

GEOSPATIAL PROFESSIONALS' 10 REQUIREMENTS FOR 3D STEREOSCOPIC MONITORS

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Introduction

Planar 3D for Professionals

In this Ebook, we explore the ten most important requirements that professional stereo monitor users in the geospatial industry have for the 3D monitors they choose to use.

As the Product Development Manager for the Planar 3D product range Mr. Scott Robinson has a good insight on what a professional user would look for in a 3D stereoscopic monitor. You will find more information about Scott at the Author page towards the end of this book.

“We chose the Planar system because we felt it best suited our needs moving into a complete digital workflow.”

*-David Day, director of IT at
Keystone Aerial Surveys,
Inc.*

Requirement 1

#1 Stereo Image Quality

Photogrammetrists and geospatial image analysts explore aerial or satellite images, discerning minute details and extracting data/information based on what they see. Successful completion of their tasks depends heavily on the quality of the stereo view they are analyzing. Geospatial professionals should not compromise on their requirements of image quality. The stereo visualization should be crisp and clear.

Stereo monitors that are dim, hazy or unsteady can cause the user to waste time interpreting the image. The brightness, contrast ratio, color, gray scale performance and resolution should be similar to what they see on a monoscopic (2D) monitor. Compromising the stereo image quality can equate to compromising the precision and accuracy with which geospatial data can be extracted.



Requirement 2

#2 Low Crosstalk

Stereo crosstalk means part of the right image is visible with the left eye and/or visa-versa. An example of crosstalk is shown in the picture above. Crosstalk (also called bleed through or ghosting) is distracting and can interfere with accurate interpretation of a stereo view. Ideally, stereo monitors should have zero crosstalk between images, since in nature your right eye perceives an object differently than your left eye.

For geospatial exploitation, stereo crosstalk should be less than 0.5%. That means that if the left image has a luminance of 50 cd/m², then the right eye should see less than 0.25 cd/m² bleeding through from the left image. Lower crosstalk enables higher stereo contrast, which allows better discernment of details.



The image above simulates crosstalk , as seen in the dark areas.

Requirement 3

#3 Comfortable Viewing

Photogrammetrists spend a lot of time looking at a stereo monitor. It is important to minimize user discomfort which can lead to headaches and eye fatigue.

Possible sources of stereo monitor discomfort are flicker, shuttering between alternate eyes (as opposed to both eyes seeing a continuous image), low brightness which causes eye strain, crosstalk, heavy glasses (such as battery powered) or holding the head/eyes in one spot.

Stereo users may be able to tolerate minor discomfort for a short time, but, long hours of subjecting the eyes and brain to the visual distress will take a toll on both the person and the project.



Requirement 4

#4 Passive vs. Active Glasses

Passive glasses are preferable to active glasses because:

- No flicker
- More comfortable
- Higher efficiency (less light loss)
- No risk of losing or swapping a synchronization signal
- Can be used in close proximity to multiple stereo monitors without interference
- Inexpensive so more people can use them at once
- Cheaper to replace should glasses be lost, damaged or stolen
- Adaptable to prescription lenses
- More dependable due to no batteries to charge
- Batteries have a finite number of charge cycles before they must be replaced



Requirement 5

#5 High Resolution

Viewing high resolution images on a low resolution stereo monitor presents a risk of missing important details. A resolution of 1920x1200 for each eye (in stereo) allows 76% more pixels to be seen than a 1280x1024 resolution and 30% more pixels to be seen than a 1680x1050 screen. Viewing more pixels allows more information to be gathered and understood at one time. This leads to an increase in work efficiency and higher accuracy.



Above: Lower Resolution, Below: Higher Resolution

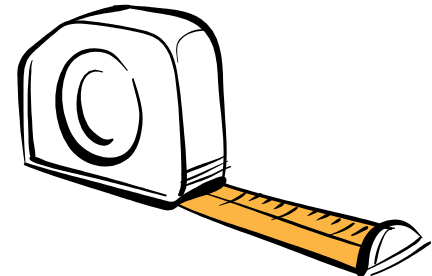


Requirement 6

#6 Size Matters

Most geospatial workstations have a screen size from 20 to 27 inches in diagonal. A larger screen is desired by some geospatial intelligence analysts that need to scan a large area quickly, see lots of details at once, or see multiple stereo views simultaneously.

Stereo users that collaborate with colleagues and supervisors will certainly benefit from a larger screen size. For workstations that will only have a single user extracting data or where limited office space is available a smaller screen size might be preferred.



Requirement 7

#7 Wide Viewing Angle

Having a wide viewing angle, both vertically and horizontally, ensures a more comfortable viewing experience. Users should be able to move right/left, up/down, and back/forth and still see excellent stereo. A wide viewing angle allows for collaboration among colleagues (see picture below) or a supervisor, whether standing or sitting.



Requirement 8

#8 Dependability

Mission critical jobs require reliable products that are made with high quality parts using high quality processes. It is critical that a stereo monitor can be dependable to present high quality stereo images. Professionals can't tolerate sudden loss of stereo viewing or have the system switch to "pseudo stereo" (left image to right eye and vice versa) during use. System simplicity is an advantage in mission critical applications.

The stereo monitor manufacturer should have quality processes, documentation and external audits in place that assure a high level of quality and dependability of their products. ISO9001-certification is one way for an organization to demonstrate their operations are of high quality. Your stereo monitor vendor should provide strong, responsive support 24/7.

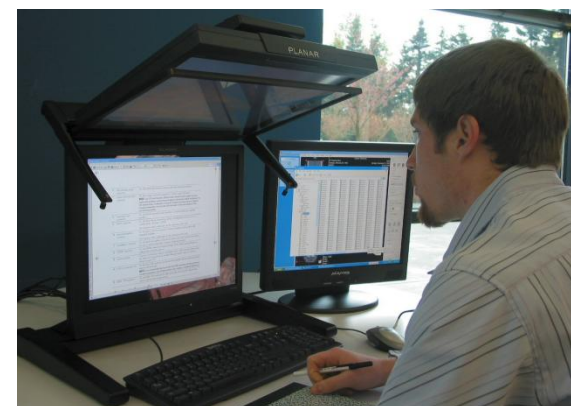


Requirement 9

#9 Multi-purpose

To save space and money, it is better to use a stereo monitor that easily converts to a 2D monoscopic monitor when needed. The switch from monoscopic 2D to stereoscopic 3D and back again should be quick and easy.

The 2D view should be as good as or better than other desktop monitors that meet the geospatial image requirements of your task. Avoid monitors with poor viewing angle characteristics, indistinguishable gray levels and reduced sharpness. For example, color shift occurs with viewing angle on TN LCD displays, creating a possibility that image detail can be inadvertently overlooked or misunderstood.

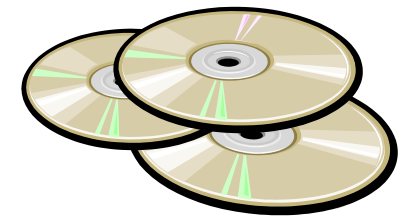


Requirement 10

#10 Compatibility

Geospatial professionals should be focused on their work rather than adjusting their workstation to show stereo correctly. The majority of geospatial software applications are written in the OpenGL API (application programming interface). This causes interface requirements for the software, graphics card, drivers, and monitors.

When hardware manufacturers and software developers follow the special requirements for quad-buffered OpenGL stereo, interfacing among the components becomes easier. It is easy to use standard graphics cards with stereo drivers to run stereoscopic monitors with a standard format.



Planar 3D

As has been outlined in this Ebook, some important requirements for geospatial professionals to consider in choosing stereoscopic monitors are stereo image quality, viewing comfort, multi-user, high resolution and dependability. Planar has developed a product line with these requirements in mind. Our patented StereoMirror technology produces the highest level of stereoscopic image quality available. By utilizing a monitor for each eye, the image quality of 2D monitors is preserved for stereo 3D use. The system minimizes crosstalk in providing a continuous, high-resolution image to each eye.

Planar's 3D stereoscopic monitors have unmatched viewing comfort for professional users. The monitors have ample brightness and are flicker free. Lightweight, polarized glasses allow multiple viewers to see superb stereo from a wide range of working positions. Minimal crosstalk and sharp, vivid images allow the stereo monitor to be used for extended hours. The product easily converts to 2D viewing either by lifting the mirror or turning off one monitor.

Planar's 3D stereoscopic monitors are available in different resolutions according to their size. The smallest utilizes dual 17" monitors with SXGA (1280 x 1024) resolution. The largest has 26" displays with WUXGA (1920 x 1200) resolution. Planar's monitors can be driven using off-the-shelf graphics cards such as the nVidia Quadro FX line or ATI FirePro cards. A wide range of software applications that support OpenGL stereo can be used with Planar's 3D monitors. To ensure quality in all its processes, Planar is an ISO-certified organization and offers warranties up to 5 years in duration on the SD product family.

StereoMirror™ Products for Geospatial Applications

SD1710



SD2220W



SD2620W



Part Number	997-2881-02LF	997-5806-00LF	997-4220-00LF
Pixel Format	SXGA	WSXGA+	WUXGA
Resolution	1280 x 1024	1680 x 1050	1920 x 1200
Megapixel Count	1.31	1.76	2.3
Pixel Pitch	0.264 mm (96 LPI)	0.282 mm (90 LPI)	0.2865 mm (89 LPI)
Screen Diagonal	17.00"	22.0"	25.5"
Colors	16.7 M	16.7 M	16.7 M
2D Luminance (typical)	300 cd/m ²	300 cd/m ²	400 cd/m ²
Stereo Luminance (typical)	85 cd/m ² (through glasses)	85 cd/m ² (through glasses)	240 cd/m ² (through glasses)
Dimensions (WxHxD)	18.7" x 19.5" x 23.3" (475 mm x 495 mm x 592 mm)	23.1" x 20.7" x 24.8" (588 mm x 525 mm x 631 mm)	18.7" x 19.5" x 23.3" (596 mm x 628 mm x 754 mm)

Summary

The 10 requirements	Planar's 3D stereoscopic offer includes
High stereo image quality	StereoMirror offers the highest stereo image quality available
Low crosstalk	SD2620W has less than 0.2% crosstalk and brightness over 200 cd/m ²
Comfortable viewing	Flicker-free viewing comfort for extended hours
Passive glasses	Each unit comes with 5 pairs of passive glasses
High resolution	Up to 1920x1200 resolution currently available
Correct size	Screen sizes from 17" to 26" diagonal
Wide viewing angle	Accommodates multiple users simultaneously whether sitting or standing
Dependability	ISO 9000:1 certified manufacturer with strong customer support
Multi-purpose	Easily switches between 2D and stereo 3D use
Compatibility	Compatible with OpenGL based graphics cards and software

About the Author

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Mr. Robinson has 15 years of professional experience with Planar Systems, Inc. He started his career with Planar in R&D working with EL, OLED and LCD display technologies. Currently he leads the development of the 3D stereoscopic product range, which includes monitor sizes from 17" up to 26".

He has given numerous presentations in trade shows and seminars in the US and Europe and published articles on 3D display technology. His latest talk in Europe was at DGI CEE in September 2009 in Prague, Czech Republic and the latest article was released in Russian Geomatics-magazine, issue 4/5, 2009.

For further information on Planar's 3D product range, please visit www.planar3d.com or e-mail Scott directly.

Visit Our Websites!

Please visit us at www.planar3D.com where you can see our entire stereoscopic product line and read case studies on how StereoMirror users such as SETI institute and Keystone Aerial Surveys benefit from Planar products.

For information about other Planar products visit www.planarembdedded.com where you find the most up-to-date information on our IBU products.