



Discovery of forested areas in topographic maps: development of orienteering maps

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ABSTRACT

Large scale topographic maps were created for the first time in the 18th century, but the real use was limited to military people in the beginning. Although forested areas were also surveyed for these maps, practically there was no military interest in forested areas. Cadastral mapping or similar engineering surveys were focused on urban and rural areas only. In military training schools, cadets had to study field navigation including distance calculation, map-sketching, and cross-country activities became part of the military training. The civilian interest in sports, including cross-country races became also important at that time. Romanticism was an intellectual and artistic movement, which originated in the second half of the 18th century. This was also a reaction against the material changes in society, which accompanied the expanding industrial capitalism. According to the Romantics, the solution was “back to nature”, because nature was seen as a source of renewal. At the end of the 19th century, all the requisites (including unclassified topographic maps, at least in some Scandinavian countries and in Britain) for orienteering as a sport were present. This was also the time when the first tourist maps were published. Most of the tourists used only tracks and paths in the forested areas (originally these tracks and paths were created for forestry or hunting purposes). The development of orienteering maps clearly shows the process of the discovery of forested areas. This paper presents the most important milestones of this development in the 19th, but mostly in the 20th century.

Early topographic maps (end of 18th century)
Map of the 3rd Military Survey (Hungary, around 1890)
The first orienteering map (Norway, 1897)
Map of Swiss Championships (1950)
The first colour orienteering map (Norway, 1950)
Swedish orienteering map (1955)
Map of the first European Championships (Norway, 1962)
The first Hungarian orienteering map (1963)

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Large-scale topographic maps were first created in the 18th century, but their real use was limited to military people in the beginning. Although forested areas were also surveyed on these maps, practically there was no military interest in forested areas. Cadastral mapping or engineering surveys focused on urban and rural areas only.

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The civilian interest in sports, including cross-country races became also important at that time. Romanticism was an intellectual and artistic movement that originated in the second half of the 18th century, which was also a reaction against the material changes in society, which accompanied the expanding industrial capitalism. According to the Romantics, the solution was “back to nature” because nature was seen as source of renewal.

At the end of the 19th century, all the requisites for orienteering as a sport (including unclassified topographic maps, at least in some Scandinavian countries and in Britain) were present. It was also the time when the first tourist maps were published; although most used only tracks and paths in the forested areas (originally these tracks and paths were created for forestry or hunting purposes).

The development of orienteering maps clearly shows the process of the discovery of forested areas. This paper presents the major milestones of this development in the 19th, but mostly in the 20th century.

1. INTRODUCTION

It is not easy to define the first time in the history when forestry issues were regulated. It is known that Visigothic Code (Lex Visigothorum, 7th century) defined the rules of forestry management and all kinds of activities in these areas, which showed the importance of forests in the contemporary economy (Scott 1982: 120).

Nevertheless, the practice of forestry and silviculture is a little bit more than two hundred years old. It developed in Europe in response to an alarming shortage of wood caused by the conversion of forest to farmland and grazing land (there were also some smaller areas in Europe where forest areas were totally destroyed by the ship construction in the middle ages). Scientific forestry began in Germany in the 1780s. A short time later, the practice was also started in France and in other well-developed countries, where forestry was treated an industrial and not a simple rural activity. Timber production became an important part of the economy, which required more professional approach than previously (Robinson 1988: 10).

The age of modern silviculture started right after the beginning of the regular topographic mapping. Scientific forestry would not work without very detailed maps; only topographic maps were good enough to support practical and scientific activities in forested areas. Topographic mapping was the privilege of the military forces, simply because only the leader of the country had enough power and resources to finance a countrywide survey. It was the interest of the emperor to have such a set of topographic maps in order to defend the country and also use it for taxation and other governmental issues. On the topographic maps, all areas including forested ones were also surveyed, but practically there was no military interest in forested areas. Cadastral mapping or similar engineering surveys were focused on urban and rural areas only.

2. USE OF TOPOGRAPHIC MAPS

The map series, Carte de Cassini was published in 1793. This was the first accurate topographic map of an entire country, France. This was the first topographic map series in the world that was capable to serve as an efficient tool of the field navigation.

Maria Theresa, the ruler of the Habsburg dominions was not only the initiator of the First Military Survey (at a scale of 1:28 000) at the end of the 18th century, but she also established a regulation on forestry. The regulation described the importance of surveying of the forested areas establishing a link between surveying and the economical use of forests. It was the time when the emperor founded the Academy of Mining and Forestry, which is considered the first technical university in the world. Forestry studies were also given in the institute. The maps of this survey are not comparable to recent topographic maps: the precision, the representation is acting on the contemporary mapping opportunities. Surveyors were concentrated on areas of human activities and there were much less details on forested areas than other areas: except for few roads (which connected settlements) and the hachures of the relief representation, the forested areas are practically empty. Forested areas at that time were not even important for military purposes; these maps were hand-drawn and they were copied only in war circumstances.

It was a very important period in the process of modernization of cartographic methods of relief representation, especially because of the invention of the fundamental method of representing relief features of the earth's surface, which is in common use nowadays. The only shortcoming of the early topographic maps was the general lack of elevation measurements, other than a few spot elevations determined by measuring the variation in air pressure with altitude using a barometer, if there were such measurements at all or the relief description was simply 'à la vue'. One of the first tourist maps was a map of the High Tatra Mountains made by a Swedish botanist, George Wahlenberg in the beginning of 19th century (Szaflarski 1959).

Although this method of contour lines allowed the accurate depiction of the relief on a flat, two-dimensional map, it was not widely used until the mid-1800s mostly because of the lack of efficient measuring techniques. The method was able to replace the hachuring only when stereophotogrammetry was invented.



Fig. 1 Map of the First Military Survey, 1:28 800, around the North Hungarian city Salgótarján, 1782.
(Courtesy of Institute and Museum of Military History, Budapest)

Although the Military Geographic Institute (Militärgeographische Institut) was established in Austria-Hungary only in 1839, the military surveyors had already finished the First Military Survey by this time and they were working on the Second Military Survey. Governments and administrations of Europe's reorganized and industrializing states committed significant resources to establish permanent mapping organizations in order to sustain increasingly intense territorial control. In most of the countries these state maps were classified and they were not used for civil purposes. Other civil activities (education, tourism, press) required suitable maps at that time, but the production of these maps normally were not based on military topographic maps. The available printing technologies also influenced the use of topographic maps; only the development of enhanced offset printing allowed the wide use of colour printed maps after 1910. Although at the end of 19th century several countries created their topographic map series using advanced field surveying methods, due to the printing facilities these maps were printed in black and white (line engraving was an appropriate printing technique for hachures).

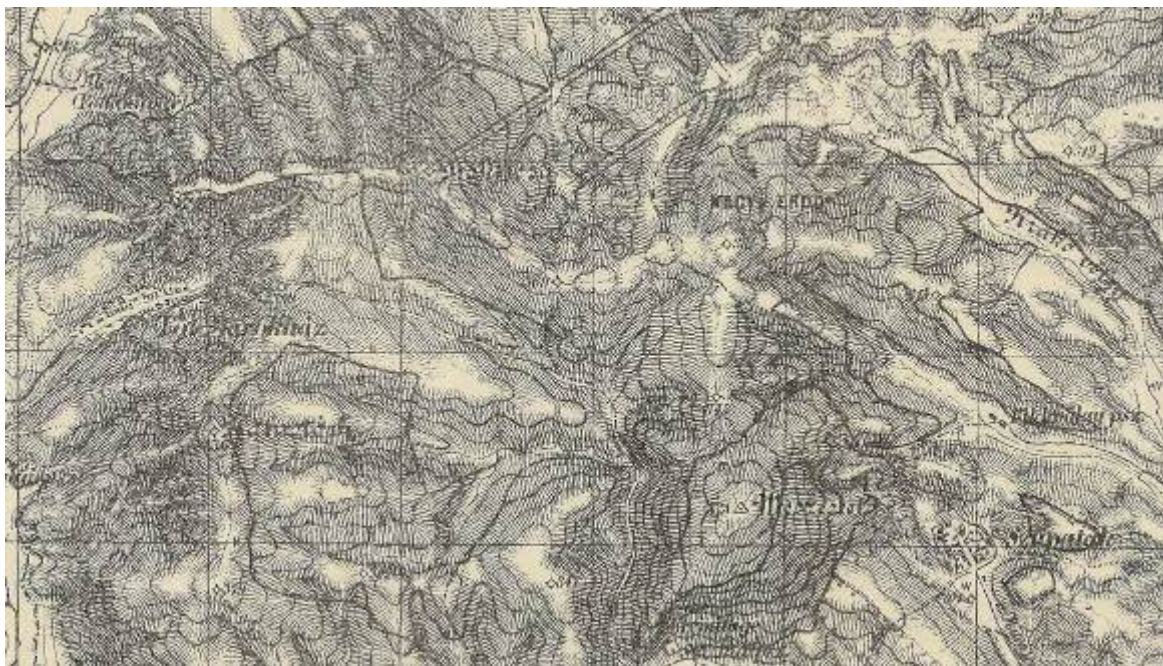


Fig. 2 Map of the Third Military Survey, 1:25 000, North Hungary, 1883
(Courtesy of Institute and Museum of Military History, Budapest)

According to the 1840 regulations of the Swedish Military Academy, cadets had to study field navigation because there were potential users of these topographic maps especially during war time. These studies included distance calculation, map-sketching, field navigation, so cross-country activities became part of the military training. Navigational skills for military officers became more and more important since the beginning of the 20th century. The development of printing technologies made the colour printing of topographic maps more affordable, which let the surveyors and cartographers create topographic maps without compromises.

3. BACK TO NATURE, THE BEGINNING OF MODERN OLYMPIC GAMES

The civilian interest in sports, including cross-country races became important at the time of romanticism, which was an intellectual and artistic movement that originated in the second half of the 18th century. Romanticism was also a reaction against the material changes in society, which accompanied the expanding industrial capitalism. According to the Romantics, the solution was “back to nature” because nature was seen as source of renewal.

The traditional team sports are seen as originating from Europe, primarily England through the British Empire. This can be seen as discounting some of the ancient games of cooperation from Asia and the Americas. Regardless of game origins, the Industrial Revolution

and mass production brought increased leisure, which allowed more time to engage in playing or observing spectator sports, as well as less elitism in and greater accessibility of sports of many kinds. With the advent of mass media and global communication, professionalism became prevalent in sports, and this furthered sports popularity in general.

During the 18th century, several small-scale multi-sports festivals across Europe were organized (sometimes the term Olympian Games were used). In 1894, Pierre de Coubertin organized a congress in Paris to present his plans on the Olympic Games to representatives of sports societies from different countries. Congress members suggested holding the inaugural modern Olympic Games in 1896. Athletics, cycling, fencing, gymnastics, shooting, swimming, tennis, weightlifting and wrestling were the sports of the first Olympic Games; rowing and yachting were scheduled, but had to be cancelled due to poor weather on the planned day of competition.

4. ORIENTEERING

At the end of the 19th century, all the requisites (including unclassified topographic maps, at least in some Scandinavian countries and in Britain) for orienteering as a sport were present. It was also the time where the first tourist maps were published, although most of the tourists used only tracks and paths in the forested areas (originally these tracks and paths were created for forestry or hunting purposes).

In the mid-1890s, there was an interest in organized sports as the example of the successful establishment of modern Olympic Games. There was also an interest in long races over unknown ground especially in Scandinavia. These races were sometimes called orienteering races. In 1890, Idrausforeningen (Sports Club) Tjalve was formed in Oslo as the first track and field club in Norway. Two years after it was formed, the club organized a hound and hare race (this sport was popular also in the United Kingdom in early Victorian times), which was repeated in the next years. In 1897, the club wanted to try something new, an orienteering event. Explanation of the new form of event was not given except that maps and compass were allowed. Unfortunately, no record of the event is kept to prove that maps were really used in this first event, but the position of the three control points is known. Nevertheless it was probably impossible to finish the course in the time the best runners did without really using a map. There were four potential maps available for the runners to choose from.

- A topographic map at the scale 1:100 000 from 1872, but based on older measurements, so this map was outdated.
- A topographic map from 1885-87 based on measurement from 1880 with a 10 meter contour interval and 1:25 000 scale (two adjacent maps were needed to cover the whole course).
- A skiing map at 1:30 000 with a 20 meter contour interval (the most likely used map).
- A skiing map of 1:60 000 with a 100 feet contour interval from 1895. Although this was the newest map, it was based on a poor base map.

Getting to the first competition was a major undertaking with the communications and transportations available at the time. Most participants probably bicycled, walked or ran the 20 kilometres out to the starting place. The participants were given 30 minutes to study the course before they started, but the organizers recommended that this time should be shortened at later races (Berglia 1987; Myrvold 2005).

The first orienteering events in other Scandinavian countries were organized in

- 1899, Norway, ski orienteering (Norway was in a union with Sweden and became independent in 1905 only)
- 1901, Sweden
- 1904, Finland (ski orienteering)
- 1906, Denmark

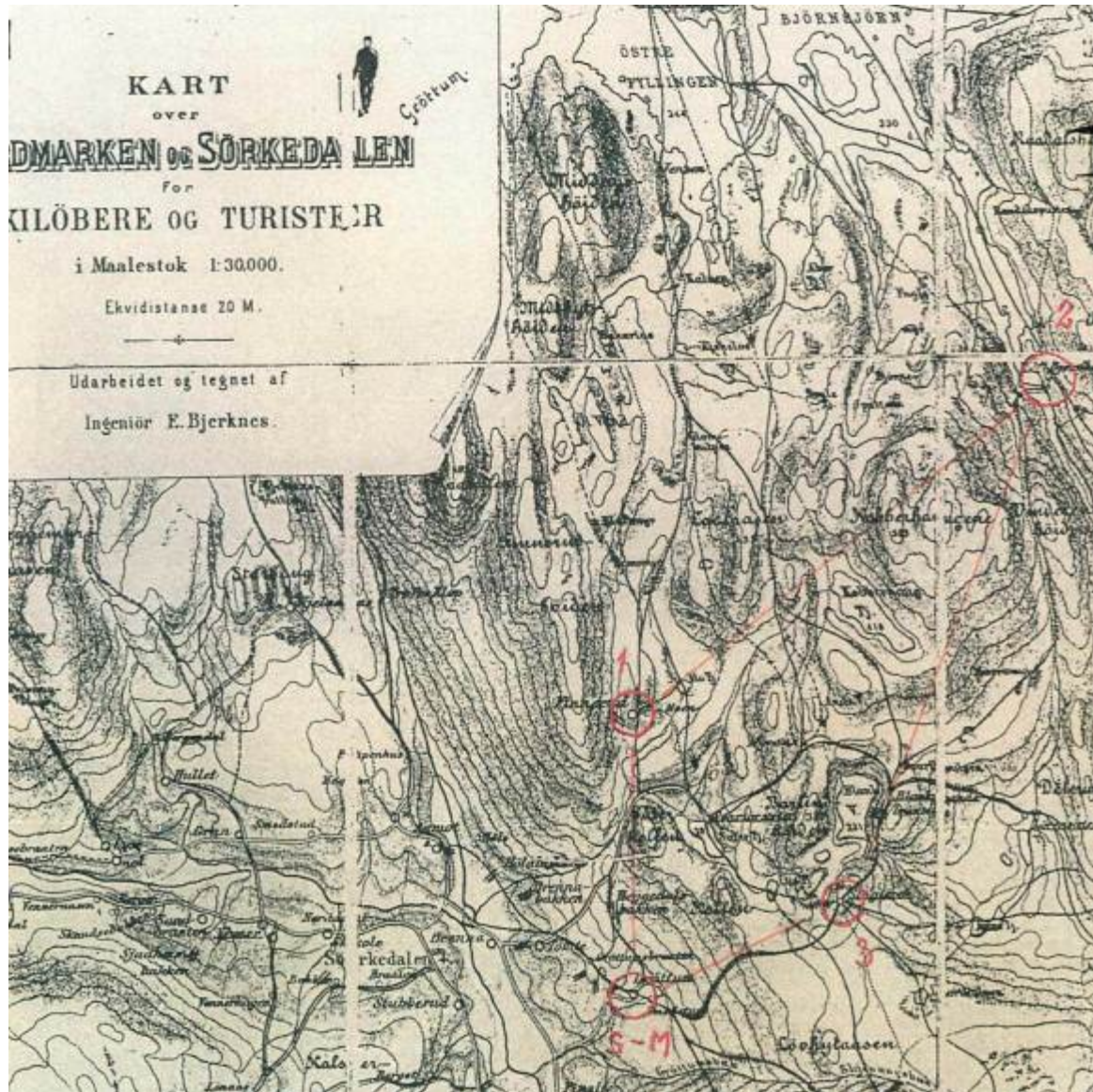


Fig. 3 One of the possible maps with the course of the first orienteering event, Norway, 1897
(Courtesy of the Museum of orienteering, Zlin, Czech Republic)

The very first written rules were only suggestions, which were written by the Swedish clubs (most of these suggestions are still valid rules of the sport).

- The direction and length of the course is secret, the only public information is the venue of the race.
- The start should be individual.
- Five minutes before the first start, the competitors will be given a map with the first control station indicated. After arriving there, the controller will indicate the next control and also stamp the control card of the competitor. The rules today are different; competitors get the whole course on the map when they start.
- The competitors shall run on foot without the help of other means of transport or communication.
- The course will be minimum 15, maximum 25 kilometres. Now there are different courses depending on age classes and forms, but the courses are shorter with more control points.
- The competitor who finishes in the shortest time is the winner.

The Scandinavian clubs faced the problem that the topographic maps and tourist maps were simply not good enough for orienteering. It was a very long process to reach the level of development where the sport was able to afford the new technical methods of surveying and printing. The development of orienteering affected also the state cartography at least in Scandinavian countries, where orienteering became one of the best known sports. Most of the professional cartographers in these countries are fans of orienteering. Their request for more detailed maps in orienteering influenced the detailness of state topographic maps.

4.1 Milestones of Orienteering Mapping

We do not have too much information on the early years/decades of the orienteering mapping. Orienteering was practised only in the Scandinavian countries before 1920 and only few other countries (Hungary, Estonia, Switzerland, Czechoslovakia, USA) tried the sport before WW II. Although the first Hungarian orienteering event was organized in 1925 by a prisoner of war who came back to Hungary from the Soviet Union via Sweden, only few events were organized before WW II, and there was no impact on the development of the sport.

The quick growth of the sport in Scandinavia is probably very much the result of a back to nature movement sweeping across Europe in the 1920s. The “Wandervogel” movement was on the rise in Germany, the boy scouts were increasing in numbers and youth hostels were spreading quickly. For nearly the first 30 years, orienteering had been for men only, but in 1925 the first event for women was held in Sweden. At the end of the twenties, there were about 5000 people who were considered active orienteers in Sweden. The sport grew so rapidly that it was considered a threat to some other established sports.

Between the two world wars, there was only minor development in the maps used for orienteering. All Scandinavian countries created the first newly drawn maps, although these maps were based on existing topographic maps. Apparently, no new information was added to the maps. Nevertheless, the map was traced again specially for the orienteering event and the scale was larger than the existing rectangle map.

The first orienteering map that was especially drawn and field-worked for orienteering was made in 1941 in Norway. This was an illegal night orienteering event during the German occupation, when the organizers had no other chance to have suitable map for an orienteering event.

During WW II, the sales of maps were stopped in most Scandinavian countries, but after negotiations, reprints of maps for sanctioned orienteering events were allowed. Still the organisers were not allowed to make any corrections or additions to the maps.

Although the Swedish orienteering was the strongest and the most developed before WW II, technical improvements in the sport was no longer a realm of the Swedes either. The mapping revolution after WW II started in Norway shortly after the war and it was not until 1965 that Swedish orienteering realised what was going on. In 1948, Norway created the first orienteering map where the contour lines were created from a special photogrammetric plot. On the very detailed Scandinavian terrains this method was used continuously, but due to the high costs of the stereophotogrammetry the spread of this method in orienteering maps was relatively slow in the beginnings. If we have methods to have more details, more features to represent on the orienteering map, we have to increase the scale in order to keep the legibility of the map. Using larger scale also meant that the production of orienteering maps started to be independent from the state topographic maps.

Another important development was the use of colour offset printing. After WW II, the colour printing technology became more affordable and due to internationalization of the orienteering it was a demand to make the orienteering maps more attractive. We may remember the same development in the state topographic maps, which shifted from black and white to colour when the technology became affordable. At that time, it was simply a financial question; the printing technology was not related to military activities, but rather a printing and media industry.

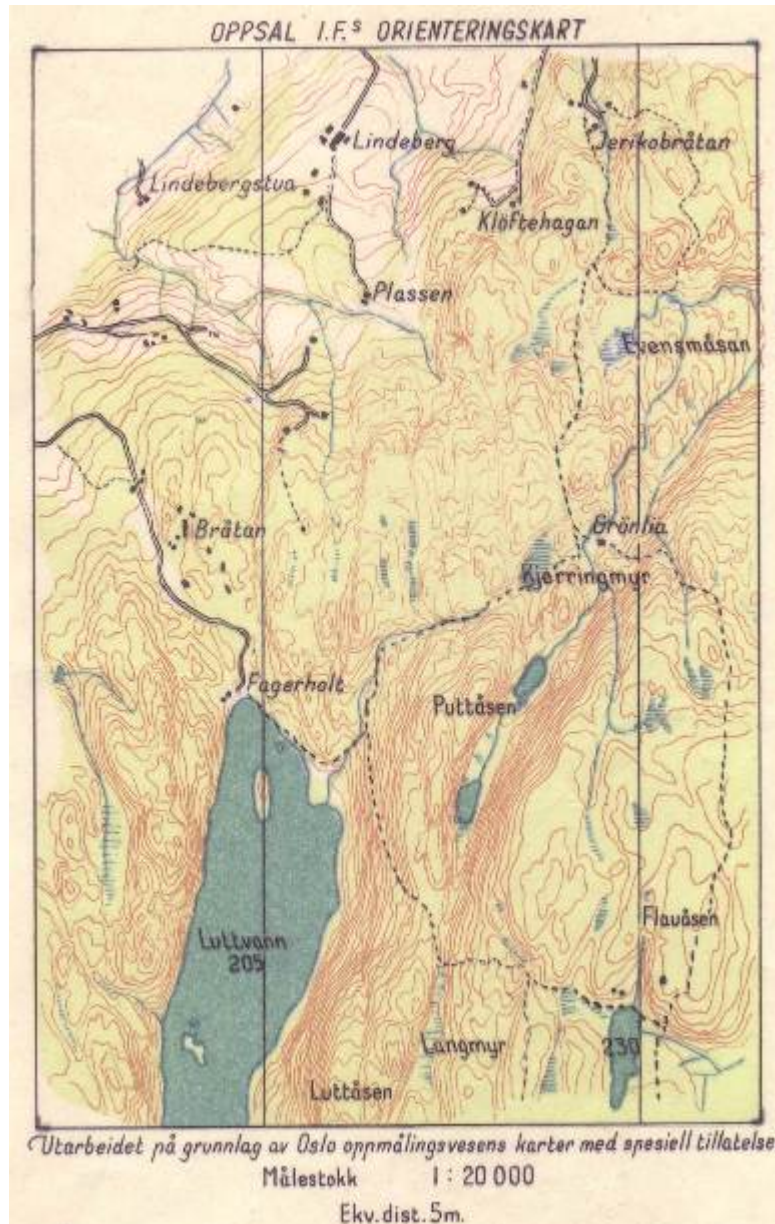


Fig. 4 The first colour offset orienteering map, Norway, 1950
(Courtesy of Tor Valstad, Norway)

The very first colour offset orienteering map was created in 1950 for an international event, but for at least 10-15 years colour maps were rarely used (this was quite common to let the competitors colour their black and white maps with crayons before the start). This early period of orienteering maps was the age of homemade maps. In most countries (excluding Scandinavia), there were no suitable maps available for public use. According to the running speed and the course distance, the scale of maps was 1:20 000-1:40 000 (1:50 000-1:100 000 in the early years). In some countries, the topographic maps were classified (Eastern Europe), in other areas the largest available scale of topographic maps was only 1:50 000 (Germany, Spain). Using tourist maps was a logical alternative, but in Eastern Europe the accuracy of publicly available tourist maps was not suitable for these events. Therefore, these countries tried to find more accurate tourist maps published before the communist era.

The real development of orienteering maps started with the “official” internationalization process. The International Orienteering Federation was founded in 1961 by five Eastern European and five West European countries. In 1962, the first European Championships was organized in Norway. The maps of the first international championships used the legend of the national

topographic maps of the organizing country. This did not make the events absolutely fair, because the interpretation of map symbols was easier for the local participants.

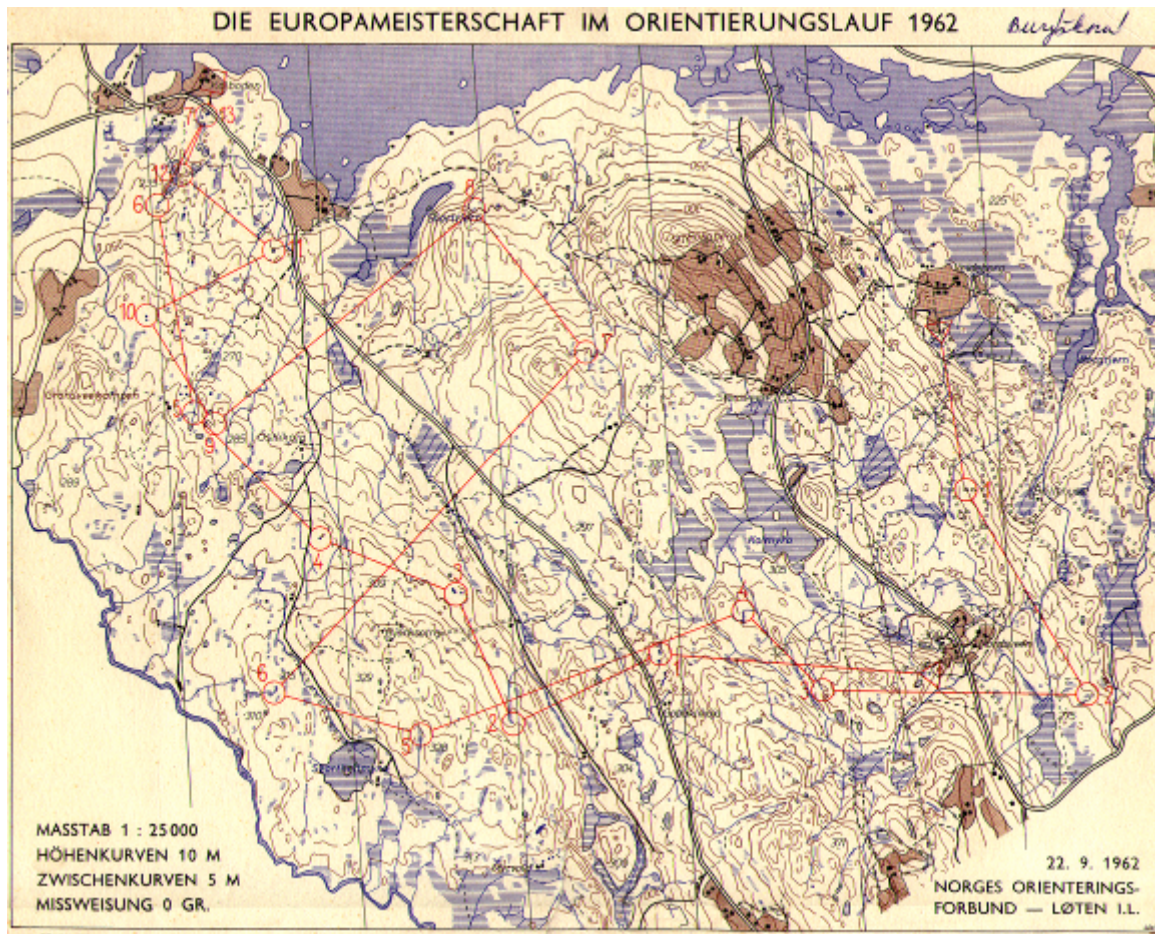


Fig. 5 Map of the first European Championships (Norway, 1962)
(Courtesy of the International Orienteering Federation)

The International Orienteering Federation formed a Map Committee to establish a map standard, but the process was relatively slow because all the dominant orienteering countries suggested their own map standards. The Map Committee finally agreed on the main principles at their first meeting in 1967:

- The orienteering maps must show the actual situation.
- They must show all visible features that are easily identifiable and useful for the competitors.
- It is very important to show all details that affect the route choice.
- The legibility is most important: leave out all unnecessary features.
- The maps of the international events have to use the same legend in all countries.

The first World Orienteering Championships was organized in 1966, replacing the former European Championships. Although at that time there were no non-European members in the International Orienteering Federation, the 'World' title really speeded up a process of the map standardization, which was one of the most important steps to make the orienteering sport global. The first international map specification was created in 1969, but it was simply a list of map symbols. Since the middle of 1970s, the map standardization process was speeded up (Spiess 1972). This was not only a short period of the standardization process, but due to the demand of larger scales maps and the availability of modern technologies (special photogrammetric plots), the orienteering mapmakers started to spend more and more time on field-working creating such a detailed map of forested areas which were never published previously.

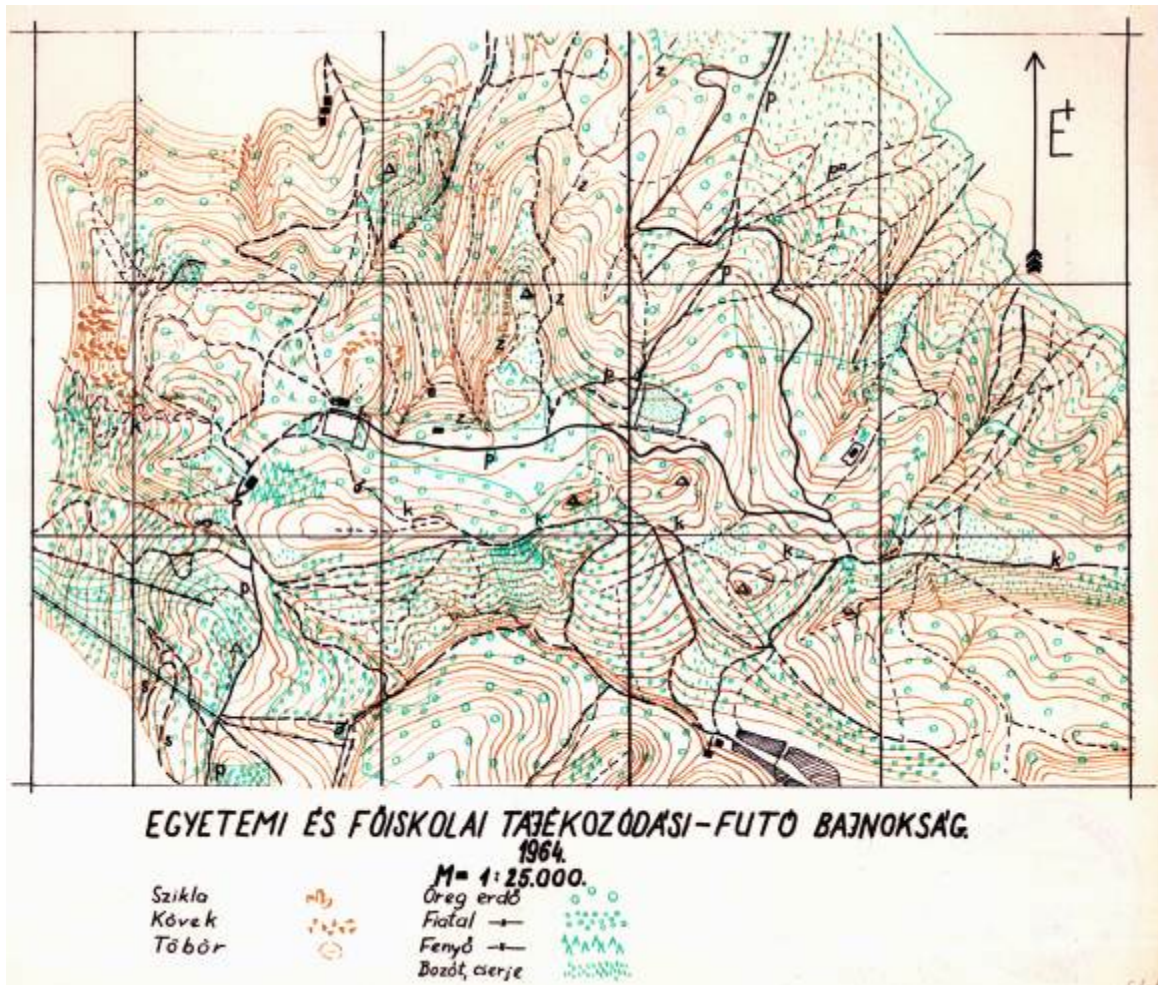


Fig. 6 The first especially field-worked colour orienteering map of Hungary (1964). Both the drawing and the offset printing were made by amateurs (without having permission on the process).

4. SUMMARY

The development of orienteering maps was a complex process, which was affected by various factors. It was mostly determined by financial and technical constraints, but political conditions were also present. Although the first civil event was organized in 1897, the development of orienteering maps in the first 40-50 years was very slow. The sport did not reach the level where the number of competitors made the organizers develop a special type of maps for orienteering. At that time, the orienteering sport used the maps that were available and suitable for the competitions: topographic maps, tourist maps. After WW II, the situation has changed, at least in the Scandinavian countries. After the rapid development in the Scandinavian countries, the sport spreads all over the Europe (in the 1960-70s) and all over the world (in the 1980-90s). After discovery of forested areas, it was the time when due to the demand of larger scale and more precise maps the level of field-working exceeded the levels of any previous mapping of the forested areas. The aim was to create maps that were suitable to put control points on any part of the map. However, the main reason was to offer a fair tool for every participant to avoid the luck factor. Having more details on the maps, especially on very complex areas, a new demand, the legibility became more important.

Now we have even better technologies like GPS and laser scanning, where we have lots of precise data. To produce a legible map requires very good cartographic and orienteering knowledge. Nowadays, forested areas are not unknown areas any longer. There are no more white patches on the maps. However, representing these areas on orienteering maps is still a challenging task. This is the last chance for topographers to do a classical job on the terrain.

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