUP	Software Update, Annual	\$1000	\$1000
EU-800	800 User Support, Annual	\$1000	inc
	total	\$15250	\$6100

*\$3000 until 1 August 1995, prices listed in United States dollars.

\$the most typical **TNTmips** PC system purchased from MicrolImages is a **D40** at 1024 by 768 pixels at \$4000 with addons of X-Y digitizer [X3], pen plotter [L3], and printer support [P5] adding \$1100.

MicrolImages is not directly familiar with the sales policies of **PCI** but offers the following comments on the above prices based upon strictly upon hearsay. MicrolImages will be happy to include corrections to these statements if further verified facts become available on this topic.

In general it is assumed that the optional modules noted “inc” for inclusive are similar to features included in the **TNTmips** product.

It is assumed that peripheral support is included in the **PCI** base system price thus add \$1000 to **TNT** price to cover printing and digitizer support for these **TNTmips** features.

PCI does not necessarily provide any new releases during the 1 year upgrade. Furthermore, it is also obvious that when new major features are released, they are sold separately rather than included in the upgrades.

The software price of \$15250 provides less than 1/2 the functionality of the **TNT** product. It does not include any of the **GIS** or **CAD** capabilities of **TNTmips**.

Finally it is well known that **PCI** directly has provided very heavily discounted prices to “buy” multi-unit sales in India, China, and elsewhere. This would appear to be the reason for their high and growing prices to individuals and single unit sales.

ILWIS Prices

ILWIS (the Integrated Land and Water Information System) manufactured by the International Institute for Aerospace Survey and Earth Sciences in The Netherlands is a dual screen **DOS** based product similar to the now nearly extinct **DOS** based **MIPS**. Like **MIPS** it is available for **DOS** based **PCs** (286, 386, and 486 based); requires dual screens (one mono and one color) and a math coprocessor; no memory requirements stated, hard drive of at least 20 Mb, supports a small selection of color display boards; **X-Y** digitizers, pen plotters, and a small collection of printers; handles raster, vector and point data but not databases. MicrolImages does not disparage this simple approach as after all, we invented it 8 years ago. However, it must be difficult to find equipment old enough to run it on.

module	product description	ITC price	MIPS price
ILW	ILWIS version 1.41	\$4800*	\$5100§
	UPG/2a Upgrade ILWIS 1.41 from version 1.4	\$160	\$200
	UPG/2b Upgrade ILWIS 1.41 from earlier versions	\$800	\$800

*conversions from Dutch Guilders based upon 1.55 to the U.S. dollar as quoted on 14 July 95.

§the most typical **DOS MIPS** or **TNTmips PC** system purchased from MicrolImages was and remains is a **D40** at 1024 by 768 pixels at \$4000 with addons of **X-Y** digitizer [**X3**], pen plotter [**L3**], and printer support [**P5**] adding \$1100.

The **ILWIS** features, approach, and prices seem remarkably similar to the prices of the **DOS MIPS** product discontinued in 1992. Since **ITC** is not a client of MicrolImages it may be assumed that someone is a common client.

MicrolImages is not directly familiar with the sales policies of **ITC** and its dealers but believes that their product is not discounted.

MicrolImages will be happy to include corrections to these statements if further verified facts become available on this topic.

Promo Materials

TNTatlas.

You will find enclosed a new **TNTatlas** product brochure. It is quite similar in layout and content to the previous brochure except for the cover. Those planning a **TNTatlas** should carefully review the insert into this brochure on the possible use of a free distribution if your atlas is for promotional purposes.

TNTsdk.

You will find enclosed a new **TNTsdk** product brochure. It is quite similar in layout and content to the previous brochure except for the cover. This project was printed in Lincoln by an incompetent printer (Baker Printing) who managed to make the green highlight bars on the back page an incorrect dark shade of green when compared with those on the interior pages. This printer has been fired but MicroImages was forced to use this incompetent result.

TNT products reference folder.

During the past quarter all the contents of a completely new **NAFTA** and International price and reference folder (terms, order forms, company reference material, and so on) were prepared and printed to replace the old, outdated “green” covered folder. This new yellow cover folder is enclosed and should become your standard reference for pricing and ordering the **TNT** products. The price list it contains is unchanged and identical to the price list you received last quarter with **TNTmips 5.0**.

New Image Printers/Plotters Supported

The FARGO Primerapro Color Dye Sublimation printer is now directed supported via printer support feature **P10** (or slower via **P8** if the printer is equipped with the Postscript option). This printer retails at \$1900 and can be used with economically thermal wax transfer foils and pare or these can be exchanged for expensive foils and paper to produce photographic quality sublimation prints. It has resolutions of 300 by 300 dpi and 300 by 600 dpi. However, when use in its sublimation materials the effective resolution is much higher as dithering is not used. Paper sizes for this printer are A, A-long, **A4, A4-long, and 8.5 by 11”**.

All color prints attached to this MEMO were printed with the **HP 1200** on regular copy paper.

New Scanners Supported

No new scanners have been supported for use in **TNTmips 5.1**. MicroImages is now considering the support of the **TWAIN** standard for the support of scanners on **PC** and Mac platforms. It has become very hard to obtain scanners from their manufactures. While support of the **TWAIN** interface will automatically make many scanners directly useable, it will not be as efficient as MicroImages past direct support of many scanners.

AUW8

The annual Advanced Users Workshop number 8 (**AUW8**) will be held in Lincoln, Nebraska on 23, 24, 25, 26 January 1996. The format will be unchanged from previous years. As usual, and for your convenience, a block of rooms has been reserved at the Ramada Inn a few steps from the Microlimages offices. Single room occupancy will be a special rate of \$59 per night. Please reference Microlimages when making reservations to achieve this lower rate. More details on **AUW8** will be provided in separate mailing during this quarter to allow you plenty of time to make your necessary organization and travel arrangements.

As I write this the outside temperature in Lincoln is 105 degrees Fahrenheit. It is safe to predict that during **AUW8** the temperature drop to 0 degrees Fahrenheit if not lower.

Digital Chart of the World

Microlimages apologizes for the slow rate at which orders for the **RVC** version of the Digital Chart of the World have been filled. Individually preparing many sets of the 4 **CD-ROMs** has taken more time than anticipated and has also taken a lower priority relative to your other technical support needs during the past quarter. However, all outstanding orders have now been filled by manually preparing each individual **CD**.

Microlimages will consider in making other universally interesting public domain geographic data sets available in the **RVC** format on **CD** at low cost. Please identify any ideas you may have. However, remember that your suggestions should be of broad interest to many clients and in the public domain and therefore should not be site specific.

Computers

High End Pentium. Almost every quarter Microlimages seems to announce that a new and better **PC** is available. This quarter is no exception and the advertisement for this configuration is enclosed and summarized below. Microlimages has just taken delivery of this system for internal use.

Powerful Gateway P5-133XL (\$4400)

- Intel 133 MHz Pentium
- 16 MB **EDO RAM**
- 256 Kb Cache
- 1.6 Gb 10 ms **IDE** Hard Drive
- PCI Enhanced **IDE** Interface
- 17" Vivitron Color Monitor (Trinitron, .26dp)
- 64-bit **ATI** Graphics w/ 2 Mb **VRAM**
- quad-speed CD-ROM with 3 disk changer
- 3.5" diskette drive
- 28.8 FAX/modem
- Sound systems and speakers from Wavetable
- 9-bay tower case
- keyboard and **MS** mouse
- WFW3.11** now and free **W95** when shipped other valuable software

3 year parts warranty

Low End Pentium. For those on limited budgets a computer totally ready to efficiently operate **TNTmips V5.10** at 1024 by 768 pixels can be purchased for under \$2000. A recent article in InfoWorld detailed and repeated the fastest, most fully configured systems priced below \$2000. A large disparity in performance was found and this table is included with **V5.10**. Dell's system was rated highest with Gateway a close second. The Gateway economy system is detailed for comparison with the more expensive system outlined above.

Economical Gateway P5-75 (\$1829)

Intel 75 MHz Pentium

16 MB **EDO RAM**

256 KB Cache

540 MB **IDE** Hard Drive

PCI Enhanced **IDE** Interface

Monitor not included

Dell's equivalent model XPS P75 at \$1990 includes a 15" color monitor

STB TRIO 32 display card w/ 1 MB **VRAM**

Dell's equivalent model XPS P75 at \$1990 includes 2 MB video RAM

quad-speed CD-ROM

3.5" diskette drive

keyboard and **MS** mouse

WFW3.11 and other valuable software

3 year parts warranty

Direct Easy Importing. Several International clients have informed Microlimages that they are having good results directly ordering Gateway computers at normal United States discount prices. For example, just recently a South American client directly ordered and received a Gateway Pentium 90 MHz machine for \$3300 plus the 20% import duty due. The Dell dealer within the country asked \$5580 plus 20% for the same configuration. A similarly equipped system from the local IBM dealer was \$8330 plus 20%. It seems that Gateway is offering world-wide access to the same low discount prices popularly advertised in U.S. magazines. Of course, mail ordering computers at low prices has a risk attached even within the United States.

The contact points for direct International Orders at Gateway are (605)232-2191 or FAX (605)232-2613.

Gateway Japan. Gateway has just announced that it is building a **PC** assembly plant in Japan to better serve the Japanese and Asian **PC** computer markets. At least one of Microlimages International Representatives has already been routinely importing and selling Gateway **PCs** in another S.E. Asia nation.

Designer Portable. An experienced Microlimages site recently assembled a psuedo-portable **TNTmips** workstation to move around to different locations. Their approach might be of interest to you.

*"Finally, I received my new Dell computer. The **CPU** is a Pentium 120 Mhz with 32 MB of **RAM**, a Mag 17" monitor (nice front controls), a 1 GB hard drive (IDE), a 14.4*

*Kb data/FAX modem, a 4X CD-ROM, a number 9 Imagine I-128 4MB **PCI** video board, and a 3COM 16-bit ISA Ethernet Combo. The Number 9 Image board works just fine with **TNTmips**. In fact, it is much more flexible with a variety of virtual desktop resolutions to go along with the several monitor resolutions up to 1600x1200. The whole system is in a minitower (except monitor, keyboard, and mouse) that is 16.5" by 16" by 8". I bought a suitcase to hold it (with wheels); I plan to line the suitcase with foam that fits the various components. The only part that I do not plan to carry around with me is the 17" monitor. I will have several of these placed at locations where I plan to use the system. At home I have a ViewSonic 17 monitor. At [another location] I have placed the Dell monitor. At [another location] they have a 21" monitor that is part of the TD-4 Intergraph hardware (dual Pentium)."*

*"The Dell system above costs about \$5,500 (I have not seen the final bill yet). I plan to get another 1 GB hard drive soon. I told Dell to leave out the sound board and audio option in the **CD-ROM**."*

"I forgot to mention that the Number 9 board has three levels of instant zoom (2X, 4X, and 8X steps). Contrary to my experience with the Matrox board, the mouse cursor stays the right shape at all levels of zoom."

This client is now researching the purchase of a small, self-contained computer video projector (for example, In Focus). This would be placed in a small suitcase and fastened atop the wheeled suitcase noted above. It would complete the total system for presenting papers, conferences and project meetings, contractor visits, etc. Of course, a small color panel projector would also work if you can count on the sites you visit having an overhead projector available. Almost every MicrolImages client has something to "sell" via the TNT products in one way or another.

Digital Raster Graphics

The MEMO accompanying the shipment of **V5.00** of the **TNT** products contained a section with MicrolImages observations on the Digital Raster Graphics products proposed by the United States Geological Survey. A copy of the MEMO, open to that section was provided to the **USGS** authors of the proposed **DRG** product as requested in the descriptive material distributed with their sample disk. A copy of their response is enclosed in which they agree with the critique and defend their decisions and **DRG** design. It is interesting to note that this public domain product will still leave plenty of room for the higher quality, commercial preparation and distribution of digital versions of **USGS** printed maps.

Technical References

Technical references.

Your Portable Persona. PC Labs tests 80 color notebooks to find the perfect choice in the category you need. PC Magazine. August 1995. Vol.14 No. 14. pages 102 to 213.

Articles Citing MicrolImages Products.

Sensing beneath the earth of South Africa. 1995. Gordon Cooper and Ronell Carey. Image Processing, Vol. 7. Issue 3. pp 28-29.

Training

MicrolImages software engineers are currently quite busy providing training in Lincoln and at client sites usually for existing clients. All this training has been of the intermediate to advanced variety for experienced groups of clients who wish to optimize their use of **TNTmips**. Remember that MicrolImages custom training is presented by the same experienced professional software engineers who provide your software support before and after such training. As a result, this custom training sets up a good personal working relationship between your staff and all of us at MicrolImages, including those software engineers who actually create the **TNT** code.

Please remember that most training is provided by MicrolImages Resellers and International Representatives.

May

One week of beginning and intermediate training for 12 staff of Carroll County, Maryland (population 130,000, area 456 square miles, and about 35 miles west of Baltimore). This training was conducted using the TNTmips systems and data already in use in this county. It is a **GIS** network with a DEC/Alpha NT based file server and 486 and Pentium computers using 6 **TNTmips** and 8 **TNTviews** in a "Data Warehousing", analysis, and distribution fashion. Extensive data has been assembled by this county including the 1/12,000 color infrared digital orthophotos rapidly becoming available for all Maryland counties from the Maryland Department of Natural Resources.

June

Three days of beginning training for two professional staff of Resource Management Consulting.

One day of review for Tom Muhr, a new European Reseller from Germany.

July

Three days of advanced training at MicrolImages for a Lt. Colonel from the Australian Army who is studying the distribution of malaria. He had beginners training at MicrolImages last summer. He will bring his extensive mosquito distribution databases for Australia and Papua New Guinea for further analysis.

August

Two weeks of training at MicrolImages for 3 Chilean government forestry **GIS/IPS** specialists responsible for making map changes in forest cover. Their project is based upon detecting changes between LANDSAT **TM** frames to detect forest cover changes. The changes in forest cover will then be interpreted and identified on scans of airphotos and inserted into earlier vector maps of forest cover prepared by an Arc/Info system. They will bring sample **TM** images and airphotos to use in the training for practice and project design.

September

Four days of training and consultation at MicrolImages with a technical specialist from one of MicrolImages Australian Representatives.

Three days of beginning training at MicrolImages for a U.S. Army Lt. Colonel from Bangkok who is studying the distribution of malaria.

One week of advanced training at Annapolis, Maryland for a group of **GIS** professionals in the Maryland Department of Natural Resources.

Other related. During August a MicrolImages **NAFTA** Reseller will be setting up two TNTmips systems and providing initial training in their operation in Belize City, Belize. This will be in a special addition to a Belize Health Facility whose professionals are to be involved in a study of the distribution of mosquito habitat as part of a multiple organization study involving the U.S. Army, NASA/AMES, CA State University at Fresno, CA State University at Davis, SPOT Images, and others.

From all the above activity it appears that the northward spread of malaria is sparking renewed interest in the geography of this scourge. MicrolImages now has a growing number of clients involved in the study of the geography and ecology of the pests and diseases of mankind and his domestic animals. It is hoped that someone will hold a conference on the application of **GIS** and **IPS** systems to this general area.

Staff Additions

Jeffrey E. Malan has joined MicrolImages Press as a scientific writer. Jeff has just retired as a Captain from the U.S. Air Force at Global Weather Command at Offutt Air Force Base in Omaha, **NE**. Jeff received his Bachelor of General Studies Degree in 1982 in Geography and his Master of Science Degree in Meteorology in 1985 from Texas A&M University. During his military career he had considerable experience with the analysis, collection, and ground station operation of meteorological satellites. Throughout his career he has authored scientific reports and managed computer software development efforts. Jeff's initial responsibilities at MicrolImages will be to update and write new subsections of the on-line documentation.

Lance A. Dyas has joined MicrolImages Press as a graphics specialist. Lance has a Bachelor of Computer Science Degree from the University of Nebraska at Lincoln in 1987. Most recently he has worked as a computer graphics design specialist for a credit card company in Omaha creating flyers, logos, presentations, forms, and related materials. Concurrent with learning the operation **TNT** products, Lance's initial responsibilities for MicrolImages will be to prepare and revise the **TNT** icon set, prepare a collection of standard line styles, and organize additional sample data sets. He will also assume responsibility for the preparation of prototype 2 of the San Francisco sample **TNTatlas** with improved features.

Jamie Caporaso has joined MicrolImages Press as a graphic specialist. Jamie has a Bachelor of Fine Arts Degree from the University of Nebraska at Lincoln in 1993 specializing in Illustration and photography. Since graduation Jamie has been employed designing promotional and advertising materials for a Lincoln equipment manufacturer. Concurrent with learning the operation of the **TNT** products, Jamie's initial responsibilities will be to prepare new advertisements as well as additional materials for the MicrolImages promotional package.

Lance and Jamie will be replacing Rick Otoupalik who left MicrolImages about 3 months ago to operate his own graphics illustration business in Oklahoma City. Rick was the first and only graphics specialist at MicrolImages for more than 4 years and created all the previous advertisements, logos, fliers, brochures, and other promotional materials. Many of you were acquainted with Rick from MicrolImages' annual workshops.

Justine Urbanek has joined MicrolImages' office management team as financial officer. Justine recently completed a **B.A.** Degree in education at Kansas Wesleyan University. Prior to pursuing this degree, she worked for 10 years in various bookkeeper and accounting positions. Justine replaces Brenda Pool who is now the financial officer at a Lincoln law firm. Brenda was the financial officer at MicrolImages for the past 4 years and was acquainted with many of you from the MicrolImages annual workshop.

Testimonials

The following are some of the comments to MicrolImages during the last quarter exactly as written except for the [edit] replacements to keep them anonymous. Obviously many more comments, some negative, are received by MicrolImages by voice and can not be accurately reproduced here.

A single written negative written response was received during the quarter and is not included. It was to the effect that the client is unhappy that they had a subscription for **TNTmips** through **V5.00**, considering the lack of new **GIS** and **IPS** features introduced during the previous year. Clearly the perception of the value of the new features added quarterly is of course related to the individual requirements of each client.

From an International Client.

*"By the way do you guys know that **TNTMIPS** Ver **4.9** has been recommended by **UNEP** (United Nations Environmental Program) as the image processing system to use in the world? I would support that and go further by saying that it should also be used as the **GIS** and **CAD** system."*

From an International Client (still using **V4.80**).

*"Further, I would like to express my satisfaction with the **TNT-MIPS** programme. With the extent of possibilities it offers and the price at which all this comes, **TNT-MIPS** is obviously in a class of its own. Congratulations."*

"One down note nevertheless. The evolution of the software is so fast that your manuals and online help can't follow the pace. Too often, the operation description and pictures in your manuals are clearly pre-historic and too often, online help displays the message "Help text not found". Luckily, the programme is so intuitive that I don't have to resort to manuals and online help all that often."

MicrolImages acknowledged in the MEMO accompanying the **V5.00** TNT products that the on-line documentation and Application Notes are falling behind the rapid pace of the addition of new software features. This is especially true recently since the user interface is continuing to have a major face lift (e.g. toolbars) which rapidly change the appearance and procedures of every process. This makes the

processes easier to use but immediately alters a large portion of the 4000 pages of written material associated with the **TNT** products, and its going to take a long time to catch it up.

The larger problem is that good scientific writers with a technical background are hard to find in Nebraska and are valued at Microlmages on a par with our software engineers. If any reader and user of **TNTmips** feels that they have talents in this direction they might wish to discuss them with the appropriate parties at Microlmages. Microlmages Press staff have considerable impact on the design of the **TNT** products and how they operate. Those who do scientific writing well find it to be a very creative and professionally rewarding activity producing very tangible daily results from their efforts.

From an International Representative.

*"Saw [University client] this afternoon. He is very happy with **TNT v5.0!**"*

From an International Representative.

"Thanks for the response. Microlmages has always been great in responding to user input!"

From an International Representative.

*"I wish to place an order for **TNTdemo**. The client is [a name] for whom we have done a lot of work in the past. [a name] has had much correspondence with our contact in relation to **TNTmips** and it's superiority over **AI** [Arc/Info]. The [a name] owns both **AI** and **Errr** [Ermapper]. They are particularly frustrated at the cost and inefficiency of using **AI**, having spent considerable money on consultants."*

From a U.S. Client.

*"Thanks for the great training. It was just what we needed to complete our transition from **DOS MIPS** to **TNTMIPS**. [a name] did a wonderful job while he was here. Everyone who had an opportunity to attend was very pleased with how it went."*

From an International Representative.

[referring to a **GIS** publication] *"The first issue mentions a marriage between **ERMapper** (image processing) and **Genasys (GIS)**. We are highlighting this forced marriage as a weakness as against the strength offered by the integration in **TNTmips**."*

*"Awareness generally about **TNTmips** must be increasing. In [a nation] as we have recently been approached by several software integration and computer hardware Companies to join with them in tenders for **GIS** installation using **TNTmips**."*

From an International Client.

"I wanted to let you know that on Friday 26th [May] I spent the whole day printing A4 layouts on our Laserjet 4M, with only one error - one of those "specified files does not exist" ones. NO application error at all, and I was using zoom function with vector points displayed as bar charts, which used to give a lot of trouble."

*"It was a really urgent set of maps and plots we had to prepare for a presentation to the board of [company name], and **TNTmips** came through with flying colours. I was really pleased, especially after all that trouble I had in March."*

"I have also spent quite a bit of time digitizing, and Vector/Edit [the old process] seems to be extremely stable. (I had a zero divide error after trying to use the Snap button, but that may have been operator error)."

From an Internet Exchange

[Question as posted]

"Hi all"

*"I am looking for people using **PCI** or ER Mapper or Intergraph **MGE** in remote sensing processing. I would like to know if these softwares have a direct input data process for satellite images (able to read the images formats (SPOT), and if they include rectification processes using fields relative to ephemeris and altitude."*

"Thanks"

[Answer from a MicroImages' client]

*"Last year I purchased **TNTmips**. It was the best decision I ever made."*

"Yes, it reads satellite data from tape."

"It has an excellent and innovative georeferencing module that allows one to interactively match an image to vector or raster layers, by overlaying or displaying in different windows. It applies projections at the same time as affine and polynomial transformation. It does have photo distortion correction capabilities, but I haven't used them so I can't tell you much about that."

*"It has by far the broadest range of capabilities of any **GIS** / Image Processing System I have used, being a full Vector **GIS** (including 3D), Raster **GIS**, Image Processing System and also has **CAD** and relational database capabilities. I have used ER Mapper, **ERDAS**, **PCI**, MicroBrian, **DISIMP**, **ILWIS**, ARC/INFO, **IDRISI** and **MAP**. **TNTmips** leaves them all far behind. For the first time, I don't need to move data from one package to an other or write my own programs to do things, **TNTmips** does it all."*

*"It has a great user friendly interface and runs under windows or **UNIX**."*

From a new client after **TNTdemo** expired.

"Please FAX authorization. We like the product and thanks for the demo!"

From a U.S. client.

*"Over the past 4 or 5 years, personnel in our offices and our associates (**USFWS**) have been using **MIPS** and **TNT-MIPS**. Early on we were often frustrated with **MIPS** and the conversion to **TNT-MIPS** was somewhat traumatic. Nevertheless, we are quite pleased with the performance of the most recent versions of the **TNT-MIPS**. We have, over the years, had four temporary personnel on staff to assist in various projects. All these people "mastered" the use of **MIPS** or **TNT-MIPS** in a relative short time despite the fact that only one of these people had training in **GIS**. Two of these people have continued on in the **GIS** field and have reported back that they much prefer **TNT-MIPS** over the system that their present employer was using (**ERDAS**). Both these people made recommendations to their employer that they acquire **TNT-MIPS**. This speaks highly of the quality of your product. Keep up the good work."*

From a new client after **TNTdemo** expired.

*“Thank you for the **TNT MIPS** demo package. The Microlmages’ fully functional demo, complete with documentation, was extremely helpful. I was able to learn and use **TNT MIPS** on our Windows **3.11** for Workgroups, Pentium system within days from installation. I Tried **TNT MIPS** on the Microsoft **NT** and was very disappointed with the performance of **NT**. However, **TNT MIPS** operation on the windows platform was virtually trouble-free.”*

*“In our line of work [environmental consulting], georeferencing historical aerial photographs to vector or **CAD** objects, and then exporting to various file formats, is very important to site investigations. **TNT MIPS** georeferencing module was easy to use and efficient compared to **ERDAS** Imagine. In fact, comparable image processing packages were not only twice the cost of **TNT MIPS**, but also not available for Windows **3.11**. The instability of Windows **NT** -- which we patched thanks to your internet server -- and the high cost of products, like **ERDAS** Imagine, for the **PC** made anything other than **TNT MIPS** undesirable.”*

*“Another satisfying feature of **TNT MIPS** was its ability to plot full-color output directly to our **ENCAD** Novajet plotter. We were surprised at the software’s capability to import **TARGA** or **TIFF** files, and plot them close to true color without manual adjustments. Other Windows-based programs could not seem to match the quality of the **TNT MIPS** output.”*

*“Thanks again for the demo package. Thanks also to the support staff for not using an automated answering device. I appreciate talking to real, knowledgeable people for software support. We are looking forward to using **TNT MIPS**. Enclosed, please find the demo key needed for our refund.”*

From an International Representative.

*[A client site] is running now a **SGI** Indigo 2 R4400 200Mhz, 128 MB memory, 2 GB + 4 GB on Hard disks, 20” monitor and XL 24 bits display board. It’s like driving a plane!, it runs **TNTmips** really fast.*

From an International Client.

Some explanation of the following material is in order. The Forestry Department in a Canadian Province is in the process of determining how to organize their **GIS** operations. The Province has about Area Offices under this Department for the management of its forests. Recently the Province and this Department has made a big deal about the need to move their decision processes and management initiatives out of their Capitals bureaucracy and into the hands of its staff in their Area Offices.

In order to determine how the Province should proceed to organize their forestry **GIS** operations, a staff member in the main office with **GIS** experience was asked to prepare a consulting report. This report was prepared without significant input from the Area Offices. The following is the response to the recommendations of this report which was prepared by an Area Office manager who began to use **TNTmips** about 6 months ago.

To the best of our knowledge, Microlimages has never talked to either of these individuals. The **TNTmips** users involved work only indirectly with Microlimages through a Microlimages reseller. However, the staff member who prepared the original report has just recently requested information about the **TNT** products.

The missing numbers in the Area Officer's response below contained information about the specific needs of the writer's organization and are not related to **TNTmips** or any other product.

2. *"Contrary to your statement, there is already the formation of "camps" supporting different **GIS** applications. There are a number of very usable applications in use (**MIPS** [**TNTmips**] is our own selection) in various offices."*

4. *"The arguments for acquisition of Arc/Info on a Sun SPARC workstation are not convincing. [this area office] has been informed that Arc/Info is old, outdated, expensive, difficult to learn and use, and does not deliver its promised potential. [not by Microlimages] We have been told there is no truly functioning Arc/Info system in Western Canada, and it has been my personal experience that industry is abandoning use of this system generally in favor of alternate applications. The acquisition of a **GIS** heavy system should be done only after a thorough analysis of the [Province's] future job needs and information requirements. [heavy appears to refer to any workstation based system as contrasted to desktop **PC** based approach] This has not been done to our knowledge. Should such an exercise be completed (we would like to be a participant) and it is determining a **GIS** heavy system is necessary, then considerable analysis of competing systems should be done to select the most appropriate one. We do not believe Arc/Info would survive such a process."*

5. *"Note that a digitizing table to us represents old technology. There are more current and accurate means of capturing spatial data than such a subjective means (**GPS**, geo-referenced ortho-rectified photos)."*

7. *"We disagree with the concept of a dedicated **GIS** analyst, as this conflicts with your base objective of [avoiding] segregating **GIS** from its users. All staff must be capable of using whatever system is selected, or it will not be used at all eventually."*

9. *"Unlike your chosen Arc/Info system. [this area office] has major problems with the 8 month training program for one chosen **GIS** analyst [for each area office]. This is elitism and flies in the face of the absolute requirement for a completely democratic system. We do not believe it will be possible to pay these people the market rate for salary, and if we did, they would be paid more than the Regional Director. [this hits where it hurts the most!] It will be impossible to hold these people for any length of time."*

10. *"The proposed selection of MapInfo and ArcView software as the **GIS** light standards is not acceptable. There has not been a complete evaluation of all alternate systems. We remain convinced in the inherent superiority of **MIPS** [i.e. **TNTmips**] for photo analysis and map making and have committed C\$30,000 [US\$21,000] in its acquisition, hardware, and support. We are in addition running four major ortho-photography programs this fiscal year to demonstrate **MIPS** uses. We will not willingly cease this program given our level of investment to date. We*

believe the [a report from another Province] was correct in its recommendations that regional offices be encouraged to find their own unique solutions to their needs. A uniform system pressed onto field offices by outside agencies has less chance of staff commitment and eventual success than one bought into by local staff. This is what empowerment really is all about!"

From an International Client.

The attached summary of the application of **TNTmips** in the exploration for the possible extension of an existing Gold Mine is enclosed with the permission of its author.

From the Grapevine

This section contains interesting written tidbits of information on the products of our competitors from various sources. They were picked up on random days from Internet threads, articles, FAXes, and other miscellaneous materials provided to Microlmages. While they constitute only a small fraction of the exchanges on Internet, they provide insight into the status and operation of other competitive GIS products.

The specific identity of those who wrote these comments is omitted. The spelling, product name errors, English language problems (Internet is world-wide), and related artifacts in these are those of their authors as they are reproduced here just as originally written. In the name of accuracy, confirmations, retractions, and further information on these topics received by Microlmages in writing will be published in future MEMOs.

Intergraph

Intergraph after 11 consecutive losing quarters has laid off 600 staff members from its 9200 employees. Intergraph places blame on 1992 decision to move from UNIX RISC systems to Intel Pentiums running NT which carry generate much lower profit margins.

ESRI and Oracle

The following was extracted from a document being circulated by MapInfo entitled Q&A: ORACLE DATA WAREHOUSING ANNOUNCEMENT and dated 23 June 1995. It may indeed reflect a possible behind-the-scenes schism between Oracle and ESRI, merely MapInfo's viewpoint, or Microlmages wishful thinking.

"Why is Oracle partnering with MapInfo and not SMI [e.g. AtlasGIS] or ESRI?"

[responses 1) to 4) contain product promotions]

"5) Oracle7 Multidimension appears to be a threat to ESRI's database strategy whereas it compliments MapInfo's best mapping client strategy."

ArcCAD

An Internet posting of 11 January 95

"This is the deal with ArcCAD. ArcCAD is single precision and will stay single precision until they change the model. Which will probably be ArcCAD 2."

"ArcCAD also does not store arcs with a radius. It stores them as AutoCAD polylines that look exactly like the Arc. It has limitations on how many arcs and

*polygons can be stored in a coverage. If you are surveying parcels of land, you can only have 5000 arcs per polygon in your database. In my work that translates into about 4000 parcels per polygon. If this really bugs you, there are other good AutoCAD based **GIS** packages out their."*

An Internet response of 11 January 95

"my understanding is that arc cadd is still single precisions. autocad is double or more, the kinds of computations that are necessary for surveying needs double precision. I also understand that arc cadd does not support a least square adjustment - which is what you really need - as opposed to cogo - so I would think those two things are troublesome and lastly the way arc and arc cadd handle curves as straight line segments rather than as equations would be very difficult especially for subdivision layout and legal descriptions. the FSW is comparing many of the alternatives and found that autocad and maybe generic cadd, one of the other commonly used surveying programs, out performed arc cadd by orders of magnetude in curve handling and adjustment data along with 'save the rules' and 'save the measurements' capabilities."

An Internet response of 12 January 95

"I would certainly second [a name] reply on ArcCAD and AutoCAD. I doubt release 11.4 will be double precision. Maybe when Release 12.0 comes along or they do to Windows 95 or NT."

An Internet posting of 18 January 95

*"I run a regional **GIS** for ten counties in South Georgia. We use AutoCad, ArcCad, and ArclInfo. We do conversion from **CAD** to **GIS** every day. We work directly with county engineering departments and consultants that use AutoCad extensively. My recommendation is: if you are doing **GIS** - use ArclInfo. If you are doing survey and engineering work that doesn't cover vast distances, use AutoCAD, if you do both, use both and bite the bullet on the learning curves. Two final items, ArcCad is severely limited for use on large projects by a 5000 arc limit on polygons, and the projection errors do not become significant as compared to other "real world" problems when the scope of work is small (20 miles by 20 miles for example)."*

From an Internet posting of 23 January 95

"Has anyone tried to run Arc 11.3 windows version with Autocad R13 on a PC? I get a bounce from the Arccad install saying "Fatal Error in Script Line 141" then it bounces me to the op system. The ESRI folks say "yep that's a problem and nope, there is no work around until V11.4 around June 1995". There must be some one in here that has come up with a patch. Any clues?"

ArcView

From an Internet posting of 13 December 94

"We have the ArcView 2 beta and tried to use it on our city's 500 tile library (each tile 2000' x 3000'). It took forever and a day, and was clearly not useful for production work against a significant library. We were not sure if this was due to it's beta status and some debug code, or not."

"Yesterday, one of our staff was at an ESRI training session on AV2 where he was told that a 500 tile library was not realistic and that there was no good work around. :-/ This is contrary to what the marketing people have been saying for quite some time now."

"Has anyone tried the production version AV2 against a library of significant size?"

The Internet response of 13 December 94

"Been checking AV2 out - just for the heck of it I tried accessing the Parcels coverage thru Librarian. It took 20 minutes to load an then another 6 minutes to draw the 350 tiles we have in-house right now. Yup, and exiting and restarting would take another 26 minutes."

"On the bright side, once everything is drawn, zooms are real snappy when zooming in."

"I also appended all tiles together into a single parcels coverage. Entry time into AV2 was no problem and drawing was no real problem. I did notice that it took about 3= minutes to draw in AV2 versus 1= minutes in Arcplot 6.1.1, bummer."

*"I also tried to symbolize arcs/points on AV2 with my appended coverage on the PA**TYPE. It took about 6 minutes for the table to populate with the item values, then another 6 minutes when I said I wanted unique values. (This is AFTER creating an item index for the TYPE field, with about 60,000 label points. I 'd out of the arc symbology for 225,000 arcs after about 10 minutes)."*

"However, when zooming in the lack of a "tiles map" command was apparent - sloooooooooooooooooooooo draws."

An Internet posting of 15 December 94

"We have recently picked up AV2 for the PC, after investigating the beta version. Though the released version is slightly faster, it is still not what I would consider a "production package" either. Our clients area requires 600 tiles per theme and it takes several minutes per redraw. Not to mention, that just using the released version's Atlanta demo, when you try to display all themes, it blows up. This is using a 486 66mhz machine containing 32Meg of RAM. The HP 700 version isn't much better!"

An Internet response of 15 December 94

*"I'm sorry, but I don't know anything about your problem. However, I am very interested in the final solution or formal word from ESRI on your problem. I work for SAIC in [a town] performing defense related **GIS** applications, some using Arc. We are in the process of obtaining our copy of AV2 and Avenue (problems with contracts, but that's another story!), but have not received them yet. I am very interested in building applications using the Digital Chart of the World (DCW) with library tiles and AV2. Since ESRI was the contractor who built the DCE for the DMA, and it contains many hundreds of tiles. I am shocked by their response to you. Obviously, if everyone could get along with less than a hundred tiles, there would be no need for tiling."*

“Although in the past ESRI has been getting very good about answering questions, I am getting very suspicious that they have grown too fast and can no longer keep up with their users. Note that the extremely late delay for AV2 and A/I 7.0. So, better talk to other users if you can’t get the info from the product creators.”

An Internet response of 15 December 94

“Just read your note about av2 and library. I run a site where our library is 800 tiles (5km x 5km each) and just yesterday completed training in AV2. I tackle Avenue in January. ESRI did not have an answer for me either. I want to use AV2 as a front end to replace our customized interface with some customization to AV2. Selecting the library choice in AV2 defaults to the entire library extent - way too slow. There is no quick way around since ESRI is moving to seamless database structure, i.e. Arc Storm. ESRI suggested there may be a way around via extra programming but not sure if it may not be better to break down library into smaller libraries. I plan to press my folks to come up with a solution since our ministry just selected ESRI as our vendor of record.”

An Internet response of 15 December 94

*“I just saw your posting. ARE YOU SERIOUS? Did ESRI *REALLY* say that a 500 tile library was not realistic and that it’s too bad?”*

An Internet response of 15 December 94

“At user Conference in 91 and 92

customer: av1 is cool, but it really needs to do libs.

ESRI: Hey, we understand, you the customer, wait ‘till the next release.

customer: (frowning) ok

At av2 demo, ESRI user Conference 93

customer: Will it do libs?

ESRI: You bet it will!

customer: have you tried it on REAL lib w/ data?

ESRI: I’m sure we have, I’d have to check w/ a programmer on that.

At av2 demo, ESRI user Conference 94

customer: Will it do libs?

ESRI: You bet it will!

customer: have you tried it on REAL lib w/ data?

ESRI: I’m sure we have, I’d have to check w/ a programmer on that.

At av2 “pre-release demo”, 1994

customer: Will it do libs?

ESRI: You bet it will!

customer: have you tried it on REAL lib w/ data?

ESRI: I’m sure we have, I’d have to check w/ a programmer on that.

At av2 training, Dec. 94

customer: It does realistic size libs right?

ESRI: A 400 tile library is not really feasible in AV2 - start up time for opening a project will be loooooonnnnnnnngggggg. The work arounds are all ugly.

customer: I=<***** o-(==< Customer has flame thrower and uses it.”

An Internet posting of 19 January 95

“I have just installed AV2 for Windows, and am finding that it is incredibly slow. It takes 5 minutes just to start the program, and 5-10 seconds to respond to mouse clicks. Before I delete the whole thing and re-install version 1.0, can anyone tell me what I am doing wrong?”

An Internet response of 19 January 95

“What hardware are you running on? I spoke with ESRI(UK) and for the PC Version they recommend (minimum) a 486DX2 66 Mhz with 16 Mb RAM. This may go some way toward explaining the slow operating speed, although you don’t say what hardware you are using. Please feel free to correct me if I am wrong ...”

An Internet response of 19 January 95

*“1st, give some info on the system you are running ARCVIEW 2.0 and then I can help. The thing is we run AV on a Pentium machine and it runs great, of course it is slow, but remember in these days of **GIS**, you need to dedicate a machine to **GIS** and get those other large Applications out of there and then try it. It sounds like a lot of lost costs by doing this, but if **GIS** is an asset, like it is for the company I work for, in the long run, it will be worth it!”*

An Internet response of 19 January 95

“What’s your platform? 386? 286? How much memory? Windows 3.0, 3.1, 3.11? What kind of video card and a bus?”

“I’d recommend not slower than a 486DX-50, 16 MB RAM, and a VESA bus video card.”

An Internet posting of 19 January 95

“ArcView2 will run with only 8 meg of RAM but spends all its time swapping in the Windows temp area. I would recommend that you upgrade to 16 meg or the response will continue to be SSSSLLLLLOOOOWWWW !!!!”

An Internet posting of 19 January 95

“ArcView 2.0 is a win32 application. This means that it is primarily designed to run under windows NT.”

“When Arcview runs under Windows 3.1, then the software has to use win32 extensions which uses windows which sits atop dos. This is why it is so slow.”

“However, it seems too slow in your case. This is probably due to not having more than 16 Meg. RAM (or 16) and a limited size swap space (should not be less than 20 Meg.).”

“If you can have RAM >= 16 and swap space > 20 Meg. the problem will run substantially faster (that is until of course you run into problems with graphics drivers (especially the S3 chip ...).”

An Internet posting of 19 January 95

“Are there any users out there with experience with both MapInfo and ArcView2? I have been using ArcView2 for several weeks producing very complex projects but have encountered unbearable errors with this software that render it unusable. It basically has a nasty habit of destroying your projects, mostly with unexplained “segmentation” errors. After spending considerable time trying to run it under Windows For Workgroups on a Compaq Pentium 60, and many hours dialing tech support, I was told to expand memory to 32mb and the problems would vanish. NO luck. Then I was informed there were serious problems with the Compaq that made it incompatible with the Windows 32-bit extensions. So I got rid of the Compaq and moved up to a Dell Pentium 90, but the exact problems persisted, so it was not a hardware problem after all. Then I was informed the problems was Windows 32-bit extensions and the problem would be gone by moving to Windows NT or Win95 on true 32-bit platforms. So I got the latest Beta 3 Preview release of Win95. Granted, ArcView2 runs much faster on Win95 than before, and some of my bug problems vanished, but it still will crash and trash whole projects to where you can never open them again. So now I’ve been through 2 Pentiums and 2 operating systems with the same problems. My conclusion is the problem is ArcView 2.0c, and I am thinking about returning it for a refund. My problem is I need a very heavy duty mapping program to handle complex plots at the census block group level with many databases joined. Can anyone able to compare MapInfo to ArcView provide some input on how MapInfo compares to ArcView?”

An Internet posting of 19 January 95

“ArcView 2.0 is a win32 application. This means that it is primarily designed to run under windows NT.”

“When ArcView runs under windows 3.1, then the software has to use win32 extensions which uses windows which sits atop dos. This is why it is so slow.”

“I would think that it is more the RAM problem than the win32 functionality.”

“However, it seems too slow in your case. This is probably due to not having more than 16 Meg. RAM (or16) and a limited swap space (should not be less than 20 Meg.).”

“If you can have RAM \geq 16 and swap space $>$ 20 Meg. the problem will run substantially faster (that is until of course you run into problems with the graphics drivers (especially the S3 chip...)).”

An Internet posting of 20 January 95

“If I remember an early conversation when Arc View 2 came out; somebody had actually spoken to two development engineers with ESRI and they had recommended 32Mb of RAM for running ver 2 successfully.....”

*“***** He tried 8Mb, ESRI Boston recommended 12, several people suggested 16, now I hear 32; who’s going to bid 64? going, going, going GONE! :->“*

An Internet posting of 3 February 95

“Help.....Help.....Help.....is needed!!!”

"Is there anyone out in the whole world who has success with printing hybrid files from Arcview 2 to Designjet 650c??? (PC-Windows-Platform)."

"We want to print a view which contains a theme with about 1800 areas and 2 themes containing image-data (ric-format, each about 25 MB). We tried combination of ArcCAD and Cadoverlay (for Acad12 Dos). There we can print (print-files have about 15 MB), but the Acad-Files get too big for effective work (15-20 MB + 35-40 MB image data), working in this combination is very slow and is not economic."

"In fact of that we have tried Arcview 2. It's very slow if we work with images and it seems to be impossible to produce print-files for our plotter. We are working with the newest revision of the HP-drivers (rel. 1.4) and the system (1 GB HD, 32 MB RAM, 486/DX2) needs 11 !!!!! hours to print 1 sheet A0 sized. The plot file grow up to 50 MB."

"First I searched the reason in the printer-setup, then in printer-driver (tested older versions), then in Windows setup (disabled print-manager etc.). It didn't work at all, so I tried to use ArcView export-functions, but I have the same (or nearly the same) results as if I use the HP-driver."

*"I fear I have to give up the hope for an effective **GIS** on **PC**-based Systems."*

"I'm interested in your judgment and experiences."

Arc/Info

An Internet posting of 18 January 95

"I telephoned ESRI Canada today and found out that they do not have a student rate. The present cost of PC Arc/Info is C\$5500 and for Arc/Info, C\$30,000. There is a University/College rate, available only to the institution (not on a student's behalf). The cost then is C\$2500 PC Arc/Info and C\$10,000 Arc/Info."

An Internet response of 8 February 95

"I have a big problem using Arc/Info 7.0.2, hope one of you has a feasible solution or that you report related problems or concerns to ESRI."

"We have an Arc/Info interface that contains about 20000 lines of AML code. It works without problem on Arc/Info 6.1.2. but crashes under Arc/Info 7.0.2 when a named thread is deleted. In some circumstances (that have not clearly been defined), Arc/Info 7.0.2 deletes all existing threads rather than just deleting the selected one! This, in fact, crashes your application."

"A month ago after I contacted ESRI. The company recognized that this was due to an Arc/Info 7 bug. ESRI is allegedly working on it. "In the meantime", the burden is on the users to rewrite their applications. This involves a significant amount of work ... 20000 lines in my case..."

"Threads are the building blocks of applications. Bugs are hard to avoid. But once discovered, I think ESRI should do whatever it takes to PROMPTLY provide a patch to the user community. I think I and other affected users have been patient so far, waiting for a month trying work arounds (which require you to think your whole programming strategy as modal threads have precedence over AML programs, which is not the case of non-modal threads!)."

"If you were in my situation, what would you do?"

An Internet posting of 7 February 95

"I have been working with a regional administration boundary coverage to which I have joined an attribute table using joinitem. The process worked fine until one day while in Tables I did a sort on the data base on a field to identify the upper and lower values and give me an idea of what would make a logical banding in a look up table. Imagine my surprise when I found that my coverage had become scrambled. In checking with our GIS guru I am informed that you can not sort any coverage .pat files as the order in which they are stored is essential to the ARC/INFO topology. Now I find it very odd that given a .pat file with recorded information on the polygon ids that changing the order corrupts the polygon topology. At the very least I would think that there should be a warning built into the sort command warning poor unsuspecting users of the results of sorting a .pat. Or that a sort has been done on a cover so that you know it is no longer a valid cover, very important with shared coverages. I know that someone will say ... 'Oh on page nnn of the manual it clearly says' but I would remind people that the manuals occupy over a metre of my shelf and as the versions seem to change so fast that I am still coming to grips with 6.0 level changes and we are already onto version 7.02 which has only online help and no paper manual. In talking with database specialists I am informed that sorting a relational database is a standard tool which is often used. So am I being unreasonable about being miffed for having to redo a lot of datawork owing to what I think is a stupid flaw in ARC/INFO?"

An Internet posting on 9 July 95

"Arclink 3.0, a free mapinfo product does a great job of transferring files between arcinfo and mapinfo. Call mapinfo for more info."

An Internet response on 9 July 95

"It's not free. Arc/Link costs \$595 unless you are getting the educational discount. However, there are some free utilities that more or less do the jib on the FTP site at ftp.csn.net/mapinfo. Arc/Link works the best though, but you get what you pay for."

AtlasGIS

From the AtlasGIS product manager 16 May 95

"Overview"

"Why Raster Underlay?"

"The ability to display a raster image as a backdrop (underlay) for the features in the map layers (overlays) is useful for the creation of presentations with high visual impact, as well as for the creation and updating of vector maps from scanned paper maps and remotely sensed imagery. The purpose is not to duplicate the capabilities of image processing systems such as filtering, classification, and resampling, although simple contrast enhancement would be a desirable feature."

"Why Script?"

"Atlas GIS 3.0 does not support the designation of a raster image as the map underlay, i.e., the backdrop for all the map features. While it is relatively

straightforward to implement the display of a given bitmap, the development of a complete program with support for multiple file formats, user control over the transformation of raster and map coordinate systems (control points), and on-the-fly vector feature transformation is too large a task to undertake for this release” [i.e. posting].

“Adding raster underlay support to Script, however, allows developers to create application scripts with these capabilities, concentrating on the file formats and user needs particular to their markets. Certain limitations do apply (see below), and bringing a number of applications to market allows us to evaluate whether those restrictions would be acceptable for the feature if embedded in AGIS possibly allowing us to reduce the requirements and the development resources needed.”

“Requirements and Limitations”

[What follows is an excellent 5-page discussion of what is involved in using raster s and in adding this feature via Script. However, one wonders if it is “relatively straightforward”, why not just do a script and post it, and not write the 5 detailed pages since raster image underlay is of such generic interest to most users]

An Internet discussion of 23 May 95

“I have recently received Atlas Script/C. After reviewing the documentation and sample app, I was wondering if anyone has the same impressions I have, that is...”

“We bought Script/C along with Borland C++. After wasting about a month with it we scraped it in favor of Script/VB with Visual BASIC.”

“Script/VB is much better, and SMI tech supports it much more thoroughly.”

“1) Documentation is sparse, at best. There are no chapters on how to actually go about writing a script. The sample script that comes with the app is complete, but really doesn’t illustrate how to put a script together overall. A “hello world” app of some sort would be nice.”

“Not to mention that compiling the sample OWL script under Borland C++ results in GPF’s, even after fixing the AtlasC library as per some instructions I received from SMI tech support.”

“2) The function descriptions are terse, at best, and the examples are next to useless, since they merely consist of on-line statements showing syntax.”

“Agreed, and the same problem exists with Script/VB.”

“I’m a student and will not buy tech support. So I don’t want to comment on the support pain issue. But I do agree with the above (1) and (2) suggestions.”

“3) Atlas Apps sound like a good concept, but have you tried writing one? Again, there is little assistance from the documentation as you muddle your way through - and no examples!”

“I agree on the above three points. I bought Script/C and Borland C++ several months ago. After reading the first several chapters in the documentation and reading the printout of the sample programs very carefully, I realized I could not start on my own. So I looked for help from the sales rep. He forwarded my inquiry quickly to tech support and on the second day I received their reply. I cannot

complain on their attitude. But the advice I got is all I have done: read the manual, look at the sample and start from simple programs."

"Since then, I received several examples from people on this net. But all of these are either in Script/VB or Script for DOS. I never saw a small Script/C example"

*"I have tried with Script/VB. It seems to work, but the documentation really doesn't describe it well, and it took me an hour before I found all the problems in my *.atl file."*

"I would like to see an example of doing this myself."

"Now, FLAME ON..."

"4) This is perhaps the icing on the cake - there is no free support other than this discussion list and a fax-back system, not even for an initial period."

*"So, to make up for a poor manual and a lack of any helpful examples, Atlas wants you to pay \$495 a year for BASIC support!! I guess this wouldn't be so bad, if SMI provided basic documentation or you got something for your extra 500 clams. However all basic support gets you is the opportunity to *fax* in questions - can't have you talking to a live support rep."*

"There is also CompuServe, although that is not free."

"They will acknowledge your fax within 24 hours, how kind. No word on how long it will take to actually get an answer."

"If you want to be able to talk with a live body at SMI about technical questions on Script, that will cost you \$1,500/yr, plus your nickel when you call."

"Actually for Script questions I find it easier to describe the problem with a FAX."

"I guess my main beef with the fax-back system is that I have already received at least 3 responses from SMI via their tech support fax which appeared to be canned responses and were not in the fax-back system."

"It would help me a great deal when I'm up at 11 pm at night trying to work on a problem if these were available via the fax-back system, thus offering me a faster turn around time on responses. Especially if it's a glaring bug, such as some of the documentation omissions I have asked about."

FLAME OFF

*"I would appreciate hearing comments as to whether current users think this is (a) Fair and (b) Reasonable. Hopefully, we can persuade SMI to (1) publish a number of *helpful* samples immediately!! (2) release a decent manual, (3) come up with a support plan that doesn't make a product impossible to use or recommend."*

*"Well the cost of the support plan replaced the high initial cost of the product. We used to pay \$2500 for Atlas*GIS, and \$1000 for Script. This was replaced by the low \$495 prices, and a \$1500 support plan."*

"This allows us, the VAR, to purchase the support plan, and offer our clients better support and a lower price product."

"Before when support was free, it was non-existent."

“Basically we’re happy to pay for support as long as we get a quality product out of it. So far it looks good.”

[MicroImages estimates that free technical support of its products absorb 1/3 the income from the sale of the products over the life of the product]

[this discussion caused a lot of additional postings as follows]

An Internet response of 24 May 95

“I can’t speak for Script/C, only Script/VB. About the only part of your post that I agree with in that context is the difficulty of getting that first app going: a skinny little “getting starting” manual would have been useful.”

“Beyond that, I think that “fee” rather than “free” support is eminently fair and reasonable considering the price of the software that we’re talking about.”

“It cost a lot of money to keep people sitting around waiting for the phone to ring. It gets tougher as the product and support people get more and more specialized. A scripting language is exceptionally tough to support since the vendor typically has no absolute control over the kinds of corners that users paint themselves into.”

“Beyond a certain basic level, I prefer to see support costs borne by the people who actually use the service, rather than being passed along to all of us whether we need the help or not. In other words, I don’t mind paying for my own learning curve, just don’t make me pay for yours. I have no problem with a company going to paid support plans as long as they keep the cost of the software down. I believe SMI has done this.”

“As I said in my post of last week, I think the quality of the support we are ALL getting through this list is exceptional [i.e. free via Internet]. Consider that SMI’s people are posting about 95% of all the answers, while high-powered consultants like you and me get to sit back, read this information, and get smart on their nickel.”

“To sum it all up, I don’t share your concerns. I think each of the products in the Atlas line is a good value, particularly in light of their price points compared to the rest of the industry. I would not hesitate to recommend any of them to a client, provided the product in question is a good match for the client’s needs and abilities. I think we are getting a lot of good-quality support right here for free. And I guess if I ever need more than I’m getting here, I should be prepared to pay for it.”

An Internet response from the original poster of 24 May 95

“I still think, and from my e-mail apparently I am not alone, that the manual for Script/C is weak, as are the samples. Script/VB may be different. I remember the DOS Script manual and samples, both of which did a reasonable job introducing and explaining the use and functionality in the script language. Perhaps this is only a Script/C shortcoming, and really I should look for Script/VB.”

“While I have no problem paying for support, I do have a problem paying for it to make up for a lack of documentation. So I guess what I’m saying is you can’t have it both ways. If Script/VB allows you to get going without support, then by all means, that’s what we should be working with. Today, however, Script/C REQUIRES support, and that is unfair when full support is 2X the cost of the product annually!”

"In closing, I do want to commend SMI in releasing the first fully open scripting environment that is flexible for the developer. Having worked at SMI for a number of years, as well as having co-written several of SMI's commercial application offerings in the AGIS DOS Script language, the trend shown in the Windows' Script language is a tremendous improvement. But PLEASE, improve the docs!!!"

An Internet posting of 26 May 95

"I was wondering if anyone else ran into this situation in Atlas GIS for Windows? Currently you can only link a table to one layer. We have a large table (18 megabytes!) and would sometimes like to link it to two or three layers, to use it in a thematic for each of these layers. I know the work around is to copy the table, and link each layer to a copy of the original. However, this uses disk space and time (and my own memory to keep track of the various names:). Ideally we'd like to maintain only one copy of this large database so we only have one file to update. When we start making copies of this large database, we need to remember to also update the copies of it. I would even accept a limitation that the table had to be set up read-only to be linked to multiple layers." [no response was posted]

An Internet posting by MicroImages of 31 May 95

"I am looking for how AtlasGIS stores data. I have been through the documentation for Atlas and have found no reference on the specific format. The company that I work for is interested in directly importing AtlasGIS data for use within our own GIS software package without having to export to another format in the interim. Any assistance in this matter would be greatly appreciated."

From the AtlasGIS product manager 31 May 95

*"The binary format for Atlas GIS geography files (those with extension *.agf and *.aif) is not a published data format. Users can purchase our Import/Export product to convert files out of popular mapping and CAD formats. Of course there is no stopping you from figuring out on your own how to convert our files to your system - MapInfo did it :-)."*

[Comment: if your chief competitor already has it then why not publish it? However, this public exchange stirred up a hornet's nest of other public posting.]

An Internet response of 31 May 95

"I know the format, but..."

"Unless I've missed something, SMI still guards their internal data format with lawyers. In other words, "if I tell you, they will sue me..." 8-)"

"I heard rumors that they (SML) were going to publish their internal format, but so far, I don't think it's been done."

"I believe this policy is so that third party data vendors cannot sell direct in SMI format without paying SMI royalties. The policy is a bit archaic, but it makes them a buck..."

"Too bad it inconveniences other users that a simply trying to make life easier."

From the AtlasGIS product manager 31 May 95

“SMI exacts no royalties (and never has) from vendors that sell data in the native format for Atlas GIS. While the file format currently is not published and is protected by license agreement there are a number of parties licensed to distribute data this way.”

“Clearly this posting (above) contains information that is incorrect and misleading.”

An Internet response of 1 June 95 [from a firm which publishes data on CDs]

“There are at least two reasons why SMI would want to maintain their formats as proprietary:”

“1) They contain trade secrets that might provide a performance edge over their competitors, and”

“2) To prevent users from relying on internal features of the format that might change. Users can be insulated from these changes by a software interface.”

“I think it is entirely appropriate for SMI to maintain their formats as proprietary.”

An Internet posting to Microlmages of 2 June 95 [from a South African client].

“As a user of MIPS [actually TNTmips] and Atlas GIS I would also like to see the ability of MIPS communicating with Atlas GIS. We do a lot of our data capture in MIPS and then export it to Atlas using the DLG option. This works very well. However, if we want to go the other way, we have to use a DXF interchange file which is not that useful. As SMI has control over their AGF file format I would firstly like to suggest that Microlmages creates a .BNA (Atlas’s ASCII Interchange file format) Import and Export routine.”

“Although I understand the concerns that SMI have in releasing their AGF file format, I would think Microlmages and SMI should discuss a possible closer working relationship on a more formal basis. The reason that I say this is the United Nations Environmental Programme (UNEP) has selected MIPS (GIS and Image Processing) and Atlas (Desktop GIS) as two of its recommended packages for work in parts of the world. The main reasons for this, I believe, is the user friendliness, functionality, and transparency in transferring data between GIS systems. Consequently, if a direct interchange between these two packages was arranged it would further support UNEP’s backing of these two products.”

“Personally, as a user of MIPS and Atlas, I would like to see a strong working relationship forming. MIPS needs the desktop interface capabilities that Atlas offers while Atlas needs the full GIS/CAD/image processing capabilities of MIPS. This would be a fantastic match and would assist both companies going against the likes of Arc-Info, Genamap, MapInfo, etc. I am sure that both companies would enjoy much market penetration with such a partnership.”

“These are just my personal thoughts but I do hope that it possibly becomes a reality in the future.”

An Internet response on 7 June 95 [from same responded as 31 May 95 above to SMI]

“Either you are misleading the readers of this list or are lacking accurate information about the organization you work for because that is exactly what SMI did to [a company name] in Canada. Data being sold in BNA format was one price and data

going out in native format went out at a higher price. I believe the reason I got for this was that a higher price was used to bolster the sales of Atlas Import/Export. This are the facts as I got them when I worked for [same company]. What is your response?"

[there was none]

An Internet response from AtlasGIS technical support, date unknown

"1) The Atlas GIS format for geographic data storage is a proprietary format that at this time is not available to the general public for use. This format is called the Atlas Geographic Format, and consists of several files, including the AGF files. In order to create or modify an AGF file, the consumer must use one of the programs sold by Strategic Mapping, Inc. that has been designed for this purpose, this includes, but is not limited to, Atlas-GIS for DOS, Atlas-GIS for Windows, and Atlas Import/Export."

"Atlas GIS products can be used to create or modify existing files in the AGF format. Atlas Import/Export can be used to transfer data in other formats from a variety of sources into the AGF format."

"The BNA format is our public format and is the easiest touse for creating, editing and transferring data."

"2) The Atlas ASCII format, or BNA format is an ASCII, or text, format for storing geographic data. The following is a VERY brief description of the BNA file format."

"(note, I use comma delimited for examples here, but BNA files can be tab, but BNA files can be tab delimited as well). There are four possible feature types in BNA, but they all follow the same format:"

NAME1, <NAME2,><NAME3,>n

X1,Y1

.

.

Xn,Yn

"Where NAME1 is the primary name, NAME2, and NAME3 are the optional names/ids, n is an integer (not equal to 0 or -1), and X1,Y1 to Xn,Yn are the coordinate pairs describing the feature."

"-If n is a positive number greater than 2, then the feature is a REGION, the number of coordinate pairs listed is equal to n, and the first and last coordinates must be the same (for closure of the polygon). Also, note that the coordinates must be in the same order that they would be in if one were to follow the perimeter of the polygon from coordinate to coordinate."

"-If n is equal to 2, then the feature is a CIRCLE, the number of coordinate pairs is equal to 2, where X1,Y1 is the center of the circle, and Xn is the radius of the circle (note that Yn is ignored)."

"-If n is equal to 1, then the feature is a point, the number of XY coordinates is 1, and it is the coordinates for the point."

"If n is equal to -2 or less, then the feature is a line, the number of coordinate pairs is equal to -n, and the coordinates must be in the order that they make up the line."

"A couple more general notes:"

"The Name values must be surrounded by quotes (and they are string values, not the number by definition)."

"All coordinates must be in decimal format (you cannot use degrees, minutes, seconds for Lat/Lons), they are in X value, followed by Y value (Lon/Lat rather than Lat/Lon), and they follow the correct conventions for sign (longitude should be negative)."

"Most regions can be drawn with a single polygon; however, some regions must be drawn using more than one polygon. These would include regions that have Lakes inside them or islands outside them. The formatting for these features is beyond the scope of this email, but if enough people are interested, I can post these instructions separately."

"If anyone has any questions about this format, please feel free to post to the AGIS-L server, and I will be happy to answer them. In the meantime, I will try to work with [a name] to get a better description on the FAQ/FTP, the WWW, and the FAX BACK server."

[So why not publish a complete, technical description of the BNA format? That is all that MicrolImages and others have asked for in the first place.]

An Internet posting of 30 June 95

*"I would like to know if it is possible with Atlas*GIS for Windows to create a map where each point would be represented by a pie chart?"*

An Internet response from AtlasGIS technical support 30 June 95

"Atlas doesn't have any built in support for pie charts."

An Internet response from AtlasGIS technical support 30 June 95

"However, it would be possible to do this with Script, and in fact SMI has begun work on a script that would do this (theoretically an AtlasApp that would be sent out free to customers who need it)."

"I am not saying this would be done anytime soon, but would definitely be possible by anyone with Script/vb or Script/c (and maybe as add-on to handle better charts). If anyone wants to attempt this, let me know, and I would be more than happy to help with pointers or strategy tips."

"Note to developers -- this script has been asked for a lot, it is a possible script that could be sold, from the number of people asking for it. I don't know who here at SMI would be a good person to talk to about that, but I could find out if anyone was interested."

From an Internet request to MicrolImages of 21 July 95

"A few months ago you were kind enough to respond to a post of mine in the comp.infosystems.gis.newsgroup (I work for an environmental consulting firm looking for a GIS application suited to our needs - we presently have Atlas GIS and

*find it too marketing oriented). I am interested in receiving information on **TNTmips**, specifically on the PC Windows 3.1x platform. Please send info to: ..."*

An Internet posting of 24 July 95

"I've recently purchased Atlas GIS for windows, and am required to run the program using a hardware key. I installed the program on my notebook, and it worked fine. I then installed it on my desktop, transferred the key, and no joy, I get the message "No Hardware Key Present" or something to that effect. I checked the parallel port and there is nothing wrong with it, in fact I run Arcview, with a hardware key, without any problem. Can anyone suggest a solution, I've tried all the solutions I can think of!"

An Internet response from SMI technical support 26 July 95

"There are a couple of things that I have noticed with AGIS hardware Keys:"

"1.) they do not work under Windows NT. It has something to do with the way NT handles I/O. I have not done any testing, nor seen any testing with Win95, so I have no idea how it would work there. If you are using either of these operating systems, it would not work."

"2.) I have seen parallel ports that barely are able to hold the keys on. I am not suggesting that you break your computer, but there is a computer here that the key must be VERY firmly pushed in, in order to be seated correctly. This tends to be truer for notebooks, where there is not much room for the parallel port, but it is possible that it is true of desktops as well (especially the smaller ones without much room on the back)."

"3.) if there is anything odd about the parallel port (it is really a 25-pin port, it uses an old i/o card, there is a weird mold growing on it), you might want to try getting a new one. IO cards with new parallel and serial ports on them are not very expensive these days."

An internet posting of 25 July 95

*"We are running ATLAS*GIS f. Win. under Windows for Workgroups on a Pentium with 16 MB RAM. After using it successfully for about a month, we are getting a "General Protection Fault" error in module AGIS.DLL at 0066:055A when trying to start it from the program manager. The program crashes while trying to load the default settings. Initially there are 68% free resources (no other program running...). Re-installing the program didn't help. Does anybody have a hint where the problem might be? Thanks in advance."*

An Internet response from SMI on 25 July 95

"Possibly. It sounds like some sort of system issue. There are many things to check -- virtual memory, video display driver, config.sys/autoexec.bat, and others. I would suggest going through the regular tech support, as they are very good at tracking these sort of things down. To get started, I would close windows, type MSD at the dos prompt, go to File, and choose Print Report. Accept the default report, and give it your info. It will print a 20-30 page report, which you can send to Tech Support. This really saves a lot of time tracking down problems that appear to be system related."

