

CHANGE OF THE MEANING OF THE TERM ‘CARTOGRAPHER’ IN THE LAST DECADES

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Abstract:

Cartography is the science and art of making maps and charts according to a very short definition which has been valid for centuries. The discipline of cartography combines science, aesthetics, and technical ability to create a well-balanced and legible representation of the real world.

The term ‘cartographer’ has been referred to the profession also for centuries (although the words ‘cartography’ and ‘cartographer’ were used first time only in the modern times). Although the real meaning of the term has changed time to time, the following activities were always considered as covered by the term: theoretical cartography (projections, map design), surveying, map drawing, reproduction.

In the 20th century, the term may be taken broadly as comprising all the steps needed to produce a modern map: surveying and planning, aerial photography, field surveys, photogrammetry, map drawing and editing, reproduction technology. Maps of all scales have traditionally been drawn and made by hand, but the use of computers has revolutionized cartography.

This paper deals with this relatively short period (comparing with the whole history of the term ‘cartography’), which started in the last third of the 20th century. It is very interesting to trace how the topics of the papers of the International Cartographic Conferences have changed in these times to clearly show how the information technologies were incorporated into cartography. We have to understand and accept that cartography has never been so widely used that it could influence the development of information technology, although special hardware and software for cartographic application were developed when the technology has reached a certain level.

Cartography, like most of the similar smaller professions, was very sensitive to adopting computer technology. This process affected all parts of cartography, but new professions (like remote sensing, geographic information system, global positioning system, location-based services) have also come into existence as the technology has managed to serve specific demands. It is also exciting to investigate the process how the terms GIS, geoinformatics or GI science have changed the term ‘cartography’. The names of different institutes and departments have skipped the traditional term ‘cartography’ and begun to include modern terms, like geomatics, geoinformatics, GIS.

Sometimes the process was carried out in two steps: first just combined the modern term with the traditional one and after years the traditional term has been dropped. This was not only the simple change of words: the researchers and university teachers were very open to accepting new technologies. More and more papers of the ICC's were dealing with these new topics and some traditional topics (like map drawing, reproduction techniques) began to disappear. The curricula of university courses were also continuously changing at that time to include the new technologies as soon as it was possible. Teaching cartography in higher education has never been a simple task: it required special, sometimes quite expensive infrastructure, so the cartographers were ready to invest to get the necessary IT technology.

It is difficult to predict how the meaning of the term 'cartographer' will change in the near future. Information technology is still developing rapidly creating new hardware and software to let us invent new chances for cartography: Internet, GPS and mobile phones are the most important topics which influence the development of cartography nowadays. They contribute to continuously changing the meaning of the term too.

Introduction

It is evident that the term cartography has totally changed in the last centuries. It is part of the natural evolution of subjects, but the recent changes (including the last 20-30 years) in cartography – like in any other discipline where the technical developments have changed the area considerably – are very characteristic.

Changes of the last centuries

The essence of the term cartography and cartographer has not changed too much till the end of the 18th century. The very first changes were caused by the invention of the printing and engraving techniques (lithography).

The second change was caused by the time of the beginning of the regular military surveys, when the large-scale topographic mapping became a continuous task of the cartographers. Practically it was only a quantitative change to increase the number of topographers, but it was not a real qualitative development.

At that time the term cartographer was nearly the synonym of mapmaker. As the technical development continued, cartographers had to be familiar with new measuring techniques, although the term still included not only the technological and scientific part, but an art too.

The invention and rapid development of photography and its incorporation into cartography and the development of offset printing at the end of the 19th century and the beginning of the 20th century were important milestones in the development of cartography.

International organizations

It is informative to overview the foundation dates of international organizations of our science:

- FIG (Fédération Internationale des Géomètres, the International Federation of Surveyors) was founded in 1878 in Paris and was founded as an international organization representing the interests of surveyors worldwide.
- The International Society for Photogrammetry (ISP) was founded in 1910, in Austria. The Society changed its name in 1980 to the International Society for Photogrammetry and Remote Sensing (ISPRS).
- The International Geographical Union was established in Brussels in 1922. However, the history of international meetings of geographers is much longer. The first of a series of congresses met in 1871 in Antwerp.
- ICA was founded in 1959. The foundation of the association was closely connected with the substantial development of cartographic technology (plastic drawing materials, phototypesetting).

We can realize that the specific international organizations for surveying and for photogrammetry were founded earlier than the more general organizations. The main reason was that the rapid development of new areas enforced a continuous international cooperation among the experts, while the map production process had already been well-developed for long time.

It is interesting to investigate the meaning of the term cartographer in the first part of the 20th century. This was the time when cartography became an independent science. The first cartographic magazines were published at that time (Globen, Sweden – 1922; Polski Przegląd Kartograficzny, Poland – 1923; Kartographische Mitteilungen, Austria – 1930). Erwin Raisz, one of the most famous cartographers of the 20th century got his PhD in 1929, which was one the first in United States (basic training in cartography started in the United States around 1900).

The first independent cartographic courses were established in MIIGAiK, Moscow in 1923, but the most important institutes concerning cartography at that time were in Zürich and in Vienna.

The first scientific organization of cartography, the Swedish Cartographic Society was formed in 1908 (Institut für Kartografie, ETH Zürich – 1925; German Cartographic Association – 1937).

The computer ages

After the integration of photogrammetry into the tools of cartography, the next challenge was the remote sensing. During the cold war it was difficult to get reliable and

“mappable” information on certain countries, so the remote sensing technologies were accepted immediately in cartography. The satellite images also helped the cartography to decrease the role of secrecy (although we had to wait for the Internet age to let GoogleEarth and GoogleMaps make secrecy more and more obsolete). Although remote sensing has not affected considerably the topographic mapping, but its use in thematic mapping was important as an easily accessible tool for data collection.

Cartography, like most of the similar sciences and professions, was very sensitive to adopting computer technology. This process affected all parts of cartography, but new professions (like remote sensing, geographic information system, global positioning system, location-based services) have also come into existence as the technology has managed to serve specific demands. It is also exciting to investigate the process how the terms GIS, geoinformatics or GI science have changed the term ‘cartography’.

Nearly all parts of cartography were affected by information technology.

While cartographers were still treated as mapmakers (map drawers) 40-50 years ago, the computer has changed it totally. Desktop mapmaking has changed the whole map production technique by making things like scribing, drawing folia, phototypesetting, screening etc. obsolete.

Digital was the keyword of that time:

- As soon as the technology made it possible (scanner, hard-disk capacity, hardware and software environment), the digitizing of existing paper maps (state cadastral and topographic maps) started. At the beginning only state organizations managed to use the new technology, but as the information technology become more affordable (personal computers, 1981) private companies started to present on that market.
- Having more data arisen in digital form, a new technology, the GIS was invented. If we check the main functions of geographic information systems (creating, viewing, exploring, editing, storing, transforming, analysing data; creating maps; helping decision making) we can realize that only few of them were present in the early GIS software.
- We still have areas where the technology is still working on the substitution or facilitation of human work (like generalization, updating).

So these days, cartographers are not only mapmakers or very few of them are really produces paper maps, but cartographers must be familiar with different types of software (data management, programming etc.).

Similar effects are also present in surveying, where the global positioning systems have made essential changes in the measuring methods. The intelligence of surveyors is built

in the smart devices so non-professionals can manage tasks that were managed only by experts previously.

Visualization

As soon as we have data in digital form we can use the advantages of computers, which can manage calculations much faster than humans. In the early days these functions were more important or these were the only available ones.

After investing lot of money and resources into this technology, it become more and more evident that one of the directions of the technological development will be the visualization (including screen representations and printing). The computer printing technology is continuously developing and nowadays it is good enough to replace the traditional technology. The wide use of GIS and the print-on-demand function simply made most of the map production (especially cadastral and topographic maps) totally obsolete.

The web era made additional changes in this area. Everybody can be a “cartographer” who can combine his/her data with the on-line maps: the tools are smart, although to select the best representation methods still requires special knowledge.

The location based services also may change the meaning of the term cartographer. Have cartographers previously dealt with 3D representation, rendering, data mining, traffic management, RFID technologies, and mobile communication)?

Visualization is extremely important in such environment. The screens of mobile devices are small so the cartographic approach is essential for the perfect visualization. Nevertheless, the old-fashioned cartographers have to understand the new technologies or to specialize in certain areas to be able to work as a cartographer.

The term cartography in the higher education

In higher education, the names of different institutes and departments have skipped the traditional term ‘cartography’ and begun to include more modern terms like geomatics, geoinformatics, GI science. The process practically was carried out in two steps: first combined the modern term with the traditional one and in the second step the traditional term has been dropped.

However this was not only the simple change of words, it has a real meaning: the researchers and university teachers were very open to accepting new technologies. If we check the names of departments of the European universities and colleges based on the last survey of the ICA Commission on Education and Training around 2002, we have found cartography 23 times, GIS 19 times and geomatics 14 times. The Bologna

transition process has probably changed these data a little bit to increase the appearance of GIS and decrease the appearance of cartography.

If we just check the name of the skill given by the BSc or MSc course it looks that the GIS expert is much more favourable in certain countries than the cartographer.

Teaching cartography in higher education has never been a simple task: it required special, sometimes quite expensive infrastructure, so the cartographers are ready to invest to get the necessary IT technology. But just to invest is not enough, we have to be familiar with the new technologies. We can say that if somebody wants to call himself/herself cartographer, it requires life-long learning.

So nowadays the term cartographer also means the capability to continuously integrate and use new technologies.

Statistics on ICC papers

The International Cartographic Conference (ICC) is the most important scientific event for cartographers. More and more papers of the ICC's are dealing with new topics, while some traditional topics (like map drawing, reproduction techniques) nearly totally disappeared or became the part of the history of cartography.

The main topics of the International Cartographic Conferences have changed in these times to clearly show how the information technologies were incorporated into cartography. We have to understand and accept that cartography has never been so widely used that it could influence the development of information technology, although special hardware and software for cartographic application were developed when the technology has reached a certain level.

I have made a simple analysis on the Proceedings of the last five ICC's. I calculated the most frequently used words in the full texts of the papers. These proceedings are available in digital form so the analysis was a relatively simple programming job. For comparison I also digitized the abstracts of the ICC 1989, Budapest. The result is very informative: even in such a short period we can trace the rapid development of cartography. Anyway, the short time of these five-six ICC's is probably not enough to safely make difference between real trends and trendy directions based only on the frequency of used words.

Frequency rank order	Budapest 1989	Ottawa 1999	Beijing 2001	Durban 2003	A Coruña 2005	Moscow 2007
1	data (1045)	data (4924)	data (9706)	data (8986)	data (9720)	data (7818)
2	information (643)	information (2977)	information (5663)	information (5659)	information (7888)	information (5802)
3	atlas (521)	spatial (1517)	spatial (4301)	spatial (3924)	spatial (3404)	spatial (3215)
4	digital (247)	database (1449)	model (2324)	GIS (2562)	GIS (2687)	GIS (2024)
5	spatial (231)	digital (1139)	GIS (2314)	research (2136)	geographic (2418)	model (1839)
6	research (225)	atlas (1010)	digital (2152)	geographic (2086)	research (2139)	research (1752)
7	scale (210)	scale (976)	geographic (1985)	database (1729)	model (2065)	digital (1628)
8	design (182)	geographic (953)	database (1879)	model (1691)	scale (1761)	atlas (1606)
9	thematic (181)	model (890)	scale (1708)	analysis (1403)	digital (1754)	scale (1570)
10	computer (177)	analysis (739)	image (1641)	digital (1336)	analysis (1654)	geographic (1509)

Table 1. Frequency of cartography-related words in the ICC proceedings. Only English language papers are included (Budapest, 1989 – only abstracts).

Conclusions

If we look at the history of cartography, the development of the last decades caused the most rapid changes. The meaning of the term cartographer is continuously changing by integrating more and more areas of information technology into cartography. Most of this knowledge is becoming a simple feature in smart software, but cartography (or just simply mapmaking) will have never been so simple that everybody can create his/her professional map just with some clicks. The technology, the software is improving, but the map itself is a complicated item and to simplify complicated items is a very complicated (or nearly impossible) task.

The cartographic approach is built in the human brain of the cartographer and will not be built-in totally in software (at least not in our life).

It is difficult to predict how the meaning of the term ‘cartographer’ will change in the near future. Information technology is still developing rapidly creating new hardware and software to let us invent new chances for cartography: Internet, GPS and mobile communication are the most important topics which influence the development of

cartography nowadays. Cartographers are ready to adapt new technologies and keep something from the times when the cartographer was an artist too.

We are not artists anymore (or only very few of us are still creating maps by using artistic methods), but we have to be ready to understand the new challenges.

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