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Sharing Geodata with Other Popular Products

with

TNTmips®
TNTedit™
TNTview®

Before Getting Started

MicroImages realizes that although the TNT products provide all the features you need for your GIS, image processing, and map making tasks, you may need to acquire data from other sources or share data with people that don't have the TNT products. You may also want to produce multiple page reports or syllabi that include color illustrations. To make such projects as effortless as possible, TNTmips® and TNTedit™ support import and export of numerous other file formats (TNTview® and TNTlite® support import only). Import and Export are the topics of two other tutorial booklets; this booklet is concerned with the direct use or creation of data in other formats.

Prerequisite Skills This booklet assumes you have completed the exercises in the *Displaying Geospatial Data* and *Navigating* tutorial booklets. The exercises in those booklets provide basic knowledge on how to use the TNT products including how to select and view raster, vector, CAD, TIN, and database objects stored in Project Files. This booklet does not present these basic skills again.

Sample Data The exercises presented in this booklet use sample data distributed with the TNT products and data you may have in other formats. If you do not have access to data in a specified format, skip the exercise. The exercises in this booklet use the files in the SHARING directory, the LAYOUT Project File from the MAPLO directory, and the MIDMAP Project File from the GEOLMAP directory of DATA.

More Documentation This booklet is intended only as an introduction to sharing data with other products. Consult the TNT reference manual for more information on each of the many processes referenced.

TNTmips and TNTlite™ TNTmips comes in two versions: the professional version and the free TNTlite version. This booklet refers to both versions as "TNTmips." If you did not purchase the professional version (which requires a software license key), TNTmips operates in TNTlite mode, which limits the size of your project materials and does not permit export. Some of the exercises in this booklet, such as the exercises on EPS, SVG, editing ARC/INFO and ArcView without converting to internal format, and saving tables to be read by Excel, cannot be completed in TNTlite because of the export limitation and/or lite limits.

Merri P. Skrdla, Ph.D., 5 May 2005
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Welcome to Sharing

MicroImages is in business to help you get your GIS, image processing, desktop cartography, CAD, and surface analysis projects, among others, done by providing the best software with the most features and excellent technical support. Since you can do all the tasks you need in the TNT products, why would we expend considerable effort on sharing data with other products? Because Micro-Images understands that data comes from many sources, and you may need to work with others that don't have the TNT products. And although TNT-mips supplies the tools for all the aforementioned tasks and more, it does not do everything. For example, although you can create complex maps and other page layouts in TNTmips, it is not well suited for producing multiple page reports or a course syllabus. So a variety of methods for sharing information with such products is provided.

The sources for acquisition of geodata in other formats and how to import them into TNTmips are the subjects of other booklets in this series (*Acquiring Geodata* and *Importing Geodata*, respectively). This booklet focuses on how to use files in TNTmips and in other software packages without relying on data import and export. The main issue is to get the job you need done as easily as possible regardless of the platform or operating system you use. Because TNTmips is available for all popular platforms, including Mac OS X, Windows (98, NT, 2000, ME, XP), Linux, and a variety of Unix platforms, it is most likely available for the platform that is the source of the material you want to also use in TNTmips.

The trademarks for TNTmips, TNTedit, TNTview, and TNTlite are the property of MicroImages, Inc. All other trademarks and logos are the property of their respective companies.
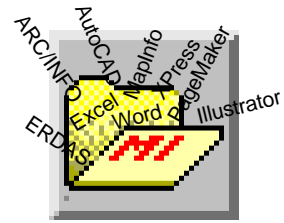
Vocabulary: A **link** is a connection to data in an external format that allows it to be used in the TNT products but retain its original format.

STEPS
- ☑ launch TNT
- ☑ use General File Maintenance or your operating system tools to copy the Project Files and files in other formats in the SHARING data collection to your local drive

Pages 4 and 5 describe system level screen capture. Pages 6–8 address capturing and inserting TIFF files in a variety of software packages. The exercises on pages 9–14 discuss sharing layouts, rasters, text and 3D animations with other software packages. Using databases as a source of information in TNTmips and database or spreadsheet software is described on pages 15–17. The direct editing and conversion of ARC/INFO and ArcView files are presented on pages 18–20. Use of Oracle Spatial data is discussed on p. 21. General sharing issues are discussed in the remainder of the booklet.

Screen Capture to the Clipboard

If you are running on a Macintosh only or under Unix, skip the steps in this exercise.

STEPS

☑ launch TNT

☑ choose Display / Spatial Data

☑ open groups and add layers as desired

☑ press the <print screen> key

☑ launch an application that accepts input from the clipboard and open a new document

☑ choose Paste (usually found on the Edit menu)

☑ select the desired part of the screen capture and crop if necessary

Note: If you use <Alt><print screen>, only the window for the active application is captured. In the case of TNTmips running in X Desktop mode, the X Server and all open windows are captured (without the Windows taskbar).

The background color for MI/X is set to white in this screen capture. White is a good color choice for the background when you will be cropping the screen capture and printing it from a word processing or page layout package.

The key stroke(s) used for capture of the current screen image varies with your operating system and keyboard. The operating system also determines where the captured image initially resides. Windows 98, NT, 2000, ME, and XP have system level screen capture using the Print Screen key on the keyboard. This key is generally found near the keypad or function keys. You may have to press the <shift> key as well on keyboards that have two functions assigned to this key.

Everything on the screen, including the X Server title bar and the Windows taskbar (if showing) are part of this screen capture. The one thing not captured is the cursor.

The screen capture becomes the current contents of the clipboard, which can then be pasted into any application that accepts clipboard input, such as Word or PageMaker. For most purposes, you do not want the entire contents of the screen and need to paste the clipboard into some intermediate product for cropping if your destination program does not provide this feature.
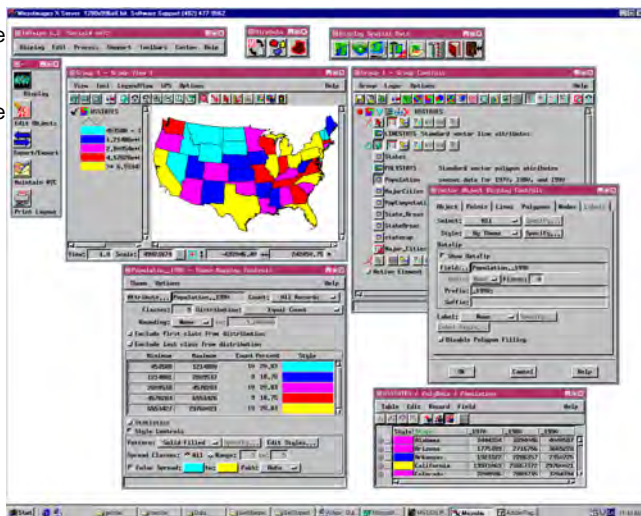
Screen Capture on the Mac

Unix platforms have no system level screen capture functions and must rely on various screen capture utilities. Mac OS X does have system level screen capture, but it differs somewhat from that in Windows systems. To make a screen capture on the Macintosh press the Command (key with cloverleaf and open Apple), Shift, and 3 keys simultaneously. Power Macs generally have a Print Screen key on the keyboard, but this key works only with PC emulation programs.

A Macintosh screen capture is not saved to the clipboard, but rather to a file on the desktop. These files are in PDF format and named Picture 1, Picture 2, and so on. Thus, you can capture multiple screens without overwriting previous captures.

Older Macintosh operating systems captured the cursor, which Windows and Mac OS X do not do. Older Mac operating systems also store screen captures in PICT format.

If you are running under Windows or Unix, skip the steps in this exercise.

STEPS
- ☑ launch TNT
- ☑ choose Display / Spatial Data
- ☑ open groups and add layers as desired
- ☑ position the cursor to enhance or at least not obscure your screen capture
- ☑ press the <⌘>, <shift>, and <3> keys
- ☑ launch an application that can place or open a file in PDF format
- ☑ choose the appropriate command and select the Picture n file (last created) from your startup drive
- ☑ select the desired part of the screen capture and crop if necessary
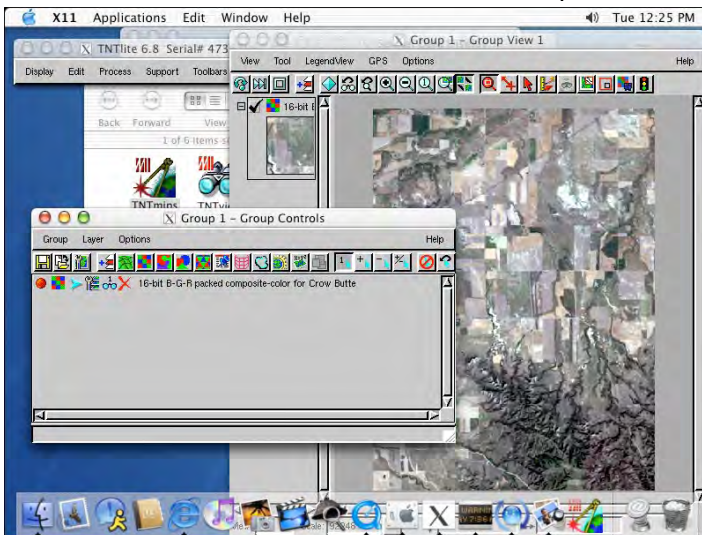
This screen capture was made in Windows desktop mode. The X desktop mode generally makes for cleaner screen captures of multiple windows.

TIFF Capture in X Desktop Mode

Note: this exercise will not work on a Macintosh.

STEPS

☑ replace TNTSERV.TWM in the TNT product for your current version (e.g. TNT_70) with the file in the XWDTIFF folder with the SHARING data

☑ copy the XWDTIFF folder with the remainder of its contents to your MicroImages folder

☑ create a screengrab folder on your c: drive

☑ exit and restart TNTmips

☑ hold the right mouse button down anywhere over the X Server background and choose Frame1 from the menu that pops in

☑ click on the main menu or toolbar and wait for the file to be written* (cursor changes when done)

☑ repeat step 6 but choose Box1, position the cursor at the upper left of the main menu bar and pull out a box large enough to include the main menu and drop down menu of your choice, then click on the menu and wait until the file is written before letting go

TIFF (Tag Image Format File) is a series of file formats adopted by Microsoft, Adobe, and others for the transfer of raster images. It can be inserted in word processing, page composition, and graphics programs on both Macintosh and PC platforms.
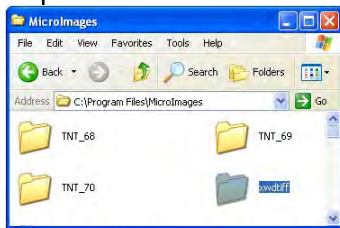
The means to save a selected window or portion of the X server area as TIFF is provided with the data for this tutorial. The right mouse button window manager menu has been customized to provide easy access to this feature. The output file name is part of the screen capture specification, so multiple entries for the same operation allow you to use the feature more than once before having to either insert or rename files without losing previous captures. The bit depth of your display determines the pixel depth of the file captured. Consult the reference manual for other methods and more details.

The "frame" operation captures the window you click on after the cursor changes to the crosshair shape. Any parts of other windows that overlay the selected window will also be captured. The only delayed actions that can be captured are changes in focus. The "rubber" operation captures the area you select with an elastic box and can capture delayed actions, such as opened menu cascades. Position the corner-shaped mouse cursor at the upper left of the area you want captured, then hold the left mouse button as you drag a box to the desired size.

name that shows on TWM right mouse button menu

* If you don't get any output files, check that the paths in tntserv.twm are correct for your machine.

path to your TNT products

path to your output files

"Frame1" f.exec "c:/Program Files/MicroImages/xwdtiff/xwdtiff -frame -out c:/screengrab/aframe1.tif"
"Box1"   f.exec "c:/Program Files/MicroImages/xwdtiff/xwdtiff -rubber -out -sleep 5 c:/screengrab/box1.tif"

time to drop down menus between drawing box and when screen capture starts

TIFF into Word or Page Composition

You created two TIFF files in the previous exercise that you can bring into any word processing, page composition, or graphics program that supports TIFF. Such programs include Microsoft Word, Adobe PageMaker, Quark XPress, Macromedia Freehand, Adobe Photoshop, and so on. The method for inserting a captured TIFF graphic will vary with the application, it is typically found on either the File or Insert menu (such as File / Place, Insert / File, or Insert / Picture).

The simplest installation of a product may not be sufficient to insure successful TIFF placement. For example, with some products you must install a TIFF translator or you will get pages and pages of mostly indecipherable text instead of an image. You can also do this exercise using JPEG, BMP, or other commonly available file formats.

* Starting the name with an "a" makes it quicker to find in a file list.

XWDTIFF window captures are inserted directly into the Microsoft Word version of the TNTmips Online Reference Manual.

STEPS
- ☑ launch the application you intend to add your screen capture to
- ☑ open a new document or a file into which you would like to insert the graphic
- ☑ choose the appropriate command for the open application and select AFRAME1.TIF
- ☑ repeat step 3 and select BOX1.TIF

aframe1.tif*
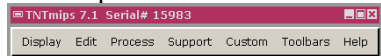
box1.tif

Six images captured with XWDTIFF have been placed on the Adobe PageMaker page shown below.
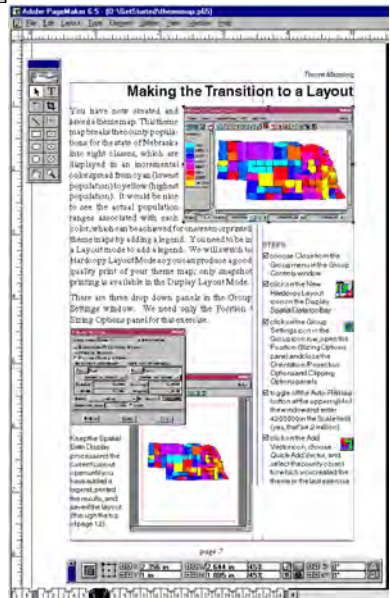
TIFF/GeoTIFF into TNT Products

☑ choose Display / Spatial Data and open a new 2D group (if necessary)

☑ click on the Add Raster icon, choose Quick-Add Single, and select aframe1.tif (from the exercise on page 6) by clicking on the Look in File icon then the Raster icon

☑ click on the redraw icon if not automatically drawn

☑ click on the Zoom 1X icon

Note: Many geospatial images come in geotiff format, but they are rarely lite-sized.

TIFF/GeoTiff can also be imported or linked to in the TNT products. When directly selected, TNT creates a *_tif.rlk file that contains pyramids and other subobjects used by TNTmips. However, you may find that bringing TIFF captures of TNTmips' windows into the TNT products can be disconcerting; you may start pushing buttons or try making menu selections and wonder why nothing happens.

Artistic images prepared in graphics packages can easily become part of a TNT layout. Graphic elements, such as logos, are placed and sized as separate groups, and, thus, require no georeference for use. Other graphic elements, such as a sunset or night sky for replacement of the original sky in landscape photographs require some simple georeference, which can be introduced either in the georeference or mosaic process, or by use of the group placement tool to interactively position and size layout components.
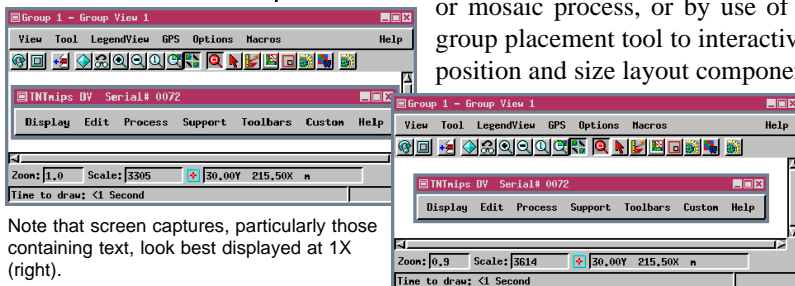
Note that screen captures, particularly those containing text, look best displayed at 1X (right).

The montage below is a layout with three separate groups positioned with the Placement tool in Spatial Data Display and captured with XWDTIFF. The landscape and moon were initially in TIFF format. The sky was generated by SML within TNT. Note that relative size and placement of layout components are easily altered, as with the moon in this layout. See the tutorial booklet entitled *Making Map Layouts* and the Reference Manual for information about the Placement tool.
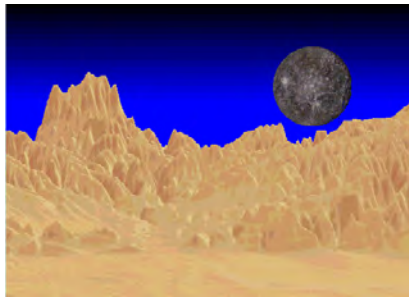
Convert Layouts to PDF

You can convert layouts to Adobe's Portable Document Format (PDF) in the Spatial Data Display process by choosing to print to PDF. Anyone can view your layouts using Adobe's free Reader available for download from their web site or from ours.

You have the option of linking to system fonts, embedding fonts, or rendering text. You do not want to link to system fonts unless you are sure that the people who will view your PDF document have the same fonts. Embedding fonts makes it more likely that the text will appear as designed, but copyrighted fonts cannot be embedded. Rendered text will have the same appearance as it did in the layout, but it will not scale well and is not editable.

Because this is a print process, you must use a hardcopy layout. Print to PDF is not available when running TNTlite.

STEPS
- ☑ in Spatial Data Display, open the Millington layout in the LAYOUT Project File in the MAPLO folder of DATA
- ☑ choose Layout / Page Setup, turn on the Printer toggle, then click on Model, and select Adobe Acrobat File (pdf)
- ☑ make sure the File toggle is on, then click on [File]nd create a new file
- ☑ check that layout components are still within the margins at this slightly different page size
- ☑ click on the Print icon
- ☑ open the PDF file created in Acrobat Reader
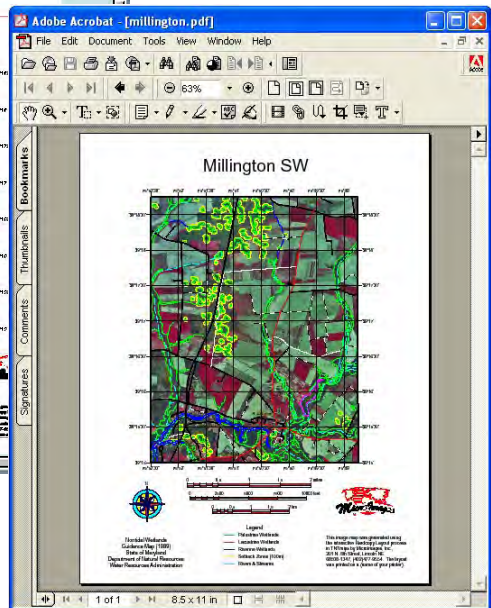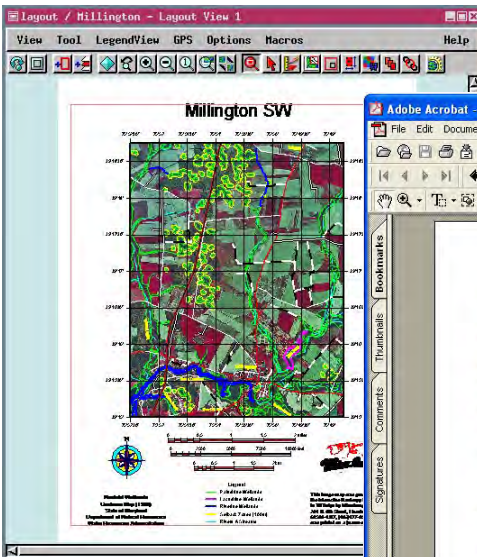
The original layout is shown above in TNTmips and the file that results from printing is at the right in Adobe Acrobat.

Direct Use of MrSID, ECW and JPEG2000

STEPS

☑ go to http://www. microimages.com/prod- ucts/tntsim LandscapeFiles.htm and select any of the files with a .zip extension

☑ unzip the file and note the contents

☑ launch TNTsim3D and select the Landscape File from the collection of files you unzipped or double click on the *.sim file

☑ explore the landscape (consult the *Using TNTsim3D* booklet if necessary)

When you export to JP2, you also get a *.rlk file with objects used by TNTmips, such as color maps. When you use the Landscape Builder to create your JP2 files, each pyramid tier is a separate *.jp2 file.

As higher resolution imagery has become available, file sizes have greatly increased. Distributing an atlas or simulation on CD-ROM or aquiring images by download may require serious compression. The TNT products let you directly select JPEG2000 (JP2), ECW, and MrSID* formats for use, just as with TIFF files. You can also export to ECW and JP2 formats so you can distribute your data for use with TNTatlas or TNTsim3D. The Landscape Builder, which produces the files for use with TNTsim3D, lets you choose JP2 as an output raster type.

Although images large enough to make compres- sion worthwhile are too large for use in TNTlite, they can be viewed by anyone using TNTatlas or, if associated with Landscape Files, in TNTsim3D. As with TIFF files, an associated *.rlk file is created that contains the accessory information, such as georeference, pyramids, color maps, and so on.

A variety of compression options are available dur- ing export. Lossy compression is not suitable for rasters you intend to use in most image processing and analysis tasks, but are well suited for display purposes. Use JP2 lossless com- pression or MicroImages' standard lossless compression for such im- ages.

* ECW is supported for Windows only.
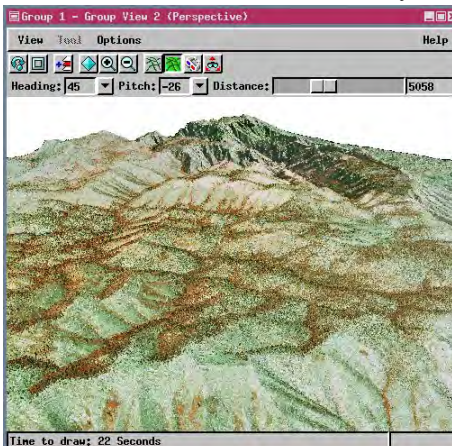
Display of JPEG2000 images in TNTsim3D (right) and TNTmips (above).

Sharing Text

There are many different instances in which sharing or moving text between TNT and other products is desirable. Many TNT processes, such as Feature Mapping, Automatic Classification, and Database Save As, create text files as part of their output. These files can be incorporated in reports you are generating in a word processing or page design program. Text groups in layouts and metadata can be read from external files maintained by a word processor, which makes features such as spell-checking available for use on these text files.

You can edit externally linked text files used in layouts or as metadata and the changes will appear in the layout or metadata the next time it is viewed—as long as the name of the file remains the same and it remains in text format.

A single metadata file can be copied or linked to as many objects as desired. The same is true with text files and layouts. If all your layouts include informative text about your company with contact information, you can maintain a single master text file with this information and insert it in every layout you generate (choose File / Open in the Text Layer Controls).

STEPS

☑ choose Support / Maintenance / Attach Metadata

☑ navigate to and double-click on the CB_TM Project File in the CB_DATA data collection

☑ click on the Add All icon, then click [OK]

☑ select LANDSAT.TXT in response to the "Select metadata file to attach" prompt

☑ turn on the Attach Metadata as Link toggle button in the Metadata Properites window

☑ click [OK]

If you attempt to attach metadata to objects that already have it, you are asked whether you want to replace the existing metadata. If you reply "No," metadata is attached only to objects initially without it.

Turn on this toggle button to maintain the metadata as a single text file linked to all the objects selected.
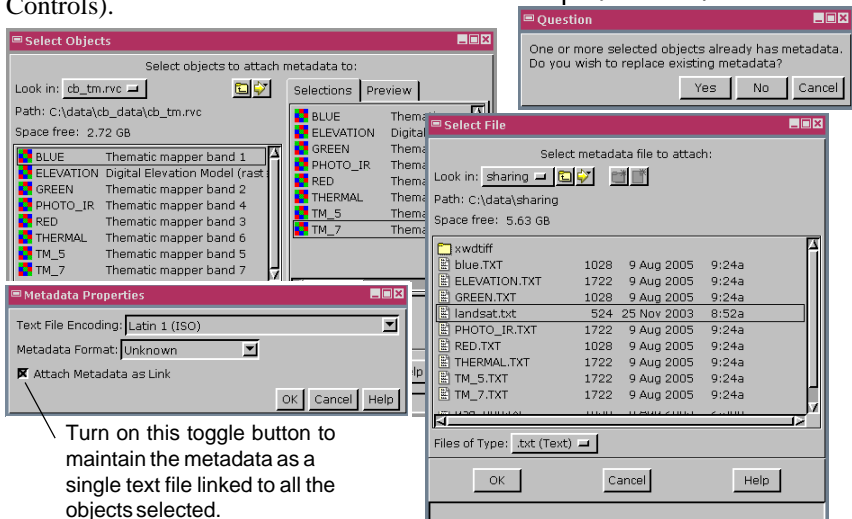
Layouts from TNT to Illustrator

STEPS

☑ click on the Open icon in Spatial Data Display, choose Open Layout, and select the STAIR LAYOUT object in the STAIR Project File in the SHARING data collection

☑ choose Print from the Layout menu in the Layout Controls window

☑ click on [Model] and choose Adobe Illustrator File* from the scrolling list

☑ click on [File], then on the New File icon, and type in STAIR in the field in the New File window

☑ click on [OK]

☑ launch Adobe Illustrator

☑ choose File / Open and select stair.eps

☑ add a background or make changes to existing elements

* Adobe Illustrator File and EPS File will not be a choice in the Printer Selection window if you are running TNTlite.

TNTmips supports printing to Adobe Illustrator's native format (*.ai) in addition to other formats, such as EPS (encapsulated PostScript), which can be opened by Illustrator.

AI and EPS formats are intended for line data. Raster objects can be converted to AI and EPS but they become unwieldy. For example, the AI file created in this exercise is about the same as the Project File with the CAD object (97 Kb and 88 Kb, respectively). Conversion of the desert landscape raster shown on page 8 to AI results in a file about 60 times the size of the original Project File containg the raster (664 Kb raster increases to 46 Mb AI file or 2 Mb EPS file).

Additionally, vector, CAD, and TIN starting materials can be altered in Illustrator either as a whole (color change) or as individual elements after ungrouping. EPS files can also be placed in page layout software but cannot be edited there. Placing EPS files rather than screen captures allows for greater resolution of line data in page layout programs.
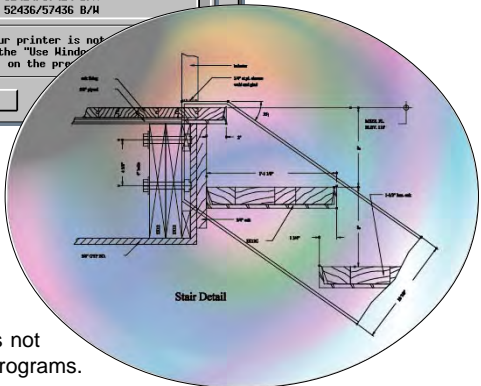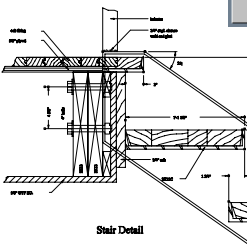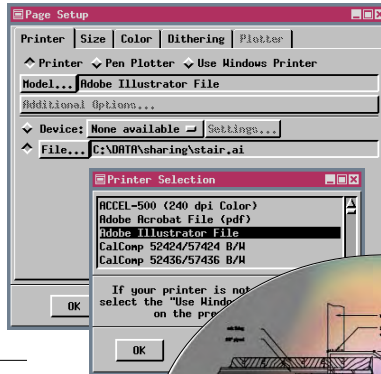
Illustrator lets you add embellishments not supported by TNTmips or page layout programs.

Layouts to SVG

Scalable Vector Graphics (SVG) format is an XML-based language well suited for web use. Adobe provides a free plug-in for your browser to display SVG. The textual content of these graphics can be searched, indexed, and internationalized. Rasters in the layout can be embedded or linked to in PNG or JPG format. Conversion of layouts to SVG is an operation that is not available to TNTlite users. However, there are a number of layouts converted to SVG format posted at http:www.microimages.com/documentation/SVG.htm that anyone can view over the web. The options used in this exercise add JavaScript to the file so you can get DataTips, make measurements, turn layers on/off and have coordinate readout.

STEPS
- ☑ go to http://www.adobe.com/svg/viewer/install and download and install the latest SVG viewer
- ☑ open the layout in the MIDMAP Project File (GEOLMAP folder)
- ☑ choose Layout / Render to SVG
- ☑ set your options as shown at the bottom left
- ☑ click on [Render to SVG] and create a new file
- ☑ double click on the file you created
- ☑ right click over the layout in SVG and turn layers off and on
- ☑ create another SVG from the same input using different options and view the result

For additional information on SVG, refer to the color plates on MicroImages' web site.

The maps illustrated are available from MicroImages' web site.
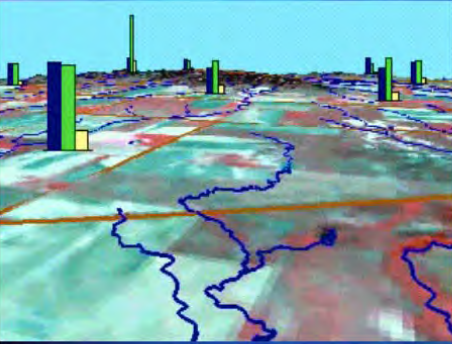
3D Animations in PowerPoint

STEPS

☑ click on the 3D icon in Display Spatial Data, choose New 3D Animation, and set up the layers, flight path, and parameters as desired*

☑ choose File / Record Movie in the Path Controls window

☑ launch PowerPoint and start a new presentation or open a previously saved presentation

☑ choose Insert / Movies and Sounds / Movie from File and select the .mpg or .avi file created in the previous step

☑ annotate the rest of the slide as desired, save it, and choose File / Pack and Go

The TNT products provide the ability to generate 3D animations and save them as mpeg movies for play back. A shortcoming of mpeg players is that all they do is playback the movie--the only annotation is the name of the file in the title bar. More information is generally desirable, even if you're the only one viewing the movie. It is particularly important if you want to distribute the movie and you will not be present to act as narrator when the movie is played.

PowerPoint provides the ability to incorporate the movie within a presentation slide and add text, a logo, and whatever else you want as part of the same slide to annotate the movie. This slide can then be packaged into a run-time file that presents the information and plays the movie in response to a mouse click without requiring the viewer to have PowerPoint on their machine.

*If using TNTlite, which does not allow movie preparations, you can select cb_sim.mpg.

Mineral Concentrations in 3D Animation

The movie at the left shows an "aerial pass" at 1500 meters (absolute elevation) of the Crow Butte area. The color-infrared image of the terrain has roads a hydrology overlaid. The pinma layer shows selected mineral concentrations centered over th collection sites. The movie was generated in TNTmips.

Click on the image to play the movie.

Direct Linking to Databases

Databases can be quite large and are often maintained and updated by someone other than the primary users. Linking to a database, rather than importing a copy of it, lets you always have access to the latest information if you are linked to an externally maintained file. The amount of disk space required for a link is minimal (36 Kb Project File establishes the link to a 58 Mb file on CD-ROM in one example). Also, when you are linked to a database on read only media, such as a CD-ROM or a fileserver for which you do not have write permission, there is no danger that you can accidentally change some of the data.

TNTmips supports direct linking to dBASE III/IV, R:BASE, FoxPro, and ESRI's INFO format. Direct linking means that TNTmips can read and write to these formats without the requirement for ODBC drivers or setup (see next exercise). If you can write to the database you link to, you can add records if necessary after the link is established using either TNTmips or the program that initially created the database. You can also sort records without ill effect unless they are directly attached to elements in a vector (or other) object. Sorting records will scramble attachments if records in a linked database are directly attached to the elements.

You can display linked databases as pinmaps without any further processing provided geographic coordinates are included in each record. Here the cities with population > 25,000 are drawn in red and others are drawn in blue.
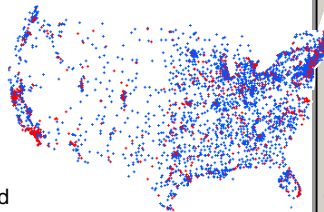
STEPS
- ☑ choose Process / Import and set the Filter to Database Table
- ☑ select format for which you have data
- ☑ click on [Select Files] panel to select the file
- ☑ click on [Next]
- ☑ in the Import Parameters window, click on the Link Only button and press [Import]
- ☑ create a new database object to import to

Import Parameters

☒ Link Only

Text Encoding: ASCII ▼

[Import] [Cancel]

v_genpop / PointData / TABLE

Table Edit Record   Help

☒ Attached Record 525 of 3733 (1/1 attached)

|	
CITYNAME>	CARIBOU, ME
CITYCODE:	2310565
STNAME:	MAINE
MANAME:	
DMANAME:	PRESQUE ISLE
BEANAME:	Bangor, ME
DIVNAME:	NEW ENGLAND
REGNAME:	EAST
LAT:	47015512
LONG:	-67984730
POP:	9415
TOT_EMPL:	4272
EASIQLIFE:	1
FAM:	2660
HH:	3626
AVEHHSIZE:	2.60
URBANPOP:	6838
RURALPOP:	2577
MALEPOP:	4595
FEMPOP:	4820
WHPOP:	9172
WHNonHPOP:	0
BLKPOP:	55
ASIANPOP:	60

Using Excel with TNT Database Tables

STEPS

☑ choose Display / Spatial Data and open a new 2D group

☑ click on the Add Vector icon, choose Quick-Add Vector, and select the object in the STATES Project File in the SHARING data collection

☑ click on the Show Details icon for the vector object, then on the Show Tables icon for polygons

☑ click on the View Table icon for the POPULATION table

☑ choose Save As from the Table menu, set the format to dBASE III* with All Records and Data Values selected, and click [OK]

☑ click on the New File icon, and name the output file USA_POP

☑ launch Microsoft Excel, choose File / Open, set the file type to All Files (*.*), and select USA_POP.DBF

☑ click on the Chart Wizard icon and make your chart

There are a couple of different methods for communicating between tables in TNTmips and spreadsheets in Excel. You can read Excel spreadsheets in TNTmips if you have set up an ODBC data source for the Excel file (see the next exercise). You can also maintain a .dbf file (dBASE III/IV format) and use it in both TNTmips and Excel.

Additionally, you can save an entire table, its statistics rows, or selected records as a .dbf file while viewing the table in TNTmips. This .dbf file can be taken directly into Excel for charting. Excel provides a number of different chart styles, one of which is illustrated below. You are, of course, not limited to making charts in Excel; you can use any of its features.
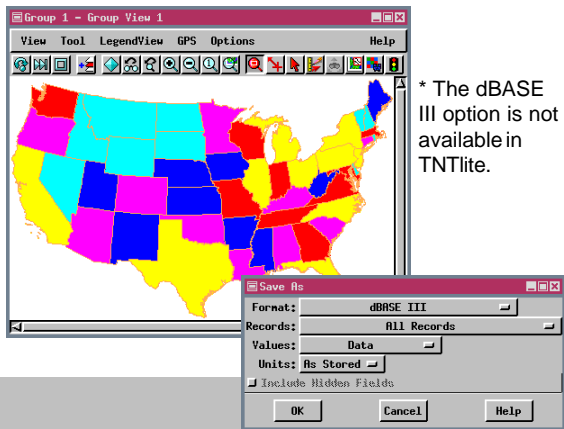
* The dBASE III option is not available in TNTlite.

Databases and ODBC

Open Database Connectivity (ODBC) is a cross platform interface specification that can be used with the TNT products for direct access to database tables in many different formats. If the vendor of the database management software you want to use provides ODBC drivers, you have access to databases in those formats, such as Oracle or Excel. You need to define ODBC Data Sources before you can use them in the TNT products. ODBC Data Sources can be defined at the system level or from within TNTmips' import process. The method for defining data sources is described in the booklet entitled *Managing Relational Databases*.

Once your ODBC data sources are set up, you can choose to import or link to the tables in external format. The arguments and restrictions for linking or copying are pretty much as described in the previous exercise, except that records in tables linked through ODBC cannot be directly attached to vector (or other object) elements; they must be indirectly related through a primary key in a table in internal format. ODBC is, however, more tolerant of table editing than direct linking through TNTmips. You can, for example, change the order of fields in an external editor without ill effects.

Note: If you have to turn off this toggle to show tables for the selected database, you should probably copy it instead of using the method on this page. If a table does not have random access capability, you will not be able to relate it to any other table or modify it.

STEPS
- ☑ with the vector object displayed from the previous exercise, click on the Make Table/Form icon for the polygon database, and choose Link to Data Source

- ☑ choose MS Access Database, then select DB.MDB
- ☑ click on StPopCap in the Tables panel, then on [Add] and [OK]
- ☑ right click on the newly linked database, and choose Edit Definition
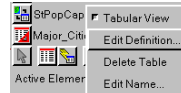
- ☑ on the Table Info tabbed panel, check that the attachment type is Related Only, then click on the Field Info tab, set the Relate to key option menu to STATES.STATE_NAME and click [OK]

- ☑ select elements and note attachments
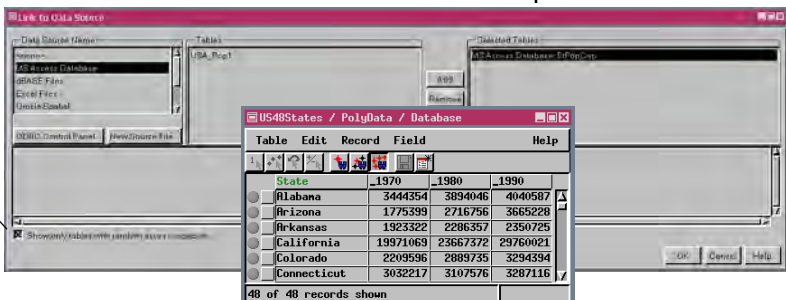
Direct Editing of ARC/INFO Files

STEPS

☑ choose Edit / Spatial Data

☑ choose File / Open External / ARC/INFO E00* and select the E00 file you want to edit

☑ set the appropriate options to get the attributes you want, and click [OK]

☑ add reference layers as necessary, then add, delete, or edit elements

☑ choose File / Save As and name the output file

* select Coverage instead if you do not have an E00 file

TNTmips and TNTedit let you open E00 and Coverage files directly in the Spatial Data Editor, which can be saved in their original format after editing or in TNTmips' internal format. Vectors from these formats can only be saved in internal format if you are running TNTlite. Conversion to internal format in TNTmips or TNTedit is achieved through a toggle button in the Object Properties window (Layer / Properties in the Spatial Data Editor window).

ARC/INFO vectors have a limit of 500 vertices per vector line, which must be enforced in the Spatial Data Editor so that the vector can be saved in its original format. If an added line would have more than this number of vertices, a node is added to divide the line and maintain the limit. The number of vertices in a line in the TNT products is essentially limitless ($>2 \times 10^9$).

You need not specify the projection of the vector in the ARC/INFO file. If the projection information (E00) or associated prj.adf file (Coverage) is available, it will be used. You can choose to override this information if you know it is in error.

Any associated attribute files are used when you open a coverage. You specify which attributes you want and how to attach them for E00 files.
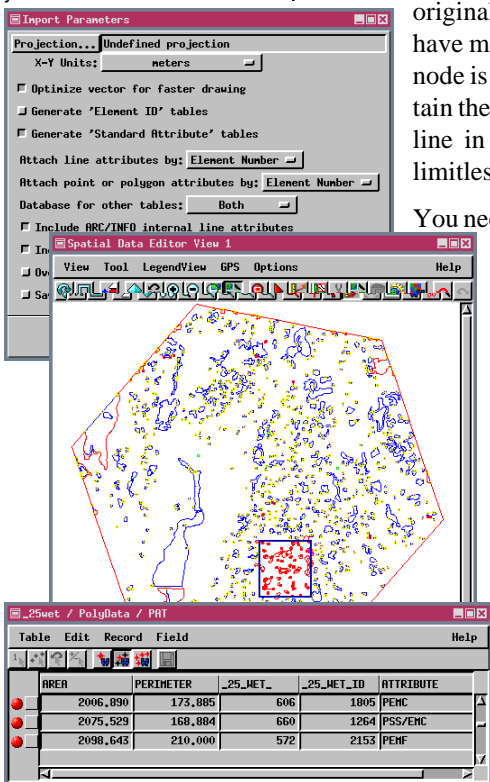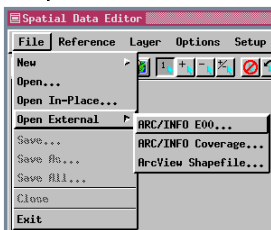
Table showing attributes attached to selected elements in E00 file opened for editing.
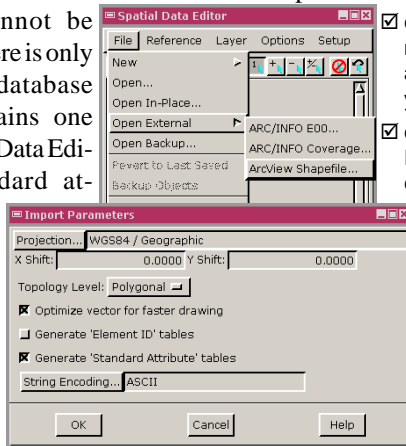
Direct Editing of ArcView Shapefiles

ArcView shapefiles generally have an implied Latitude/Longitude coordinate system, which is offered as the default when you choose to directly edit a shapefile. No additional options are present in the Import Parameters window because an implied georeference cannot be overridden and there is only one associated database file, which contains one table. The Spatial Data Editor creates standard attributes tables for lines and polygons and element ID tables for all element types when the file is opened, but these cannot be saved with the file unless saved in internal format because of the one table constraint for shapefiles. Having the standard attributes tables lets you use the Editor's filtering functions that depend on length and area.

Shapefiles do not have the 500-vertex limit for lines that E00 and Coverage files have, so the number of vertices allowed is essentially limitless just as for lines in TNTmips' internal format. Shapefiles acquired for reference purposes, such as the ZIP code boundaries shown, can easily have a variety of other database information attached and saved if brought into TNTmips' internal format. The methods for adding tables and converting to internal format are described in the next exercise.

Add Tables & Convert to Internal Format

☑ continue with the shapefile from the previous exercise or remove the layer and select the shapefile you want to add tables to

☑ click on the Show Details icon for the shapefile layer then on the Show Tables icon for the appropriate element type

☑ right-click on the desired table and choose Edit Definition from the menu

☑ select the field for the primary key in the list on the left, click on the Primary Key check button (Field Info tab), then click [OK]

☑ click on the Make Table/ Form icon, choose Add Table and select the database and table you want to add

☑ choose the corresponding field and set the Primary Key option button to the field you choose in step 4, then set the Attachment Type to Related Only, and click [OK]

☑ choose Layer/Properties, turn on the Convert to internal format check button, and click [OK] then [Yes]

☑ click on the Save As icon and name the object

☑ use the Select tool and / or GeoToolbox to select elements and view their attributes

A shapefile database is not relational since there is only one table. The ground work for a relational database, namely a primary key field in the table directly attached to elements, makes associating information in additional tables with elements in the shapefile a trivial matter. The Shapefile must be converted to internal format for this newly associated information to be saved with the vector.
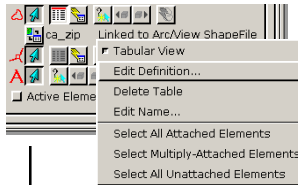
The shapefile chosen for this example depicts the ZIP code boundaries in California. There are many commercial sources of data that provide demographic information broken down by ZIP code. The one chosen for this example provides a number of tables in dBASE IV format with such information by ZIP code for the entire USA. You could add this same linked table to the shapefiles for all states if desired or you could prepare the data before the table is added so it was separated by state. (This database is too large for use in TNTlite.) You can add many tables from a variety of sources that contain information broken down by ZIP code if desired.
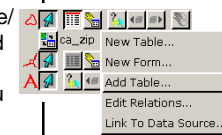
Select the desired field, then click here for the shapefile table (step 4).
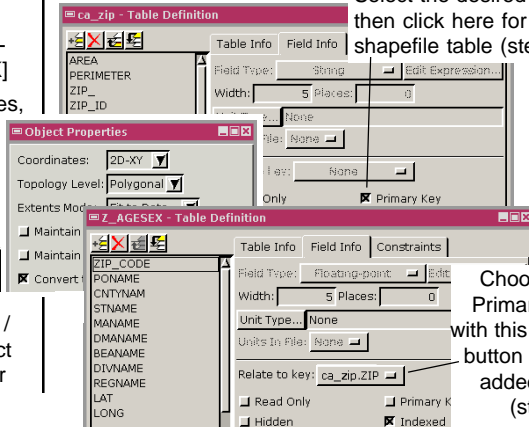
Choose the Primary Key with this option button for the added table (step 6).

Import/Export Oracle Spatial

Currently, sharing with Oracle Spatial is achieved by import and export. Shortly the TNT products will introduce a new object type—the shape object. This object type will provide direct display in vector format from Oracle Spatial, ArcView shapefiles, and MapInfo TAB files.

Oracle Spatial is an unforgiving database structure—relational database rules are not merely guidelines, they are requirements. TNTmips tolerates entries in a foreign key field that are not in the primary key table and allows multiple records to have the same entry in the primary key field. Oracle Spatial does not.

TNTmips and Oracle Spatial each have their own vocabulary. In TNTmips, elements in vector objects have associated attributes that are stored in an element specific database with georeference and other information stored as subobjects of the vector. In Oracle Spatial, layers with their associated geometries and attributes are all stored as database tables with additional tables that contain the relationship between these tables, georeference information, and so on.

The Oracle Spatial import interface is similar to that for linking to databases illustrated in the exercise on p. 17 with an additional tab that lets you specify topology level, optimization, and generation of element ID tables and standard attributes. Both import and export require a password to access the Oracle Spatial tables.

STEPS

☑ choose Process / Import or Process / Export and select Oracle Spatial

☑ import and/or export data

The same vector object and table shown in Oracle Spatial (left) and TNTmips.
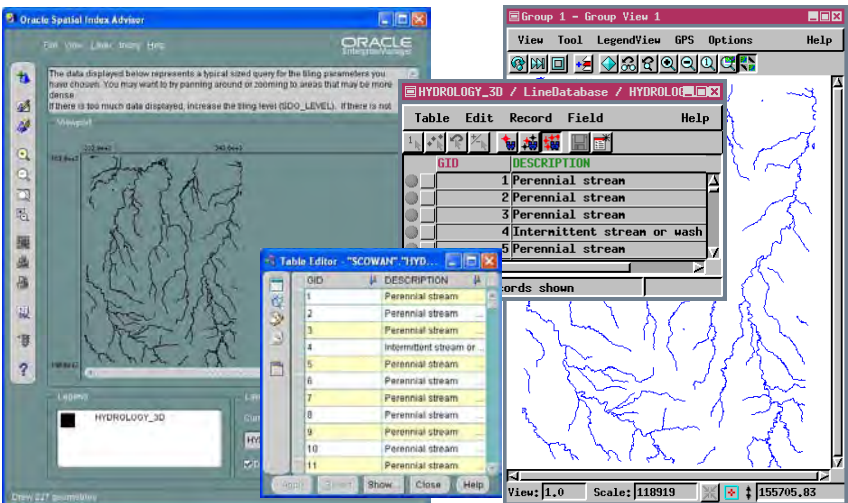
Cross Platform Compatibility

* A "yes" in this column indicates native file compatibility on all platforms supported
§ Not applicable

Another important sharing issue concerns the use of project materials in a multi-user, multi-platform environment. It is not uncommon to have a mixed workstation and PC environment in the workplace or to work in a Macintosh shop and have a Windows machine at home or vice versa. The question then becomes whether the same software is available for all platforms of interest and, if available, whether you can view and edit the same files or they have to undergo some kind of translation process whenever moved from one platform to another.

Many software packages that run on multiple platforms require some type of translation before the files can be used on a different platform supported by the same software. TNTmips' Project Files can be used on all supported platforms without modification. Some software packages, such as PageMaker, open a new "untitled" document on a different platform. Other software packages, such as ARC/INFO, have special formats for moving between platforms. However, this "near compatibility" is not the same as the transparent data compatibility offered by TNTmips (one native format file for all platforms). The difference is quite apparent when you think you've brought work home, but it's saved for the wrong platform.

Product	Transparent Data Compatibility*	Platforms Supported				
		Windows 2000, XP	Windows NT 4.0	Unix	Linux	Mac OS X
TNTmips	Yes	Yes	Yes	Yes	Yes	Yes
ARC/INFO 9.0	No	Yes	Yes	Yes	No	No
ArcView 9.0	Yes	Yes	Yes	No	No	No
ERDAS	Yes	Yes	No	Yes	No	No
Word	Yes	Yes	No	No	No	Yes
PageMaker	No	Yes	Yes	No	No	Yes
Illustrator	?	Yes	No	No	No	Yes
AutoCAD	N/A§	Yes	No	No	No	No
Excel	Yes	Yes	No	No	No	Yes
ODBC	N/A	Yes	Yes	Yes	Yes	No

More About Sharing

TNTmips provides new processes and new features in existing processes, including SML, with every release. But MicroImages realizes that even if all the tools to get your projects done are available in TNTmips, there will often be some reason you have to get your project materials from or into another format. So an additional feature of TNTmips is to make it as easy as possible to make such transitions when necessary. Devoting a tutorial booklet to the topic is one method of making such transitions smoother. Additionally, TNTmips, TNTedit, and TNTview all include Spatial Manipulation Language (SML) as a customization and design tool. SML is a simple, cross-platform programming language for geospatial analysis that lets you go beyond the predefined processes found on the standard menus and provides another means of sharing with other products. You may often encounter data problems that can't be solved in TNTmips, particularly if you work with a data format specially created for your organization and collection devices. SML provides functions to handle many of these situations, such as importing ASCII to create raster, vector, CAD, or TIN objects. You can set up such import or export as a batch process using SML.

Another approach not yet mentioned for sharing data is through implementation of new features requested by our clients. Many of the ideas for new features that become a part of TNTmips come from clients. An extensive list of new feature requests is maintained by MicroImages, some of which are implemented with each new release. The priority given to new feature requests is influenced by the current direction of software development, but it never hurts to get your requests in to the software support staff.

Think you're familiar with all the features in TNTmips? Then take this quiz. Identify the process with which each pair of icons is associated.

a)
b)
c)
d)
e)
f)
g)
h)

Answers:
a) Sample Turnkey Product b) Network Analysis c) Feature Mapping d) Morphological Functions e) Watershed Analysis f) Spatial Data Editor g) Vector Filters and Spatial Data Editor h) almost all processes

Advanced Software for Geospatial Analysis

MicroImages, Inc. publishes a complete line of professional software for advanced geospatial data visualization, analysis, and publishing. Contact us or visit our web site for detailed product information.

TNTmips   TNTmips is a professional system for fully integrated GIS, image analysis, CAD, TIN, desktop cartography, and geospatial database management.

TNTedit   TNTedit provides interactive tools to create, georeference, and edit vector, image, CAD, TIN, and relational database project materials in a wide variety of formats.

TNTview   TNTview has the same powerful display features as TNTmips and is perfect for those who do not need the technical processing and preparation features of TNTmips.

TNTatlas   TNTatlas lets you publish and distribute your spatial project materials on CD-ROM at low cost. TNTatlas CDs can be used on any popular computing platform.

TNTserver   TNTserver lets you publish TNTatlases on the Internet or on your intranet. Navigate through geodata atlases with your web browser and the TNTclient Java applet.

TNTlite   TNTlite is a free version of TNTmips for students and professionals with small projects. You can download TNTlite from MicroImages' web site, or you can order TNTlite on CD-ROM.

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