**Working in 3D-Stereo –
Viewing-only was yesterday!**

Stefan Oeldenberger – Dipl. Geol.

schneider
d i g i t a l

Professional 3D-Hardware

Full-service solution provider …

… for professional 4K, 3D and VR hardware

Schneider Digital – Your partner for processing & visualization

✔ As a specialist hardware manufacturer, neutral and perfectly networked to all major geospatial software vendors – we enhance professional user experience!

✔ Focused to provide best hardware value and performance, matching required software application resources to user and project requirements;

✔ Passionate about stereoscopic visualization and data interaction, development partner for many software companies;

✔ We are driving development: Bi-directional, active collaboration with software manufacturers, connecting hardware specifications to new geospatial application capabilities.

esri Bentley HEXAGON GEOSPATIAL BAE SYSTEMS DAT/EM Terra solid POINT CLOUD INTELLIGENCE RIEGL

nFrames Trimble orbit GEOSPATIAL TECHNOLOGIES RACURS Agisoft ESPA SYSTEMS euclideon

FARO DASSAULT SYSTEMES PhoTopoL ATLAS ZF Zoller-Fröhlich Bitmanagement INTERACTIVE 3D WEB cardinal systems

Stereo Implementation & Tools

Stereo Navigation – 'vertical' 3D controller

For GIS and Photogrammetry data capture
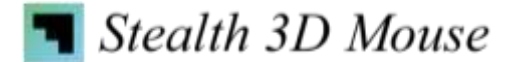
Stereo Visualization – how is it done?

- ✓ Only needs a 2nd camera view-port, placed at eye-distance with distance-depending parallax adaption;

- ✓ Simple stereo implementation – full resolution 'side-by-side' output from any graphics card – produces a full-screen left image and right image on two screens

  - ➤ Advantage – works with any graphics, even on-board CPU

  - ➤ Disadvantage – only full-screen stereo, no menus

- ✓ ‚Quad-buffer' implementation requires OpenGL, DirectX or Vulkan

  - ➤ Advantage: normal Windows environment with application menus, multiple monoscopic and stereoscopic windows

  - ➤ Disadvantage: needs 'professional' graphic cards
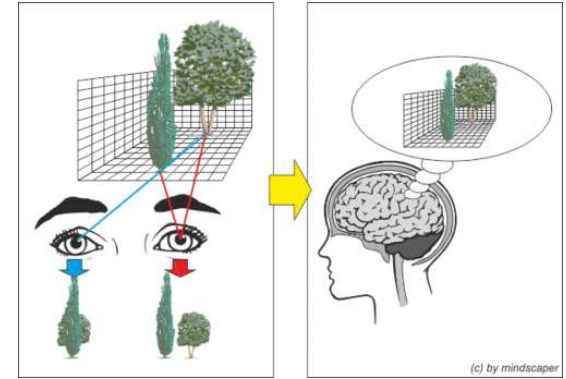
- Simple software implementation: **monoscopic cursor**

  - ➢ Advantage: no additional effort

  - ➢ Disadvantage: cursor floats in front of the stereo visualization, not a productive way to easily edit/snap to objects, complicates also navigation in stereo

- Professional software implementation: **stereoscopic cursor**

  - ➢ Advantage: productive, intuitive working in 3D-stereo, easy editing of objects, intuitive navigation, automatic depth adaptation possible (*snapping*)

  - ➢ Disadvantage: additional implementation effort

- **CAD Assistant** – a demonstrator for a 'perfect' user experience – intuitive, easy-to use stereo cursor implementation, even with a normal mouse; Freeware! Download Link

Professional 3D-Hardware
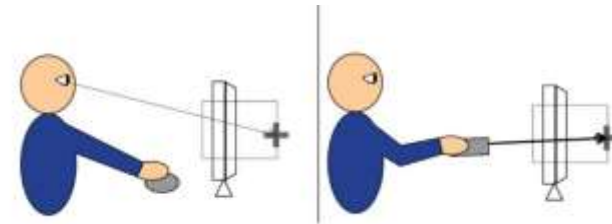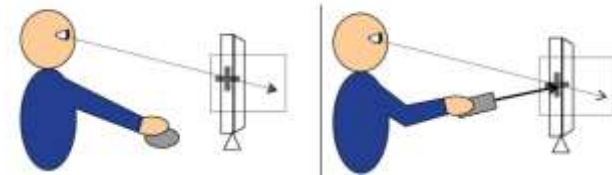
Compatible with all operating systems – from Windows XP to Windows 11!

✓ PLANAR SD monitors and the Schneider Digital 3D PluraView
use the ‚**passive Stereo**‘ principle with dual screens for full stereo resolution
and passive (no batteries), cross-polarized glasses:

- very light-weight, comfortable glasses, bright image - daylight compatible!

2005

2016

2021, 2022, 2023,...

3D PLANAR
SD1710

3D PLANAR
SD2020

3D PLANAR
SD2220

3D PLANAR
SD2420W

3D **PluraView**

22", 24" and 27", 28"

Professional 3D-Hardware

Hardware Functionality – visualization flexibility

✔ Autostereoscopic monitors – single screen, fixed position(s)

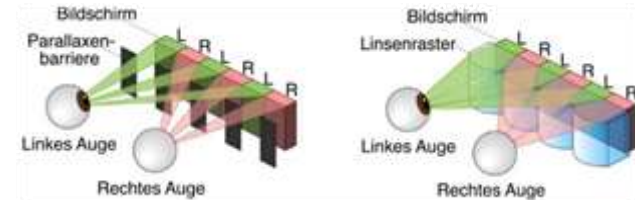✔ Large-format **Stereo** Display Systems / with and without VR interaction, e.g.. Schneider Digital ‚smartVR Wall'

> Front- or back-projection, stereo with 120Hz shutter glasses

➢ Immersive ‚cave' projections

✔ Head-Mounted Displays (HMD)

➢ LED Tile systems

> **VR**: example - Oculus Quest 2, also for photogrammetry, 3D city models – a mobile solution!

> **AR**: example Microsoft HoloLens 2 for engineering, simulation, Digital Twins, etc.

Professional 3D-Hardware

Monthly updated list for stereoscopic software & vendors, current PDF on our PluraView website!

ArcGIS Pro	Metashape	SOCET GXP v4.5	Sci-X	Summit Evolution	ESPA 3D	VRTwo	TerraStereo	Atlas	Landmark Geoprobe
ImageStation	Stereo Analyst	Inpho	OSGeo	PurVIEW	TNTgis	Scene	LaserControl	CloudCompare	
3DM Content	Photomod	Simwright StereoGIS	JewelSuite	RiSCAN Pro	3d Zephyr	STK	Petrel	DJI Terra	
KomVISH	sure aerial / Pro	Go2VR / D2P	Photosoft	GoCAD	Kingdom	Unity 3D	DPS / Delta		
LiMON Viewer PRO	Vizable	uSmart	StereoCAD	ContextCapture	Eternix Blaze Terra	Micromap Manager			
Delmia	Geovia	Creo View MCAD	DeltaGen Rhino	Precision 3D Topo	WinATLAS				

How about your software application(s)?

2020's Geospatial Data Acquisition & Processing

Professional 3D-Hardware

✓ Joint acquisition and processing of LiDAR and high-resolution imagery

➢ Airborne data from integrated sensors (Leica CityMapper-2)

➢ Airborne data from separate sensors combinations: mostly medium-format, multiple camera heads with Riegl or Teledyne Optech airborne LiDAR instruments, multi-hole configurations

➢ Trends: UAS data acquisition & large-area scanning, Leica SPL100

GeoCue TrueView

✓ Integration of airborne and terrestrial sensor data

➢ Addressing resolution, geometry shifts sensor and acquisition date differences

➢ CycloMedia and BlueSky cooperation; **Software development by Trimble, Hexagon, Vexcel?**

Professional 3D-Hardware

✅ Trend: ‚Multiple, Open, Online Data Sources' (MOODS)

✅ Democratization of data acquisition, smart combination of diverse data sources:

➢ Smartphone – tiny 200MPx sensors and solid-state LiDAR integration;

➢ Geospatial industry adapting to provide professionally-acquired reference data as integration source and framework;

➢ Multi-scale geospatial data availability from open-online satellite sources (Landsat, Sentinel); commercial, subscription-based sources (Planet, Maxar)

➢ From wide-area aerial imaging (Vexcel Condor4.1, Leica Content Mapper) as national reference, to centimeter-scale 3D City models - all accessible online;

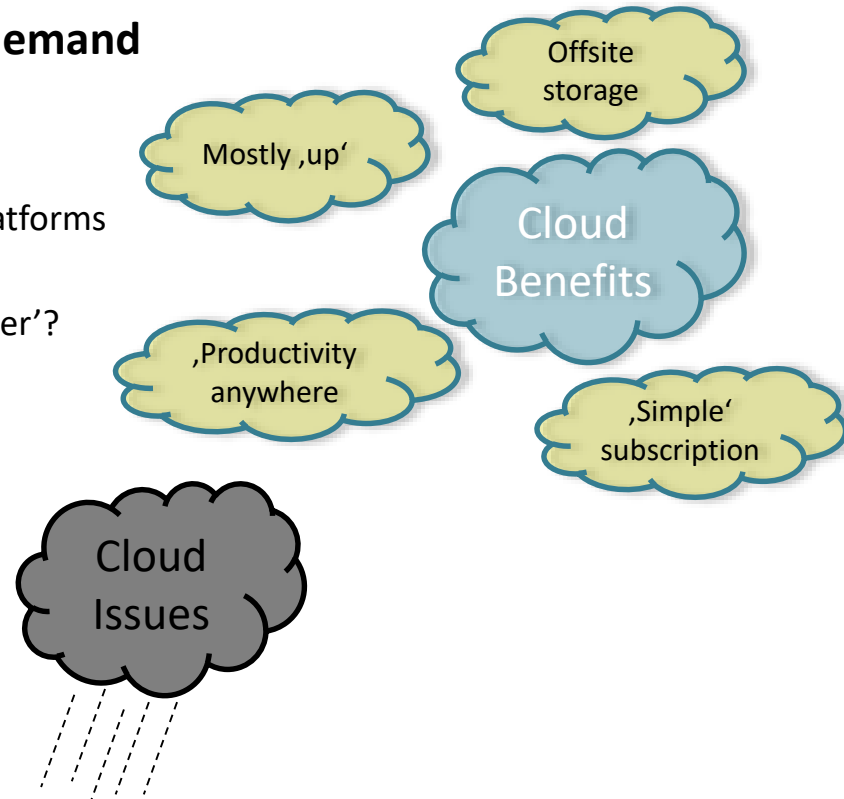➢ **The value of geospatial data is based on dissemination – its' use and –**

USEFULNESS!

LiDAR Sensor

NEW

Professional 3D-Hardware

✔ Challenge: real-time processing, products on demand

✔ Maximize the '<u>usefulness</u>' of the available data:

- ➢ Multi-scale approach, switching sources, serving platforms and views, (public) viewers and user groups;
- ➢ Multi-temporal data availability – Google Earth 'slider'?
- ➢ Thematic data selection – a dialogue with 'Alexa'?
- ➢ ' **The cloud is not the only answer**'
  - ➢ Control?
  - ➢ Intellectual property rights?
  - ➢ Processing, accessibility and storage cost?
  - ➢ Sustainability?
- ➢ **Also a hybrid answer for a hybrid world?!**

Offsite storage

Mostly ‚up'

Cloud Benefits

‚Productivity anywhere

‚Simple' subscription

Cloud Issues

Professional 3D-Hardware

✓ Processing equipment by specialized hardware providers – Schneider Digital

✓ Project example: Osprey4.1 flight, AOI 4700 sq.km, 10cm resolution

➢ Approx. 60,000 nadir images, 4x60,000 oblique images

➢ Each raw nadir+oblique dataset at Level-0 amounts to 1.3GB on FDU

➢ Nadir RGB-I (288MPx) at 14bit, uncompressed at 2.3GB / 140TB for AOI

➢ Multiple products (DTM/DSM, ortho, 3D City model – 1 PetaByte storage

➢ **UltraMap processing solution by Schneider Digital**: distributed processing with high-speed fiber optics network, fileserver and four (4) AMD Threadripper 32-core workstations for 128-core UltraMap5 license

Fiberoptics, high-speed LAN

32-core processing nodes

Control Station

Thank you for your attention!

Stefan Oeldenberger

Josef Schneider

More information online:

www.schneider-digital.com

www.pluraview.com

schneider
d i g i t a l
Professionelle 3D-Hardware