Glossary

A list of the most important terms used in 3D visualization

Terms and Definitions

123

2.5 D 3D surfaces, where every X, Y point has only one Z value (e.g. terrain models without overhangs or caves).

3DS-Format File format of 3D Studio Release 4

A

A/D- Converter (DAC) Converts digital input signals into analog output signals, i.e. visual data in the display memory of the graphics card is converted to video signals, so that it can be shown on the monitor.

Additive colors When a white surface is illuminated by several light sources in different colors, the result is an additive color. The (additive) mixing of two complementary colors adds up to the color white. The additive mixing of colors is the basis of computer graphics.

ADI Abbreviation of Autodesk Device Interface, an interface to the products of Autodesk

Aliasing Staircase effect

Alpha Blending In addition to the values for the colors red, green, and blue, a transparency value is assigned to every pixel. This method allows the representation of materials in various degrees of transparency, e.g. normal glass, milky glass, fog, smoke.

Alpha Channel The color rendering of pixels is made up of the colors red, green, and blue. By adding another byte, the transparency of the pixel can be defined - this additional byte is called the “Alpha Channel”. In an 8bit Alpha Channel, 256 shades of transparency can be represented. In image editing, this channel is often used for saving masks.

Ambient light The ambient light defines the basic brightness and the basic coloring of your scene.

Analog Continuously varying electronic signal for generating data. Opposite: digital.

ANIMATICS Animated scripts, normally generated by integrating separately drawn up scribbles in the form of a QuickTime or an AVI movie. The finished video sequences are called ANIMATICS.

ANSI American National Standards Institute

Anti-Aliasing This is the interpolation of the colors of neighboring pixels, to prevent "pixel visibility" in a picture. Anti-Aliasing is normally used to avoid the "staircase effect" in diagonal edges and lines.

Area Light In the field of studio photography, this method is often used for simulating natural light. Area lights generate very smooth transitions between light and dark

ASCII Arc Info Grid Format A spatial data model defined by a raster of even sized pixels (gray scale picture). An attribute value, e.g. for defining the elevation, is assigned to every pixel. For editing, the extension Spatial Analyst or 3D Analyst, is needed.

ASCII American Standard Code for Information Interchange. This is a simple code for the digital saving of alphanumerical data, which can be read by nearly every computer system; it is made up of a maximum of 256 signs.

Aspect Ratio The Aspect Ratio indicates the proportions of a still frame or a movie frame as the ratio of width to height. As a rule, the aspect ratio is either given as the quotient of width and height (e.g. 4:3), or as the ratio number on the basis of 1 (e.g. 1,333).

ATKIS Acronym for "Amtliches topographisch-kartographisches Informationssystem", the German official topographical-cartographical information system.

Atmospheric effects Mist and fog in a nature scene, the light veil of haziness in the distance, cloud formations and smoke, are all examples of atmospheric effects.

Attribute Information linked to objects in a GIS or CAD system describing geometrical or subject characteristics (e.g. area, volume).

AVI-Files Short for Audio Video Interlaced, the video format of Microsoft

B

Batch In a batch job, certain programs or commands are executed automatically by the computer, without further interference

	by the user.
Bezier Curve	Bezier curves will provide the model with softer forms than straight-lined polygons. The course of the Bezier curves is interpolated by selecting surface points in regular intervals. The degree of curvature is defined by tangents positioned along the curve.
Beziér-Spline, B-Spline	B-Splines are an extension of Bezier curves. The term spline comes from the flexible spline devices used by ship-builders and draftsmen to draw smooth shapes.
Billboard	Square transparent plane containing a bitmap for the representation of a 3D object. In landscape visualization, a frequently used method for representing the vegetation.
Bitmap	Digital raster picture
Bitmap - Image Format	Saving of a graphic representation by dividing up the graphic into even and regular picture elements. Some various possibilities for use the word “Bitmap” are:
	Bitmap - general term for pixel graphics
	Bitmap - *.bmp – picture format of Microsoft (see bmp)
	Bitmap - value for color depth (2 colors: black and white)
Bits per pixel	Number of bits representing the color information of a pixel.
	8 Bit corresponds to 256 colors
	16 Bit will give you around 65.000 colors (High Color)
	with 24 Bit, 16,7 million colors (True Color) can be represented.
	32 Bit per pixel will allow the representation of 16,7 million colors plus an 8 Bit Alpha Channel for transparency information (see Alpha Channel).
Blinn Shading	A special method for shading based on Phong shading, the significant difference being that highlights on glossy surfaces will have a more rounded shape.
Blur	The effect in a picture or in a movie, that moving objects will appear blurry. This effect can either be directly assigned to specific objects, as object characteristics, or it can be assigned as soft focus to the entire scene, in the rendering dialog.
BMP files	Bitmap. Windows file format for pixel graphics.
Boolean Modeling	With this method, by using the logic operators AND, OR, NOT, objects can be added or subtracted, and their intersection can be determined.

Bump Mapping To provide a texture with a near-reality structure, it has to be superimposed by a bump map which will then transfer the elevation data to the texture. A Bump Map is a gray scale picture where different values for brightness are used to indicate different topographical levels of height. The darker the values of the Bump Map, the more depth will be added to the texture.

C

CAD Computer Aided Design

CAM Computer Aided Manufacturing

CAVE Computer Augmented Visualization Environment

CGA This is an abbreviation for Color Graphics Adaptor by IBM, one of the first standards for color graphics. It can either represent 320x200 pixels with four colors, or 640x200 pixels with two colors.

Chrominance Chrominance is part of a video signal linked to the color value and containing information on color shade and saturation. This color component basically increases the brightness and luminance of a color picture

Cinepak Cinepak is used for compression of 24 Bit videos for CDs. It is available on Windows as well as on Macintosh computers. Best results are obtained when the Cinepak-Codec is applied to the pure original data which have not yet undergone a very lossy compression. Cinepak is a very asymmetrical codec, i.e. the decompression by Cinepak is much faster than the compression.

Clipping All currently invisible areas of a 3D picture (depending on the perspective to be calculated) are left aside and ignored during later picture editing.

Codec The encoder/decoder is a piece of hardware for the conversion of analog and digital audio and video signals. The term is also used for hardware or software that can compress and decompress audio or video data (compression/decompression), or for the combination of encoder/decoder and compression/decompression.

Color Depth Also called pixel depth. Number of bits per pixel. A system using 8 bit per pixel, can represent 256 colors. A system using 16 bit per pixel can represent 65.536 colors. A system using 24 bit per pixel can represent more than 16.7 million colors. 24 bit colors are often called Real Color Representation, because the human eye can distinguish between only around 6 million different color shades, i.e. a

	lower number than is available in a 24 bit color system. 24 bit means 8 bit for every RGB. In a pixel depth of 32 bit, the additional 8 bit are used for the Alpha Channel.
Constant Shading	Method for constant shading. Every surface of an object is calculated and represented as being even. This method is very similar to Flat Shading, but includes a number of added highlights.
Control Points	Control vertex points for editing Splines or NURBS, see CV.
Coordinates	A system of coordinates is used for spatial orientation. The precise position of a point within a 3 dimensional space is determined by the values of X, Y, and Z.
CPU	Abbreviation for Central Processing Unit, the main processing chip of the computer, e.g. Pentium chip.
CV	Abbreviation for Control Vertex

D

DDS Format	The Data Dictionary System allows the exchange of parameter definitions and binary data between software programs and the user
Delaunay Triangulation	A method of connecting arbitrary sets of points together in a network of triangles which meet certain mathematical criteria (specifically, the circle described by the three points in any triangle contains no other point in the set), used in creating a TIN
Delta Image	This is a picture containing only data which has changed since the last picture. Delta images are a very efficient tool for the compression of visual data.
DEM	Digital Elevation Model (*.DEM – NASA-Format)
DEM Base Model	The Swiss base model includes digitalized contours, as well as the main alpine tectonic faults as polylines, and an irregularly distributed number of points. It is available at swisstopo (Bundesamt für Landestopografie), for Switzerland.
DEM Matrix Model	The DEM Matrix Model was interpolated from the DEM Base Model. It has a standardized grid and a regular distribution of points.
Depth Cueing	Depth cueing plays an important role in the realistic representation of 3D models: objects in the distance will appear blurrier and darker than objects nearby. This effect is

	achieved by fading with black pixels. In other words, depth cueing is a kind of black haze.
Diffuse Color	This is the color of a directly illuminated surface. When asked about the color of an object, it is the diffuse color that is normally given.
Digital	(1) Method for the representation of sound or other waves as a succession of binary signals. (2) Method of radio setting where the desired frequency is set on digital. (3) Numerical representation of information data. Opposite: analog.
Digitize	Translation of an analog signal in digital data, e.g. scanning of an image.
Digitizer	Translation of an analog signal into digital data, e.g. when scanning a picture.
Distant Light Dithering	Method for representing pictures with originally high color depth, in good quality but with less depth of color , and thus requiring a smaller file size. The picture is rasterized and the color values are interpolated.
DOM	"Digitales Oberflächenmodell" - digital surface model, representing the surface of the earth, including vegetation and buildings.
Double Buffering	Also called page flipping. While one picture is shown on the monitor, the computation of the next picture is in progress. It is saved in a special memory and is shown only after the computation has been completed. This way, a visible construction, line by line, is avoided, which reduces the flickering of the picture in animations, games and video replay.
DPI	Dots per Inch. Measure for the resolution precision of a digital representation.
DTM	Digital Terrain Model (without buildings or vegetation)
Dummy	A dummy is an object used as an aid in animation. A dummy is not rendered during the computation of a picture. Dummies are a popular device for the animation of separate limbs and for links between objects.
DXF POLYMESH, DXF POLYFACE	These are special polylines. DXF POLYMESH can be compared to a wireframe model, whereas DXF POLYFACE defines a surface. Because in POLYFACE the indices of all corner points are included, the datasize is about 2.2 times larger than that of POLYMESH.
DXF Files	Data Exchange Format, corresponding to the AutoCAD original format DWG as ASCII set of data. The DXF for-

mat is NOT a standard and changes with every new release of AutoCAD.

E

ECD Short for Enhanced Color Display, by IBM, for a resolution of 640 x 350.

Environment The environment of 3D models. There is a choice of real environments (universe, sky, clouds), or surreal environments (anything the imagination allows).

Environment Map In this map, the calculation of the radiation of the reflected environment is simulated, by using a bitmap as reflection. In this way, an existing picture can be used for reflection as well as for refraction.

EPS-Files Encapsulated Postscript. EPS is an extended version of Postscript. Apart from the option of editing vector and pixel information, it also includes the option of using release paths.

Extrusion With this method, depth of space is added to a 2 dimensional model, along one of the spatial axes.

F

Field of View (FOV) The focal length determines the field of view, i.e. those areas of a 3D scene which are to be rendered

Fields (upper, lower) The picture on the television screen actually consists of two pictures (fields), alternating 50 times per second. This means that instead of a linear sequence of 25 single frames, 50 half frames are chasing across the TV screen. During rendition, a line jumping procedure is used, in which a "normal" full picture is divided up into specific lines, i.e. into even and uneven lines. The uneven lines are reserved for the first half picture, the even lines make up the second half picture (field, semi picture). This method was originally developed to reduce the bandwidth for the transmission of television signals.

Filter The special effects in a video clip or picture can be modified by a filter. Filters are also used for correcting color contrast, brightness, or balance.

Flare Simulation of a light refraction, generated by a bright ray of light hitting the lens of a camera.

Flat Shading "Flat" shading method. All surfaces of an object are represented by using only one color , i.e. only one color value per surface. The objects computed by flat shading have a sharp edged appearance.

Focal Length The focal length is the main information of the camera lens. As a rule, objectives cover a specific, fixed focal distance: 28 mm, 50 mm, 85 mm.

There are, however, zoom objectives covering a specific range of focal distances: 20 – 28 mm, 28 – 85 mm, 70 – 210 mm.

Fog A fading effect, depending on the distance of the object to the viewer.

Forward moving kinematics (FK) The hierarchical linking of an object on a higher level to an object on a lower level (downward kinematics).

FOV, Field of View The area which you can see.

FPS Frames per second. Measuring unit of picture ratio in videos and animations. A picture ratio of about 20 frames per second will result in a continuous sequence of pictures. Television is broadcasted in 25 pictures per second.

Fractal Fractal geometry is based on the principle of "self-similarity". Fractal objects are made up of elements showing the same structure as the original elements on the higher level of hierarchy. Benoit Mandelbrot is a mathematician who has done intensive studies in this field.

Frame Single video picture

G

G-Buffer In video post production, picture layer actions use G-Buffer masks, instead of RGB and Alpha masks. These are based on graphic puffer channels.

Geo Referencing Assignment of a coordinate system to objects.

Geo Tif Pixel-based data format containing geo-referenced information.

Ghosting Formerly, animations were drawn on a transparent celluloid foil, through which one could see the previous hand drawn frames.

GIF Files Graphics Interchange Format. GIF is a LZW compressed format, which was developed to reduce the file sizes and transmission times via telephone as much as possible.

GIS Geographic Information System. A system for the retrieval, administration, analysis and representation of huge amounts of spatial data including their thematic attributes.

Glow Illumination effect generated during rendering.

Golden Section The "golden ratio" is the division of a specified length in such a way that the ratio of the entire distance to the larger part is equal to the ratio of the larger part to the smaller part. According to this theorem, the division of a length or a surface in a ratio of 3:5 will appear harmonious to the viewer.

Gouraud Shading Optimized type of Flat Shading, in which the edges are interpolated with intermediate color values, resulting in a picture that is less irritating to the viewer.

GPS Global Positioning System

Gray Scale A gray scale picture is made up only of shades of gray. There are normally 254 different shades of gray, plus black and white: thus there are altogether 256 shades.

Grid format DTM In digital terrain models, the grid format is the composition on the basis of an even matrix used for the definition of the terrain model in rows and columns.

Grid A mesh forming the basic structure of a raster representation.

H

HLS Hue, Lightness, Saturation. Color system for the definition of colors according to depth of color , brightness, and saturation.

HSDS Hierarchical SubDivision Surfaces is the subsequent subdivision of surfaces, with the goal of obtaining a higher resolution for an improved quality representation.

I

IGES Initial Graphics Exchange Specification. ANSI standard for the definition of a neutral format for the data exchange between different CAD (Computer-Aided Design), CAM (Computer-Aided Manufacturing), and computer visualization systems.

IK, Inverse Kinematics In contrast to the real-life course of the movement of, for instance, the human arm, where the chain of movement (kinematics) when lifting the arm, will start at the shoulder, and then move down to the upper arm, then to the lower arm, and finally to the hand, 3D models are easier to control from the end of the chain of movement. This reverse

movement control is called Inverse Kinematics.

Indexed Color Indexed color pictures include a table of colors in their data. This table lists all colors that can occur in the picture. For an indexed 16 bit color picture the table contains 16 listed colors (4 Bit), for an indexed 256 color picture there are 256 colors (8 Bit). Further colors can be simulated, like in the gray scales of a purely black and white representation, by positioning pixels of different colors close to each other. The eye will then see colors that are not actually present in the color table. You can change pictures into indexed color pictures, if you want to be able to load them in some programs like Windows Paintbrush, or to show them on a monitor which can only represent 256 or 16 colors.

INTEL Indeo Video For the compression of 24 bit video for CDs. Like the Cinepak Codec, the INTEL Indeo Video achieves higher compression rates, a better picture quality, as well as a replay speed than the Microsoft Video 1 Codec, and it is available for Windows as well as for Macintosh computers.

Interactive Special modus of the operating system where data input and program control by the user can be done during program execution

Interface An connection between two or more components of a system.

Interlaced Representation The screen is divided into lines. In the interlaced method, first all even, then all uneven lines are built up for the picture on the monitor. This method allows a higher graphics resolution, but the monitor will flicker more than a non-interlaced monitor, where the entire monitor surface with all its lines is actualized every time.

INTERLIS INTERLIS is a descriptive and transfer mechanism for geo data. With this universal language, the experts can model their data precisely in order to provide software applications and interface services. The basic idea behind INTERLIS is that a digital exchange of structured information is only possible when the institutions participating in the exchange have a precise and identical idea about the characteristics of data to be exchanged. Further information under www.interlis.ch.

J

JPEG, JPG Files Joint Photographic Experts Group. JPEG is the current format for the representation of photographs and other

semi/halftone /continuous tone pictures in HTML files in the World Wide Web and other online services.

K

Keyframe A keyframe is a basic picture used for comparison with other frames in order to detect differences. Keyframes are used for defining various animation sequences.

Keyframe Animation This term originates from the world of animated cartoons drawn by hand, and was used for the keyframes of the movie which were drawn by the main designer. The frames in between the keyframes were done by numerous "drawing servants".

L

Landsat Mosaic A Landsat Mosaic is a satellite picture of a large area, e.g. Switzerland, in a resolution of 25 m, composed without visible transitions, by a mosaic of several geocoded and radiometrically fitted scenes. The satellite pictures were taken by the remote sensing satellite Landsat 5, from a height of 705 km. The picture comprises only the spectral channels 3, 2, and 1 and is available in the resolutions of 25m and 100m, in TIFF format.

Landscape Models Landscape models represent the objects of a landscape in a flexible vector format. They are made up of subject layers (e.g. a traffic system). Every layer includes geo referenced objects as point, line, or surfaces. Attributes and relationships are assigned to every object (topology).

LandXML This format represents the topology of a TIN in a list of knots and elements. Land XML is an OpenSource format supported by many GIS products and software producers.

Lathe, Rotation Object 2-dimensional vector graphics are changed into a 3-dimensional form, by turning them around an axis. The semi-sectional cut of any object is an ideal basis for a Lathe model.

Lens Effects Lens effects are illumination effects as perceived by the human eye. Just imagine you were looking directly into the sun (never ever do this without a filter, please). You would see many rays and a diffuse illumination around the sun, a strongly accentuated aura. In computer graphics, lens effects are usually generated via filters during post production.

Light Decrease, Attenuation With increasing distance to its origin, the intensity of light decreases. Objects near the source of light will appear

lighter than objects further away from it.

Lights In 3D programs there are usually several types of light or illumination sources.

LOD Level Of Detail – Real-time objects have to be represented in different levels of detail, normally with less detail in the distance and with more detail in the foreground.

L-System Descriptive system for the simulation of the development of graphic structures, used mainly for the generation of pictures showing plants.

Luminance Part of a video signal determining the degree of brightness - generally the scale of black and white underlying a color picture.

M

Mapping Mapping is the current term used for assigning a texture,(e.g.) a material, to a 3D object.

Material The term material describes the sum of all surface characteristics of an object.

Matte Object By using matte objects, invisibility is assigned to specific objects. They are able to cast shadows, but you cannot see them.

Meshes Description of objects, usually by a polygonal mesh.

Metadata Data about data, like source, date, precision, and further attributes.

Metal Shading Metal shading is used when dealing with strongly reflecting surfaces like metal or glass.

Microsoft Video 1 Compression of analog video - a lossy spatial compression supporting color depths of 8 to 16 bit.

MIP Maps MIP maps are a collection of optimized bitmaps (4x4, 16x16, 256x256 pixels provided in addition to the main texture. MIP maps are used especially in real time applications, to increase flight speed. The abbreviation is taken from the Latin “multum in parvo”, meaning “a lot in a small space”.

Morphing Special effect in which one form is slowly transformed into another form.

MOV files Movie, the Apple data format for audio and video

MPEG4 MPEG4 is an internationally standardized method for the memory-saving recording of moving pictures including

multi-channel sound. This format is supported by the "Motion Joint Picture Expert Group" (MJPEG). An important characteristic of all JPEG formats so far is the upward compatibility, i.e. updated encoders/decoders (Codecs) continue to accept older formats of the same edition.

N

Normal A surface normal, or just normal to a flat surface is a three-dimensional vector which is perpendicular to that surface. A texture is normally mapped on the side containing the surface normal.

NTSC National Television Standards Committee, the video standard used in North America, large parts of Central and South America, and in Japan.

NURBS Non-Uniform-Rational-B-Spline. NURBS are precisely defined mathematical functions, the precision of which does not depend on the detailing of elements, unlike polygonal modeling.

NURMS Non-Uniform-Rational-Mesh-Smooth, a special Mesh-Smooth-Modifier integrated in Max.

O

OBJ-Files Alias Wavefront data format

Omni-Light Like a light bulb, an omni light emits its light evenly in all directions. It is not possible to specify the focus of the rays of this light type.

Opacity Light impenetrability. Low values correspond to a high transparency, high values to a low transparency.

OpenFlight Data format of MultiGen Paradigm, which has become standard in the field of simulation of terrain data.

OpenGL 3D software interface (3D API) for Windows NT and Windows 95, licensed by Microsoft and based on Iris GL from Silicon Graphics.

Ortho photo An ortho photo is an aerial or satellite picture which has been corrected by geometrical transformation, and corresponds to an orthogonal projection of a terrain onto a cartographic surface.

Ortho Rectification Method of fitting a photograph to a costant horizontal scale.

Overshoot Option for the illumination of the entire scene, independent of the actual cone of light. However, shadows will only be cast in the area of the cone of light.

P

PAL "Phase Alternate Line". PAL is the television standard of most European countries.

Particle System Snow, rain, dust etc. can be simulated by particle systems.

Patch Patch objects are suitable for generating slightly curved surfaces.

PDF-Files The Portable Document Format (PDF), like HTML, is a platform-independent file format for the administration of text, vector and picture data.

Perspective A view based on the way the human eye sees. Objects in the distance are shown to be smaller, which gives the impression of spatial depth.

Phong Shading In Phong shading, the edges and surfaces are smoothed. Highlights of evenly glossy surfaces are realistically rendered.

Photometry Photometry is the simulation of the distribution of light in a defined environment, based on physical factors.

Pivot Point A pivot represents the local centre and the local coordinate system of an object.

Pixel Shading (Dither) Representation of a color by mixing closely related colors.

Pixel Abbreviation of "picture cell", the smallest unit represented on the screen, also called pel, "picture element". Pixels can be compared to the dots that make up photographic representations in newspapers.

POI, Point of Interest Main subject of the representation. The entire scene revolves around the POI.

Polygon A surface consisting of any number of straight lines. The smallest polygon is a triangle.

POV, Point of View Position of the camera. Point from which the scene is viewed.

Primitive Objects consisting of simple geometric forms, like spheres, cubes and pyramids. Since these forms can be easily described in mathematical terms, they save on computing time and memory space. In modeling, one should always fall back on these basic objects, as long as this remains re-

	alistic.
Procedural Map	In contrast to the fixed matrix of a bitmap, a procedure map is generated with the help of mathematical algorithms. A great variety of forms can be generated by using procedure maps
Projection	Mathematical formula for the conversion of points of a sphere (e.g. planet earth) onto a plane (e.g. for a plan).
PSD File	Photoshop file format
PS File	Postscript. Actually a controllable printers' language.

Q

QuickTime	QuickTime Movie. Apple file format for audio and video

R

Radiosity	In radiosity, light is considered to be energy, which allows the physically nearly correct computation of the diffuse distribution of light in a defined space.
Raytracing	In Raytracing, a "virtual" projection surface is set up between the eye of the viewer, i.e. your camera, and the scene to be viewed. This projection surface corresponds to the desired resolution of the resulting planned picture, with respect to length and width.
Real time	In real time 3D visualization, the tedious computation of the pictures and scenes becomes redundant, because one can make use of highly specialized hardware (high-tech graphic cards) which is nowadays included in most standard PC systems. These graphic cards include many algorithms in the hardware which would normally have to be dealt with by the software and the CPU of the computer. With the help of these graphic cards, computations in real time can be done, i.e. with more than 25 frames per second.
Refraction, Index of R.	The degree of refraction which occurs when light encounters a more or less transparent surface. A virtual sphere of glass will look very realistic when the refraction index of the "glass texture" is set equal to the typical refraction factor of real glass.
Refresh Rate	Number of pictures represented per time unit. Software videos have a fixed refresh rate. During replay the actually shown rate of pictures may differ by a large degree from

	that existing on the tape (see also fps).
Render	This is the computation procedure which is necessary to transform a 3D model or a 3D scene into a 2D representation. This procedure can be done by various computational methods, each requiring different calculation efforts and resulting in a different quality of the finished result.
Resolution	Number of horizontal and vertical pixels on the screen. The higher the resolution, the higher the precision of the picture.
RGB 8 Colors	The RGB 8 color data type is a 3 bit type, in which every pixel can take on one of eight colors. The RGB 8 color pictures are automatically changed to indexed 16-color pictures; the eight original colors are retained while space is provided for eight additional colors. However, it is not possible to change another data type into the RGB 8 color type.
RGB Color space	By additive mixing of the colors red, green and blue, a picture with an infinite number of colors can be represented on the monitor. That is why the editing of visual data is done with the data from the RGB file. The three color vectors are forming a color environment, where the value for the color black is positioned/set in the origin, and the value for the color white is found at the opposite end.
RGB Format	In most cases, a TIF file is too large to be used in a real time environment. The picture needs to be optimized for quick loading by a graphics card; a suitable format for this is .rgb. RGB files can be written from Photoshop, when a Plug-In has been installed. The Plug-In for Photoshop can be found under: http://www.telegraphics.com.au
RGB True Color (True Color)	RGB is short for Red Green Blue. In this data type, the colors are composed by mixing a specific percentage of each of these three basic colors. The percentage of each of the three colors can vary in 256 grades. By mixing these color grades, 16.7 million possible color combinations can be obtained (3 times 8 bit = 24 bit, 2 to the power of 24 = 16.7 million). The human eye is not capable of distinguishing between such an immense number of color grades. Hence the term True Color = representation in real-life colors.
RLA Files	RLA is a widely used SGI format. The RLA format supports 16 Bit RGB files by a single Alpha Channel. RLA is an excellent format for further editing of 3D visualizations, because it is possible to save depth information in this format.

Rotoscopy A rotoscopy is the method of importing video frames as a background for suitable objects.

RPF Files RLA files are replaced by RPF files as the preferred format for the rendering of animations which require further editing or additional work on specific effects.

S

Saturation Saturation defines the depth of a color . A color with a high degree of saturation is very intense, a color with a low degree of saturation will look faded.

Scanline Renderer A Scanline Renderer is used for calculating the brightness of every single pixel of a surface. This ensures a realistic transition from bright to dark, as well as the positioning of highlights and textures.

Scene The sum of all elements of a 3D composition (models, lights, textures, etc.).

Self Illumination By self illumination you obtain the effect of an illuminated surface which does not cast a shadow. This illusion is achieved by replacing the shadows on the surface with diffuse colors.

Shading (Flat, constant, Phong, Blinn) Shading, or rendering, allows the definition of the colors on a warped surface, for giving the object a natural look. In order to achieve this, the surfaces are divided up into small triangles.

Shadow Color Generally, the color of the shadow will correspond to the complementary color of the main light source.

Shadow Map The bitmap generated by the renderer during the first rendering of a scene is called the shadow map. In a Scanline Renderer, the generation of the shadows is done by so-called shadow maps. The precision of the shadow is defined by the size of the shadow map. The higher the value, the more precise is the calculation of the shadow.

Shape file A vector data format for saving the position and other geographical attributes.

Skinning With this technique you put a skin around the cross beams of a model.

SMPTE SMPTE (Society of Motion Picture and Television Engineers) is a time setting used in most professsional animation productions. The SMPTE format indicates minutes, seconds, and frames from left to right, separated by a colon, for example 01:14:12 (1 minute, 14 seconds, and 12

frames).

Spline A curve which is defined by control points outside the curve. The method is similar to the Bezier curves, but is defined by a different mathematical algorithm. The term spline was originally used in ship building, where metal tapes around the body of the vessel were bent into the required shape by weights attached to specific points.

Spotlight Spotlights are basically point lights, the difference being that the light distribution is limited to the area within a defined cone, a 360° spotlight being a point light. In most 3D programs this angle can be set on a continuous scale.

SPOT Mosaic Spot Mosaic is the new 5 m satellite mosaic picture of Switzerland composed by several geo-coded and radiometrically adjusted scenes. The satellite pictures were taken by the remote sensing satellite Spot 5, from a height of 822 kilometers. The true color picture with a resolution of 5 m was composed by integrating two mosaic pictures taken simultaneously at two different resolutions, and will be available in TIFF format. http://www.npoc.ch

Subtractive Color This is the color which results when one or more colors of the incoming light are absorbed. When all the colors of the spectre are absorbed, we perceive the color black.

Sunlight In sunlight, the rays of light reach the scene in a parallel fashion. Depending on the time of day and the constellation of the weather, the angle of the incoming light, as well as the brightness and the coloring (from a high percentage of white at midday to increasing shades of red in the evening) will vary. This, in turn, has an influence on the intensity, the direction and the coloring of the shadows of the illuminated object

T

Texture Mapping The representation of a bitmap on an object, taking into account the adjustment of perspective (e.g. with respect to the pattern of the wallpaper, the wood grain on furniture).

Textures By mapping a 3D model by a texture with an organic-looking surface, the 3D model will get an appearance closer to reality. A texture can be a bitmap picture, or a procedurally generated map (see procedure map). The appearance and the illumination of the texture can be adjusted by parameters like refraction or transparency.

TGA Files Truevision format. TGA was developed for use with systems working with Truevision video cards.

TIF(F) Files Tagged-Image File Format. TIF is a flexible Bitmap format, supported by nearly every software for painting, picture editing, and page layout. TIF pictures can be produced on nearly all desktop scanners.

Tiles The patterns of floor tiles or wallpaper are typical examples for the use of tiles. A small segment, i.e. a tile, is used and repeated n times, depending on the pattern. In 3D visualization usually a specific number of tiles in U and V direction of the map will be given. U and V are the local axes of the respective map.

TIN Triangulated Irregular Network. In each case the nearest neighboring points are combined into irregular triangles; the surfaces obtained in this way will form the terrain model.

Topologic Data Structure The method for saving graphic data in such a way that the topological relations between the different objects can be calculated.

Topology The science of the position and arrangement of geometrical bodies within a specified space.

Transformation Matrix Linear algebra is the language of 3D graphics. All transformations within a scene, e.g. scaling, rotation, or positioning of objects, are defined by 4 x 4 transformation matrices.

Transparency Transparency is the characteristic which allows the light to penetrate a material, in contrast to opacity, which prevents the light from penetrating.

True Color Representation Simultaneous representation of 16.7 million colors (24 or 32 bits per pixel). The color information saved in the display memory is directly transferred to the D/A changer, without having to proceed through a translation table. Therefore the color data for each pixel has to be saved separately. True Color representation is based on the fact that the human eye cannot distinguish between more than 16.7 million colors.

U

UVW Coordinates Mapping coordinates are called UV or UVW coordinates. These letters refer to the spatial coordinates of an object, in contrast to the XYZ coordinates used for describing the entire scene.

V

Vector Graphic Saving of graphic data based on the coordinates of single points, or specific lengths of geometric curves.

Vertex Point

VGA Short for Video Graphics Adaptor by IBM, with a standard resolution of 640 x 480 pixel and 16 colors.

Virtual Reality VR is a term used for describing interaction in 3D worlds. The most advanced example for this are CAVE technologies.

Volume Model The digital definition of a geometrical object including its 3 dimensional characteristics.

VRAM Short for Video Random Access Memory; memory chip for fast graphic charts.

VRML Virtual Reality Markup Language,

W

Wireframe Model The skeleton structure of a 3D model, consisting either of polygons, or Bezier curves, or even NURBS (see below).

Wireframe Wireframe view of a 3D model. The skeletal body of the model without textures. There are wireframe views with hidden lines, and meshwire views including all lines (transparent model).

World Coordinate System The world is the universal coordinate system for all objects in a scene.

X

XML The Extensible Markup Language is a standard for the generation of machine readable as well as human readable documents, structured like a tree.

Xref External reference. An external file referred to.

Y

YUV Color space Visual data of single pictures are composed by one part brightness and two parts color . The color values are obtained by differentiation with the value for brightness. This method was originally used in color television technology

Z

Z Buffer Information about the 3D depth (position in the 3rd dimension) of every pixel. Z Buffering is a method for removing hidden surfaces.

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Used Software

Operating System:	Microsoft: Windows XP Pro www.microsoft.de
Word Processing:	Microsoft: Word 2000/XP www.microsoft.de
Picture Editing:	Adobe: Photoshop 7.01 www.adobe.de
Vector Graphic:	Corel: CorelDraw 12 www.corel.de
Landscape Modeling:	AutoDesk: Civil 3D www.autodesk.de

GIS-Applications:	ESRI: ArcGIS 9.1 www.esri.com
3D-Visualization:	AutoDesk Media: 3ds max 7.5 www.autodesk.de Itoo Software: Forestpack www.itoosoft.com Digital Elements: Worldbuilder 4 www.digital-element.com Planetside: Terragen www.planetside.co.uk Eon Software: Vue 5 Infinite http://www.e-onsoftware.com
Plants	Digital Elements: Verdant www.digital-element.com
Interactive Applications	Anark Corporation: Anark Studio 3.0 www.anark.com Act3D: Quest 3D 3.0 www.quest3d.com Viewtec: TerrainView 3.0 www.viewtec.ch

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