TOURISTIC MOUNTAIN MAPS:
From art-realistic model to 3D map

Emil Simeonov
Dipl. engineer – UACG, Sofia, Bulgaria
e-mail: emil_simeonov@abv.bg

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Introduction
Mountains territories are very often a challenge for cartographers in choosing their cartographic representation. Traditionally, they are presented by 2D topographic or touristic maps. Another possibility coming from the past is connected to art representation of these objects: art-realistic models. If they have enough accuracy as map products, they can be shown by making similar but accurate enough models as a 3D map.

Different kinds of data for designing art-realistic models of mountain touristic objects are outlined in the report. The most popular projections for its creation are shown. Different kinds of sources are needed in all steps of art-realistic model creation. Some of them could be used also for 3D modeling of the same object and for creating 3D maps.

A technology for 3D map design is developed as an alternative modern method for mapping of mountains. After sources collection, the necessary data is processed to be appropriate for 3D modeling techniques. A symbol system containing 2D and 3D symbols is created for 3D map compiling. The final 3D map is a product realized after photo-texturing, virtual camera and rendering techniques.

A comparative analysis is made on the basis of the creation of an art-realistic model and a 3D map of one and the same territory - a famous winter resort in Bulgaria.

For the current report, two ways of for representing mountain territory for winter and touristic centre by art realistic perspective model and 3D map are outlined.

I. General presentation – development and visualization of art realistic model

People are able to perceive quite naturally the surrounding world. But understanding topographic maps turns out to be a very difficult task. A number of studies have been conducted in order to understand how people perceive information, aiming at improving the quality of topographic maps and making them easier to work with. In recent years, a number of standards on how to create such maps have been adopted. The aim is to create a map that is very close to people’s natural perception of the surrounding world. People can go to an unknown town and use the city map or just drive along the streets but it is difficult to imagine a tourist going to an unknown mountain without using a map. This is the reason for the rising demand for mountain maps and other types of information about mountain regions and ski resorts.

Creating this type of art representation is a long and laborious process. The painter-cartographer must be well acquainted with the relief features in order to depict the terrain and provide users with correct information about the relief, the high-mountain features, and peaks
Through correct use of light and shades and with the sole aim of creating a highly realistic representation. The painter must be skilled at perspective in order to correctly depict the region and provide mathematical and color credibility, as close to reality as possible.

Projection is at the basis of every map. Brief information about the different ways for using projections in creating art models is provided below.

1. Different projections for creating of art realistic models

In the beginning the painter–cartographer makes a choice appropriate projection when he presents a new art realistic map. The projections define how the terrain will be present. When the map is prepared with a traditional hand-made method, the choice of elaboration is much bigger than with digital resources. The reason is that much software not offers alternatives for frequent use of central projection.

According to Bernhard Jenny in his study “Bringing traditional panorama projection from the painter’s canvas to the digital realm”, the most frequently used projection is the central projection and it has different varieties. He depicts the following types of this projection.

- **progressive projection** - The progressive projection (or progressive perspective) is an interesting enhancement of the central projection (Hölzel 1963). The progressive projection artificially curves the terrain in the foreground downwards, to achieve an improved three-dimensional effect. Two alternative ways lead to this result: (1) The digital elevation model can be artificially curved (Patterson 1999); or (2) the renderer combines the characteristics of two cameras. When using the latter technique, the first camera portrays the foreground with a rather steep angle, whereas the second camera targets the horizon of the terrain with a flat angle. The rendering engine linearly interpolates between the parameters of the two cameras (figure 1).

- **Fisheye Projection** - The fisheye projection is an eye-catching alternative to other projections. The information on a map using the fisheye projection is possibly harder to seize for an inexperienced reader. However, the fisheye projection is a good means to catch the reader’s attention solely by the shape of the image.

- **The “rubber projection”** - aims to portray important features of the terrain in the geometrically “best possible way”. It is often based on the progressive projection. With this type of projection, the relative size of mountains depends on their “significance”. The painter has to take the decision what the “best possible way” could be and what “significance” a mountain has. These decisions depend on the intended purpose of the map.

(Figure 1. The progressive projection combines a step angle for the foreground (left), and a flat angle for the background (right).

“Bringing traditional panorama projection from the painter’s canvas to the digital realm” from Bernhard Jenny)

Very often used in the Berann art realistic map.
2. Technologies of creating the map of Borovets ski and touristic resort

- **Planning.**
  The main aim of the product is to depict the tourist and ski zone of Borovets, with its infrastructure – ski runs, ski jumping, lifts, roads, routes, and buildings, including hotels, chalets, villas, and others.

  Initially, studies of the region were conducted and data and information about the terrain were gathered.

  After complete inspection of the area, a drawing on paper with pencil and rubber was made, using geodesic data, topographic maps and photos. As the beginning of the composition, we accept the highest part of the mountain (Musala, Irechek, Deno) and Borovets resort is radially arranged on the map.

  ![Fig. 2 Location of Musala peak as related to the resort of Borovets. Radial situation – Borovets and Musala](image)

- **Mathematical basis**
  - **Usage of digital data**
    Coordinates of 17 points were used.

    The data for the road infrastructure was scanned and vectorized from topographic maps of scales 1:25 000, aiming at achieving high accuracy.

    The digital data was then entered into AutoCAD. Coordinates and benchmark points were entered into the software and through a central projection the plane was rotated (3D orbit) in order to depict the terrain with maximum visibility and credibility. Musala peak and the resort of Borovets were placed diagonally (radial) to each other for better visualization. The digital information is plotted into cardboard with size 100x75 cm which will be useful for creating the primary drawing.

  - **Use of analog data**
    - Manually defining distance on maps
    - Defining relief through studying contour lines
    - Defining visual location of ridges to create the model
    - Defining light direction and separation of light and shades.
    - Processing analog data for creating the model. This stage includes an initial outline of the terrain, using mainly a pencil.

- **Perspective**
  Perspective provides the skeleton structure for developing a panoramic map, defining the maximum amount of area the viewer will be able to see. Perspective is a science that helps us correctly depict the objects on the drawing plane.
Perspective—finding the perfect fit. (left) A hypothetical landscape shown without perspective. It fits nicely into a rectangular format, but looks somewhat artificial. Background features appear too large. (middle) Excessive perspective convergence requires additional terrain to be shown in the empty corners, shown at A and B, thus increasing the amount of work and possibly including distracting or competing area. Background features are compressed. (right) Berann typically used modest amounts of perspective, especially on large-scale scenes."

A view from on High – Panorama and Landscapes visualization”, Tom Patterson - www.shadedrelief.com/3D/mtn.htm - 2000

Increasing the amount of perspective increases the visual field, compressing more information from the background plane in the defined width of the panorama. Perspective usage increases realism, except in the cases when it is used excessively, tending to unnaturally limit the backdrop.

Positions of lines in space vary. Some are seen without interruptions with their true characteristics (when they coincide with the plane of the picture). Those lines that are parallel to the picture plane are situated behind it and can have vertical, horizontal, or inclined position. The farther they are from the picture plane, the smaller they become on the picture but their direction is preserved.

Perspective is more often used in small-scale maps than large-scale ones. The points of perspective were defined in the process of map-creating. The visual field was defined.

The human eye sees the objects on the horizontal line within the visual angle that does not exceed 53 degrees. All visible points of the objects are connected to the eye through the so-called visual beams. The major beam is located in the center of the visual angle and divides it in two equal parts. The objects in the center of the visual field are those that are most clearly seen. In order to see a side object clearly, we must change the direction of the view.

(TEAM (1986), Publishing Moskow “Fine art”, Moskow, Russia, pp. 35-37)

• Orientation

The orientation of the panoramic map is south because all elements are arranged in the northern slopes of the Rila Mountain.

In one of his studies, Tom Patterson explains: “In his work, the famous cartographer–painter very often uses the southwest direction. Looking southwest reveals northeast mountain faces, which tend to be steeper, more distinctive, and more glaciated. Prevailing southwest winds transport summit snows to these lee slopes, which also get less direct sunlight.”

Because of this, many panoramic maps can see in southwest direction exactly Berann’s map, but the cartographic area is much bigger. (country, continent)

A view from on High – Panorama and Landscapes visualization”, Tom Patterson - www.shadedrelief.com/3D/mtn.htm

• Camera, image plane and vertical exaggeration

In art-realistic maps, the position on camera is very important. When the position of watching is much higher, the horizon will be always visible, but mountain and hilly terrains will fuse with the entire area. When the camera is at a lower level, the mountain range will protrude and lose the background information. Patterson’s suggestion is that the projection
plane must be tilted towards the viewer and, from a point about two thirds of the way into the scene, a convex curvature must be added to flatten the horizon.

The end result is a panorama that combines the best of both worlds: the foreground and middleground (where the important information resides) appear map-like while the background appears realistic, complete with a horizon and sky (Patterson, 2000).

This method is good for small-scale maps and is very often used in the maps of Berann and Stimuvoll.

For the vertical exaggeration, several things may be said. Many important places must be shown in the map. Here the painter–cartographer must take a decision which important places will be offset for reinforcing the thematic specificity of the map. In this case, the theme is ski and touristic entertainment. Here, we see a vertical exaggeration the main range of Musala peak in 2:1, because here is the main object of interest (ski runs, lifts, chalet, hotels and etc). Next we see two pictures taken from Google Earth and an art-realistic map.

![Fig 4. First on the right, art realistic map of Borovets region Musala – Jastrebec with 2:1 vertical exaggeration and (on the left) the same place in Google Earth. You can see a vertical exaggeration in Mousala range with 2:1 – range Skakavcite – lower than Musala.](image)

- **Primary drawing**

In the first stage of work, the data is plotted on undestroyed paper – geodesic points and digital data. I can describe several steps about creating the primary drawing using only pencil and rubber.

  - Projection plain is accepted to be - elevation 1300 m.
  - The mountain range Musala, Irechek, Deno, Shatur to be vertical exaggerated – 2:1, then the remaining part.
  - The valley of rivers Iskur and Maritza is enlarged using Rubber projection and Moving Mountains (for the cartographer has represented the mountain valley magnified, because thus the viewer can see landmarks who is invisible in real life).
  - Using the progressive projection is important for representing the front part of the area (resort Borovets) - combines a steep angle for the foreground, and a flat angle for the background.

The primary drawing will be used as the basic skeleton for further work.

- **Color, lights and shadows**

The next step in creating the map is how to turn a mechanical drawing into a beautiful landscape.

The painting is done with tempura “which are opaque water-soluble paints, and generally progressed from top to bottom” (Tom Patterson 2000)
Light tones are applied over the penciled line work. After that - dark colors are applied to shadows with a broad brush. Black, blue and brown colors are used for the shadows. For light places, the basic color is blue. In the end, it is important that the color between light and dark spots is underlined.

The next step is to complete the scene with a fine brush, using additional colors. This is a delicate work requiring light and shade effects. In shadow places - forest is depicted in blue, green, brown and grey upon the color of firs – black, blue, brown using fine uniform vertical lines shaping a real hill, height or peak. This type of work is used also in light places in forests using white color. The final map becomes a real picture and gives an idea for a 3D model.

For higher unwooded parts of mountain, softer colors are used. For rocks, brightly orange and brown (may contain and red) are used, and for slant slopes, only blue and white are used. For the central part of Borovets ski resort, bright colors are used to be more visible. Here is used fine brush also.

Fig. 5. Central hill of Deno peak.
The first color in Forest – for shadows places: black, brown;
For lights places – blue.
For unwooded places – white and blue.
Next stage of working – finely representation using the art realism including additional colors – white in blue forest and blue, grey, brown color in shadows forest.

- Lights and shadows

The last stage of work refers to light and shadows. Here are using an art technique, thinness, and completeness. Once again, the rules of conventional cartography do not apply to panoramas. Using more shadows improves natural realism, with minimal detrimental effect, although some detail is sacrificed.

According to (Patterson 2000), to place cast shadows Berann had to calculate how irregular shadow profiles would project on irregular adjacent slopes. The shadows typically result from a relatively low-altitude illumination source to heighten the overall dramatic effect.

Here we choose the eastward direction of light rays from the sun, about 10-11 o’clock. For some hills that are higher in the opposite slope, reflect shadows are shown. Some effect is used for representing the opposite effect of shadows – dark places are reflected from light slopes and this is shown with lemon and white colors. (fig. 6)

Fig. 6
On the left, in the centre – Sharply turn from light to dark at strong change
On the right –easy and finely passing from light to dark part
System of Symbols

Upon completion of the artistic work, a map symbol system was created using software for processing of raster images – Corel Draw. The model created was scanned and processed in high resolution in Corel Draw.

Symbols are very important in map making. A lot is written about their classification but most correctly they can be classified according to the type of the depicted objects (represented by points, lines, or area) and according to their characteristics (name, designation, quantity.).

Final map of art realistic model with system of symbol (ski slopes, lifts, names of interest, table sign and table with length of ski tracks and lift) on “Ski and touristic centre Borovets Bulgaria” published from DataMap Europe Ltd – 2004
II. General presentation – development and visualization of a 3D map of Borovets. Tourism and Ski Center area

The process of creating a 3D model can be divided into the following stages:
- Collecting initial data
- Processing initial data
- Modeling the 3D map
- Creation and application of a symbol system in the 3D model
- Visualization of the end product
- Generalization and accuracy

1. Collecting initial data

Due to the vastness of the region, existing digital data (cadastral and specialized maps), satellite photos, photogrammetric, and remote methods for collecting data, were used. Collecting data through direct geodesic measuring on a territory of this scale would have been an extremely laborious process.

Vector as well as raster data were used in creating the 3D map of Borovets. Initially, a preliminary study of the region was done and initial data and information found, in order to achieve maximum authenticity and accuracy of the map. The following means were used as basis for the cartographic work:

- **Cadastral and specialized map of the Borovets resort**, provided by Geoprecise Engineering Ltd. The data was provided in CAD format. The map was used for constructing the street network, the hotel area, and the geodesic points.

- **The Military Geographic Service** – provides topographic maps of the country with scale of 1:25 000 to 1: 1 000 000. The map used for the region had a scale of 1:25 000. Four topographic map sheets were chosen with map tiles - κ-9-44-Б-б, κ-9-44-Б-Г, κ-9-45-А-а, κ-9-45-А-в. The maps were scanned in 3150x3150 resolution as through vectorization data were collected about: the relief, road infrastructure, lakes, forests, ski runs, etc.

- **Ministry of Agriculture** as well as the Ministry of Environment and Waters. Data from a map of restored ownership, provided by Geocad-93 Ltd, was used to define routes of ski lifts, ski runs, ski trails, the forest belt, and the road network.
Coordinate register of geodesic network in the area – for the area depicted in the map, coordinates with 130 datum points were provided by Geocad 93 Ltd. With the use of initial coordinates and through affine transformation the map sheets were positioned and transformed.

Raster data – Through the use of satellite photos from Google Earth. The photos are appropriate to use as initial data, as the photographed region is not limited and images provide complete view to the Borovets resort, together with ski runs, lifts, drag lifts, other facilities, the hotel area, and the road network. The routes of the ski runs and lifts, as well as the location of lift stations and other buildings and facilities are easily seen on the satellite photos. Detailed depiction of the forestation, the open areas, and the water basins is also provided. For higher accuracy using specially ordered satellite photos of the region is recommended. Existing maps of the region as well as other sources can add to the information provided by the photos.

Geodesic measurements – the geodesic measurements were used in this map for checking the cadastral basis of the different objects (hotels, roads, routes), as well as for defining the height of the characteristic buildings. The datum points were defined on the plain and in height, taking in mind the geodesic basis. It is one and the same for the horizontal and the vertical measurements, with defined coordinates and heights of its points.

The depicted area is the central region of the Borovets resort and the newly built hotels “Flora,” “Flora Residents,” as well as “Iglika 1 and 2.” Geodesic measurements were carried out, including the buildings’ characteristic features such as the contour lines, the cornice and top levels. Additionally, the cornice and top levels of the Rila, Samokov, Ela, and Breza...
hotels were measured. An existing specialized map provided data about alleys, stairways, and green areas.

2. **Processing initial data – scanning, vectorization, and digitalization.**

In order to create a 3D model, vectorization of the data from the map sources is necessary. The raster data (satellite photos – Google Earth, map sheets) were imported in AutoCAD. Using the coordinates of the geodesic points, the map sheets were positioned through affine transformation with the Rubbersheet function of the software, and then the needed data were vectorized (forest belt, horizontal lines, lakes, lifts, and ski runs) from the already positioned maps. Whenever digital data was available, they were used directly in the model. Importing the data in 3D Studio Max Design followed next.

3. **Modeling the 3D map**

Before data processing begins one must be completely acquainted with the technology for creation and the means for visualization of the 3D model, in order to modify the initial file for software processing and additional work and visualization. The software used for visualization was 3D Studio Max Design 2009, which recognizes only loaded layers. That is why while creating closed objects in 2D; they were separated into different layers in AutoCAD Map before processing them in 3D environment.

The basis of the work is creation of a three-dimensional digital model, which is processed in 2D environment. It is used for initial terrain data in 3DS Max.

- **Developing a digital three-dimensional model**

The horizontal lines from the topographic maps, vectorized in AutoCAD environment, were imported in 3D Studio Max. They are continuous or closed polylines with defined datum points. The next stage requires using the 3D S Max function, which creates an irregular mesh of triangles (TIN) by using the peaks of the polylines to form a plain. The created terrain is a mesh that can be edited, smoothed, and different textures can be applied to it. To create the terrain, digitalized horizontal lines at a distance of 10 meters from each other were used.

A 3DS Max function for smoothing the terrain was used, as well as a snow texture from the [www.3dsmaxresource.com](http://www.3dsmaxresource.com) web site.

![Fig 10. 3D terrain of the area – 3D studio Max](image-url)
- **Positioning of characteristic objects in the digital model (road infrastructure, lifts, hotels, and others).**

  The initial stage of positioning the road network into the model included the network’s extraction from the initial materials (cadastral map, restored ownership map, topographic maps) and its storing into an AutoCAD file. Processing was done on a horizontal plain. The next stage included placing the road infrastructure into the terrain model. Through the use of an additional “Glue” plug-in to the basic software product of Itoo Software, a given polyline can be placed on a terrain plain as each vertex is placed according to the terrain level. In addition the plug-in uses interpolation in the z-direction, which adds points at every two vertexes of a given polyline, in order for the line to follow the terrain closely. Closed contour lines or polygons are allowed to follow the terrain closely without sticking out or hiding some of their parts.

- **Modeling and placing other objects of major importance**

  The modeling and placing objects of major importance is a task that requires choosing which objects will be depicted on the basis of their true dimensions and which will be represented by symbols, in order for the end product to be realistic. The objects of major importance – ski runs, lifts, hotels, and others must be easily distinguishable.

  It was decided that some of the objects of major importance would be modeled using their true dimensions, while others will be magnified in order to become more distinguishable. The hotel area was depicted on the basis of its actual dimensions.

  - **Hotel area of the Borovets resort**

    Due to the vast amount of information, a total of 6 three-dimensional hotel models, characteristic of the resort, were created. These are the Rila, Samokov, Ela, Flora, Bor, and Edelweiss hotels. 2D data from the cadastral map were used for the first 4 hotels, while data from the map of restored ownership were used for the Bor and Edelweiss hotels. Further geodesic measurements were carried out for the newly built Flora hotels, as all cornice and top levels were measured. The data were processed into AutoCAD as 3D objects and then the objects were imported in 3DS Max. The three lift stations of the gondola lift to the Yastrebets Peak were also imported from the cadastral map and the map of restored ownership, as the bottom lift station was magnified two times in order to be more distinguishable. The stations of the chair lifts were depicted by a symbol.

    Processing in AutoCAD included – processing in 2D environment using various commands. The *polyline* command creates new polylines, while the command *Join* and *Fillet* were used for connecting a given type of line to another one. The ready-made Polygon, Rectangle, Circle, etc. can also be used.

    For 3D processing the Extrude function was used to lift the object by using the cornice and top level of the geodesic measurements, while the contour line from the cadastral map was used as a basis. The figure shows a hotel in 3D environment with used measurement data (blue) and data from the cadastral map (red).
The next stage included importing in 3DS Max, where texture to the facades was added. Figure 3.28 shows the Rila hotel in 3D wireframe before and after rendering. For the Bor and Edelweiss hotels textures for the facades were used in 3DS Max, as objects such as ledges, windows, balconies, and others were modeled additionally in AutoCAD.

4. Creation and application of a system of symbols in the 3D model
The classification of the objects when designing the system of symbols was based on a number of conditions taken into consideration during the process of map creation: contents, function, usage characteristics, visual field characteristics, aesthetic requirements, hardware and software abilities.

“A solution must be found, combining realistic depiction of highly detailed object with usage of symbols for low-detailed objects, designed to be as similar as possible to those in two-dimensional maps.

Designing 3D symbols requires observing certain conditions:
- The symbols used in the 3D map must look similar to the real object. The principle of stereotypes and associations is kept;
A minimum number of polygons are used when designing the symbols;

- The symbols must preserve the dimension proportions of the depicted objects;
  This condition is necessary in order to provide correct proportions for visualization of the map objects and allow direct measuring on the model, due to the lack of scaling.

- Symbols of this type of visualization allow to be edited easily and fast by different users. “

  (Symbolic System for 3-dimensional Maps – paper by T. Brandova)

In the current project it was decided that the hotels in the main resort would be depicted in their real proportions, while those object related to the Tourist and Ski Center of Borovets, such as lift columns, trees, and lift stations, would be depicted in a way that will not mar their visualization.

### Columns and lift facilities

Development of a separate object starts first in AutoCAD. The next stage includes importing and positioning the model in 3DS Max. The objects were copied at a certain distance and it was made sure that they were positioned according to the route of the lift, which in reality does not exist in the model but is used as a basis and for positioning of the objects. For their positioning an additional 3DS Max plug-in – “Glue” was used. An important thing is the center of each element with X,Y,Z coordinates to be situated in the center of their base.

![Fig. 13](image1.jpg)

*Fig. 13. “a” “b” “c”*  
Lift columns modeled in 3DS Max. “a”- standard gondola lift column; “b” – a special gondola column at the top lift station; “c” – chair lift column.

![Fig. 14](image2.jpg)

*Fig. 14*  
A model of a 3D symbol for the upper station of the chair lift.

### Vegetation

Taking in mind the fact that the region is highly forested in the 1000-2000 meters altitude belt, a correct depiction of the vegetation in the region must be provided without excess of details in the completed model. Here it must be taken in mind what the visualization of the end product would be – a momentous frame from the camera of the model or animated fly animation. In case the first type is required, the density of the vegetation is chosen in such a way so that the model does not become overburdened with details and the correct visualization of objects is kept. In order to achieve a compact model that provides the user with easy access to information. In case of animated visualization, the model requires the elements to be depicted in accordance to its actual dimensions, as the camera provides information on its trajectory and the model becomes animated.
The used vegetation plug-in is developed by Itoo Software and is called Forest Pack Pro 3.3, offering a variety of functions – selection of a group of trees by a certain polygon, changing the density of trees in a closed polygon, choosing between different types of trees through the so-called billboard function, manipulation of tree density in a closed polygon (higher density in the center, and lower in the periphery), easy placing of vegetation from a single plain onto a terrain plain, and many more.

The result is a fast, easy and compact depiction of the 3D model of the chosen region.

5. Visualization of the end product

Fig. 15 A shot from the camera: Lift route, Borovets hotel area and trees.

Fig 16
Used textures for visualization of the pine forest in the area.

Final scene of 3D map with system of symbol “Ski and touristic centre Borovets
Diplom work - 2010
III. Conclusions and comparative analysis

The creation of an art-realistic model is undoubtedly one of the difficult cartography tasks. In addition to artistic talent, the author of such a map needs to be skilled in reading 2D topographic maps, digital data, geodesic data, and to present the information in a three-dimensional art realistic version and that viewers can understand and use it. The creation of such a map takes a lot of time – in this particular case, it took about a year to make the art-realistic model due to the specific requirements for its creation and the volume of the information presented. In comparison, the 3D map was created for some 4 to 5 months. Another important requirement is to present the terrain accurately, and also focus on various sites that are important to the map’s thematic specificity.

The hardest task in drawing a 3D map of a tourist map is the collection and processing of the initial information, uniting it in a single mode via which the modeling and visualization will be implemented. Unlike the artistic-realistic model, the mathematical basis has been introduced in the visualization software (3D max Design), which makes this map much easier for presenting an accurate model and it is no longer necessary to use different projections in its processing.

The artistic-realistic model is made directly upon a paper material in a two-dimensional coordinate system due to which the visualization of the terrain depends entirely on the mathematical basis and the central projection adopted beforehand. Modeling is done by presenting various techniques – perspective, projection place, orientation, colors, as this is done in the process of work. In the computerized three-dimensional visualization system in the X,Y,Z coordinate system, a space reality is recreated and this enables the modeler to move and monitor the terrain in a tri-dimensional environment, to choose various looks, to examine the territory in detail, as thus incredible opportunities are opened for this type of 3D cartography.

In the time, digital 3D maps are becoming more and more popular and meet an increasing number of requirements and standards, and can be produced faster and cheaper compared to conventional maps. In addition to this, digital products can be easily used as multimedia applications and GIS, and in this way the production costs of several projects for creation are cut down.

Nowadays, 3D software applications have fewer requirements for cartography than the ambitious cartography of panoramic maps with hand methods and skills. Despite that, the success of 3D visualization lies in the choice of design that is determined by the personal artistic skills of each modeler. The evolution of cartography towards 3D visualization is a new opportunity for exploring the Earth, its resources, objects, and phenomena, as in the course of time 3D cartography will turn into a basic source of spatial data and satisfies more and more demand, but the artistic realistic model remains an inspiring task in its field with its artistic and visually rich images.

This survey shows that the different maps can be presented by uniting them from two ways of representation into one. The visualization of nature elements – forested plots, mountains are with higher level of imagery and realism in the hand-drawn models, and for urbanized territories – computerized models are better. In the future, with the popularization of aerial photography and scanning of the earth surface, 3D cartography will present in a more accurate and realistic way the necessary characteristics and elements of the earth’s surface and it emerges as the main successor of traditional cartography but the artistic factor should be remain secondary since it develops the skills of a cartographic thinking and perception of the map.
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