

25 YEARS
**INTERNATIONAL
CARTOGRAPHIC
ASSOCIATION**
1959 * 1984



25 YEARS INTERNATIONAL CARTOGRAPHIC ASSOCIATION 1959-1984

The first twenty-five years of the
International Cartographic Association

compiled by

Ferdinand J. Ormeling Sr.



International Cartographic Association/Association Cartographique Internationale
Printed at ITC, Enschede, The Netherlands

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PREFACE

It is a common problem in all organisations to find the time and resources to record the past for posterity whilst heavily pressed in fulfilling present-day commitments and in planning for the future. Yet it is valuable to keep records, especially in new organisations which are growing quickly and have limited resources because much of what is happening is held only in a few members' heads, and, if not set down, would soon be lost.

The ICA is fortunate to have had Professor Dr. F.J. Ormeling Sr. carry out the task of recording the founding, growth, people and activities of its first twenty-five years. He is indeed in a unique position to have done so, for he has had direct experience of all aspects of the Association, first as an active supporter in its foundation and initial years, then as Secretary-Treasurer (1964-1976) and as President (1976-1984). Over and above this, he has had the energy, and has somehow made the time, to research and analyse the ICA archive and describe the activities, personalities and happenings with a light touch. He has made known facts new to most of us, eliminated some myths and pointed out some valuable lessons for the future. He is a worthy teller.

Professor Ormeling starts with the meetings and reasoning which led to the foundation of the Association, describes the twelve conferences in retrospect, the twenty-five years of map exhibitions, the Commissions and their activities, and reviews the Association's publications. He proceeds to set out the ICA's policy towards the Third World, records seminars held in China and India, and describes relations with sister organisations in surveying, mapping and geography. Professor Ormeling wishes to make it clear that the inevitably subjective views given in this book are his own and not those of the Association.

Including also is Professor K.A. Salichtchev's comprehensive review of cartographic periodicals of the world as they exist in the mid-1980's. Additional aspects of the Association's interests are represented by two papers, one on "Commercial cartography in Western Europe" and the other on "The effects of the computer on education and quality in cartography". Short biographies are included of 11 cartographers who have been recognized for their service to ICA, and messages of good wishes for the Association from sister organisations are noted. The final paper by our present President, J.L. Morrison, is on "The Future of the ICA". This volume will undoubtedly prove its usefulness in the future as cartographic scholars work to research the early history of the ICA.

H. Fullard
Past-Chairman ICA Publications Committee

ACKNOWLEDGEMENTS

The international separatist crusade of cartography initiated in the 1950's, resulted in the establishment of the non-governmental International Cartographic Association in 1959. In reviewing its first twenty-five years it can be stated that the Association with more than 60 member countries, has not done badly. Though it has operated with extremely modest means, it has succeeded in bringing together cartographers with different nationalities, backgrounds and experience, scientific and practical cartographers or map producers, map authors, educators and publishers. Borne by the drive, enthusiasm and hard work of volunteers, its corporate life has enjoyed a high frequency of well attended biennial conferences, alternating with seminars and symposia. Through the efforts of its commissions and working groups it has promoted discussion and disseminated knowledge on vital cartographic subjects such as education, terminology, automation etc. It has gained the appraisal of the sister organisations in geography and surveying and mapping and earned recognition from international governmental organisations such as UN and UNESCO.

In 1984 the Executive Committee proposed to mark the jubilee by issuing a publication on the first 25 years. In view of his longstanding involvement with the Association, the present author volunteered his services to this end. For various reasons, however, the compilation of the work took longer than anticipated. The major one was that retired cartographers, deprived of regular clerical assistance, live on charity, which considerably slowed down progress and at times almost brought it to a standstill. For a long time the realisation of the plan seemed far away. That the volume could eventually be completed and the task fulfilled was due to the generous support of the management of ITC, Enschede, Netherlands, who in a decisive phase, granted the required technical facilities, thus inspiring great gratitude. The information collected in the present volume is derived from various sources. It is mainly drawn from unpublished material in the ICA archives – minutes of Executive Committee meetings and General Assemblies, correspondence, commission reports etc. Only the latter have been published in part in the IGU Bulletin, in the International Yearbook of Cartography and recently in the ICA Newsletter. Equally important sources were the conference papers and documents such as circulars, programmes, abstracts of papers, proceedings, exhibition catalogues and country reports. Finally there were the reports on conferences by various participants, published in different journals and mentioned in the list of selected references in the back of this volume. With regard to friends and colleagues who have supported this project the author would like to mention first of all Dr. Mannerfelt and the late Professor Imhof who both provided valuable material. Acknowledgements also go to the former members of the ICA Executive Committee Olof Hedbom and Rolf Böhme, who supplied some supplementary information, to Harold Fullard, past-chairman of the ICA Publications Committee, who read greater parts of the manuscript and made suggestions for improvements and to Luuk van Zuylen, ITC, and to Ferjan Ormeling, Utrecht, who constructively commented on various parts of the text. Further, grateful thanks are due to those colleagues, whose contributions constitute a vital part of this publication, thus considerably enhancing its value. These include the articles of approbation by colleagues in China and India and the wise messages of the sister organisations FIG, IGU and ISPRS, whose interests are so closely interwoven with ours. Contributions deserving particular mention are those of two past-Presidents – K.A. Salichtchev and A.H. Robinson – who thus demonstrate their unremitting interest in the Association. In view of the important role of commercial cartography in the foundation and further development of the ICA, it was considered justified to devote a special article on this sector. The author has gladly left the future of the Association in the capable hands of his successor President Morrison. Without this contribution the publication would not have been complete. Finally, Secretary General Pearce provided the two world maps on

ICA membership and conference locations respectively, for which he deserves thanks. To Alison Morgan, ITC, the author expresses his keen appreciation of her careful revision of his heavy English text for stylish clarity and simplicity, reserving for himself the responsibility for imperfections caused by later amendments.

A special debt of gratitude is owed to Ginie Ooster-laken, who in overtime hours typed the manuscripts and prepared it for setting on an ITC word processor and finally to the ITC Repro Department that took care of the printing and binding of the publication at very short notice.

The project had the fullest support of my wife. She even urged me to recommence the work which was almost abandoned owing to a series of setbacks in 1985, advice which was well worth following. We both felt that a tribute was owed to our worldwide circle of friends with whom we had carefully built up the Association for more than twenty-five years. By the appearance of the present volume this debt can, we hope, be cleared. May the next 25 years of the Association be as exciting as the first!

F.J. Ormeling Sr

Foundation and consolidation

THE EARLY YEARS

Introduction

The history of cartography demonstrates a continuous endeavour to increase the speed and efficiency of the map production process with a commensurate reduction of costs. The invention of printing and engraving in the 15th century, the development of lithography, the invention and rapid advancement of photography and its incorporation into map making, the development of the offset printing process in the 19th century, to mention a few examples were, all significant milestones along this road. Since then, the field has been in a continuous state of upheaval. Every innovation demanded a period of reorientation and experimentation, of searching for information and often retraining and adaptation for the practising cartographer, a process that used to take many years.

The foundation of the ICA is closely connected with a new period of rapid and substantial development of cartographic technology. In the 10-15 years after World War II, against a background of a sharply increasing worldwide demand for maps, an almost simultaneously occurring wave of innovations further revolutionised the map production process. Plastic drawing materials made their appearance, first the vinyl polymeres, soon succeeded by the dimensionally stable polyesters; scribing on coated polyester material replaced conventional drawing; tint screens and cartographic masking were introduced; aluminium superseded zinc as printing plate metal and phototypesetting machines replaced time consuming hand lettering.

As in the past the application of the new materials and methods was uneven and uncoordinated and as such differed from country to country and from workplace to workplace. Just as with the introduction of the computer in our day, everything had to be learned by trial and error. Like their predecessors, managers and practising cartographers looked for opportunities to obtain information and advice and to gain experience, both nationally and internationally. Some of them attended meetings and conferences of the graphic arts profession, but in point of fact they did not find what they were looking for.

The Esselte Conference

It was Dr. Carl M:son Mannerfelt, Esselte Map Service (Sweden) who recognised this need and in 1956 invited a number of foreign experts in various fields of map production (editing, compilation, reproduction etc.) to exchange information on the technological innovations. The resulting conference was held in Tollare near Stockholm. It was attended by 36 participants from 11 countries who presented 41 papers on technical matters. Among the participants, apart from Mannerfelt himself, there were several persons who were to play important executive roles in future national or international cartographic organisations: Bosse (FRG), de Brommer (France), Ficker (Switzerland), Hedbom (Sweden) etc. From a technical point of view the conference was considered very successful. The group was small and eager to learn, the atmosphere was informal and papers and discussions were focused on practical problems and very much down to earth.



Figure 1. Men of the first hour, Esselte Conference 1956. From left to right, Chervet, Mannerfelt, Klawe, de Brommer and Striker

The conference in Tollare was not the first international contact between cartographers. In the revival of cartography after World War II several other international meetings and activities took place. The awakening of interests in mapping resulted at UN level in convening of a "Meeting of Experts in Cartography" which in its turn led to the creation of the UN Cartography Section, which in 1951 launched the first issue of its *World Cartography*. In 1954 at the International Printing Congress in Venice a working group was established for the study of cartographic techniques. In 1956 German cartographers, sponsored by the *Institut für Forschung im graphischen Gewerbe* organised an international course for map reproduction in Munich, FRG, followed in 1960 by a second one. In 1957 the first issue appeared of the *Bibliotheca Cartographica*, an internationally orientated cartographic bibliography, edited by Professor Emil Meynen (FRG). In the same year the Swiss professors Imhof and Bertschmann organised an international Advanced Course in cartography in Zürich, repeated in 1960. On a national level in many countries impulses were given or first steps were taken towards the establishment of cartographic societies or committees and to start cartographic journals and to organise courses in cartography. An impressive example of the last activity was the *Arbeitskurs Niederdollendorf* on map design and compilation, held for the first time in 1957 and since then repeated with astonishing regularity every second year under the guidance of Heinz Bosse, from 1967-1979 President of the *Deutsche Gesellschaft für Kartographie*.

In the history of ICA the conference in Sweden became known as the "Esselte Conference on Applied Cartography", almost a magic name to those who were involved, because it was there that the idea of establishing an international cartographic association was first raised and discussed. The following paragraph presents the essential part of Dr. Mannerfelt's closing address, in which he elaborates on the concept and summarises the suggestions brought forward by the foreign participants. At the end of his address Dr. Mannerfelt proposed a resolution containing the recommendation to pursue the matter further and to form a committee to take the necessary steps.

Mannerfelt's proposal

"Now that the Esselte Conference on Applied Cartography is drawing towards its close, it is natural that one should wonder whether this week has fulfilled all our hopes or whether it should have been planned and executed in some other way. When we issued the invitations to this Conference, we were immediately faced with the difficulty of so choosing the delegates that the greatest possible variety of technical knowledge could be encompassed by the 36

specialists whom we had planned to include. This was a very taxing problem, but in my belief that it has been solved in a satisfactory way. Participants have taken an active part in the Conference and have shown a keen interest, presenting viewpoints based on experience in their home countries.

If we acknowledge that the Conference has been a success, then we must at the same time admit that this success has been primarily due to the generous contributions made by the delegates themselves. When I get down to the problem of planning international collaboration in the field of applied cartography, there is one factor that I shall particularly bear in mind. This is that it is more effective to work in small groups on residential courses, dealing with a limited number of current problems. I have never been very enthusiastic about large world conferences, with hundreds and even thousands of delegates. Nevertheless, I am just as convinced now as previously, of the necessity of striving for the formation of an international organisation for cartography.

After all, international cooperation on cartography has had a long and successful record. There are a large number of organisations that are in one way or another interested in cartography on an international level. I should like, in particular, to mention the Fédération Internationale des Géomètres, the International Union of Geodesy and Geophysics, the International Geographical Union, the International Society of Photogrammetry and the International Association for Printing and Allied Trades. Within the framework of the United Nations we have the ICAO and the FAO and of course the United Nations' Cartography Section with its Bulletin World Cartography. All these organisations operate on a worldwide basis, and in addition to these, there are also associations representing large regions. The most active of these are the American Congress on Surveying and Mapping (ACSM), the Pan-American Institute of Geography and History (PAIGH), and the Collège d'Europe in Bruges.

Despite the existence of all these organisations there is no international forum dealing primarily with the science of Cartography. There is a perceptible lack of organisation in "Cartography Proper" from compilation through drafting to reproduction.

Cartography in its widest sense, according to the definition of the UN, includes geodesy as well as surveying, photogrammetry, map compilation, drafting and reproduction. An association with all these questions on its program would, however, be too unwieldy. While Geodesy, Geography, Photogrammetry and Printing have their own world organisations, I think that Cartography Proper i.e. cartography in its more limited sphere, has been somewhat neglected.

I am quite aware of the difficulties that might at present be raised against any efforts to establish a cartographic union or association within the framework of UNESCO. I think, however, that we should contact the authorities in different countries in order to find out their interest in the project and investigate the possibilities of forming an International Society for Cartography. It ought to comprise separate sections dealing with questions related to drafting, compilation, reproduction etc. Such a Society could include among its main aims the following: 1. To bring together experts on cartography at technical meetings at an international level for the purpose of exchanging ideas and experiences. 2. To stimulate the exchange of personal and technical reports on cartographic experiments between countries and establishments. 3. To arrange exhibitions of maps and the material used in mapmaking. 4. To contribute to editing and publishing books and periodicals in the sphere of cartography through international cooperation, for instance a textbook on applied cartography. We have discussed these problems in small groups during the course of the Conference and, in

addition to the suggestions that I have put forward, there are three others, one from the German group, one from the American and one from the British group.

Suggestions by participants

The German participants are of the opinion that cartography proper is not covered by one of the existing international organisations and consequently they are greatly in favour of the formation of a separate international society for cartography. Such a society should pursue the following objectives: 1. Exchange of experience; 2. Standardisation of map symbols, scales etc.; 3. The preparation and publication of a dictionary of technical terms in cartography; 4. The publication of a cartographic periodical. According to the German colleagues, when creating an international cartographic society, there were two possibilities: a governmental or a non-governmental organisation. In the first case the relationship with the UN Cartography Section and with UNESCO has to be investigated and cleared, and governments must be prepared to pay the annual subscriptions. In the second case the organisation should be approved by the governments but operated through the national cartographic societies, who then have to pay the annual dues. Any solution should enable national mapping agencies such as Ordnance Survey, IGN, IfAG etc. as well as the larger private cartographic firms to participate and contribute.

The American participants agree that the Esselte Conference fills a definite need for international cooperation in applied cartography, particularly in areas between map compilation and the printing press, where to date there has been no vehicle for such exchange.

They unanimously recommend that similar Conferences should be held at regular intervals in the future, although some delegates are not able to speak officially for their organisations in this regard. They propose to hold the next conference in the United States, perhaps in the environs of Washington DC or Chicago, in the autumn of 1958. They suggest that no more than 2-3 years should elapse between succeeding conferences because of the tempo of new developments and the importance they may have for us all. They further recommend that Dr. Mannerfelt appoint or form a small organisational committee with appropriate representation to explore reactions in various countries to the idea of a formation of an International Cartographic Society and at the same time to make preparations for a meeting in 1958.

The British participants recognise that the Esselte Conference has been most interesting and valuable, due to its limited size and the wide field of knowledge of the participants. They consider the idea of an exchange of personnel and an exchange of information on cartographic techniques on an international basis possible and desirable and they recommend further consideration of the matter. Further they are of the opinion that at international cartographic conferences representatives of governmental cartographic agencies as well as from private firms should participate. They welcome the idea of a textbook. Its contents should be limited to developments of techniques which are of direct use to cartography. Finally, they point out that as individual participants it is impossible for them to put forward comments or proposals officially.

Final resolution

The contents of these suggestions conform closely with my own ideas on the subject. I should therefore like to recommend that the Conference passes the following resolution: The delegates to the Esselte Conference on Applied Cartography agree that a body for the

continuation and extension of international cooperation on Applied Cartography should be formed. This international organisation should concentrate its activity on such aspects of cartography as are not already covered by existing organisations. The Conference is aware that the question should be subject to further investigation in various countries before any definite steps are taken. The delegates propose to form a committee within their own ranks for the purpose of establishing contact with the authorities in the countries in question with a view to proposing the formation of an International Society of Cartography during 1958, when a meeting should take place either in the United States or in one of the European countries. If the Conference is willing to adopt this resolution I suggest that the proposed committee should comprise a maximum of six persons."

The Committee of Six

This was the essence of Dr. Mannerfelt's historical address. The proposed resolution was unanimously adopted, although some of the participants once more pointed out that they were not able to speak officially for the organisations they represented. The proposed Committee – further known in ICA history as the "Committee of Six" was designated with the following membership:

- Dr. Carl M:son Mannerfelt, Esselte Map Service, Stockholm, Sweden - Chairman
- Prof. Dr. Erwin Gigas, Director Institut für Angewandte Geodäsie, Frankfurt am Main, FRG
- Mr. K.W. Bland, Ordnance Survey, London, UK
- Mr. Stéphane de Brammer, Institut Géographique National, Paris, France
- Dr. Daniel Chervet, Eidgenössische Landestopographie, Wabern, Switzerland
- Mr. Duncan Fitchet, Rand McNally Company, Chicago, USA.

The Committee of Six did its home work. It distributed the results of the Esselte Conference in English, French and German and approached a number of governmental mapping agencies and leading cartographic experts to sound out their reaction to Mannerfelt's proposal. The committee met again on the occasion of the international exhibition "Graphic '57" in Bern and Lausanne, reinforced by a few newly interested colleagues, including Professor Eduard Imhof for the first time. Chairman Mannerfelt reported that the result of the committee's soundings were encouraging. Among the reactions were recommendations to build up the cartographic organisation from below and to start promoting the creation of national committees or cartographic societies in the interested countries. The *Deutsche Gesellschaft für Kartographie* recommended the creation of a European Cartographic Society as a first step towards internationalisation. At a later stage this body could form part of an international society. As to the status of such an organisation, some countries were of the opinion that it should be completely independent from existing geographic or geodetic organisations, others again were in favour of an incorporation within one of them preferably the International Geographical Union. The opinion was also voiced that international contacts could be affected best by private informally arranged meetings with a limited attendance such as the Esselte Conference.

Critical notes were heard from the United States where upon the initiative of Duncan Fitchet, member of the Committee of Six, a meeting was held in Washington D.C. in October 1956 to discuss the suggested international organisation. The meeting was attended by representatives of all great US governmental mapping organisations and of the National Geographical Society.

The idea of assigning cartographic proper its own territory was not new in the United States. During one of the early meetings of the American Congress of Surveying and Mapping (ACSM), in 1942 a Division of Cartography was founded, to represent those aspects of the

field of maps and mapping not primarily connected with surveys and dealing with cartographic representation, compilation and reproduction of maps, problems relating to map collections, and the dissemination of information concerning maps and studies of the history of cartography – a fairly complete list of subjects, pretty well corresponding with later concepts of Imhof and Mannerfelt. Perhaps inspired by the incorporation of cartography within ACSM, the meeting in Washington held the opinion that – though the desirability of better international contacts was recognised – there might be easier ways of attaining the required aims. Instead of establishing a new international organisation it seemed preferable to realise the cartographers' ambitions within the framework of one of the existing organisations such as IGU or ISP, which both covered parts of cartography in their programmes. It was recommended to deepen, to broaden and to coordinate the cartographic activities within those organisations. Other US experts were in favour of the foundation of a European counterpart of ACSM in order to facilitate contact on an equal footing. Others again were inclined to leave the desired coordination to the United Nations where in 1951 a Cartographic Section was founded.

Under the influence of these critical notes the Committee of Six decided not to be overhasty, to extend the opinion-sounding and to urge interested countries to establish their own national committees, so that an international one might be formed with representatives from each country. Further, recognising the importance of close contacts with geographers, the committee approached the IGU to investigate the suggested possibilities of establishing a cartographic association under the aegis of IGU. The idea was discussed by the IGU Executive Committee at its meeting in Tokyo in August 1957, where it met support from President Professor Hans W:son Ahlmann (Sweden) who argued that cartography was linked so closely with geography that the inclusion of a cartographic section in IGU would be advantageous to both. On the other hand Ahlmann was realistic enough to realise that such a section would primarily deal with geographic cartography and photo-interpretation and not with cartographic techniques and that professional cartographers would not feel at home among academic geographers. Awaiting the formation of national cartographic committees IGU decided to strengthen its cartographic component at its next Congress.

The Chicago Conference

Two years later another representative of Commercial Cartography, Rand McNally & Company, Chicago, after consultation with the governmental US mapping agencies and with the American Society of Surveying and Mapping (ACSM), invited a number of experts for a second international discussion, at Northwestern University in Evanston near Chicago. Fifty-five participants (35 of whom from USA and Canada) took part in this so-called "Chicago Conference". As in Sweden, papers presented mainly dealt with problems of practical cartography: design, compilation, relief depiction and reproduction. The Committee of Six, that had got through a great amount of work, reported that the concept of an international cartographic association had met with sympathy and approval among the countries consulted. The efforts of stimulating the foundation of national committees or cartographic societies had also met with success. Therefore the Committee of Six with its newly appointed first secretary Professor Gigas, FRG, was invited to take a step forward and to convene a meeting with the representatives of the national committees or societies, recently founded or in preparation, to plan the structure of the international organisation. Furthermore, one the positive results of the Chicago conference was that US cartographers, though not unanimously in favour of the proposed concept, to put it mildly, continued to cooperate. In the years to come they provided the Association with a fine sequence of officers, who served as Commission chairmen, Vice-Presidents and Presidents.



Figure 2. A roof with a view, Chicago Conference 1958. From right to left, Mannerfelt, Gigas, Host Rand McNally III, Imhof, Baldock, Harris, Rzedowski and de Brommer

Decisive steps at Mainz

The proposed meeting of the Committee of Six with the representatives of national committees or societies was held upon the invitation of the *Deutsche Gesellschaft für Kartographie* (DGfK) in Mainz (FRG) in November 1958. This time no technical papers were presented and the whole attention focused upon the concept of an international organisation. One after another the reactions of the 14 countries that had responded to Mannerfelt's appeal passed the review. To a certain extent the meeting in Mainz was decisive. Participants agreed on the desirability of the formation of an international platform. It was striking that the group, predominantly consisting of cartographers proper, disregarded most of the previous suggestions as to its future structure, rejected the idea of amalgamating with any of the existing organisations and expressed its preference for an independent one. In order to prepare such a body the Committee of Six, of which Professor Imhof was appointed chairman, was instructed to arrange a foundation meeting. As the importance of maintaining close contacts with geographers was fully recognised the Committee was further requested to examine possibilities of a coordination or affiliation with IGU. Thus, the idea of a subordination to IGU was abandoned in favour of coordination.



Figure 3. Mainz 1958. Committee of Six meeting national delegates. Behind the table from left to right, Fitchet, de Brommer, Mannerfelt, Imhof and Gigas. Standing (among others) Bohme, Knorr, Ormeling, Frenzel, Koeman, Siewke, Harris, Kormoss, Gaussen, Bormann

Foundation meeting at Bern 1959

In the spring of 1959 Imhof and Gigas sent out invitations to attend a foundation meeting. In June of that year the following thirteen nations who had accepted the invitation assembled in the *Eidgenössische Landestopographie* in Wabern near Bern: Austria, Belgium, France, FRG, Finland, Italy, Netherlands, Norway, Spain, Sweden, Switzerland, UK and USA. It was during this meeting that under Imhof's presidency the formal decision was made to create an organisation named the International Cartographic Association (ICA), with two official languages (English and French) "for the purpose of extending international cooperation in the field of cartography and for the purpose of joining the IGU as an affiliated organisation with sufficient autonomy". The meeting dissolved the Committee of Six and appointed a provisional Executive Committee with representatives of seven nations among whom Professor Imhof as President and Professor Gigas as Secretary-Treasurer, to serve until the First General Assembly of Delegates planned to be held in Paris in 1961. Finally, the meeting discussed and adopted the draft Statutes as prepared by the Committee of Six, subject to approval of the General Assembly in Paris. The main job was done. The relationship with the IGU still had to be settled. The members of the Committee of Six, the "founder members" of the Association – de Brommer, Fitchet, Gigas, Harris, Imhof and Mannerfelt – were presented awards of distinction as a mark of gratitude by Imhof's successor President Thackwell at the General Assembly in New Delhi in 1968.

Discussions on the Affiliation

In 1960, during the XLXth International Geographical Congress in Stockholm a series of discussions took place on the proposed affiliation between Imhof and Mannerfelt on one side and the IGU executives President Ahlmann, his successor Professor Troll (FRG) and Secretary-General Professor Boesch (Switzerland) on the other. Within IGU a Special Commission on Cartography was set up to study the proposals, and to present a solution acceptable to both ICA and IGU and to recommend any appropriate changes in the Statutes to give effect to this solution.

Ahlmann's successor Professor Carl Troll (FRG) was a strong supporter of the affiliation idea. When attending the first ICA General Assembly in Paris in 1961, he officially declared that he considered that one of his main presidential tasks was to promote the definite approach between the two organisations. Despite his enthusiasm, in the IGU Executive Committee doubts were raised as to whether ICA's aims and objectives were compatible with those of the IGU. The doubts arose from the fact that at the Esselte (1956) and Chicago (1958) conferences, cartographers were invited by private institutions (Esselte Map Service and Rand McNally respectively) and that invitations were not extended to all cartographers and countries. While geography, belonging to the domain of universities and other scientific institutions, was traditionally beyond suspicion, cartography as a technical science might be subject to commercial and governmental influences. Taking this view Vice-President Gerasimov (USSR) expressed the opinion that the proposed affiliation with ICA had to be rejected. According to de Brommer who reported on the matter, it is likely that the USSR was put off because initiatives originated from western countries including NATO members.

First General Assembly of Delegates

In May 1961 the first General Assembly of Delegates was held in the Conference Centre of the Department of Foreign Affairs in Paris. The meeting, attended by 84 delegates from 29 nations, was royally organised by the *Comité Français de Techniques Cartographiques* (CFTC), established in 1957. It was steered by its dynamic Secretary-General Stéphane de Brommer, who had succeeded in getting the support of no less than four Ministries as well as that of the *Commisariat Général du Tourisme*, the *Institut Français du Pétrole* and the

Institut Géographique National (IGN). Among the participants were Professor Carl Troll (FRG), President of the IGU Director Paes Clémente (Portugal), President of ISP, Mr. Georges Laclavère, Secretary General of the IUGG, Mr. Armand Rumeau, Director of IGN, and Professor Henri Gaussen, President of the Comité Français. It seems that this meeting with its extensive social functions – a dinner on the Eiffel Tower, a cruise on the River Seine, a night visit to the Louvre Museum and a visit to a fashion parade at Christian Dior – was the most glamorous the Association ever had. Cartography was doing fantastically well in Paris in 1961!



Figure 4. First Executive Committee. Standing from left to right, de Brommer, Thackwell, Emminizer, Imhof, Mannerfelt, Gigas, Traversi. In the foreground outgoing members of the "Committee of Six": Harris and Fitchet

As far as business was concerned, the most important event of the meeting was the adoption of the Statutes of the Association, thus formally consolidating its existence. Further, 26 nations were inaugurated as member countries. The provisional Executive Committee set up in Bern in 1959, made way for an officially elected one, with Professor Imhof as President – who as an amiable host dominated the scene – Professor Gigas (FRG) as Secretary – Treasurer and five Vice-Presidents. Plans were laid out for a Technical and Scientific Conference in Frankfurt am Main (FRG) in 1962 and for the Second General Assembly to be held together with a Technical Conference in London and Edinburgh in 1964, coordinated with the XXth International Geographical Congress. Mindful of the successful Esselte Conference, with its limited number of participants, in planning the Frankfurt meeting the new Executive Committee restricted attendance in advance to a maximum of 100 persons. Apart from planning future conferences, attention was concentrated upon the study objects to be allocated to Special Commissions to be installed by the next General Assembly. One of the sessions was devoted to the national progress reports presented by no less than 23 countries, which thus anticipated the obligation laid down in Article 5 of the Statutes for each member country to present regular reports to the General Assembly on its cartographic accomplishments. Though regrettably in the following years less than half of the members met this obligation, those that did – mainly the industrialised countries – presented useful information on their cartographic state-of-the-art, submitting in total more than 200 reports. Among the reports received were outstanding examples of graphic skill such as those of Japan, Switzerland and France or of solid information concisely presented (Netherlands, UK, USA etc.). The first official act of the young association was the sending of a message to UNESCO requesting support in the promotion of a worldwide free exchange of cartographic data particularly for the benefit of thematic mapping.

The affiliation

The Statutes as adopted in Paris in 1961 made it clear that ICA did not represent either government or commercial cartographic interests. Its objects were (and are) the advancement of the study of cartographic problems, the instigation and coordination of cartographic research involving cooperation between different nations, the exchange of ideas and documents, the furtherance of training and the encouragement of the spreading of cartographic knowledge. To achieve these objectives it would hold conferences on selected cartographic subjects. It also would set up Special Commissions to examine selected aspects of cartography. Of particular importance was Article 3 of the Statutes, which stipulated that membership of the Association was open to ... any nation without any restriction, pursuing an independent cartographic activity.

The clear language of the ICA Statutes managed to convince the opponents in IGU. In 1962 its Executive Committee decided to place the affiliation proposal on the agenda of its General Assembly and to recommend its adoption. Shortly after, President Imhof on ICA's behalf made a similar overture. In 1963 the technical questions concerning the functioning of the affiliation were discussed. There was full agreement that the two organisations should remain independent bodies. The hope was expressed that both would try to coordinate the place and date of their international congresses and would cooperate in the exchange of information in all matters of common interest.

In 1964 in London the programmes of the IGU and of the ICA had been arranged so as to give the maximum mutual benefit. At their General Assemblies IGU and ICA on 24 and 28 July 1964 respectively both ratified the affiliation, for which the statutory prerequisites had been prepared. Before the voting at the IGU General Assembly the delegate of the USSR, who had been opposed to the affiliation, made a short declaration of approval, seconded by the delegates of Hungary and Poland. In the same week the three countries, having applied to join the Association, were inaugurated as member countries by the ICA General Assembly thus considerably strengthening the potential of the Association. Finally, its tasks being successfully completed, the IGU Special Commission on Cartography under Professor Imhof, set up in Stockholm 1960 was dissolved.

The Field of Cartography

From the outset, apart from the structure of the organisation to be created, the demarcation of the field of cartography was a major topic of discussion.

Contrary to the broad UN concept of Cartography, the Committee of Six concentrated on a more restricted field, excluding surveying and photogrammetry and all primary data gathering by other disciplines such as geology, statistics etc. Though neither initiators nor later ICA Executives ever ventured to undertake the delicate task of defining cartography, at the General Assembly in Paris there was general acceptance of the description in Article 1 of the Statutes saying that the Association was particularly concerned with the "source material, the compilation, the graphic design, the drawing, the scribing and the reproduction of maps and associated forms of graphic representation".

A few years later, Stéphane de Brommer (France), reached the conclusion that for his work as chairman of the ICA Commission on Education in Cartography a clear demarcation of the field was desirable. He had the following definition of Cartography accepted by his Commission: "Ensemble des études et des opérations, scientifiques, artistiques et techniques, intervenant, à partir des résultats d'observations directes ou de l'exploitation d'une documentation, en vue de l'élaboration et de l'établissement de cartes, plans et autres modes d'expression, ainsi que dans leur utilisation". This definition, together with its freely translated English version was presented to and adopted by the Third ICA Conference at Amsterdam (1967) and finally ended up in this form in the *Multilingual Dictionary of Technical Terms in Cartography* edited by Professor Emil Meynen (1973). The English

version is as follows: "The art, science and technology of making maps, together with their study as scientific documents and works of arts. In this context maps may be regarded as including all types of maps, plans, charts and sections, three-dimensional models and globes representing the earth or any heavenly body at any scale". This text seems to be less precise than the French original that explicitly excludes surveying and photogrammetry from cartography proper. The term "artistique" in the French definition was introduced upon Imhof's proposal, while the "utilisation" or use of maps was added upon Professor Salichtchev's (USSR) suggestion. The latter continued to regret that the definition was concentrated too much upon map production and neglected cartography's role as a science. Once printed, de Brommer's definition has stood the test of time and though, owing to the advance of the computer in map production and the better insight of the role of maps as communication media, there is every reason to revise it, it still stands as the official ICA definition and as such is regularly quoted in literature, despite the fact that various individual cartographers have launched alternative definitions since. During the ICA conference in the United States in 1978 an attempt was made to find a group of experts to revise the official version, but nothing came of this. In our days of blurring map technologies the task of drawing boundaries around the activities of cartographers is more delicate than ever.

Membership

Judging from the growth of the young association, the moment of its establishment was correctly timed.

Membership increased by leaps and bounds from 13 founding member nations in Bern in 1959 to 62 at the General Assembly at Perth in 1984, and surprisingly quick it took its place between the established sister organisations to develop into a recognised forum for cartographic discussion.

Today the member countries are geographically mainly concentrated in Europe and Asia. Within 10 years of its existence almost all European countries had joined the Association. In Asia, since the early days, India, Japan and Thailand and more recently the People's Republic of China and Indonesia have been points of support. Australia and New Zealand are early members. Developing countries in Africa and Middle and South America are under-represented: Africa with 8 members out of some 50 sovereign states and Latin America with 7 out of 39. There are several reasons for this situation. One of the main ones is undoubtedly the fact that, generally speaking, ICA activities are adapted to suit the needs and interests of technically advanced countries and are only of limited use to developing nations. The latter's direct cartographic needs are better served by bilateral agreements, such as those maintained between various African states and their former colonial masters. Moreover, in 1975, under the umbrella of the UN Economic Commission for Africa, countries of that continent created their own Association for Cartography, adhering to the UN definition of cartography. Latin American countries rely for cartographic assistance and training upon the Inter Geodetic Survey of the US Defense Mapping Agency and its Cartographic School in the Panama Canal Zone, where since 1952 some 7000 Latin American students have been trained. Further, as a forum for information exchange there are the regular consultations of the Cartographic Commission (1941) of the Pan-American Institute of Geography and History (PAIGH) of the OAS with national representations in each member state; British Commonwealth countries also regularly hold cartographic conferences for their members.

In order to help developing countries to join the Association, the entrance regulations of requiring "independent" mapping was deleted from the Statutes, upon French recommendation in the General Assembly in 1976. At the same time, potential membership was extended by creating the possibility for scientific or technical organisations to join the

Association as affiliated members, without compromising the principle of single representation for each nation.

The desire to reach as many countries as possible resulted in a certain amount of membership promotion, emphasising the following advantages of being part of the Association: 1. Participation in biennial ICA Conferences, 2. Participation in Commission and Working Group Activities, 3. Free copies of the following: International Yearbook of Cartography, Papers presented at biennial conferences and all other ICA publications including the ICA Newsletter when available (in preparation), 4. Free subscription to the IGU Bulletin and to a cartographic journal of international repute – either the Bulletin du Comité Français de Cartographie or Cartographica (Canada). Further, to promote membership, the Executive Committee divided the non-ICA world into five parts and assigned each part to one of its vice-presidents as recruiting officer. Moreover non-member countries were regularly invited by the Secretariat to send observers to IGA conferences – in 1976 adopted as standard practice. As a whole, this package of measures had good results and with 62 member countries in 1984, the ICA equals the average membership of the International Scientific Unions in ICSU.

National Representation

According to the Statutes each member country can be represented in ICA only by one national organisation, preferably a national society or committee for cartography. In ICA practice, however, alternative forms of representation occur. Most countries follow the requirements of the Statutes; they are represented by independent cartographic societies (FRG, Netherlands etc.) or national committees (Czechoslovakia, Norway etc.). Others are represented by cartographic sub-divisions of geodetic-cartographic or geographical organisations (Bulgaria, Greece, USA etc.). Others again by cartographic sub-committees of National Academies of Sciences or similar bodies (GDR, UK). Further, in countries where cartography outside the national mapping agencies is still developing and cartographic societies or committees do not exist as yet, the representation is in hands of the national mapping agency or survey (Algeria, Argentina, Thailand). This means in practice, that it is under the authority of the Surveyor General who then is supposed to act not as a State institution but to represent the interests of the national cartographic community. It is difficult to say which system is best. Every system has its merits. According to the author's experience, however, representation by national committees or by sub-committees of an Academy of Sciences representing the entire national cartographic community, is preferable to that by a cartographic society, where opinions of cartographers who are non-members, may be disregarded. It will be clear, that whatever representation is chosen, the ICA, like its sister organisations, follows the pattern of an international federation of national organisations, in which traditional systems of decision forming prevail, and in which there is no opportunity for the participation of the individual cartographer. Normally, communication between the Association and national bodies is carried out at executive level and the amount of information which filters down to individual members of the national societies is extremely small. Some thought has been given to consider a change from the international federal pattern to direct individual membership. Needless to say, that as long as mapping is surrounded by security measures, direct communication of the individual cartographer with a worldwide organisation is completely inconceivable.

Finances

In financial matters the outlook of ICA's initiators has been on the conservative side. The Association started with an annual subscription for member countries of US \$50.- an amount

which was gradually increased in four steps often only after animated discussion, and in 1972 it reached the \$125.- level.

Compared with the subscription of international sister organisations this is still on the low side, in fact almost too low to be taken seriously. The modest resources thus created a serious drawback from the beginning. It meant that an important part of the Association's work, at Executive and Commission level, depended upon the voluntary effort of individuals and upon hidden support from Governmental and private mapping agencies. ICA officers, often in leading functions, giving freely of their time (and money!) often managed to generate a chain of supporting activities. Thus on many occasions, office space, transport facilities, clerical, reproduction and printing capacity, all indispensable for the successful running of the Association, became freely available. In this way, the ICA Secretariat was able to be conducted for twelve long years from the ITC, Netherlands, without any other costs either than a minimal supplementary salary for ITC secretaries. The same kind of services were generously granted by *Liber Kartor*, Sweden, during Hedbom's Secretary-Treasurership from 1976-1984. Without this kind of condoned support, predominantly governmental, which can not be expressed in figures, the non-governmental ICA could only marginally exist and could not even finance the necessary travels of its executives, a frustrating situation in the long run.

Owing to continuing inflation, the growing number of commissions to be financed, the increasing travel costs to meet the growing obligations of the Association, in the mid Seventies new steps had to be taken. In Moscow (1976) the General Assembly adopted a differential subscription system, similar to that of the IGU, whereby the annual subscription is expressed in six categories, multiples of a basic unit, each country being free to select its own category. The new system did bring more revenue; not so much, however, as was expected because subscriptions in a non-governmental organisation often have to be paid by national societies, sustained by individual members, who have only vague ideas of what happens on an international scale, have no opportunity for participation at world level and are often averse to paying for it. Moreover, the ICA Treasurer over the years has had to contend with great arrears in payment of certain member countries. According to the Statutes, those not paying their dues for three consecutive years can be deprived of membership, but when the developing countries are in arrears, the rules are often waived. Faced by the fiscal restraint during the early 1980's, when government taps were turned off, the ICA has begun thinking of a more realistic management in the form of a fully remunerated staff. An obvious approach in this situation could be starting a dialogue with non-government sister organisations involved in map-making, which sooner or later have to face the same problem. The old idea of ex-President Thackwell in the late 1960's was reintroduced. This involved the establishing of a combined, collectively financed, permanent office of 2-3 organisations with a full time chef de bureau and 1-2 clerical staff. A combined performance of the organisations involved in mapping would undoubtedly contribute to their efficiency and prestige. The idea is currently on the table and still worth investigating!

Reflections on the past

Before concluding the Foundation Period it is worth touching upon a historic attempt to establish an international cartographic association by the Russian General A.A. Tillo as described by Salichtchev (1971). At the Geographical Congress in London in 1895, while discussing Albrecht Penck's proposal to compile the IMW, Tillo introduced the idea of an international cartographic association which he believed would help substantially in the creation of the World Map. The Congress in Berlin in 1895 set up a special commission to study the suggestion. After Tillo's death in 1899 his disciple Yu. M. Shokalski pursued the matter. His "ICA", contrary to the then irregular International Geographical Congresses,

would be a permanent organisation, with a central bureau, of which governments, private cartographic institutions as well as individual specialists could become members. It would concern itself with technical cartographic problems as well as with symbolisation and transcription and would assist in the production of maps of extensive territories such as the IMW. In many ways – Salichtchev observed – Shokalski's ideas anticipated the stature of the present International Cartographic Association. Owing to differences of opinion, the Commission set up in 1895 and renewed in 1904, did not produce any real results. One of its members, wanted to reduce the Association's task to the compilation of a World Catalogue of Maps, of direct use to private cartography. The outbreak of World War I further barred the realisation of the project. In 1922 the International Geographical Union was founded under the wing of which the interests of cartography seemed to be safeguarded for the time being. Contrasting with these early attempts, bound to fail by internal division of opinion, negotiations in the 1950's between cartographers from government agencies and private enterprise, the latter initially in a leading role, were successful. The German playwright Bertolt Brecht once said that the finest plans are often spoiled by the narrowness of those who have to carry them out. This time this did not apply to cartography. The realisation of the Swedish concept took only 2-3 years.

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OPENING ADDRESS, FIRST GENERAL ASSEMBLY

(Translation from original version in French in Bulletin du Comité Français, Fascicule no. 12, November 1961)

Paris, 29th May 1961

Eduard Imhof

Ladies and gentlemen,

In my capacity as President of our Association, and on behalf of our Executive Committee, I am pleased to welcome you at the occasion of the Opening Session of our First General Assembly.

I am happy to welcome Mr. Cahen Salvador, State Adviser and representative of the Minister of Public Works and Transport who will be doing us the honour of presiding at this meeting. I take pleasure in the great interest and support which unites delegates from thirty countries. For our recently founded Association, this attendance is a great success.

I would like to thank Professor Henri Gaussen, President of the *Comité Français de Cartographie* for his fine words of welcome. My thanks go to all the members of his Committee, and especially to our tireless Mr. Stéphane de Brommer for doing the preparation for this meeting.

We must not forget to thank Professor Erwin Gigas, Director of the *Institut für Angewandte Geodäsie* in Frankfurt am Main. Along with Mr. de Brommer and his colleagues, Professor Gigas, as Secretary-Treasurer of our Association, took on a burdensome task of organising this meeting.

It is with great pleasure that I welcome our guests who by their very presence here show their support. I extend a special welcome to Mr. Rumeau, Director of the *Institut Géographique National*. We thank him particularly for his interest in our organisation and for his kind assistance. Also present is Professor Carl Troll, President of the International Geographical Union and Chancellor of the *Rheinische Friedrich Wilhelm Universität* in Bonn. It gives us special pleasure to see that Chancellor Troll has joined us today, despite his many scientific and administrative duties.

Paris, this marvellous city, cultural centre of the world, is a particularly propitious venue for our meeting; we love this city and come here with pleasure. Some of the liveliest impulses in the field of cartography have always radiated from Paris and from France.

French mathematicians and geodesists laid the theoretical foundation for the development of modern geodesy, along with cartography. I refer to their measurements of the arcs of the meridian and their surveys of large areas by triangulation in the 18th century which resulted in the famous *Carte Géométrique de la France* in 182 sheets 1:86 400, by Cassini de Thury; the first use of contour lines on land maps by Dupain-Triel in 1791 as well as to the Golden Age of French map engraving. A great many other things could be remembered, particularly the current French cartographic achievements in North Africa and in South-East Asia. The atmosphere of Paris is most propitious for our work.

I would now like to open our meeting with a few comments regarding the position of cartography in the world, as well as the aims and objectives of our young association. In many countries at the moment, there is much activity in the field of cartography, both in governmental organisations and in private companies, university institutes, etc. An estimated 40 000 different maps are currently produced each year around the world; between a 1000 and 100 000 copies are printed of each of them. These figures include topographical maps and special or thematic maps of all kinds and on all scales. Even though this report appears satisfactory at first glance, a closer examination of the maps produced shows that map coverage of large parts of the earth responds poorly to current and future requirements.

According to recent surveys of the area of the world covered by maps, there are topographical maps on a scale greater than 1:100 000 for only 10% of the earth's surface. But most of these maps, even for certain areas in Europe, do not correspond, as far as accuracy, contents and updating are concerned, to modern requirements.

Good, accurate topographical maps at scales larger than 1:100 000 scarcely exist today for more than about 1% of the earth's surface. For vast regions it is not even possible to compile the International Map of the World to 1:1 000 000 with uniformly good topographic quality. In numerous countries, detailed thematic mapping is only in its infancy. This applies to geological maps, maps showing soil types, vegetation, land use, density and composition of population, economic conditions, traffic, and many more.

Maps are indispensable for all kinds of planning and administrative work, for traffic and transportation by land, water and air. Topographic and thematic maps of various kinds are as important for the organisation of modern life as statistics. In all those places where population density, construction work, production, commerce and traffic are increasing, good up-to-date maps are necessary. Of course, maps will never solve all the world's problems, but they are indispensable weapons in the battle against chaos. We live at a time in which technical, social and political developments are transforming major parts of the remaining virgin and sparsely populated land. Even within the more densely populated areas, the face of the earth is being modified at a faster rate than ever before.

There is a danger that the cartographic community will no longer be able to meet the sharply increased requirements for maps. Aerial photography and photogrammetry however, have supplied us with a great deal of topographic and geographic data. Moreover, the recent advances in drafting and reproduction techniques have greatly accelerated map production, but we must still encourage technical improvements to further speed up the process.

However, these are not our only worries. In producing maps, it is not enough merely to consider purely technical advances. The content and format of numerous maps – perhaps the majority – are still open to improvement. Despite the simplifications in representation which are brought about by reductions in scale, a map must be, on the one hand, as close as possible to geographical reality and, on the other hand, simple, clear and easily legible. For many

maps, the problem of combining geographic accuracy with graphic simplicity has not yet been solved. Numerous ancient maps, almost all hachured maps and even certain maps of today, appear to the graphically trained eye as an awful tangle of lines, symbols, and lettering, all too dense, all inextricably muddled. One of the top graphic artists in my country told me that maps were horrors to him from graphical point of view.

Today we find ourselves in the middle of a cartographic/graphic reformation. A good draftsman should not tolerate any line which is not easily understandable once the work is finished. His success does not depend on what has been drawn, but on what the map user can see clearly.

And there is something else which should be borne in mind. Because of tradition, and because of old graphic doctrines, numerous maps, particularly those at small scales, are set according to established routine, their style is often forced and they are unnatural. Here again, reforms are necessary; geographical reality should be our only starting point. These comments equally concern thematic maps of all kinds. In this field we are confronted with challenging possibilities for development, from both the geographical and the graphical points of view.

These few observations clearly demonstrate not only the scope of our task, but also the difficulties. We have to train cartographic specialists of different types and levels for the future, in a more systematic way, and in larger numbers, as the number of well-trained specialists available today falls short everywhere. Our new association should encourage all efforts made in this direction, by means of exchanging experience and the spreading of knowledge.

Dr. Carl M:son Mannerfelt was the first to recognise the urgent need to bring cartographers together. In 1956, in Tollare near to Stockholm, he successfully convened the first international conference on technical cartography, the Esselte conference; this was such a great success that two years later, Rand McNally organised a second equally successful technical conference, near Chicago. These two conferences, together with the meetings at Bern, Lausanne and Mainz, were to lead to the foundation of our Association in 1959 in Bern.

One may wonder why such an association, for which the need is so evident, was not created long ago. International associations for geography, geodesy, geophysics, etc. had already been in existence for a long time. Why did the cartographic specialists hesitate so long? This question seems to merit a brief examination.

The difficulties in forming an international association are particularly great in the field of cartography, and will continue to pose problems into the future. In fact, the production of a map is not generally the work of a single individual, or even a single uniform professional group, but it is the result of cooperation between people of diverse professions. Topographic engineers and photogrammetrists have long had their own national and international scientific associations. It would be incorrect for us, with our poorer means to wish to infiltrate into their fields of activity. Moreover, their specialist organisations are only incidentally concerned with cartography, and then only with topographic mapping.

If we look at thematic cartography, which interests specialists in the natural sciences, historians, geographers and others, the situation appears even more complicated. There is not one cartographer who could personally undertake the research necessary for all types of thematic maps. On the other hand, there are few naturalists, historians, geographers, etc. who

could take on all the current problems of designing, compiling and reproducing the map image. The cartographic technician needs to rely on their scientific research, while the others, for their part, need to call on the assistance of cartographic draftsmen and technicians.

Cartography indeed figures to a limited extent in the curriculum of geographers. Their education, however, is insufficiently concerned with problems of cartographic/graphic art and with reproduction techniques. The diversity of cartographic operations and the variety of talents required have so far formed an obstacle for the establishment of a distinct professional cartographic education system.

This juxtaposition of professional disciplines does not constitute the only difficulty. Professional division in the vertical sense is also inherent to cartography. Staff members of geological, geographic and historical departments are usually academics, but the production of maps involves the participation of technologists (engineers, chemists) and cartographers with various specialisation, such as draftsmen, engravers and, finally, reproduction technicians (photographers, copiers, printers, etc.). This collection embraces a diverse range of professionals from the academic to the skilled worker.

Responsible managers and staff members in the field come from diverse professional backgrounds. They often have limited experience in cartography. Consequently, in practice the geodesist for instance will have to contend with repro-technicians, the engineer with toponymists, the repro-expert with the topographer, the draftsman or engraver with the geographer and the geographer with the theories of graphic art, visual psychology and drawing materials.

Let us look now at another source of difficulties for the education of a scientific professional class of cartographers. Cartography is not simply research, or technique, or geography. It is closely linked with agencies set up for the production of maps, which is often a state responsibility but it can also be in the hands of private industry. Producing a map is not simply a scientific and technical activity, it is not simply a public service, it is also a means of earning money. So, cartography is in part populated by civil servants and professors, in part by commercial firms and businessmen.

Such a multitude of professions, educational levels, talents, professional and social positions, makes the term "cartographer" confusing: It is therefore very difficult to form a professional group of cartographers, with the same feeling of pride and responsibility for their discipline.

There, then, are some problems concerning professional organisation. This is the reason why too little notice has been taken of cartography at most of universities until now. This explains why the creation of cartographic associations and committees in various countries has been so tardy, and finally why the foundation of our international association has come so late. But it is just this dispersion of efforts and diversion of scientific branches which so urgently demand professional consolidation. The geodesists, the geographers, the graphic designers or cartographic artists, and the reproduction technicians must come together, and it will be through this coming together that new processes and a science of map production will emerge.

Allow me, finally, to add a few words concerning the organisation and future activities of our association. The International Cartographic Association is an independent scientific institution, as are parallel international organisations of geodesy, geology, geography, photogrammetry, etc.

According to our draft statutes: "Each nation may only be represented as a member by a single organisation, preferably by a national committee or national association of cartography". Since such independent scientific committees do not yet exist in some countries, membership status may provisionally be bestowed on a governmental mapping agency or institute. These institutes are expected to exercise their membership functions as representatives of their national cartographic community, not as State institutions, which may be bound by government directives. It is to be hoped that independent scientific committees or associations will soon be founded in those countries, which do not yet have them, so that they will be able to exercise their full function as members of our Association.

Our Association, and its General Assembly of delegates, does not form a committee of delegates representing different governments. In the field of cartography, as in others, scientific research must in principle remain free and independent. This must not, however, prevent the directors and officials of state-run cartographic institutes from exercising, within their own national cartographic committees the influence which they have by virtue of their experience, their professional activities and their managerial competence.

On the other hand our Association will never issue instructions to any nation or State institution. All we wish to do, and all we can do, is to transmit and facilitate an exchange of ideas on scientific and technical innovation. We can discuss problems of general interest, we can make recommendations and we can even suggest certain mapping projects of an international nature. But we will refrain from any interference in the sovereignty of member states, as strictly as we refuse any interference from any governmental body ourselves.

I am convinced that our Association will become an essential support for cartographic science and technology and that it will be productive for cartography in many countries serving neighbouring sciences like the geosciences as well. Like all international associations our activities will contribute to bringing the people of the world together by encouraging contact and friendships which reach around the globe. It is in expressing this desire that I open the First General Assembly of the International Cartographic Association.

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Paris 29 May-3 June 1961

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Preparatory Committee of Six Nr. 2 1958-59

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** Died in 1977 Replaced by Prof.Dr. A.M. Komkov (USSR)*

*** Died in 1977 Replaced by Prof.Dr. A. Ciolkosz (Poland)*

**** Replaced in 1983 by Dr. E.P. Arzhanov (USSR)*

Conferences

TWELVE CONFERENCES IN RETROSPECT

Introduction

The objectives of the ICA as laid down in its Statutes are: the advancement of the study of cartographic problems, the instigation and coordination of cartographic research involving cooperation between different nations, the exchange of ideas and documents, the furtherance of training in cartography and the encouragement of the spread of cartographic knowledge. Holding of conferences is one of the main instruments used in the pursuit of these goals – conferences at which papers are presented and discussed on selected cartographic problems. The importance of these conferences is beyond dispute. Sociologists and psychologists investigating the value of international meetings have come to the conclusion that they produce highly useful information in a short period of time at comparatively low cost. Further, they bring about a strong stimulus to the introduction of new ideas, concepts and methods, provided they are kept relatively small, are not too lengthy, and provide plenty of time and place for informal contacts. The conference material – in the case of ICA the papers, catalogues of exhibitions, reports of commissions and member countries and special issues of cartographic journals – constitute a precious part of contemporary professional literature.

Preparation of Conferences

According to Article 9 of the original Statutes adopted in 1961, Technical Conferences are to be held as a rule in conjunction with General Assemblies of Delegates which normally meet every four years. Moreover, according to Article 22, the Executive Committee is entitled to call scientific or technical conferences independent of the regular General Assemblies. Since the foundation of the Association, the Executive Committee has exercised this right considering that no more than 2-3 years should elapse between conferences because of the tempo of new developments. Apart from the seven General Assemblies, six of which were held in conjunction with conferences, a second series of six independent conferences has also been held.

The difference between scientific (in the sense of nontechnical) and technical conferences was never clearly explained. In making this distinction the Founding Members, mostly practising cartographers (editors, map compilers, repro technicians etc.) had the Esselte and Chicago meetings in mind, where, under the impact of new techniques in map production, technical problems dominated the discussions. In subsequent conferences rather philosophical papers were gradually introduced, and consequently they lost their exclusive technical character. After Amsterdam (1967) the conferences were mostly announced and labelled as "international conferences". The technical conference disappeared gradually. First from ICA terminology and, after their revision in 1980, from the Statutes.

According to the Statutes, the organisation of conferences is entrusted by the General Assembly to one of the member countries which has volunteered for the job. The chosen host country proposes the conference themes and draws up a programme, subject to the approval of the Executive Committee. In practice, this regulation has never given rise to problems. On the contrary. Discussion between the Executive Committee and representatives of the host country usually resulted in fruitful minor programme adjustments and changes which contributed to the success of the conference.

The need for Government Assistance

Conferences are supposed to be financially self-supporting. Expenses are to be covered by the ever-rising registration fees of participants (Warsaw 1982: \$170.-) and accompanying persons, and the stand fees of commercial exhibitors. In addition, organising committees are supposed to find sponsors – governmental or private – to cover possible deficits resulting from disappointing attendance, due to political or other reasons. As far as I know, Dutch cartographers in 1967 generously supported by their national mapping agency – the *Topografische Dienst*, Delft – were the only hosts who ever made a fair profit out of an ICA conference, which they used as a basis of a publication fund.

Though hotel accommodation of participants, sight seeing and post-conference tours are generally jobbed out to professional operators, Government support is further indispensable for the preparation and execution of the scientific and social programmes (plenary sessions, opening and closing ceremonies, exhibitions, technical tours etc.). Practice has shown that the Conference Director needs the assistance of some 30-40 volunteer-cartographers all of whom have to be disengaged from their normal duties, inevitably bringing them to a stand still.

There might have been truth in the rumour heard in Perth (1984), that during the preparation of the conference whole departments were depopulated and that the mapping program of Western Australia was severely disrupted. There are compensations, however, if not for the government then for the mapping community. Hosting conferences promotes the recognition of cartography in a country and creates a spirit of togetherness and solidarity among its cartographers. It enables young organisational and artistic talent to emerge and enhances the image of the mapping industry of the host country in the professional world.

Location

Most conferences are held in large urban centres with adequate facilities, nearby governmental and private mapping agencies, map collections and museums. In 1970, the Italians deviated from this practice and chose the city of Stresa as conference venue, a tourist resort on the border of the Lago Maggiore, famous for its delightful springs and not too far away from the mapping agencies in Novara and Milan. Unfortunately, nature lagged behind in 1970 and delegates froze behind the thick walls of the *Palacio Congresso* where meetings and exhibitions were concentrated. Neither this inconvenience, nor the invasion in the city hotels of Scottish football fans on their way to an Europe Cup Final in Milan could spoil the success of the Stresa conference, which featured an unusual series of "big names" such as Bertin, Breu, de Brommer, Imhof, Koeman, Komkov, Edgar Lehmann, H.A.G. Lewis, Pillewizer, Rado, Ratajski, Robinson, Salichtchev and Yoeli, etc., perhaps the most impressive cast ever appearing together at an ICA meeting.

ICA member countries being mainly situated on the Northern Hemisphere, most of the conferences have been held in the northern spring or summer holiday season. Disregarding all geography lessons, the General Assembly accepted the Australian invitation to convene in August 1984 "down under" in Perth, from where participants returned with a shaken confidence in climatological statistics, which had predicted 7.8 hours of daily sunshine in the Australian winter.

Conference programmes

In order to increase the benefits from its conferences ICA has followed the practice of not splitting up meetings into small groups and avoiding concurrent sessions. All papers, with the exception of those discussed at the so-called Poster Sessions, are presented at plenary sessions, thus enabling participants to benefit from all contributions and reducing the

disturbing coming and going in lecture rooms. Further, in order to avoid the turmoil of mass meetings, the Executive Committee agreed in 1965 to restrict attendance at conferences not held in conjunction with General Assemblies. It was decided to make a distinction between delegates and observers; the latter category were to be seated apart and were not to take part in the discussions. Further the total number of delegates was to be limited to 200. Each member country would be permitted to send six delegates. Alloted places not used up could be re-allocated to other member countries but no country was to send more than 25 delegates. The number of observers was fixed at the discretion of the host country. The system was tested at the Amsterdam (1967) and Stresa (1970) conferences, but being too complicated, was dropped altogether afterwards.

Organisation of sessions

As is apparent from the List of Conferences the number of papers presented increased from 28 at Frankfurt (1962) to 128 (of which 22 were for discussion only) in Moscow (1976). According to the Moscow programme the 106 papers were read during nine sessions of 2-3 hours i.e. an average of more than 10 papers per session, leaving hardly any room for the discussion, which had been considered so fruitful during conferences in the 1960's. To restore the contact between speakers and their audience US organisers in Collega Park (1978) introduced, in addition to the plenary sessions, the so-called Poster or Visual Display sessions, during which speakers could receive visitors interested in their subject in a booth or stand, where maps and graphs were displayed and where face to face contact was possible – a widely acclaimed novelty. Thus the Japanese succeeded in drastically reducing the number of papers presented at plenary sessions to an average of 7-8 papers, a digestable average. During the conference in Madrid another novelty was introduced, the so-called Open Session enabling experts to present papers on subjects not officially listed as conference themes. These Open Sessions which provided a broad exposure to the whole range of cartography, were well received. Both Open and Poster Sessions were maintained in the programmes of subsequent conferences.

In Warsaw (1982) the organisers introduced two new elements: 1. the idea of defining a single leading topic for the whole conference, which made it possible to steer the session themes and discussions with more precision and 2. the inclusion of technical visits to cartographic agencies in post-conference excursion programmes.

The Australian organisers at Perth (1984) added a special seminar on computer-assisted cartography (AUSTROCARTO I) to the conference programme, designed to parallel North American AUTOCARTO and European EUROCARTO series. The AUSTROCARTO I, held two days prior to the opening ceremony of the main conference, was primarily intended for Australia, New Zealand and the Pacific Asian area.

Papers

Over the years the quality of papers presented at plenary sessions has been a matter of permanent concern. In order to achieve and maintain high standard contributions double screening of proposals for papers presentations has become the rule. Papers are screened first by the national committees – or in the case of sessions on commission themes by the Commission chairmen – and second by the paper committee of the host country. Further, in order to stimulate both the level of the session and the ensuing discussion, it has become common practice to invite reputed cartographers to present an introductory paper on the specific subject matter of the various sessions, to act as pacemakers. In addition to these speakers chairmen and co-chairmen are invited to conduct the sessions and to stimulate the discussion. Though in general these precautions had the desired effect this does not imply that all papers concerned major innovations! This is partly due to the practice of selecting

papers on the basis of short abstracts. The author only starts to write his paper in full after having received the green light from the host country. Further, as Ian Mumford (UK) commented in 1967 a considerable number of the papers are rather pedestrian passports to conferences instead of fiery incitements to argument.

Finally not all countries are trend-setters in cartography. The trend-followers, i.e. the less advanced member countries, are also entitled to be heard and criticised. Moreover, not even in the key indicator countries do new prophets of Bertin's or Robinson's calibre arise every two years. Those who complain about the papers' mediocrity lose sight of the heterogeneous composition of the Association and its obligations to less privileged countries. As far as the distribution of conference documents to participants is concerned, the four yearly member countries' progress reports were usually handed out only to heads of delegations. As guides to the sessions, paper abstracts were normally distributed by the organising committees to participants upon registration. The full papers as soon as they were available were handed out thereafter. Authors of accepted papers were therefore initially requested to deliver in advance 100-200 copies to the conference centres. As conference attendance increased, this number soon became insufficient, forcing conference bureaux to make additional copies. As the number of papers to be presented also increased and conference bureaux had to deal with dozens and dozens of parcels in all stages of imperfection – incomplete, damaged, overdue, held up at customs etc. – finding another distribution system became imperative. The Australians at Perth found an easy solution. They printed and bound the complete set of conference papers, received before a certain deadline, and distributed them at registration. Thus, the ICA Conference Proceedings, abandoned in the 1970's, were reintroduced. Another Australian initiative found equal approval. The opening and closing ceremony addresses as well as most of the invited papers were recorded on tape and offered for sale.

Simultaneous interpretation

Normally papers have been presented in one of the two official languages of the Association, English or French, and simultaneously translated into the other. Simultaneous translation facilities and interpreters have always been a heavy burden on the conference budgets. Considering the rapid spread of the command of English in the professional cartographic world, it has often been considered to abandon the system of simultaneous interpretation. Especially since interpreters familiar with cartographic terminology are scarce and translations are consequently not spotless. Practice learns, however, that even the bilingual presentation of papers does not meet the needs of the participants. In few cases host countries also use simultaneous interpretation into their national language. On the occasion of the IGU and ICA conferences in Moscow in 1976, Russian was accepted as an additional working language and accordingly papers could be presented in Russian, provided that the text was simultaneously interpreted into one of the official ICA or IGU languages. In order to compensate for the resulting inconveniences, Soviet organisers prepared nine pocket-sized booklets, one for each conference session, containing the abstracts of all papers presented at that session in three languages: English, French and Russian – a welcome initiative.

Unavoidable obstacles

In preparing conferences all organisers sooner or later have had to face factors beyond their control. During ICA conferences a fair number of papers do not get across due to bad or inadequate supporting visual aids, transparencies and slides. Remarkably enough, cartographers who are supposed to be masters in communication transfer, often underestimate the range of visibility of their own illustration materials – a notorious shortcoming, which is pointed out repeatedly but pops up again and again. In Tokyo (1980), in Warsaw (1982) and in Perth (1984), to mention a few recent examples, illegible tables, maps and graphs often

disfigured paper presentation, despite the guidelines which were given by the organising committees. Apparently, instruction on slide and overhead production for cartographers addressing larger audiences is highly desirable.

Finally, late withdrawals and unexplained absences sometimes create havoc in conference sessions requiring the session chairmen to improvise. It is not always possible to fill up the gaps or to maintain the remaining speakers in the same sequence as listed in the programme, a cause of confusion among the participants.

The political issue

Though the ICA is a non-governmental organisation it has appeared to be impossible to avoid political issues. Many conference visitors are employed and paid by governments and consequently act in non-scientific discussions as their countries' representatives. During voting procedures for new member states or for executives, political controversies were often just around the corner. The mere mention of the name of member country-elect Chile during the General Assembly at Moscow (1976) caused consternation. In Amsterdam (1967), one of the US speakers stirred commotion by illustrating his paper by images of Vietnam. The negotiations on the People's Republic of China's entry into the ICA in Peking in 1979 were greatly facilitated by the circumstance that Taiwan did not happen to be a member of the Association. Well known is the controversy between the Soviet Union and FRG on the status of West-Berlin, which flares up regularly whenever candidates from that city are nominated for posts to represent FRG. Further, various colleagues experienced obstacles when applying for visas for countries hosting conferences or seminars. In 1968 India, organising the fourth ICA conference, refused visas to cartographers from Portugal and South Africa. After letters of protest to the country's Prime Minister and telegrams to the ministers of Education and Foreign Affairs remained unsuccessful, ICA President Thackwell launched a public protest during the opening ceremony in the presence of India's Vice-President. He pointed out that the Association (as well as India!) adhered to the principles of the International Council of Scientific Unions (ICSU) according to which no one should be discriminated against in scientific meetings for political reasons. The protest did not achieve the slightest effect and was ignored by the media. Since then, a few similar refusals and administrative delays at subsequent conferences have been solved in time through kind mediation of the ICSU. In cases where established cartographers fell from favour for internal political reasons and were no longer sent to international conferences, nothing could be done. On the whole, the climate remains rather grim. Discrimination still continues and some countries remain closed to cartographic experts of other countries.

Conferences in retrospect

A short review of the twelve ICA conferences since 1959 first of all indicates a steady increase of the number of participating individuals and countries, the former from a hundred during the first conference in Frankfurt am Main (1962) to 861 in Perth (1984). ICA has come a long way from the informal gathering in the library of Villa Mumm, headquarters of IfAG in Frankfurt am Main, to recent conferences, offering pre-package tour programmes, containing a mixture of academic and tourist activities and entertainment, with folk dances, concerts, ballet performances, bullfights and dancing horses under floodlights. Conference themes reflected the main thrust of development in contemporary cartography. Since the mid-Sixties there has been a manifest advance of the various branches of Thematic Cartography. Automation was discussed at all conferences and gradually took on a dominant position, thus reflecting the advance of the computer in map production from a period of exploratory research and development to maturity. The application of satellite imagery was represented in conference programmes since 1974. Since raster and vector systems

technology have merged into single systems, remote sensing and cartography are so intertwined that there is a considerable overlap. Communication in cartography, Education, Marine and Urban cartography were other features which appeared with notable regularity. There was a trend away from traditional subjects such as cartographic generalisation, map reproduction and relief representation. A few times the issue of cartography in developing countries was on the programme and twice, in Stresa (1970) and Warsaw (1982), the subject of geographical name standardisation, so well dealt with by a permanent UN Group of Experts.

In the following pages, the twelve ICA Conferences are briefly reviewed, with an emphasis on the advancing role of the computer in the map production process. It is recognised that this review will be partial and incomplete and that the choice of what the author considers as being essential is highly subjective.

Frankfurt am Main, 1962

At the first ICA Conference at Frankfurt am Main (FRG) in 1962 Dr. Knorr from IfAG stated that no important progress in the automation of graphic operations in the map making process could be reported. Though promising examples of prototype electronic equipment were shown, the general feeling was that much had to be left to the hands and brains of conventional draughtsmen. The participants' limited experience in automation was reflected by the fact that only a few took part in the discussion. The highlight of the conference was undoubtedly the presentation of the Gigas-Zeiss orthophoto projector which provided a clever solution for removing the geometric distortions of aerial photographs and changing them into planimetric correct map images, thus facilitating orthophotomap production.

London-Edinburgh, 1964

Two years later during the London and Edinburgh meetings the Oxford System of Automatic Cartography was first demonstrated. The Oxford System was the result of four years of research and development by D.P. Bickmore of the Cartographic Department of the Oxford University Press and Dr. A.R. Boyle, the Technical Director of Dobbie McInnes Electronics Ltd., Glasgow, the firm that constructed the system. In Edinburgh, the equipment was illustrated by a short film, *Map Making by Electronics*, through which the cartographic community learned that the source material for mapping could be stored on magnetic tape in the form of a series of coordinated points along the selected items of detail. Thereafter, the tape containing the information required could be played back and reproduced as a line on a sensitised plate at any desired scale.

The system aroused as much approval and enthusiasm as doubts, as is the common fate of pioneering projects. It even received attention from the Scottish media, resulting in radio interviews, a good press cover and a TV programme. For the supporters, a new era was inaugurated, though even they realised that it was too early to assess the full possibilities and/or difficulties of the system. Doubts were explicitly expressed as to how the system would overcome the difficulties of generalisation and displacement of adjacent detail when reduced to smaller scales. In addition to Bickmore and Boyle's elaboration on the project, Tobler (USA) dealt with the application of automation in the preparation of thematic maps on the basis of statistical data, an interesting complement to the previous paper.

The following years were characterised by in-house experiments, mostly hardware oriented and though the air was full of expectations and speculations, at the two or three ICA Conferences, directly following the demonstration of the Oxford System, little solid progress was reported. Provisional research results, however, made people feel that automation was on its way in cartography and that it would be only a question of time before it would speed up map production. Some even guessed that the computer would enable the production of new

thematic map types, that would have been impossible with conventional methods. It further dawned on people that cartographic data in digital form would be the beginning of the formation of data banks, useful for many purposes.

Amsterdam, 1967

The conference at Amsterdam mainly dealt with the rapid expansion of thematic cartography and the use of colour. It gave the stage to two famous speakers: Imhof (Switzerland) and Robinson (USA), both on their favourite themes "Art in Cartography" and "Psychological aspects of colour in cartography" respectively. Basically, they came to the same conclusion that the profession needed cartographic designers, preferably talented, with a fair understanding of the perceptual complications involved in the use of the graphic media. A particularly interesting paper was that of Klove (USA), who urged the computer be harnessed to aid geographers and cartographers in the production of more significant census maps to inform the general public, a desire soon to be fulfilled. Schlager reported that within the US Defense Mapping Agency (where costs were a secondary consideration) computers would become an integral part of mapping systems in the near future. Talking on new forms of map presentation, he introduced the coloured orthophotograph, produced by the Gigas Zeiss orthophotoprojector. He also showed a Pictomap, concurrently developed by the Army Map Service, by means of the pictoline process, a technique known by the graphic arts but new to mapping.

New Delhi, 1968

Though at New Delhi Automation in Cartography was only touched on, a few papers on the subject were marked by their originality. Aumen (USA) shocked his bespectacled middle-aged audience by visualising a future world in which the numerical map or non-map would replace the conventional one. Riffe (USA) discussing the temporary map of the future displayed on a cathode ray tube, dealt with the slow digitising data capture process, a problem that would preoccupy cartographers for years to come. Before the ephemeral map could become a useful research and planning tool, complementing the conventional map, faster and better methods of data acquisition and of formatting the data into structures for efficient storage would be required. Tomlinson (Canada) showed the film *Data for Decision* of the Department of Forestry and Rural Development, describing a data bank, a structured collection of cartographic data stored in a storage device like a magnetic tape or disc. From this data base administrators would be able to call up "instant maps", a new concept of the value of which people had still to be convinced. Koeman (Netherlands), as usual operating in the forefront, recommended the use of photographs of orbiting spacecraft for rapid updating of small scale maps, instead of following the conventional method and waiting for the completion of basic mapping at topographic scales. Finally, Jacques Bertin (France), on his way to fame for his *Semiologie graphique* published one year before, addressed an ICA meeting for the first time. He dealt with the coming developments within the profession of cartography in the automation era and came to the conclusion that the future would be in the hands of those cartographers, who were fully aware of the importance of the principles of information analysis and who understood the means, limits and rules of the graphic system. Only they would be able to stand their ground on an equal footing with the mathematicians in the treatment and communication of information.



Figure 5. Opening Ceremony, Third General Assembly New Delhi 1968. Fifth from the left, Dr. Giri, Vice-President of India flanked by ICA President Brigadier Thackwell and IGU President Professor Chatterjee

Stresa, 1970

In Stresa for the first time the subject of maps as means of communication was on the conference programme. Koeman (Netherlands), a geodetic engineer by profession, who used to swear by large scale maps for construction and engineering purposes, described how, when transferred to a geographical environment, he discovered the infinite world of thematic maps and its diverse uses. Gradually he had realised, that for this category of maps there were other criteria than geometric accuracy, namely the correct application of the language of graphic symbols. Thus, speaking on "How do I say what to whom" he detached cartography from geodesy and established links with communication science. Bertin (France) drawing a distinction between the amount of information in a map and the amount that a map reader could get from it, raised objections against synthetic and complex maps as advocated by Salichtchev, arguing strongly for more, but simpler maps which would allow for comparison of potentially related data. Joly (France) pleaded for standardisation of symbolisation in thematic cartography, particularly in mapping economic and social data. He was supported warmly by subsequent speakers from Hungary, Poland and the USSR. The discussion showed up the perpetual conflict between the advantages and disadvantages of standardisation. Some standardisation is clearly desirable, but how far should it go?

Imhof (Switzerland) once more lectured on the unsurpassed *Schweizer Manier* of relief presentation, ringing out an era as it were. It was a significant juxtaposition that Yoeli (Israel) reported on his experiments in automated hill shading in the same session. Apart from that, and though it was recognised that computer mapping by line printer mostly using the SYMAP programme, had become commonplace, the expectations for the computer in mapping were still not too optimistic. Thompson (USA) showed the discrepancy between the number of papers published on automation (some 800!) and the limited extent of solid achievement. Nobody, he said, had a completely automated system in operation. For most of the individual phases that had been successfully automated, neither the economic advantage nor the quality standards had been substantiated. His statement did not prevent Williams (UK) from presenting experimental work from Ordnance Survey including plottings at 1:6250 and 1:25 000 scales from digital information at a scale of 1:2500. Finally, Andersson (Sweden) prophesied that computer technology would bring the diverse paths of topographic and thematic mapping closer together.

Ottawa, 1972

The veil of mystery which had hidden the progress of automation in map production from view was further lifted at the Ottawa Conference, where more information became available. Williams (UK) reported that automated cartography was operational at the Ordnance Survey (1:2500 and 1:1250 scale maps), at the Department of the Environment (thematic mapping), at the ECU (thematic mapping) and the Hydrographic Office. In other countries digital mapping was slowly being introduced. It was clear that in this field everybody had to go through a long learning process. It was stressed by Bickmore (UK) and Linders (Canada) that the possibilities of automated cartography were not limited to the application of new techniques to make conventional products. Its greatest challenge was the formation of data bases, from which selected graphics could be supplied on demand. In this regard US speakers reported a growing demand for topographical data in digital form. Bertin (France) emphasised the need for data banks of relief data to which thematic information could be related. Denegre (France) reported on the automated production of slope and insolation maps, better adapted to the needs of map users than contour maps. Merlin (France) dealt with the application of computer assisted cartography in the setting up of the experimental data bank of Paris. For the first time the international audience heard of the US work in the making of colour separations in cartography by scanner. For the majority of delegates it became clear in Ottawa that automated methods were invading all branches of map production.



Figure 6. Opening session, Fourth General Assembly, Montreal/Ottawa 1972. Behind the table from right to left Bonapace, Brice Burroughs, Ormelino, Pres. Salichtchev, Bonnet Duperron, Klawe, Thackwell.

Jenks (USA), one of the exponents of the North American research focusing on the perception of graphic map elements, reported on his study of the map reading process by recording the movements of map users. Ratajski (Poland) introduced his *Cartology*, the essential science of cartography, studying the "expression and transformation of chorological information by means of maps" to be distinguished from applied or practical cartography. His cartology did not get much support. Robinson (USA) discouraged over-enthusiasm for the standardisation of map symbols. The Japanese demonstrated the growing need in urban mapping for the representation of the third dimension.

Under the guidance of Dr. Helen Wallis (UK), in the National Archives at Ottawa an extra-mural evening session on the History of Cartography was so successful that it was decided to take up the subject at subsequent conferences. At a time of rapid technological change it seemed appropriate, if not imperative, to study the history of cartographic innovations. This was the prelude to the creation of the Commission on the History on Cartography.

Madrid, 1974

It is likely that in the ICA history the conference at Madrid will be considered one of the most successful and distinguished. It excelled in all departments: the overall organisation, the quality of the papers, the content and the layout of the exhibitions and the social aspects. One of its highlights was the opening ceremony attended by His Royal Highness Prince Juan Carlos, now the King of Spain.



Figure 7. President Robinson is introduced to His Royal Highness Prince Juan Carlos, Madrid 1974

There seemed to be little doubt that after a period of hard labour, computer-assisted cartography was beginning to mature. The overall principles of digitising, processing and plotting cartographic data seemed to be well defined. Manufacturers were selling systems which could carry out a number of simple but essential tasks, and the trends showed that costs of automation of certain cartographic functions were decreasing although still high when compared with traditional methods. Despite all this the general attitude towards automation was still hesitant. The time consuming data collection was still the great bottleneck. Of the current methods, the off-line digitising system required a considerable amount of processing and control. In the early 1970's the interactive on-line method was put into practice in cartography. In Madrid the new variant was introduced by its initiator Dr. Boyle (Canada). Though it required a larger computer and special software, it rapidly became the most used system as it put the operator in a position to check and to correct the digitised map elements, immediately displayed on a CRT. Next to these manual systems for digitising, Laser Scan Ltd. developed a semi-automated line-following system, that, however, in the case of more complex, detailed cartography on smaller scales had not yet proved to be satisfactory. Finally, much was expected of the fully automatic digitising by scanner, which was still in an experimental stage in cartography. Concern was expressed in Madrid regarding the poor graphic quality of line printer maps. Certainly, they were widely used – whole atlases had been filled with them – but only in those fields where positional accuracy, graphic variation and effectiveness did not have priority. In the UK and in USA programmes had been developed to improve their graphic quality by the use of the microfilm plotter, while in the former country the monochrome thematic maps using the LINMAP system could be upgraded by using the COLMAP option to produce coloured maps, a great improvement.

Another unsolved problem, that of automatic generalisation, was tackled by Hans J. Gottschalk from the Institut für Angewandte Geodäsie (If AG, FRG), one of the leading centres in automation research in Western Europe. He introduced a method of smoothing digitised line elements by means of a gliding arithmetic mean. Fred Christ, from the same

Institute, pleaded for rationalisation of the topographic map content, to be undertaken simultaneously with the automation of map production, a recommendation often heard. Data bases seemed to have become the prime objective in digital cartography. Their setting up and use, particularly in urban mapping, planning and management was amply discussed. Speaking on the development of urban data banks Williams (UK) stressed the necessity of reconciling the requirements of national and local government with those of service industries. He considered that in the long run a good system for Britain would be to base all coordinate referencing on the National Grid System, with the Ordnance Survey making its digital mapping data accessible to other management systems. Dobner described the setting up of a cadastral data bank for the City of Mexico with detailed information on each parcel of land while Bouillé (France) reported on the structure of a geological data bank for mapping and engineering purposes.

Kadmon (Israel) described his experimental hyperbolic-scale town and road maps produced by computer-and automatic plotter from information in a data bank. Rhind (UK) referring to the rapid growth in number and size of data banks in UK urban areas, stated that maximum benefits from the growing volume of data could only be obtained when the cartographers became aware of the role and workings of the data banks and of the automated techniques at their disposal, a warning frequently repeated since. In the field of remote sensing, it was reported that more information from space programmes had become available, resulting in increased experimental application. The requirements (ground resolution and repetition) of space imagery for resources mapping were discussed on the basis of papers by Doyle (USA) and Bodechtel (FRG). Most changing earth resources – Bodechtel reported – could be mapped if the images had a ground resolution of 30-50 m and a repetition rate of 9-18 days. However, the requirements of the various disciplines differed very substantially. The use of satellite imagery for the revision of very small scale topographic maps, scales 1:500 000 and in open areas 1:250 000, was discussed.



Figure 8. Seventh Conference, Madrid 1974. Opening address by Professor Nunez de las Cuevas. Third from the right Prince Juan Carlos, third from left President Robinson

Moscow, 1976

The conference at Moscow (1976) was dominated by speakers from middle and eastern Europe. Out of a number of 128 papers listed in the conference programme, 79 were presented by experts from several socialist countries, 43 of whom came from the USSR. The main attention was focused on subjects such as cartography for public education (ten papers

out of 11 were of socialist origin), mapping for environmental protection and application of remote sensed data. As a result computer-assisted cartography did not get much attention though a few speakers reported on interesting operational uses of the computer. Among them was Bickmore (UK), since 1967 Director of the Experimental Cartographic Unit (ECU), who described a computer-based world atlas of seismic activity, the result of collaboration between the ECU and the Institute of Geological Sciences and compiled from a digital file of some 300 000 records of earthquake locations determined instrumentally during this century. The atlas provided a basic reference for insurance companies and engineers concerned with seismic activity. Bickmore stressed once more that in automation one should not copy traditional map design but exploit the possibilities for new graphic presentations and map forms.

The Geological Survey of Denmark introduced its first computer-drawn map (County of Wiborg) presenting geological and hydrological data by using the cyclogram technique based upon information from boreholes.

Experts from the FRG took up their favourite theme of cartographic generalisation: Schittenhelm tried to find computer-assisted solutions for the problem of displacement by proposing an order of map elements to be observed during the generalisation process. Christ reported on experiments in fully and semi-automated interactive generalisation and symbolisation.

In the field of remote sensing application, Colvocoresses (USA) assessing the multiband surveys by satellites, stated that Landsat 1 and 2 had demonstrated that continuous sensing of the earth's surface from space was feasible and useful, providing data of economic and social value. They had introduced the parameter of time into mapping, and temporal and seasonal phenomena could be mapped now. However, Landsat had two limitations 1. its resolution precluded the recording of many cultural features and 2. due to its orthogonality it could not be applied to three-dimensional mapping. Thus Landsat had to be supplemented by other space and aircraft systems to meet mapping needs.

Experts of the Institute of Space Research of the USSR Academy of Sciences reported on the problems of compiling general purpose and thematic maps of the Moon, based upon small scale photographs obtained by the interplanetary station Zond, and of an Outline Map of Mars at 1: 20 000 000.

Various speakers presented examples of the multifarious applications of remotely sensed data for revision of small scale maps, for mapping of natural resources, depth in shallow sea areas, diffusion of polluted water and for exploring arid and underwater landscapes, the latter in coastal waters showing characteristics of bottom sediments and vegetation which could be used for the evaluation of fishing conditions. Faleev (USSR) reported on the recently published Soviet World Ocean Atlas. This fundamental scientific work, based upon direct océanographie observations, provided information on the main physical and chemical elements of the ocean water to a depth of 5000 m and of the atmosphere up to a height of 16-18 km.

Ludmilla Ilyina (USSR) stated that the development of vast pioneer regions in Siberia required a further perfection of the theoretical basis of analytical and complex mapping. She stressed the need for portraying interaction of natural and technical complexes to evaluate natural conditions and resources needed for long-term planning and geographical forecasting. Baghdassarian (USSR), starting from the premise that, due to the deterioration of the environment, complex mapping is becoming of exceptional significance, described the first regional complex school atlas, that of the Armenian Soviet Republic (1976). Finally, various speakers from socialist countries advertised their 1:2 500 000 Map of the World as a base

map for worldwide thematic application series such as for population (Hungary) or for hydrology (Poland).

Sen Gupta (India) reported on the need to change the design of the topographic map of India 1:50 000 (or its predecessor, the one inch to one mile series) from one originally designed predominantly for military purposes to one for non-military development work. Mahindar Singh (India) dealt with the Planning Atlas of Andhra Pradesh comprising 300 maps with explanatory text, the first job of its kind undertaken by the Survey of India with the Osmania University at Hyderabad. Among the problems faced during the preparation was the deterioration of the Stabilene Peelcoats, which became brittle and unpeelable owing to the tropical climate.

Finally, a "cri de coeur" was heard from the New Zealand Cartographic Society. The demand for maps was exceeding the ability of organisations to supply them. The importance of cartography was largely unrecognised in the country and there were no exclusively cartographic training facilities.

College Park (University of Maryland), 1978

The American hosts in College Park displayed their impressive achievements in computer assisted cartography, topographic and thematic, the latter on the basis of satellite imagery and census data. The technical visits to the famous US mapping agencies in and around Washington D.C. – baptised *Cartopolis* during the conference – such as the US Geological Survey, National Ocean Survey, the Hydrographic and Topographic Center DMA etc. demonstrated that some automation had become the norm in many branches in North American cartography. However the US 1:24 000 topographical series consisting of 55 000 separate sheets (planned to be completed in the 1980's) was still mainly produced by conventional methods. A critical colleague observed that visitors had seen more of the future than of the present day map production. Among the most spectacular innovations seen at DMA was the voice entry system used in map digitising work, presenting the operator the possibility of making data entries by voice.



Figure 9. Executive Committee in College Park, University of Maryland, 1978. From left to right, Ciolkosz, Robinson, Khosla, Nomura, Komkov, interpreter Berk, Ormeling, Hedbom and friendly secretary

In total out of the 127 presented papers, 34 were devoted to automation, and 18 of these were presented by USA and FRG speakers. During the session on automation, attention was

focused again on the time consuming digitising process, still the bottleneck in establishing cartographic data bases. The first results of fully automated raster scanning procedures were presented. The scanner measures light pulses of small picture elements (pixels). The pulses are stored in digital form in the memory of the computer. As mentioned above, the scanning technique had been "just around the corner" in cartography for a decade, but as it required sophisticated software for raster to vector conversion i.e. to turn scan marks via a computer programme into map features, the general feeling was that further research was needed before it could be used in cartography.

Polish and Soviet-Russian experts reported on applications of remote sensing for environmental mapping. Finnish cartographers dealt with vegetation mapping using Landsat data and the Department of the Environment in UK reported on its research into the use of satellite imagery for urban land use mapping. Further, the USSR dealt with the application of space images for various types of geological mapping, revealing new data on the geological structure of many regions. Multispectral images obtained from the Soyuz 22 space ship, in accordance with the Raduga experiment undertaken together with the GDR, made it possible to construct various types of geological, tectonic, geomorphological and metallogenic maps on scale 1:1 000 000 and larger. Most interesting was the announcement of Rupert B. Southard, Chief National Mapping Division (NMD) of USGS, that within the newly defined National Mapping Programme, NMD had started a research and development project to design a complete National Digital Cartographic Data Base (NDCDB), which would be the largest digital data base of cartographic and geographic information in the USA. It would consist initially of hypsography, hydrography, boundaries, public land net and transportation features. A major use of these data was envisaged as input to a variety of geographical information systems used by Federal, state and local government agencies to support resource and management decision making processes. Further the digital data base would be used to expedite and to enhance the production of various map series. In starting this programme the NMD would become a manager of cartographic data categories and not merely, as in the past, a map maker. Further USGS had been delegated the lead role in implementing coordination of all Federal digital cartography programmes. Digital and graphic data taken from the NDCDB would be made available to users through the National Cartographic Information Center (NCIC).

Linders (Canada) described the development of a prototype of a geo-referenced data base for the province of Ontario, used to produce topographic maps at scales 1:10 000 and 1:20 000 as well as thematic maps including forest and land use maps. Ottoson (Sweden) reported on the satisfying results with the technique of computer-aided photo-typesetting in use at *Landmäteriverket* for the production of topographic maps. Pasquier (France) spoke on the experiences in statistical cartography at the IGN Department of Automatic Thematic Mapping (created in 1976). Spiess (Switzerland) introduced the DIAMANT programme of the Cartography Department of the ETH, Zürich, successfully used for the production of thematic maps for the second edition of the *Atlas der Schweiz*. In principle the programme could be used for all cases of thematic mapping where point or area related quantities had to be represented by point centred diagrams or scaled symbols. Lichtner (FRG) described a pilot project of the *Landesvermessung Niedersachsen* for the production of a land use map-series for planning purposes 1:200 000 based on aerial photographs and Landsat images.



Figure 10. Ninth Conference, University of Maryland 1978. VIPs meeting at opening reception. From left to right, Dr and Mrs de Henseler (UN), Professor and Mrs. Robinson, Vice-President Bartholomew

Though substantial progress had been made in computer-assisted cartography, the following reservations were made in College Park: 1. The successful use of interactive computer graphics for cartographic work was still a rather difficult job for a good team of experts, both computer technologists and cartographers, 2. The organisational consequences of "going digital" in map production were far-reaching, 3. Because of evolving mapping programmes, the effects of inflation on wages and the continuing changes in methods and equipment precise cost comparisons between new and traditional methods were almost impossible. For the second time in ICA history, at College Park, a session was devoted to cartography in developing nations with contributions from India, Indonesia, Mexico, Nigeria and Sudan. Nigeria admitted that its present map coverage was inadequate in scope, scale and content to meet the country's requirements. India reported on cartography education on three levels – professional, technological and technical – at Hyderabad; Indonesia gave information on its systematic geological mapping program; Sudan had news of its initial steps to produce a National Atlas in cooperation with the Directorate of Overseas Surveys, UK, while Mexico surprised the professional community by the rapid progress of its ambitious, integral mapping programme, started in 1968, and covering its 2 million square kilometres of territory with topographic, geological, soil, land use and potential land use maps at 1:50 000.

A hallmark was the appearance in the conference centre of the ICA-flag designed by Professor Joseph Wiedel from the Geographical Department of the University of Maryland. It was presented on behalf of the US Organising Committee on the occasion of the 20th anniversary of the Chicago conference (1958), and was considered symbolic of the coming of age of the Association and the professionalisation of cartography. The blue and white flag is symbolic of both the old and the new in cartography. The world map on the flag is a computer-produced prolated azimuthal equidistant projection centered on the Mediterranean, the area considered to be the origin of scientific cartography. The heraldic devices on both sides of the map are the wind rose and the one-handed callipers with scales – symbols found on the earliest maps and which continue to be used. The flag was brought in by an international student guard of honour and formally accepted on behalf of the Association by President Ormeling. The Association hoisted it as a symbol of discovered territory upon which it had staked out its claim. As the poet says "We celebrate our Jubilee and carry the

flag that makes us free". Since College Park, the flag is transported from host country to host country decorating the platform of all plenary conference sessions.



Figure 11. Presentation of the ICA flag by designer Professor J.W. Wiedel, Maryland University 1978

Tokyo, 1980

In Tokyo, the Science Council of Japan, the Geographical Survey Institute, the Japan Cartographers Association together with the Japan Map Center put forward a demonstration of accomplishment that lived up to the highest expectations both scientifically and technically, as well as socially and touristically. Set against the background of one of the earth's scenic and cultural wonderlands the Tokyo conference made a lasting impression. Among the highlights of the conference were the visits to 1. the cartographic museum at the birthplace of Ino Tadataka (1745-1818) who started Japanese surveying and mapping activities and 2. the new headquarters of the Geographical Survey Institute in the academic city of Tsukuba, an appropriate setting for this institute with its vast responsibilities for geodetic surveying, topographic mapping and the conservation of the Japanese environment.

At the conference the consolidation of the computer in map production was illustrated by the major role this subject played in all sessions. Moreover, cartographers were increasingly concerned with mapping data derived from sensing satellites and with the establishment of Land and Geographic Information systems. The UK reported that 1:1250, 1:2500 and 1:10 000 scale maps were being routinely produced using digital methods. Linton (UK) dealt with the geochemical mapping project carried out by the Experimental Cartographic Unit and the Institute of Geological Sciences. This work was based upon data in digital form and leading to the production of a series of Regional Geochemical atlases.

By chance, conference participants discovered a Scitex scanner (drum type) complete with edit station and raster plotter at the last minute installed in premises outside the exhibition hall. For most visitors, this was their first acquaintance with this scanning device, developed in Israel that would be successfully applied in map production in the years to come. In the same year Kongsberg (Norway), demonstrated its Sysscan scanner (flat-bed type) on the ISP congress in Hamburg. A similar device, the Broomall scanner was already in use at DMA and USGS in the United States.

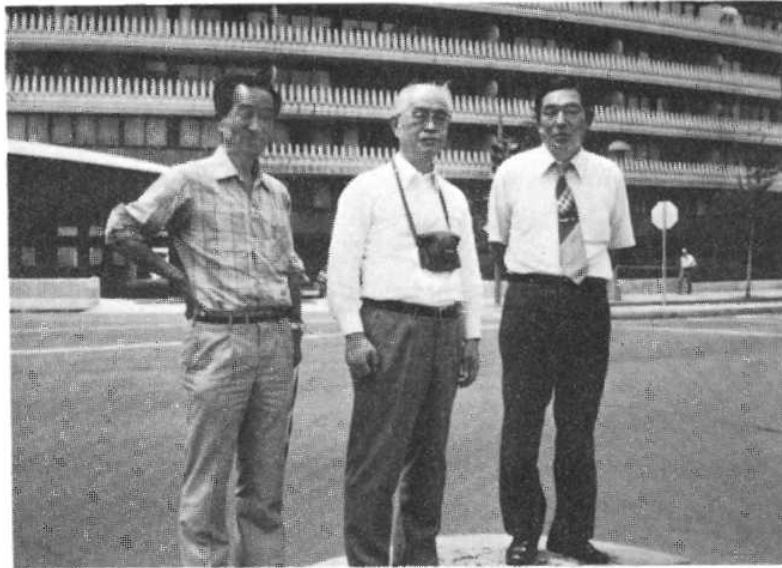


Figure 12. The organisers of the Tokyo Conference, Professor Akira Watanabe, ICA Honorary Fellow, flanked by Kanazawa, organiser of the International Map Exhibition (left), and Secretary Nishimura

Laura Ives (Canada) examined the use of maps for environmental assessment and proposed reliability diagrams for thematic maps. Alain Radureau (France) described analytical landscape mapping at large scales (1:25 000 and 1:5 000), allowing analysis and stimulation of landscape evolution by introducing transformation agents (urbanisation projects, seasonal cycles). Freitag (FRG) made an attempt to integrate the communication theories of Kolacny and Board with the graphic theories of Bertin and Imhof, an attempt criticised in situ by Bertin (France). Judy Olson (USA) introduced a new field of research: the cognitive processes stimulated by maps –the term cognitive referring to the mediating mental processes that allow one to "come to know" – suggesting a model of map use different from the input-output view developed from the general communication models.

Piekuth (Poland) looking into the far future proposed the establishment of an ICA Working Group of Information and Documentation to evaluate the possibilities of the establishment of a world information system for cartography and remote sensing.

Warsaw, 1982

Due to the proclamation of Martial Law in Poland in December 1981 and the ensuing interruption of communication, there were serious doubts as to whether the planned ICA conference in Warsaw in 1982 would take place at all. In order to remove uncertainty, President Ormeling and Secretary Hedbom visited Warsaw in March 1982 and were assured by the Polish military authorities that the conference interests would be safeguarded. The Association owes a special debt of gratitude to the Polish colleagues, among them Professor St. Pietkiewicz, who was awarded the ICA Honorary Fellowship. They succeeded in less than six months in organising a successful meeting. The 440 participants, from 38 countries, who made the journey to Warsaw were rewarded by a conference noted for its variety of papers, magnificent exhibitions and a hospitality which surpassed everything visitors could have expected.

One of the advantages of the Warsaw location was the ample representation of colleagues from the socialist countries resulting in a series of interesting papers on the establishment of data banks, interactive computer techniques, remote sensing applications, geo-information systems, and their combined impact on education in cartography in Czechoslovakia, GDR, Hungary, Poland and the USSR. Konecny (Czechoslovakia) described a data base containing

some 3000 areas and 27 related variables in the Brno region, used for modelling and predicting of soil erosion. Hajek (Czechoslovakia) reported on the construction of a data base derived by digitising the Czechoslovakian 1:200 000 maps. Bochenek (Poland) presented the results of an analysis of Landsat data by computer techniques to evaluate the usefulness for land use classification.

Though the western countries were underrepresented, in general Warsaw confirmed the impression that computer-assisted cartography was being used at many more places than four years previously, that better software could now be obtained off-the-shelf and that more attention was being paid to raster methods. Micro computers with drastically growing power were becoming popular and a number of cartographic packages had been written. They were bringing the potential for computer-assisted mapping into the office and home, at least in limited scope. Smaller and lower cost stand-alone interactive systems using minicomputers were being introduced for specific purposes. Noteworthy was Freitag's (FRG) paper on the possibilities of the THEMAR software system, developed at the *Freie Universität*, Berlin, capable of raster plotting choropleth maps, isolines, point symbols and combinations thereof. For the second time, Standardisation of Geographical Names was on the programme, and, just as in Stresa twelve years before, Joseph Breu (Austria) and H.A.G. Lewis (UK) appeared as invited speakers. The first advocated the use of the general purpose transcription systems sanctioned by the International Standardisation Organisation (ISO), the other the systems widely used in the English language and well known in the world thanks to the diffusion of English.



Figure 13. Mini-conference of present and future first ladies, meeting in Warsaw, Regina Ormeling, (left) and Beverley Morrison.

In order to pay tribute to the late Polish cartographer Lech Ratajski, one of the sessions was devoted to Theoretical Cartography, a field to which he had contributed so much. The papers presented illustrated once more the search of cartographers for the foundation of their discipline. The paradigm of cartography as part of the science of communication as elaborated by Ratajski provoked the expected opposition.

Perth, 1984

In his opening address Sir Ninian Stephen, Governor General of Australia, welcoming ICA to one of the homelands of very early cartography, referred to the ritual or dream maps of the

aboriginal desert people of Western Australia. These maps drawn in the sand and covering a whole hectare of the desert floor, showing resting places, sacred sites, water-holes etc. tell the story of the continuous travelling through the deserts of the totemic ancestors of the dream time long ago.

Member countries' progress reports – 28 of which were presented – demonstrated that the use of computer assisted mapping and of cartographic data bases had grown dramatically, particularly when compared with the state-of-the-art at the Madrid conference ten years before. Though the reports attested to an uneven growth, to a large extent uncoordinated, even at national level, the computer was reported to be operational in several countries in large scale topographic, orthophoto and thematic mapping and in satellite image processing. In a number of countries, vast national digitising operations were under way. National Mapping in the host country's capital, Canberra, reported on the progress of the geographical digital data base development programme, planned to obtain computer files of topographic, census boundary and digital elevation data at 1:1 million scale.

Independently of the Federal Project, Western Australia was developing a Land Information System, managed by a corporate umbrella organisation in which the interest groups such as cadastre, urban planning, utilities, rural land management and computer experts were represented. Mention must be made of a few other countries from which data were available. UK had converted some 25 000 sheets i.e. 10% of its complete map coverage at 1:1250, 1:2500 and 1:10 000 scales into digital form. Canada, working on its National Digital Topographic Data Base, had digitised some 150 1:50 000 maps and had recently started converting the 1:250 000 sheets, to be completed in 1989. The United States had completed its small scale national data base by digitising the 21 1:2 000 000 scale maps of the National Atlas and was making progress on its largest scale National Digital Cartographic Data Base, destined to hold some 54 000 quadrangles at 1:24 000, with data sets for five categories: hypsography, hydrography, public land net, boundaries and transportation. Further, USGS had started the creation of a 1:100 000 data base planned to be completed in 1987. In France, a large number of digital files had been produced to cover the entire relief at 1:25 000, the main planimetric features and commune boundaries at 1:100 000 and the departmental boundaries at 1:1000 000.

Sweden was working on its national terrain data base using a 50 x 50 m grid and planned to be completed in 1989. In the Netherlands, where computer-assisted mapping had already been in use since the mid 1970's for special purpose mapping at large scales by the Ministry of *Rijkswaterstaat*, several digitising programmes were under way. Among others, the Topographical Service was preparing a digital data base to produce the 1:250 000 scale JOG (Joint Operations Graphics) map for military and civil use. So far, digitising programmes had been mainly carried out by interactive on-line procedures and map data were accordingly stored in data bases and processed as vectors. However, since manufacturers had developed scanning systems with software for raster to vector conversion i.e. for translating individual pixels into line features, and moreover interactive editing of raster data became available, more attention had been given to raster scanning. As it became clear that in the field of data collection it was generally far quicker to scan, experts seemed to shift their allegiance to raster scanning. The newest USA project of digitising the 1:100 000 map series was carried out for most categories of data by raster scanning on the Scitex Response 250 system. In France, in recent years raster scanning had been applied in soil and land use mapping, and among other applications in the continuous land use inventory at 1:25 000 of the entire coastal zone. It would be too optimistic, however, to assume that the present (1984) raster to vector conversion was solving all problems. In particular for maps at scales of 1:25 000 and smaller many hurdles remained.

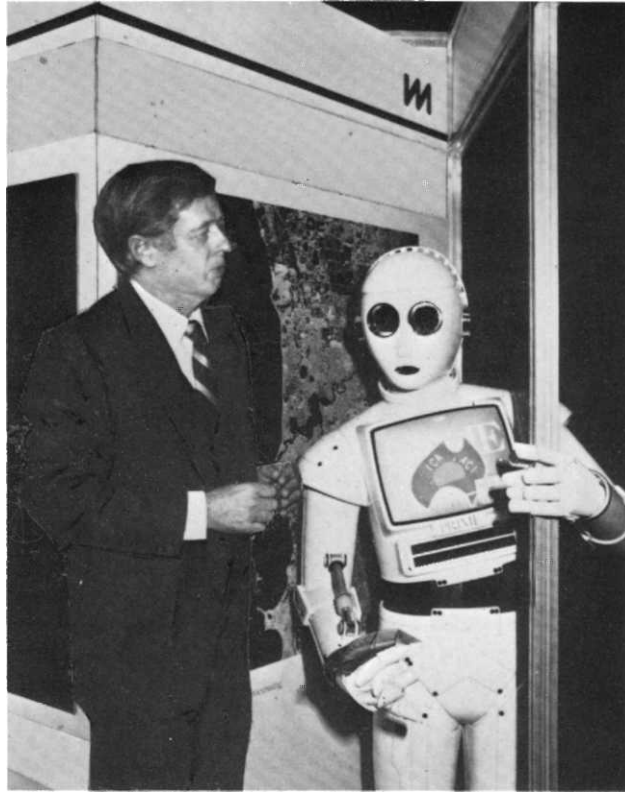


Figure 14. Conference Director Pearce and obedient assistant, Perth 1984.

Much attention was devoted to the problem of how to maximise the use of the expensively collected digital data. In this connection Rhind (UK), stating that data were generally disseminated by disparate organisations, once more stressed the need to link together digital data collected over, or referenced to, space, i.e., geographical data. For instance the linkage of environmental data on topography, hydrology and weather or of pollution sources and demographic information would greatly extend their utility. Rhind also pointed out that there had been little research into principles, methods and limitations of data integration in data bases. In a second paper he described an experiment by Ordnance Survey (UK) to predict the nature, volume and location of topographic changes in Britain on the basis of social, economic and demographic indicators. The storage of data on the digital optical recorder was also a point of discussion.

In the field of remote sensing application, it was once more made clear that a topographic use of Landsat imagery was limited to the scale of 1:250 000, particularly in densely populated areas.



Figure 15. Seventh General Assembly, Perth 1984. Behind the table from left to right, Legris, Arzhanov, Bohme, Secretary Marlies Simmons, Ormeling, Hedbom, Morrison, Ciolkosz, Goodrick, Agarwal

Consequently stereoplotting from current air photographs and field checking remained essential elements in the map revision process. The French satellite SPOT, due to be launched in 1985, seemed to be a promising tool for cartographers because of its higher separating power or resolution, improved image quality and the possibility of recording stereo pairs of images which could be plotted as in classical photogrammetry. It was expected that SPOT imagery would provide data for some revision of 1:100 000 scale mapping.

Costanzo (USA) dealt with the mapping applications of video disc technology particularly that of the optical video disc. The video disc is storage medium for vast amounts of cartographic data which are stored as signals in non-erasable microscopic grooves on the disc surface. Interfaced to a computer the data can be "played back" on a television screen. Due to the limited resolution of a television monitor only a small image can be viewed at any one time if, all symbols, names and features are to be readable on the screen. Judy Olson (USA) recommended specific arranging of data on the disc as well as improving graphics design for small space that suit the special video disc environment. Fraser Taylor (Canada) warned the cartographic community to be alert to the convergence of the rapid development of increasingly powerful small computers (variously named home, micro, office or personal computers) with videotext technology, thus providing access to remote computer data, which can be updated regularly and can be displayed on a video display screen such as a home TV set. Among the software available for these small computers there were programmes with colour graphics for popular video games. The same simple graphic software used for these games could be applied to draw maps on the colour monitors attached to the machines. Taylor pointed out that map design for a TV screen or for a colour monitor was a challenge entirely different from standard map design. So far,

however, cartographic research in this field was non-existent and as a result maps on TV were created by computer specialists and graphic designers. Cartographers threatened with the loss of control of what might become the most common method of producing thematic maps in the near future!

Carter and Meehan (USA) picked up the same thread and criticised the so-called *Business graphics*, commercially marketed general purposes software packages for use on computers of different capacity, with a great potential for easily creating a variety of maps (basic, prism, block and surface maps). As this software was developed by private companies, as a rule without the assistance of cartographers the resulting maps were far from perfect. They were often distorted and misleading, with meaningless classes and symbolisation.

Concurrently with the growing public attention in exploration of the marine environment, Australia and Japan both reported on the mapping of the offshore areas under their jurisdiction, areas greatly increased by recent redefinitions at the UN conference on the Law of the Sea (1982). As with many other maritime nations, they are finding themselves in possession of vast territories which are almost unexplored and only superficially mapped. Australia described the use of Landsat multispectral scanner imagery for research and management purposes of the vast area spanned by the Great Barrier Reef, one of the great wonders of the world, and still generally uncharted. The Japanese Hydrographic Department reported on its electronic or digital charts, automatically displaying ship positions and tracks on CRT and used in combination with other chart information, such as coastlines, depth lines, aids to navigation etc. stored on magnetic tape or floppy disc.

In the field of urban mapping Kanakubo (Japan) reported on a project to start a 1:10 000 map series of the three major Japanese conurbations (Tokyo, Osaka and Nagoya) covering some 20 000 km² where 70 million people or 60% of the country's population is concentrated. The new map series will be produced by local public bodies on the basis of the existing 1:2500 maps.

A report from Kubasov, Space Pilot of the USSR, was presented containing information on the observations of the earth's surface within the Biosphere M programme during the flight of Soyuz 36, flown by an international Soviet-Hungarian team and docked with the orbital station of Salyut-6. Further, Soviet experts lectured upon their Atlas of the Natural Environment and Natural Resources of the World containing about 400 maps, graphic diagrams etc. being compiled by the Academy of Sciences of the USSR, an important part of which will consist of biogeographical maps, soil maps and maps on nature conservation (1/5 of the volume). Wennstrom of the Lantmateriverket, Sweden, reported that, according to the National Mapping Programme for the period 1985-1994 the printing of the well known Economic Map Series 1:10 000 (11 600 sheets with an average age of 15 years) will be discontinued; the 1:20 000 variant will take over its task.

In the History of Cartography Section William Richardson (Australia) dealt with one of the most intriguing problems of Renaissance cartography: the delineation of the continent of Java-la-Grande, which first appeared on charts and maps of the so-called Dieppe school (1540-1570). On the basis of place name research Richardson made clear that there was no question whatever of identifying Java-la-Grande with Australia. In the discussion, feelings ran high particularly among the Dutch when their discovery of Australia was called in question in favour of the Portuguese.

CONFERENCES, VENUES AND THEMES 1962-1984

a) Venue; b) President respectively Secretary of Organising Committee; c) Number of participating countries; d) Number of participants; e) Number of presented papers according to conference programmes

1962 Frankfurt am Main

a) Institut für Angewandte Geodäsie (Villa Mumm);
b) Prof.dr. E. Gigas, Dipl.Ing. R. Böhme; c) 18; d) 97; e) 28.

1. Generalisation on maps
2. Map revision
3. Automated cartography

1964 Edinburgh

a) David Hume Tower; b) Brigadier D.E.O. Thackwell and Mr. J.C. Bartholomew; c) 30; d) 233; e) 26.

1. Editorial problems of atlas making
2. Production control of cartography
3. Technical problems on thematic mapping
4. Automation in Cartography
5. Technical problems of design and maintenance of topographic map series

1967 Amsterdam

a) Internationaal Congrescentrum RAI; b) Prof.dr. F.J. Ormeling Sr. and Dr. J.J.C. Piket; c) 31; d) 250; e) 36.

1. Training of cartographers
2. Thematic cartography
3. Map and colour
4. Atlas cartography
5. Metacartography
6. Automation in cartography
7. Definition, classification and standardisation of cartographic terms

1968 New Delhi

a) Vigyan Bhawan; b) Brigadier J.S. Paintal; c) 23; d) 120; e) 37.

1. Education and training in cartography
2. Automation in cartography
3. Problems of map production in small quantities and frequent editions
4. Maps of the future
5. Generalisation of map detail'
6. Mapping of developing countries
7. Map revision
8. Standardisation of technical terms

1970 Stresa (Italy)

a) Palazzo dei Congressi; b) Dr. U. Bonapace and Dr. G. Motta; c) 34; d) 280; e) 31.

1. Cartography of mountainous areas
2. Standardisation of symbols in thematic cartography
3. Cartography as means of expression and communication
4. Synthesis of data in economic mapping

5. Hydrographic charting/Oceanographic cartography

1972 Ottawa

a) Carleton University; b) Brigadier E.D. Baldock and Mr. T.H. Kihl; c) 40; d) 390; e) 55.

1. Urban cartography
2. Cadastral mapping
3. Automated cartography
4. Aeronautical and hydrographic charting
5. Economics of cartography

1974 Madrid

a) Palacio de Congresos y Exposiciones; b) Dr. R. Nunez de las Cuevas and Dr. F. Vazquez Maure; c) 43; d) 508; e) 61.

1. Methods for increasing the graphic quality of computer derived maps
2. Tourist cartography
3. History of cartography
4. Application of information derived from space programmes
5. Advances in cartographic technology
6. Urban cartography and data banks
7. Innovations in aeronautical and oceanic cartography

1976 Moscow

a) Palace of Culture of the Moscow State University;
b) L.V. Ovtchinnikov and Dr. A.V. Postnikov; c) 43; d) 520; e) 128¹⁾.

1. Cartography as a service to public education
2. Mapping of nature and natural resources for environmental protection
3. Application of remote sensing in compiling thematic maps
4. Cartographic education
5. Communication in cartography
6. Methods of map utilisation for scientific research
7. International collaboration in compilation of small-scale thematic world map series
8. Development of cartography in the USSR

1978 College Park (University of Maryland)

a) Centre of Adult Education; b) W. Beetschen; c) 38; d) 412; e) 127²⁾.

1. Map perception and design with special reference to map reading (colour, symbolism, tactual)
2. Cartography in the developing nations
3. Oceanic and coastal cartography with special reference to boundary demarcation, remote sensing, positional data, automated chart making
4. Remote sensing with special reference to Landsat status, future plans, applications in aeronautical charting
5. Automation in cartography with special reference to the user, digitising and editing output systems, data bases, technological exchange

1980 Tokyo

a) Keidanren Kaikan; b) Prof.dr. A. Watanabe and Mr. K. Nishimura; c) 53; d) 572; e) 107²⁾.

1. Maps as a means of communication of information
2. Utilisation of maps for environmental assessment
3. Map representation of cities (general and thematic maps)

4. Application of new techniques developed in fields related to mapping
5. Marine resources and maps
6. Modern requirements and experiences in training cartographers

1982 Warsaw

a) Palace of Science and Culture; b) Prof.dr. B. Ney and Mr. Szymczak; c) 38; d) 437; e) 56.

1. Theory of cartography
2. Advanced data collection techniques and automation in thematic cartography
3. Thematic maps for regional and economic planning
4. Contemporary school atlases
5. History of thematic cartography
6. Revision of topographic maps
7. Standardisation of geographic names

1984 Perth (Australia)

a) Concert Hall; b) Mr. D.T. Pearce and Mr. A.G. Young; c) 54; d) 861; e) 110.

1. The role of cartography in management and planning
2. Coastal zone mapping
3. Computer-assisted cartography
4. Cartographic education
5. Topographic map revision
6. Mapping of natural resources
7. The history of cartography

¹⁾ 22 *for discussion only*

²⁾ *including papers presented at Poster Sessions*

Exhibitions

TWENTY-FIVE YEARS OF MAP EXHIBITIONS

Introduction

Visual expression is the essence of cartography, hence maps constitute the ultimate expression of the cartographers combined theoretical and technical knowledge. It is therefore only logical that from the early days of the Association, exhibitions of maps and atlases have formed an integral part of international cartographic conferences. Remarkably enough, in reports on ICA conferences these exhibitions, made possible by the efforts of many specialists, are usually dismissed in a few words. Of the thirteen major map exhibitions and their many subsets – in total about 40 separate map displays – only those in Edinburgh (1964) and in Moscow (1976) have been covered by a detailed report. An attempt will be made in the following paragraphs to record the highlights of the thousands of maps which have filed past since the Association's foundation and to note the lines along which the profession has developed. Obviously the selection of these highlights is a subjective one.

Categories of exhibitions

Though the early exhibitions were rather amorphous in character the five following categories gradually crystallised: 1. *International exhibitions* staged with invitation of the host countries and open to all ICA member countries usually divided in sections associated with the main themes of the conference. 2. *National exhibitions*. Though at some of the early exhibitions (Paris – 1961 and Frankfurt – 1962) the maps of the host country formed part of the international exhibition it became the practice to arrange special national exhibitions. 3. *Exhibitions of historical maps*. A further differentiation took place when historical maps, initially staged as part of the national exhibition, were mounted as separate displays. 4. *Technical exhibitions*. The interest of commercial companies in the ICA conferences gradually increased first and particularly from the Ottawa conference (1972) onwards more and more equipment, instruments, materials and methods used in map production were displayed culminating in the impressive technical shows at Tokyo (1980) and Perth (1984) the latter with 40 stands. 5. *Cartographic art exhibitions*. In Perth (1984) the organisers, aware that cartographers even in the computer age are still graphically talented, started a new type of exhibition, an art exhibition displaying paintings, sculptures, photographs etc. by individual cartographers, an initiative which was well patronised.

Participation

The number of participating countries has fluctuated but has gradually risen from 10 in Amsterdam (1967) to 40 in Tokyo (1980) i.e. two thirds of the ICA membership and so far a record. Leading exhibitors were the major industrial nations particularly the Federal Republic of Germany (FRG), France and the United Kingdom with varied, well-prepared collections, quantitatively and qualitatively, spread over governmental and private map producers. Among the smaller member nations Finland, Hungary (annually organising international map exhibitions itself), the Netherlands, Sweden and particularly Switzerland have stood out as regular contributors. Asia was generally well represented by displays by India, Israel, Japan and Thailand. In Tokyo (1980) the People's Republic of China, Indonesia and the Republic of Korea made their interesting debuts, while in Perth (1984) Iran put up a notable collection. Apart from Cuba that first participated in Madrid (1974) and excelled in Moscow (1976), and Mexico that put up an interesting collection in Warsaw (1982), Latin-America's share was minimal. Regrettably the same applied to Africa. Although Morocco, Kenya and the Republic

of South Africa displayed home produced work, the remaining countries were mainly represented by maps and atlases made in Europe.

Arrangement of exhibitions

The arrangement of international exhibitions requires skilful planning and involves a great deal of work. Member nations have to be invited months in advance and when they participate they have to submit information concerning the display space required. As national exhibits are supposed to be representative of the country's map production, a careful selection is required from the latest maps made by official (state, provincial and municipal), university and commercial producers. National committees are responsible for short descriptive texts supporting their map material and for its timely shipping. Practice has taught that these shipments often suffer delays including those at the customs of the country of destination. The late arrival of national exhibits was no exception. Sometimes they were even delivered by the chief delegate upon registration. Late comers run the risk that their exhibition space will have been taken by other countries and that their maps will not be listed in the exhibition catalogue, which happened to ten out of the 23 participating countries in the Warsaw exhibition. In Perth (1984) fate struck the UK exhibitors; their maps, atlases and national reports arrived at the end of the first conference week, causing considerable embarrassment.

To achieve maximum profit from exhibitions and to avoid time lost in getting from one venue to another, host countries are advised to accommodate exhibitions in the buildings where conferences are held. This was not always feasible, particularly when displaying vast collections of maps, atlases and literature as was the rule at combined, overlapping IGU and ICA conferences. This necessitated the display of the material in special halls or spreading it over different buildings. Thus, the 7 exhibitions staged during the 1964 IGU/ICA conferences in London were spread over 6 buildings and the 6 exhibitions in Moscow over 5 locations. In Tokyo (1980) visitors had to cross the city by subway from the conference centre at Keidanren Kaikan to the Sunshine Building where the international exhibition was mounted. Those who undertook the journey were rewarded by the most complete geographic-cartographic exhibition ever staged, with 1700 maps and 1400 books and atlases, an achievement of the highest order. In 1978 the US organisers did succeed in concentrating the joint exhibitions in their conference hall at the Centre of Adult Education of the University of Maryland, where screens were brought in for the occasion and sited in the corridors of the ground floor and basement. Though the material was easily accessible to conference participants this ad-hoc arrangement did not enjoy the advantages gained by a special exhibition centre and made it difficult to give the display a coherent overall design. In Perth (1984), where a similarly worthy attempt was made to concentrate as much as possible in the conference centre the international exhibition was unfortunately somewhat cramped in the side galleries.

In arranging international exhibitions of maps, aspects which require special attention are: political boundaries and country names. Over the years the inaccurate ("subjective") rendering of political boundaries or the use of incorrect country names, ordinary or full title of sovereign states, or their abbreviations have frequently caused the displeasure of conference attendants and resulted in protests. It is amazing to find how harmless visitors can turn into aggressive politicians when they think that their nation's honour has been injured. Official notifications that neither organising committees nor executive committees are responsible for boundary representation on foreign maps have not prevented such commotion. To avoid irritations the ICA President and Secretary Treasurer have made a habit of checking the exhibition before its opening and covering up or "easing out" conspicuous danger zones.

Publicity

As a rule the opening of the combined exhibitions is one of the highlights of the conference, culminating in the ceremonial cutting of a ribbon, preceded by addresses and followed by receptions. At the Sunshine Building in Tokyo (1980), when standing in front of the ribbon and awaiting the supreme moment of its cutting, a "combat de générosité" developed among the waiting officials. To avoid frustrations, the organisers, prepared for everything, produced five pairs of scissors and handed them out to the officials with the request that they cut simultaneously at a given sign. Unfortunately ICA's President made a false start but no return was possible as the ribbon had been cut.

Depending upon the news value of mapping in the host country, the opening ceremonies were followed by press conferences and radio- and/or TV interviews, thus bringing cartography to the notice of the general public. The interest of the media was overwhelming at the ICA conference in Warsaw – the first international meeting after the proclamation of Martial Law in December 1981 – when no less than

12 radio interviews (alternately in English, French and Swedish) were given, four TV broadcasts were made and the opening ceremony made front page news. After having been covered by the Washington Post, the Indian Times, the Neue Zürcher Zeitung etc., it was surprising that the media in Australia ignored Conference and International Exhibition.



Figure 16. Five-men ribbon-cutting team. Opening International Map Exhibition, Tokyo 1980

Limited duration

As a rule the duration of these "Banquets of maps", realised by the efforts of some hundreds of cartographers, is limited to the duration of the conference, i.e., 2-3 weeks. In some cases where organisers have been of the opinion that their displays deserved a wider audience than a few hundred conference attendants, they opened them to the general public and kept them open for longer periods. In New Delhi (1968), where staff members from the Survey of India volunteered as guides, the public showed great interest. In Moscow (1976) the combined exhibitions drew some 10 000 non-cartographers as visitors – a considerable success – but still small relative to time and effort invested. Elsewhere as in Amsterdam (1967) parts of the exhibitions were shown at national meetings at a later date. The greater part of the Dutch display of water control maps even travelled to the UK and was restaged at a meeting of the British Cartographic Society in London. In most cases, however, the maps from participating member countries – if not explicitly reclaimed – have disappeared into the map libraries of the host countries. A suitable home for the exhibition materials was provided in Japan, where

the complete collection of atlases, books and maps was donated to the University of Ochanomizu, Tokyo, and accommodated in an "ICA-IGU Memorial Library". Usually, however, the only traces left behind by these impressive manifestations are the exhibitions catalogues, elaborately compiled by the host countries and, in certain cases, such as in USSR and Japan, presented as separate issues for international, national and technical exhibitions. The total collection of catalogues, a pile one foot high, forms a indispensable supplement to the conference's abstracts or proceedings.

International exhibitions

The first international exhibition under the auspices of the Association took place in Paris in 1961, on the occasion of its first General Assembly when the *Bibliothèque Nationale* organised an instructive exhibition of maps dealing with relief representation showing a great variety of foreign maps.

The international display of thematic maps in the Royal College of Art in London (1964) was the most wide ranging show of its kind up to that time. The national exhibition in the Geological Museum will be remembered as the site of the first demonstration of the Oxford System of Automatic Cartography. Edinburgh a week later had the première of an international display of urban maps. The exhibition *Map and Colour* in Amsterdam (1967) staged an instructive collection of badly designed maps, meaningless use and bad juxtaposition of colour. The display in Ottawa (1972), the most extensive yet mounted at an ICA conference, showed for the first time a variety of educational materials as well as work at various levels of students – most of it of French origin. It was also in Ottawa that Japan demonstrated its experimental function maps – printed on both sides; almost mini atlases – of their complex urban areas, showing a range of data (height of buildings!) usually omitted from conventional maps. Further, at Ottawa experimental products of computer-assisted cartography were displayed. The United Kingdom showed the computer-drawn 1:1250 sheet from the Ordnance Survey produced from digital data obtained from field survey. Sweden showed its experimental computer-drawn 1:50 000 topographic map based upon digitisation of a 1:10 000 manuscript. France had experimented with automatic processing of hill shading and Israel showed its attempts to improve the quality of line printer maps. Finally US Geological Survey (USGS) surprised visitors with a reconstituted ERTS satellite colour photo of Monterey Bay in California.

Spanish organisers in Madrid (1974) had an extensive exhibition of cartographic applications of information derived from space programs, which culminated in interesting false colour image mosaics and satellite maps prepared by the USGS, definitely opening the door to the future. From then onwards maps produced using computer-assisted techniques or compiled from satellite remote sensing data have been taken for granted and have formed an integral part of the subsequent exhibitions.

Two years later in Moscow (1976) fourteen countries presented a total of 60 samples and atlases compiled with computer techniques, while eight countries mounted maps and mosaics based upon satellite imagery.

Products of computer-assisted cartography

The realisation that computer systems reduced time-consuming computation and compilation procedures in conventional mapping, and also opened up possibilities for new types of graphic display, resulted in a series of experimental map forms: maps of relief energy, hyperbolic scale maps, isodemographic maps, perspective surface views, classless choropleth maps, two variable cross maps and other variants of census maps etc.



Figure 17. Section of the First ICA Map Exhibition, Paris 1961. Subject: Relief representation

Simultaneously, the systematic acquisition in digital form of spatial imagery of large areas, most of it based upon material from US space programmes, incited many countries to produce a great variety of thematic maps, conventional types and new forms: geological, soil, land use/land cover and vegetation maps, urban area and landscape maps, maps portraying flooding, dust storms, snow and ice cover, water quality and other environmental issues. Many samples of these categories found their way to ICA exhibitions. A brief selection may follow.

In Moscow, the United Kingdom presented the Atlas of Durham, the first known atlas produced by computer on the basis of population data for 1 km square areas, while the US Bureau of the Census introduced its counterpart in the form of Atlases produced with a laser beam plotter, of the largest Standard Metropolitan Statistical Areas. Australia showed its computer-produced census atlases of Sydney and Melbourne. The Ordnance Survey continuing its pioneering role, presented its digital 1:10 000 and 1:25 000 maps. At the same exhibition the USA introduced its coastal zone maps, a new category, part of an effort to develop a compatible map series showing the detailed land/water interface of the coastline, intended for planning purposes and as source data for selecting baseline points to establish coastal boundaries. Interesting too were the US bathymetric maps intended to aid the Government in its resource management program and environmental studies for the US Outer Continental Shelf oil and gas leasing scheme. Since the redefinition of the Limits of the Continental Shelf by the UN Convention on the Law of the Sea in 1982, this type of mapping has been given priority in various other maritime nations (Canada, Australia, France, Norway etc.).

In Tokyo (1980) Finland exhibited its timber stand map 1:20 000 produced from aerial scanner data using digital interpretation and image processing. France displayed its demographic maps, quickly and cheaply produced from digital data relating to 33 000 municipalities. Most interesting were the products of the Lanchad (Land Use in Chad) mapping project, a joint research effort of the Chad University and the Sorbonne using remote sensing for monitoring land cover changes in a Sahel type of environment. Switzerland exhibited the ninth edition of its 1:500 000 ICAO map (updated each year) produced by computer-assisted editing and plotting as well as a satellite image mosaic of the country consisting of 11 Landsat scenes in near natural colours. Canada's Ecological Land Classification Map of Labrador and Japan's Ecosystem Map were also both based upon Landsat imagery.

The Royal Danish Hydrographic Office, responsible for 168 nautical charts covering the waters around Denmark, the Faroes and Greenland illustrated the application of automation in scribing networks, buoyage and coordinated points. The annual sales of these charts (including fishery and yachting charts) amount to 130 000 copies.

A very instructive stand in Tokyo was that of the Experimental Cartographic Unit (ECU), UK. It mounted an exhibition by means of models and displays of automated cartography demonstrating digitising, checking, editing and plotting. On the same occasion ECU's former Director David Bickmore introduced his Digital Data Base of Europe 1:1 000 000 Project initiated in cooperation with IfAG, FRG. Finally, UK under the title Plot Program Options, displayed the digital map tape for sale at the Ordnance Survey together with a plot program in a Fortran readable format.

At Perth (1984), Canada showed one of the first sheets of the National Topographic Series 1:50 000 produced by digital photogrammetry, the topographic features being recorded directly from stereoscopic plotting. The Ordnance Survey (UK) displayed an experimental topographic map 1:50 000 produced from a digital data base. The Netherlands mounted their computer-produced soil and planning maps. Kümmerly and Frey (Switzerland), one of the first private map publishers to apply automation, showed their Road Map 1:300 000 edited and updated with the aid of a Scitex scanner. The *Freie Universität Berlin* exhibited the thematic maps produced by its THEMAK software system while the *Technische Fachhochschule*, also from Berlin, showed samples of its 1:250 000 map coverage of Egypt for planning and administration, comprising in total 78 working sheets, based upon Landsat Imagery. These enhanced Landsat images, examples of what the French call "spatiocarte", illustrated the usefulness of this type of mapping in unmapped arid lands.

Conventional maps

Among the variety of products, conventional maps still dominated the exhibitions. Almost all major maps, map series and atlases in this category – national and international productions – compiled in the period under review, made their appearance. Among the international projects were the map series sponsored by UNESCO in cooperation with FAO, WMO or other specialised agencies e.g. the Soil Map of the World 1:5 000 000, the Vegetation Map of the Mediterranean 1:5 000 000, the Hydrological Map of Europe 1:2 500 000, the Quaternary Map of Europe 1:2 500 000, the Climatological Atlas of South America and others. In Moscow the first sheets were displayed of the fifth edition of the General Bathymetric Chart of the Oceans (GEBCO) 1:10 000 000, based upon data supplied by France, UK, USA and USSR, coordinated by the International Hydrographic Organisation (IHO) and UNESCO and published in Canada.

Another product of international cooperation on display in Moscow was the International Map of the World 1:2 500 000, a joint effort of seven socialist countries upon a Hungarian initiative and completed in 1975. The series, covering the entire earth surface in 234 sheets, stands out by its uniform representation and may be regarded as an impressive achievement. It was on the basis of this 1:2 500 000 series that Hungary introduced its thematic Land Use of Europe Map Project in Warsaw (1982).



Figure 18. Section of the International Exhibition in Moscow, 1976. Mounted in the background, sheets of the Map of the World 1:2 500 000

Among the national productions worth remembering were Sweden's Economic (land use) Maps series 1:10 000 shown at Ottawa (1972), published as orthophotomaps in 4 colours, 2300 of which had been produced since 1968 as well as the experimental topo-geomorphological maps 1:20 000 of *Landmåteriverket*, Gävle. The FRG scored high with the sheets of its *Afrika Kartenwerk*, almost a regular item at ICA exhibitions, and the equally impressive *Atlas des Vorderen Orients* of the University of Tübingen, both ambitious long term projects of the *Deutsche Forschungsgemeinschaft*. In Moscow, Canada displayed the map of the Peyto Glacier in Banff National Park 1:10 000, an unusual aesthetically pleasing map in eight colours employing hill shading techniques similar to these used for Swiss maps. In Perth (1984), India exhibited maps and atlases compiled and edited by the National Atlas and Thematic Mapping Organisation in Calcutta and printed by the Survey of India. As the ICA period under review coincided with the world wide explosion of national and regional atlas production, it is not surprising that many of these prestigious storehouses for geographic information were displayed at most if not all ICA exhibitions – either in a completed form, as separate sheets or even as proof sheets. A number of these atlases were mounted at the international exhibition at Moscow (1976), under the vigilant eye of Professor Salichtchev, the great stimulator of National Atlas production. Among the national atlases, comprising comprehensive information on physical and economic conditions of their entire countries, were the pioneer examples Finland and Canada, presenting their fifth and fourth editions respectively, further the GDR, Japan, Poland, the Slovakian Republic, Sweden, USA and that masterpiece of cartographic artistry and design, the Atlas of Switzerland, made their appearance. Third World countries were represented in this series by the national atlases of Cuba (produced in cooperation with USSR cartographers), Libya (prepared by Esselte Map Service under the supervision of the Surveys Department at Tripoli), Cameroun and Cote d'Ivoire (both prepared by ORSTOM, France) India, Kenya and the Republic of Korea. Among the regional atlases, which are characterised by intensive analysis of single themes of parts of countries and are often made for planning purposes, were the atlases of the regions of France and their overseas departments and territories, the State atlases of the United States, the provincial atlases of Canada, the regional planning atlases of the FRG, the six regional atlases of Hungary based upon uniform principles and the series of multi-thematic or complex atlases of the major USSR republics.

In Tokyo (1980), Austria revealed the high level of its cartographic standards. Its exhibit consisted of no less than seven long-term atlas productions, varying from the Atlas of Styria (94 sheets; completed in 1970), the Atlas of the History of Peasantry in Styria (55 sheets; completed in 1976), the National Atlas of the Republic of Austria (120 sheets; completed in 1980), the Ethnological Atlas of Austria (117 sheets; completed in 1980) to the Historical Atlas of the City of Vienna, the Atlas of Tirol and the Atlas of the Danubian Countries, the last three, of which loose sheets or instalments were shown, to be completed in the 1980's. Since the middle 1970's the production of national, regional and urban atlases has made increasing use of digital methods. Examples include the National Atlas of Norway – a number of sheets of which were displayed in Perth (1984) – the fifth edition of the Atlas of Finland, the second edition of the Atlas of Switzerland, the third edition of the Atlas of Israel (in Hebrew and English) and the Toronto Planning Atlas shown at Warsaw (1982), with computer-drawn maps of planning indicators. It will not be long before other atlases of this calibre will follow their example.

Private map publishers were well represented at ICA exhibitions, as a matter of fact almost exclusively in the sector of conventional maps, as most commercial houses have watched the advance of the computer from a safe distance. The Italian exhibit at Warsaw (1982) was the sole work of the *Istituto Geografico de Agostini*, the famous map and atlas producers at Novara, while the one at Perth was provided by the *Touring Club Italiano*, Milan. Maps and atlases exhibited by Iran at Perth (1984) were all produced by the Geographic and Drafting Institute Sahab, Teheran. The National Geographic Society at Washington D.C. highly reputed for its contribution to cartography, was well represented in the exhibits in Moscow (1976) and Perth (1984).

Over the years, commercial map publishers in France, FRG, Sweden, Switzerland and UK, within their respective national exhibits, have displayed their rich assortment of maps and atlases for education and tourism. Among them were well-known names such as Hallwag, Kümmerly & Frey and Orell Füssli in Switzerland; Bertelsmann Verlag, Falk Verlag, Georg Westermann Verlag, and Maier's Geographischer Verlag in the FRG; Michelin and the Touring Club in France and Italy respectively, both of them with series of guides and maps admirably suited to the needs of business travellers and tourists; John Bartholomew & Son, George Philip & Son and Collins/ Longman in the UK and Esselte Map Service in Sweden. Many of these companies operate on a world-wide scale, serving both developed and Third World countries overseas just as their state-controlled sister institutions do in the socialist countries, such as VEB Hermann Haack (GDR), Cartographia (Hungary), Geokart (Poland) and Geocenter (USSR).

Commercial publishing houses regularly showed new map and atlas editions. Among their many leading productions, George Philip and Son, London, in association in 1970 with Mitchell Beazley, showed the innovative *Wine Atlas of the World* (conceived by Harold Fullard, written and edited by Hugh Johnson) predestined to become a bestseller. In Tokyo, the National Geographic Society (USA) showed the first Landsat colour mosaic of the 48 contiguous United States. Westermann Verlag (FRG) produced the *Weltraumbildatlas* containing pseudo-natural colour Landsat sub-scenes and maps of more or less the same areas, a much-appreciated novelty in education. Justus Perthes (FRG) displayed its Transparency Atlas for Geography, History, Politics and Social Sciences consisting of 190 series containing some 2000 transparencies.

Over the years, exhibitions have presented interesting examples of international cooperation between publishers. In Ottawa (1972), Rand McNally showed the International Atlas, concurrently published in USA, UK, Mexico and Scandinavia as a result of an exchange of ideas and data between the participating co-publishers, just as C. Bertelsmann Verlag (FRG) had done in the 1960's with its *Grosse Weltatlas*. In the Norwegian display at Perth (1984), the *Reader's Digest Great Norway Atlas*, designed and produced by John Bartholomew and Son, Edinburgh in cooperation with Nordbok AB, Göteborg, stole the show. At Perth, Wolters-Noordhoff (Netherlands) showed its international family of school atlases based upon the Grote Bosatlas dating from 1877 and since continuously updated.

National exhibitions

The separately staged National Exhibits offer host countries the opportunity of showing more detail than is practical at international exhibitions and of emphasizing their specific types of maps. Thus, it was logical that the Dutch at their national exhibition (1967) displayed their *Waterstaatskaart* (Water Control Map) 1:50 000. This map series, consisting of 110 sheets, celebrated its centenary in the year of the exhibition. It gives information on water management aspects including drainage areas, canals, sluices, dikes, pumping stations, water levels etc. The map type, unfamiliar to most visitors, is essential to the Low Countries.

At Ottawa (1972), the Canadians with their well-developed tradition of national and provincial atlases displayed among others the Economic Atlas of Ontario (1969), a typical research atlas noteworthy for the logical organisation of its contents. During the opening ceremony, Dr. Sam Gamble, Director of the Surveys and Mapping Branch, announced the Government's green light for the production of the fifth and ensuing editions of the National Atlas. A spectacular innovation was the computer-processed isodemographic map of Canada showing the land area of the provinces proportional to their population, intended to provide an accurate impression of the regional distribution of the population. It was the first map which portrayed census divisions isodemographically and in such detail.

Spanish organisers in Madrid (1974), apart from showing their National Atlas (completed in 1965), concentrated upon their topographic mapping program 1:50 000 (to be completed in 1968) and on the urban maps of Madrid at scales from 1:500 downwards. A special section was devoted to the Geographic Service of the Spanish army with a panel showing the evolution of the military map 1:200 000 in four stages since 1916.

The exhibition *Cartography in the USSR* in Moscow (1976) consisted of two parts, first, *Cartography in pre-revolutionary Russia* and second, *Soviet Cartography*. The latter focused on the main achievements of geographical cartography, showing a fine collection of wall maps and an educational atlas series at different levels as well as research-based polythematic or complex atlases. Both wall maps and atlases portrayed the major USSR republics and territories, with legends in their respective languages. Regional atlases published after 1964 followed Salichtchev's directions concerning uniformity of design and applicability to regional and cultural planning. The section "Maps Compiled on the Basis of Remote Sensing" provided interesting samples of photomosaics (Caspian and Aral Sea Region!) and maps of which most visitors had until that time only vague ideas. These images were based upon data obtained by the Salyut Orbital Station, by Soyuz type Manned Spacecraft with multispectral cameras and by TV-equipment aboard the Meteor type satellites. A series of thematic maps prepared on the basis of these data revealed the possibilities of their utilisation in earth oriented studies. Further, the Soviet maps of the Moon (visible and far side) and of Mars were revealing!

Among the many atlases, reference and thematic, on display in *Cartography in the USSR* was the Geological-Geophysical Atlas of the Indian Ocean, completed and published in the Soviet Union (1975). It was one of the products of the UNESCO sponsored International Indian Ocean Expedition in which 13 countries with 45 research vessels participated.

The US national display in College Park (1978) demonstrated the pioneer role of American cartography in computer-assisted map production and remote sensing data application. The USGS showed its Land cover/Land use maps 1:250 000 derived from Landsat computer compatible tapes, its topographic maps with computer-generated shaded relief and a series of impressive satellite image maps and mosaics at a scale of 1:5 000 000 and larger (Arizona, Florida etc.). The US Bureau of the Census displayed its colour statistical maps and, finally, a notable array of 12 State atlases (Alabama, Florida, North Carolina, Kentucky etc.) was displayed, all published in the 1970's, most of them produced by small groups of enthusiast geographic cartographers with modest university support. Among these State atlases the Atlas of Oregon (1976) was particularly noted for both content and graphic design.

In Tokyo (1980), the Japanese exhibited their Land condition maps for the purpose of disaster prevention, the Urban Function Map of Sapporo 1:15 000 displaying nine urban land-use categories and heights of buildings in three categories, their experimental mapping of sea bottom and water conditions for fishing ground development and the yachting chart program of the Hydrographic Association.

The National Exhibition in Warsaw (1982) gave a splendid illustration of the great diversity of Polish map and atlas production since 1945. No less than 600 maps and 100 atlases were shown and made accessible by a catalogue of more than 100 pages in three languages. Among the maps exhibited were military topographic sheets on 1:10 000 and 1:50 000 converted for civilian use and available for the public. Geological, geomorphological and soil maps were amply represented bearing witness to the long Polish tradition in the field. Among the atlases were the outstanding National Atlas of Poland, the Atlas of Warsaw, atlases of 8 provinces and a whole series of thematic atlases: geological, climatological, ethnographic, agricultural etc.

Finally, the elegant national exhibition in Perth, displayed by individual states, reflected the host nation's struggle with all its three scourges: drought, flood and fires and at the same time its almost unlimited potential for outdoor life and recreation. Sport-loving Australians can take advantage of maps for bush walkers, orienteers, campers, picknickers, boat owners, runners and skiers. The microfiche atlas of the country's socio-economic structure, the language atlas of the immense linguistic variety in the Pacific area (produced in collaboration with the Japan Academy of Sciences) and last but not least the exhibition of the Royal Army Survey Corps, which displayed equipment with a freedom seldom seen before at an international gathering, were all noteworthy additions to the exhibition.

Exhibitions of historical maps

In some venues, the National exhibitions contained interesting historical components such as the subsection of the exhibition at New Delhi (1968), devoted to the growth of the city, or the exhibition *Cartography in the USSR* (1976) that contained an important section on cartography in prerevolutionary Russia. Equally impressive was the national exhibition in the National Diet in Tokyo (1980.), where next to modern maps, ancient ones gave a fine illustration of the craftsmanship of Japanese cartographers who were able to represent the details of the landscape without sacrificing aesthetic qualities and legibility.

In some cases, the display of ancient maps developed into separate exhibitions, such as in London (1964), where the growth of the city was displayed in the Victoria and Albert Museum and the history of geographical exploration in the British Museum. The early maps of Scotland found a place in the Edinburgh Central Library. In the exhibition *The World on Paper*, staged at Amsterdam (1967), the Dutch depicted the 17th century flowering of their commercial cartography by means of maps, globes and atlases, all designed, compiled and printed in their capital and illustrated in an exceptional catalogue. In 1974 in Madrid, the Spanish hosts mounted an unforgettable selection of the treasures of the *Bibliotheca Nacional*, the *Museo Naval* and the *Servicio Geografico de Ejercito* under the name *Cartography in the Age of Exploration* with maps, manuscripts and documents, some of them – as was also the case in Amsterdam – never before displayed in public.

The historical exhibition of the National Library in Warsaw (1982), with its selection from the ancient maps and plans which had survived the heavy losses during World War II, drew a lot of interest. The display was supported by a 300 page catalogue in three languages which included black and white illustrations of about one third of the 166 maps. Finally, the Australians at Perth (1984) presented an interesting historical cartographic show entitled *Terra Australis Percepta* in the local Art Gallery. It comprised a great deal of rare material, particularly concentrated on the west coast of the continent as seen through cartographer's eyes.

Conclusion

The present review does not reflect the totality of global cartographic activities. Non-member countries were not represented at the exhibitions. Late arrivals were not listed in the catalogues and the participating countries did not always send in their most recent material. Further, the exhibits of several countries suffered from security restrictions on public use of larger scale topographic maps, an anachronism in our days of easily available high resolution satellite imagery. In the national display *Cartography in the USSR* in Moscow, 1976, apart from an educational demonstration model of topographical maps, the maps themselves were conspicuous by their absence. The unhindered exchange of information and the free flow of maps as advocated by its founders in the early ICA days are still a long way off.

Despite their shortcomings, the long series of more than 40 separate map exhibitions of the last 25 years have illustrated the main stream of global cartographic development. The exhibitions have demonstrated the wide scope of mapping and the continuous diversification of thematic cartography into new branches such as atlas, tourist, educational, urban, environmental and regional planning cartography, a growth accelerated by the advance of the computer and the use of satellite imagery, which considerably widened the horizon of the profession. Thus, maps have become indispensable tools in research, planning and decision-forming and as such have entered into the activities of many sectors of present day society.

Finally, when comparing the more recent exhibitions with similar displays 20-30 years ago, it is not only the great diversity of subject matter being mapped which is striking, but also the progress made in the effectiveness of the graphic representation – undoubtedly the result of the continuing effort to optimise the map's function as a means of communication. Despite the mastery with which present day cartographers can display their data, the exhibitions showed that now and again there remains scope for interesting graphic innovation.

EXHIBITIONS, THEMES AND VENUES 1961-1984

Paris 1961 (ICA)

International Exhibition: Theme: Relief representation – Bibliothèque Nationale

Frankfurt am Main 1962 (ICA)

International Exhibition – Institut für Angewandte Geodäsie

London 1964 (IGU and ICA)

1. International Exhibition of Thematic Maps – Gulbenkian Hall, Royal College of Art,
2. Britain Makes Maps – Geological Museum,
3. The Growth of London – Victoria and Albert Museum,
4. Geographical Exploration – Royal Geographical Society,
5. The History of geographical discovery – British Museum,
6. Geographical Books published in Britain – Queen Alexandra House,
7. The Teaching of Geography – Queen Alexandra House

Edinburgh 1964 (IGU and ICA)

1. International Exhibition of Topographical Maps – David Hume Tower,
2. Early Maps of Scotland – Edinburgh Central Library,
3. Early Estate Plans in Scotland – H.M. General Register House,
4. Urban Maps – David Hume Tower

Amsterdam 1967 (ICA)

International Exhibition – Internationaal Congrescentrum RAI

Themes: Map and Colour,

1. Colour Charts,
2. Thematic Maps with colours accentuating certain phenomena,
3. Chorochromatical maps with colours used to distinguish or to arrange,
4. Choropleth maps with colours used for graduation and
5. Multicoloured Town Plans National Exhibitions:
 1. The Struggle of the Dutch against the sea – Internationaal Congrescentrum RAI
 2. The World on Paper (The flowering period of Dutch cartography in the 17th century) – Historisch Museum De Waag

New Delhi 1968 (IGU and ICA)

International Exhibition – Ravindra Bhavan Themes:

1. Survey Maps,
2. Thematic Maps,
3. National Atlases,
4. Devices for remote sensing of the environment,
5. Geographical books and journals,
6. Aids to the teaching of geography and
7. Delhi through the Ages

Technical Exhibition – Triveni Kala Sangam

Stresa 1970 (ICA)

International Exhibition – Palazzo dei Congressi Themes:

1. Cartography of mountainous areas and
2. Maps as a means of expression and communication National Exhibition – Palazzo dei Congressi

Montreal 1972 (IGU and ICA)

International Exhibition – University of Montreal Themes:

1. Population problems,
2. National and regional Atlases 1968-1972,
3. Geographical Books and Journals 1968-1972,
4. Computer Maps, Satellite Photography and Mapping and Remote Sensing Imagery and
5. Special Exhibition: IGU Congress Centennial Canadian Exhibition

Themes:

1. National Display: Federal, Provincial, University,
2. The Historical Cartography of Canada,
3. The Landscape of Canada,
4. The Greater Montreal Region,
5. Display of Canadian publications and Illustrative Materials,
6. Special Display a. Exhibition on Snow: its significance in Canadian Life, b. Exhibition on Soils and c. Association of Canadian Map Libraries

Ottawa 1972 (ICA)

International Exhibition – Carleton University Themes:

1. Urban cartography,
2. Cartographic Techniques,
3. Marine Cartography and
4. Education in Cartography

Madrid 1974 (ICA)

International Exhibition – Palacio di Congresos y Exposiciones

Themes:

1. Tourist Cartography,
2. Urban Cartography and Data Banks,
3. Cartographic Applications of Information derived from Space Programmes and
4. Aeronautical and Oceanic Cartography National Exhibition – Geographical and Cadastral Institute of Modern Maps

Technical Exhibition – Palacio di Congresos y Exposiciones

Historical Exhibition: Cartography in the Age of Exploration – National Library

Moscow 1976 (IGU and ICA)

International Exhibition Subdivisions:

1. Geographical Maps and Atlases – Polytechnical Museum,
2. Scientific Literature on Geography and Cartography – Library of the Geographical Faculty of the Moscow University,
3. Geographical Study of National Resources – Geographical Institute of the USSR Academy of Sciences and
4. Means and Methods of geographical education – Moscow University

National Exhibition: Cartography in the USSR – Lenin State Public Library

Technical Exhibition – Moscow University Sports Complex

College Park – University of Maryland 1978 (ICA)

International Exhibition – Center of Adult Education Themes:

1. Automation in Cartography,
2. Map Perception and Design,

3. Cartography for the Developing countries,
4. Remote Sensing and
5. Oceanic and Coastal Cartography

U.S. National Exhibition – Center of Adult Education Technical Exhibition – Center of Adult Education

Tokyo 1980 (IGU and ICA)

International Exhibition – Sunshine Building Themes:

1. Thematic maps and atlases,
 2. Experimental maps and maps of the future,
 3. Recent literature on Cartography,
 4. Geo-information systems including remote sensing technique and
 5. Mass Media in Geographic education and dissemination of geographical knowledge
- National Exhibition (Including a section of historical maps) – National Diet Library
Technical Exhibition – Sunshine Building

Warsaw 1982 (ICA)

International Exhibition – Palace of Culture and Science Themes:

1. Topography and Thematic maps and atlases,
2. Contemporary schoolatlases and
3. Recent literature on cartography

National Exhibition – Palace of Culture and Science Exhibition of Ancient Maps and Atlases
– National Library

Perth 1984 (ICA)

International Exhibition of Maps and Atlases – Concert Hall
National Exhibition of Australian Cartography – City Mutual Tower
Art Exhibition – Concert Hall
Technical Exhibition – Concert Hall
Historical Exhibition of Ancient Maps – Art Gallery

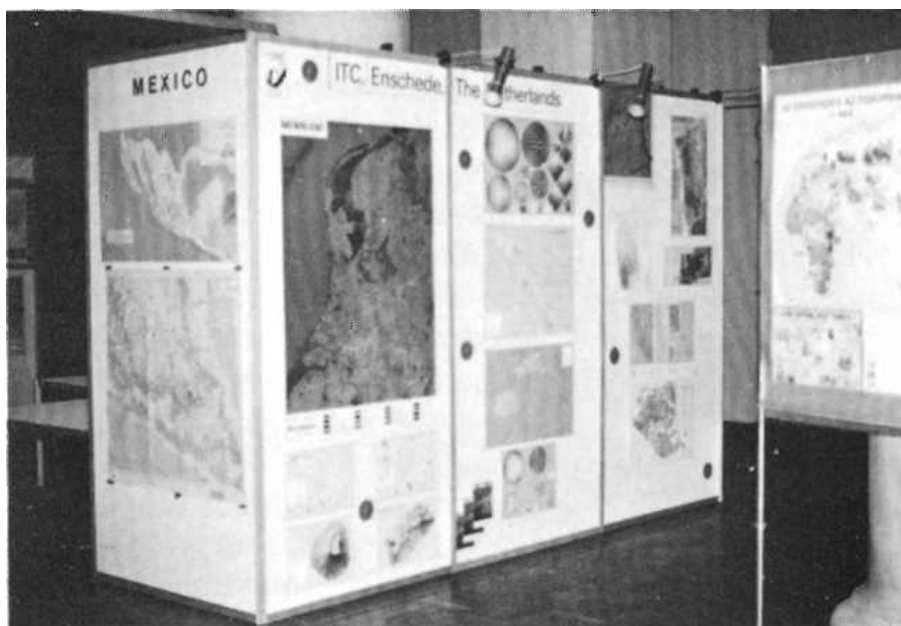


Figure 19. Section of International Map Exhibition, Warsaw 1982

Commissions

COMMISSION ACTIVITIES

Introduction

The realisation of the main objectives of the Association, the encouragement and coordination of cartographic research, is assigned to the commissions and working groups. Encouragement involves the awakening of interest in various fields of study. Coordination means the provision of channels of communication and the inclusion of contributions from all competent sources in order to obtain the best possible results. Commission and working groups form the most vital part of the Association. It is here that the bulk of the work is done. According to the Statutes, Commissions (or Special Commissions as the initial Statutes read) can be established by the General Assembly or Executive Committee for the execution of important tasks as laid down in their terms of reference. In principle their tenure of office is limited to the time between two General Assemblies i.e. four years. A commission consists of a chairman appointed by the General Assembly or by the EC and of a number of members selected by the chairman. If desirable, a "small number of corresponding members" can be added. Commission chairmen have to report to the General Assembly.

Formation and performance of Commissions

The initial Statutes only roughly outlined as to how the commissions should be established and should perform. They did not contain details on the initiation of such commissions nor on the selection or the number of their members. It became common practice to sound out member countries on ideas and proposals for the formation of commissions. From their reactions a choice was made, subject to approval of the four yearly General Assemblies. Over the years most of the suggested subjects were accepted as commission themes. In order to avoid duplication or overlapping with activities of sister organizations or of the UN, or because no suitable chairman could be found to promote the commission or no agreement could be reached on its terms of reference, a certain number of proposals were rejected. Some of them were: Cartographic bibliography, Copyright problems, School Cartography, Standardisation of symbols, Geographical names and Inventory of the world's topographic mapping.

In general the formation of commissions was carefully prepared. Prior to its actual establishment, the General Assembly used to set up a Working Group to explore the field and to survey possible tasks of a future commission. This procedure was successfully followed in preparing the commissions of Marine Cartography, Cartographic Communication, and History of Cartography while in 1974 plans for a Commission on Technology were submitted for comment to all member nations by questionnaire. In a few cases, where commissions were called into existence without this preparatory work, the period of four years appeared too short for the commission to mature. Before members were selected and the commission had decided its course of action, a few years would have elapsed and the end of the tenure would already be in sight. Such experiments were not always successful.

When formulating the terms of reference for commissions and working groups, ICA executives were not always far-sighted. Assigned tasks were often too vague or too burdensome to be completed in the allocated time of four years. True, by way of exception the Statutes allowed the extension of commissions' tenures, for the completion of tasks undertaken, but in 1975 it was found that exceptions had become the rule and that three out of six commissions had already existed for eleven years and two for seven, thus assuming a status of permanent commissions, in no way sanctioned by the Statutes.

The Commissions' activities were subsidised by the ICA Treasury with a four yearly subvention of US \$ 1000.-, payable upon request of the chairmen and primarily intended for subsidising travel costs of regular commission members. As commission chairman often managed to find other sponsors – in the FRG commission meetings were repeatedly subsidised by the *Deutsche Forschungsgemeinschaft* – the allocated money was often not paid out and remained in the ICA treasury. Here it could accumulate to what was euphemistically called the "ICA capital" amounting to some US\$ 20 000.- in 1984. It was out of this modest reserve that the manual *Basic Cartography* (1984) could be paid, the only ICA publication ever completely financed by its treasury.

As to the selection of commission members it became good practice to approach candidates through the intermediary of their national committees or other representative bodies. It was logical that candidates preferred regular membership status to that of corresponding member, as the latter was considered a lower category and in practice was not eligible for travel costs funding by the commission or by the home country. A few chairman extended the membership of their commissions with the intention of involving as many countries as possible. In the late 1970's there were two commissions with 10-15 regular members and over 30 corresponding members. One of the negative effects of this development was that at commission meetings, time and again, there were new faces, which considerably delayed decision making. One of the positive effects of the Commissions was their stimulative impacts at the national level. As commission members depended upon national support to enable them to carry out their obligations, in various member countries (Australia, France, FRG, Netherlands), national working groups were created with parallel tasks.

Revision of Commission Policy

In 1975 the Executive Committee under President Robinson decided to revise its Commission policy, to keep a better eye on the commissions and to attempt to formulate their tasks in such a way that they could be accomplished in the designated time. During a successful meeting with the chairmen of all commissions and working groups in London in 1975 President and Secretary investigated the commission plans to see whether they could be accordingly improved. The meeting resulted in a series of concise terms for all commissions, which were adopted by the 5th General Assembly in Moscow one year later. Ties with commissions were further tightened by obliging them to draw up working programmes and tentative budgets. EC members were encouraged to attend Commission meetings as "guardians" to stimulate them in their activities. Though the new "project approach" was a considerable improvement, the organisation still displayed lapses. While most commissions were active and organised meetings and issued publications, others unfortunately lagged behind owing to economic, political or other reasons. Moreover it appeared that beyond the map production scene, not all cartographers were equally disciplined. Most commission chairmen adhered strictly to their terms of reference but a few of them modified or extended them thereby exceeding their mandate and creating confusion.

In 1980 at the VIth General Assembly at Tokyo further improvements were introduced. The tasks of the 11 Commissions were again precisely formulated and the chairmen were once more urged to present four-yearly programmes and budgets. Two commissions, their tasks almost being terminated, were reduced to working group level. In order to improve their efficiency and mutual contacts, a set of general terms of reference was drawn up for all commissions. Together with the International Federation of Library Associations (IFLA) a joint working group on Documental Aspects of Cartographic Materials was established and for the organisation of Third World Seminars a special committee was set up.

The term of office 1980-1984 was characterised by the determination to intensify the contacts with the commissions and to tighten their rules and timetables. In 1981 a special working group under Vice-President Morrison was set up to examine these thoughts and formulate guidelines for a revised commission policy, in which, next to commissions for short term projects more permanent or Standing Commissions could find a place. Most useful for the relations between the two was the joint meeting in 1983 of the Executive Committee with four commissions (those considered for promotion to Standard Commission level) in Visegrád, Hungary, where in the guesthouse of the Loránd Eötvös University in a harmonious atmosphere work programmes and relationships were discussed, a model recommended for the future.

Further it is worth mentioning that twice during 1980-1984 the ICA, with a team of speakers recruited from the Commissions, took part in North American conventions. In 1982, together with the sister organisations FIG, IAG, and ISPRS it contributed to the Centennial Convention of the Canadian Institute for Surveyors in Ottawa and in 1984 at the spring convention of ACSM in Washington DC, it presented a comprehensive review of *European Cartography today* with papers on National Mapping, Commercial Cartography, Education, Automation and Remote sensing applications.

In the meantime Morrison had formulated his proposal for a revised commission policy, the essence of which was laid down in motions to change the articles of the Statutes concerning the authority of the EC and operation of Commissions. The main aim of these motions was to entitle the EC to prepare guidelines and rules for the formation and operation of commissions, including their functioning and reporting, and to establish two types of commissions: Standing Commission, concerned with subjects of continuing general interest to the Association and Ad Hoc commissions that undertake specific tasks in the period between the General Assemblies. Further, the motions provided the possibility of creating informal Working Groups for the purpose of formulating proposals for new commissions. Finally they authorised participation of the Association in formal joint working groups with other international organisations, a cooperation that had informally existed since 1976. Morrison's proposal to introduce a more rigorous set of guidelines for the operation of all commissions and working groups met approval. As new element the obligation was built in to report annually to the EC while at the same time the EC was granted the power to disband a commission or working group in the case of prolonged inactivity. The General Assembly at Perth (1984) discontinued three commissions, adopted the motions to change the statutes and with four Standing and five Ad Hoc Commissions, three working groups and two inter-association working groups the ICA turned over a new leaf.

Commission on Education in Cartography

Out of the recommendations for Commission subjects, in 1964, the General Assembly selected three themes, which were considered vital for the further development of the profession: Training, Terminology and Automation. In all three sectors, interesting results were achieved, the highlights of which are recorded below, followed by a selection of other commissions.

At the time of the formation of the Association in the 1950's training and education in cartography was generally inadequate. Cartographic draughtsmen were usually trained on-the-job with minimal theoretical background knowledge. For the higher echelons, specialised education was generally non-existent, they were populated with "renegade" surveyors and geographers, who as immigrants brought the land under cultivation, awaiting, as it were, a new generation of pure cartographers.

From the outset, the Association realised that giving guidance in the upgrading and standardising of cartography education would be one of its main tasks. For that purpose the Commission on Training in Cartography (renamed Education in 1967 and Continuing Education in 1980) was established under Stéphane de Brommer, Director of the IGN *Ecole Nationale de Sciences Géographiques*. De Brommer was an inspiring leader. He succeeded to assemble in his group a fine collection of experts from East and West. He presented his commission to plenary conference sessions in Amsterdam, New Delhi, Stresa and Ottawa, thus promoting widespread understanding for the subject of education. The start of his commission coincided with the arrival of the computer in map production. Since the demonstration of the Oxford System in London in 1964, it started to dawn on cartographers that to make optimal use of the new technology, additional training was needed. As computer technology in mapping further progressed, the call would become louder for new programme structures for various levels of learning and for "ideal" cartographers with sufficient knowledge to keep their foothold in a computer environment. Before complying with these wishes the first step of the Commission was to acquire a better insight into the existing diffuse cartographic community, its structure and level of education. For this purpose, chairman de Brommer sent out three series of detailed bilingual questionnaires to hundreds of addresses, mapping agencies, government and private, university, institutions, individual cartographers etc. Further, de Brommer succeeded in exciting the interest of UNESCO, Paris for his commission. With their financial support he organised three seminars on Education in Cartography at UNESCO Headquarters in 1966, 1968 and 1970 respectively. During the first of these meetings, the unavoidable discussion on the demarcation of the field to be covered by education, resulted in a general agreement on the definition of cartography as mentioned in Chapter I. Being the first – and so far only – official ICA attempt to stake out the discipline, de Brommer's definition was to make history. It was adopted by the conference at Amsterdam in 1967 and has served as ICA's trade mark since.



Figure 20. ICA-UNESCO Seminar on Education in Cartography, Paris 1967, with organiser de Brommer in foreground. Front row second from right Radó, next to him (left) Salichtchev, further Mrs. Zaroutskaja. Far left Kanazawa and Mrs. Kishimoto

Additional definitions were adopted, constituting the bases for further work. Three kinds of cartographic activity were outlined: 1. Essential Cartography, called "W", 2. Activities

affected by cartography, called "V" and 3. Activities related to cartography, called "Z". Within the first group four levels of training for professional cartographers were distinguished, designated from the highest to the lowest using the symbols W1, W2, W3 and W4. For a long time this classification in four levels was used in international literature on cartographic education, though the requirements employed in various countries for individual degrees were not the same. W4 is associated with the draughtsman or technician with sufficient knowledge and experience to produce at an acceptable speed, high quality, accurate originals to reproduction standards on various media, using different equipment. Category W3 issues the Diploma-Technician with sufficient practical and theoretical background to perform any task in the map drawing section. He is the cartographer "par excellence", the head of the drawing room and as such distributing, checking and supervising the work and being responsible for the time schedule. Step W2 produces the engineers in cartographic work and university graduates in cartography, while W1 are the scholars in the field of cartography, the scientific or academic cartographers, geographical cartographers and cartographic engineers. Finally, three essential functions were distinguished, corresponding to different levels of education: 1. Functions of research, teaching or direction, 2. Functions of supervision, organisation and control of production, 3. Function of execution, varying in complexity.

In New Delhi (1968) the Commission presented the first results of its inquiry in the form of a *Catalogue of Institutions providing Instruction in Cartography*. This Catalogue revealed the astonishing fact that less than 50 years after the first academic programme in cartography was established, some 130 institutions provided instruction in cartography, including a great many at higher levels.

It was not surprising that the Commission was invited by the General Assembly in 1968 to pursue its interesting studies for another four years and to collect further information and to make appropriate recommendations. In Stresa (1970) the Commission distributed two new interesting publications: 1. *Typical Syllabuses of Instruction for the education of cartographers*, and *International Bibliography for Education in Cartography*, both based on the responses to questionnaires and on supplementary comments from Commission members. The Syllabuses contained a wide range of subjects for instruction of the "W" category of cartographers, including matters resulting from new developments such as automation and semiology, useful for all levels in different countries. The Bibliography listed some 150 works used in cartographic education at different levels in 22 countries. Works specifically intended for teaching cartography proper had been included in the first place, but they were few in number.

In Ottawa (1972) Professor Cor Koeman (Netherlands) succeeded Stephane de Brommer as chairman of the Commission. When assessing the results of the latter's work it can be said that the great amount of information collected and his proposals on education in general and study programmes in particular considerably contributed to the insight into the structure and requirements of the cartographic community.

Before leaving, de Brommer summed up recommendations for future commission work: 1. Preparation of instruction manuals; a simple general one for W4 cartographers and separate more advanced manuals on different subjects for W3 and W2 students, 2. Comparison of education programmes at various levels in different countries, 3. Organisation of seminars for teaching staff, 4. Aid to developing countries. At Ottawa (1972), the IVth General Assembly, considering that the discipline was in permanent development, decided that the Commission should continue its activities. Out of the above recommendations the following terms of reference were chosen: 1. To consider the possibility of the preparation of a Basic Manual for education in cartography at W4 level for international use, 2. To prepare a second edition of

the Catalogue of Institutions and 3. To compile a list of manuals for education in cartography. Under the new chairman, the Commission deliberately concentrated upon the compilation of the manual, which in view of the scarcity of textbooks in cartography at that time, was greatly welcomed. The start was full of promise. In three years the Commission reached agreement upon level – W3 instead of the proposed W4 – and the contents of the manual, planned to consist of a volume of nine chapters with about 250 pages, to be written by cartographers from different countries, ranging from France and Switzerland to Japan and Sweden, from UK and USA to the Netherlands, FRG and Bulgaria. UNESCO, impressed by the momentum of the project, paid US\$ 4000.- to defray travel and preparation costs, holding out prospects for further grants. In 1976 at the Moscow Conference the first chapter of the manual, the one on map reproduction by Christer Palm (Sweden), was presented in printed form.

After Moscow, unfortunately, the momentum was lost and in the following years Koeman experienced the full weight of the problems connected with the compilation of a textbook with unpaid authors from different countries, with varying backgrounds and experience in cartography and with different local support. Long discussions were required to try to get authors organised, and to endeavour to maintain a common style in text and illustrations and to keep the level, quality and detail constant. Because not all authors were able to stick to their promises, progress slowed down and UNESCO, becoming impatient, stopped its financial support. In 1980 when Koeman retired from his University, and had to do without clerical support, the manuscript was still incomplete. Thus, the retiring chairman who started the strenuous task with much courage, had to pay the price for his ideals for an international approach. In 1981, the Publication Committee (under Harold Fullard, UK) taking over the responsibility for the manual, decided to split it up into two volumes and to put up the more complete chapters as Volume I. It took another three years of publishing discussions, checking, page make-up, reproduction and printing before the plan could be realised. In 1984 Volume I of *Basic Cartography for Students and Technicians* saw the light, still an inspiring example of international cooperation, but, appearing on a market where textbooks in cartography were no longer scarce. In retrospect, it can be stated that the example of having a commission, or at least a number of its members, concentrate for a long series of years upon the compilation of a single publication, to the exclusion of all other activities, should not serve as a model. "Those involved, including the Executive Committee, might have recognised that the cartographic community most of all needed short term guidance on how to adapt education to the changing requirements of the swiftly developing discipline. Seeing the need for constant surveillance of education, the Commission was renamed "Commission on Continuing Education in Cartography" in 1980. Its chair was taken over by Dr. K.H. Meine, expert in cartographic education in the FRG, one of the few countries where the position of cartographic technician is legally recognised. At its meeting at Frankfurt am Main in 1981, the Commission abandoned the four levels of cartography education – W4 up to W1 – introduced by chairman de Brommer in the 1960's, because of the difficulty in most countries providing education at these levels concurrently. Henceforth, the Commission distinguished two levels instead of four: cartographic technician (CT) and cartographic scientist (CS). Within the Commission, working groups were established to develop educational curricula for both levels, as well to give guidance for the long term continuing education, according to the terms of reference. Much energy of the commission was taken up by its second term of reference namely to prepare exercises to enhance the usefulness of the manual *Basic Cartography*. The preparation of the exercises was slowed down because of differences of opinion as to the type of exercises or map samples required. However, there was much appreciation of the Commission for providing a successful UNESCO-sponsored seminar for French speaking African participants in Rabat, Morocco in 1984. Its

organisational work was carried out in cooperation with the Moroccan Conservation *Foncière et des Travaux Topographiques* and the African Association for Cartography. The papers presented by members of the Commission, supplemented by a few guest lecturers, were published in a volume entitled *Formation des Cartographes*, the first ICA publication completely in French.

In 1984 the Commission, in view of the vital importance of education in cartography, was promoted to the level of Standing Commission. However, its activities are still weighed down by the commitment to complete the exercises for *Basic Cartography*, a heritage from the past. Since the introduction of the computer many educational centres, academic and technical, have adjusted their programmes to cope with changing demands by introducing a multi-disciplinary approach, including computer technology. The problem of reconstructing cartography curricula, however, is still very much alive and gives rise to controversy. The question as to which elements of the traditional curriculum (drawing, handlettering) should be retained when introducing new subjects, was the issue of the memorable epic discussion between Koeman (Netherlands) and Dahlberg (USA) at the Conference in Tokyo (1980). At the Perth Conference (1984) the call for cartographers understanding the entire mapping process and knowing how to handle spatial information by modern methods, was once more emphasised by various speakers. Bouille (France), repeating what had already been said in different words introduced the "New Look" Cartographer who should be conversant with "geomatics" i.e. a combination of geosciences, mathematics, informatics and statistics. Penetrating was the paper of Fraser Taylor who, argued that the technological changes had revolutionised cartography to such an extent that a "New Cartography" (term first used by Guelke, Canada) had emerged. This New Cartography required adaptation on a wide scale. So far – Taylor said – the cartographers' response to these challenges had been weak and unless the situation changed, computer scientists, computer graphics specialists and graphic designers would dominate the mapping scene. Cartographers beware! It is obvious that for a future ICA Commission on Continuing Education there is much to be done!

Terminology

One of the main aims of the Association is the international exchange of information. In order to avoid misunderstanding resulting from divergent use of terminology, the General Assembly at Edinburgh (1964) constituted a special Commission on the definition, classification and standardisation of technical terms in cartography. Professor Emil Meynen (FRG) was appointed chairman together with six regular and twelve corresponding members from sixteen different countries in fourteen language areas. Each of these members established working groups in his own country with the exception of Britain and France, where these working groups already existed. These working groups consisted partly of commissions of the national cartographic or geographic societies, partly of official boards charged with standardisation. In total some 150 experts became involved in the project. According to the terms of reference of the Commission adopted by the Second General Assembly in London (1964), Meynen was committed to make lists of definitions of terms used in the principal cartographic documents and the essential cartographic operations. It was felt that these general objectives could be best realised by the preparation of a multilingual dictionary, an idea that met with international approval. Although the Commission was not empowered to standardise terms for any language, the terms selected for definition in the dictionary would provide a preliminary basis for normal usage.

The optimism with which Meynen accepted the colossal task and the energy with which he proceeded was astonishing. He managed to inspire his commission members and to coordinate their efforts by correspondence and in regular meetings. A pilot sample *Hundred*

Technical Terms in Cartography was presented at the Third International Conference in Amsterdam in 1967. Five years later Meynen submitted a proof copy of the dictionary to the General Assembly in Montreal/Ottawa and in 1973 – nine years after the beginning of the work – the *Multilingual Dictionary of Technical Terms in Cartography* (MLD) came off the press, just in time to be presented at the UN Regional Cartographic Conference in Tokyo in the same year.

The definition formulated by Commission I in 1966, approved by Commission II and adopted by the ICA, determined the scope of the dictionary. This meant that the MLD included the basic cartographic terms relevant to art, science, and technology in cartography, including the aspects of evaluation, compilation, production, interpretation and use of maps and that all terms relating more specifically to methods and processes of surveying, photogrammetric compilation and general printing were not included. The MLD contained 1200 technical terms in cartography with their definitions in five languages; German, English, French, Russian and Spanish and equivalent terms in nine additional languages (Czech, Dutch, Hungarian, Italian, Japanese, Polish, Portuguese, Slovak and Swedish). Under the "definition languages" German was mentioned first because it had been chosen for the alphabetical order of the terms, as it had the widest range of cartographic terms.

The MLD was of considerable importance to the cartographic community. It provided the profession with its own terminology and as such contributed to its status as a science. It stimulated discussion at a national, and promoted the exchange of information at an international level. Its appearance produced a chain effect. Various countries whose languages were not selected as definition languages started working on national definitions, some of them with equivalents in English. Others whose languages were not included in the dictionary, applied for participation in a possible second edition. The Multilingual Dictionary was a successful operation made possible by the enthusiasm of the cartographic community in those early days, as well as by inspiring leadership of Professor Meynen, whom as a token of the Association's appreciation was awarded the Honorary Fellowship in 1983.

Being aware of the shortcomings and imperfections of the first edition, Meynen strongly recommended a revised second one for which he received the green light from the Fourth General Assembly in Ottawa (1972).

With renewed energy the Commission started working on this task. It was decided that in consultation with the commissions or working groups concerned, a certain number (later determined at some 120) of new terms and definitions on automation, documentation and communication would be inserted. Further Working Groups that had participated in the first edition were given the opportunity to correct existing terms and/or definitions. Finally, requests from nine additional "equivalent term languages" for participation were granted, resulting in a drastic increase of this category from nine to nineteen (including two versions in Arabic: one from Morocco and one from Algeria). By the mid-1970's a total of 23 working groups were involved in the project, all controlled and directed by Meynen assisted by Dr. Joachim Neumann (FRG). At the General Assembly in Tokyo, Meynen reported that the manuscript for the second edition was nearing completion. The commission was subsequently replaced by a small working group, again under Meynen, to give the work the finishing touches. In 1983 part of the manuscript document representing some ten years work by specialist contributors from more than 20 countries, was delivered to Steiner Verlag, Wiesbaden, who had printed and published the first edition. In total the following 24 languages in 7 different scripts were represented: the five "definition languages" i.e. German, French, English, Russian and Spanish, and 19 "equivalent term languages" i.e. Arabic (two versions) Bulgarian, Chinese, Czech, Danish, Dutch, Finnish, Hindi, Hungarian, Italian, Japanese, Norwegian, Polish, Portuguese, Serbocroatian, Slovak, Swedish and Thai. In 1985, Steiner Verlag, which in the meantime had changed ownership, informed Professor Meynen

that, owing to unexpected labour-intensive typesetting problems it was not possible to publish the second MLD edition without a substantial subsidy – exceeding ICA means – and that in fact it was considered too costly to publish it at all. Though the Publication Committee had recognised that the MLD project with its 24 languages and 7 scripts had reached the limits of the possible, the decision came as a complete surprise, the more so as it was known that Steiner had started the work and had already completed 20% of the typesetting. As there was no possibility of redress, the only way out for the Association was to campaign to obtain necessary funding elsewhere or to find a publisher prepared to rescue the project. It is likely that Steiner's decision to disregard previous gentleman's agreement with Meynen, could have been avoided if arrangements with regard to the printing of the second edition had been founded on a more businesslike basis. It was not the first time, however, that the ICA had arranged its affairs informally. Because of Meynen's efficient handling of the first edition, the Publication Committee and the Executive Committee had relied upon his connection with Steiner, and had not interfered at all. As this contact was lost due to the change of ownership, the Association did not have a leg to stand upon. Thus, the result of the combined effort of more than 20 countries, undertaken in the name of ICA, was undermined, a heavy price for letting things take their own course and leaving a nasty problem for the succeeding Executive Committee. As some mitigation, it may be assumed that on various national levels (India, Netherlands etc.) the compilation work for the second edition will yield fruit and will result in the publication of national glossaries.

Automation/Computer-Assisted Cartography/Advanced Technology

It is to the credit of the ICA initiators that, anticipating the advance of the computer in map production, they included Automation in cartography in their conference programmes right from the start. They established a Special Commission on Automation in 1964. This Commission on Automation, in 1980 renamed Computer-Assisted Cartography and in 1984 Advanced Technology, succeeded in carrying out an impressive programme of activities under the guidance of a succession of US Chairmen: Granville K. Emminizer (1964-1968), Morris M. Thompson (1968-1972), Gordon Stine (1972-1976), Dean Edson (1976-1980) and Lowell Starr (1980-1984). The Commission was launched with the most general terms of reference "to study and evaluate automated aids for the cartographer", a task which under chairman Morris Thompson was specified as follows:

1. To study the application of automation to the following aspects of cartography a) collection of cartographic data, b) map compilation, c) presentation of data and d) development of cartographic systems,
 2. To collect and disseminate at appropriate intervals information on those activities in which automation is already applied,
 3. To develop a card-file bibliography with abstracts on automation in cartography and to make this information available to all countries,
 4. To produce a glossary of terms and definitions pertaining to automation in cartography.
- By a series of symposia – Frankfurt am Main, 1966 and 1969; Madrid 1968, Stresa 1970; Paris 1971; Budapest 1973 and Enschede 1975 – during which members used to present state-of-the-art reports on the progress of automation in their countries, the commission successfully fulfilled an essential part of its task.



Figure 21. Sándor Radó opens the Seminar on Computer-Assisted Cartography, Budapest 1973. From right to left, Csáti, Stine, Radó, Robinson and Ormeling

The only objection which could be raised to the Commission's work is that it usually highly emphasised hardware developments while the cartographic presentation remained in the background. If – Adam Kerr said in London in 1975 – the ICA Commission wants to compete with the growing number of meetings on Automation it should pay more attention to bringing together traditional cartographers, specialists in cartographic presentation, and specialists in automation. Seven years later Dr. Boyle, speaking on computer-assisted cartography in general, was still of the opinion that "much of the present efforts are hardware oriented and too little has been done so far to develop true cartographic oriented methodologies".

As a follow up of the newly adopted "project approach" with regard to the commissions and also in sympathy with the rapprochement between ICA and ISP as well as with the ICA's Third World Policy adopted in 1976, the terms of reference of the Commission were drastically restricted in 1976 as follows:

1. To organise an international seminar in East Africa on the application of automated cartography for natural resources mapping inventories and
2. To cooperate with ISP experts to form an Inter-Association Working Group on Automation in Cartography.

Within the framework of these terms the Commission organised a seminar in Nairobi, Kenya, sponsored by UNESCO and the Swedish Government in 1978, and in 1979 initiated a meeting with ISP and FIG experts in Zürich, to identify and discuss areas of common interest in digital mapping. The seminar in Kenya was soon to be followed by Seminars in Jakarta (1980), Wuhan (1981) and New Delhi (1983), for all of which the Commission provided lecturers. In the meantime past obligations were duly fulfilled. In 1980, with the assistance of ACSM the Commission under chairman Dean Edson, published a *Glossary of Technical Terms in Computer-Assisted Cartography*, with concise definitions in English and French. In 1984, under chairman Lowell Starr the Commission issued a *Computer-Assisted Cartography Research and Development Report* presenting the state-of-the-art in ten ICA member countries, based upon information gathered by questionnaire. Not all undertakings were equally successful. The plan to develop a comprehensive card-file bibliography with abstracts on automation in cartography, which was considered useful in the early 1970's, was

abandoned due to an overwhelmingly large number of publications on the subject. A bibliography by Dr. K.H. Meine (FRG) dating from 1969 already contained more than 800 entries.

Since the mid 70's the ICA Commission on Computer-Assisted Cartography gradually lost its forum role. To an important extent, this was due to the success of the ACSM sponsored biennial conferences, known under the name AUTOCARTO, the first of which took place at USGS in 1974. Supported by the impressive resources in equipment and personnel of the US, these Autocarto's rapidly developed as international highlights in computer-assisted cartography, attracting visitors from far and near. To certain extent the ICA Commission found compensation for the lost ground in the western world by its rewarding tasks in the developing countries. The Third World Policy had been adopted at the right moment. Competition from the EUROCATO's, started in 1981, and since held annually, could be neutralised by seeking and achieving collaboration with their initiator Bickmore and incorporating them into ICA programmes.

Cartographic Technology/Map Production Technology

In 1971-1972 an opinion poll demonstrated that member countries believed that there was room for a commission to study practical map production problems other than those covered by sister commissions such as automation. Accordingly a Commission on Cartographic Technology was set up in 1972 with the following terms of reference 1. To review current cartographic techniques and processes, 2. To disseminate information on these techniques and processes,

3. To organise commission meetings. In order to avoid overlapping with the automation group, the new commission decided to restrict its activities to the study of 1. Colour proofing techniques, 2. Register Systems and 3. An evaluation of techniques for the production of small editions of multicoloured maps. The Commission assembled a fine group of enthusiastic members, who under successive chairmen (Spiess, Switzerland; Groot, Canada and since 1980 Burmester, Denmark) displayed great activity. It organised a series of meetings during which useful exchange of information took place and issued two publications, one on *Colour proofing* by Christer Palm (Sweden) and another on *Register Systems* by Ir. Arie Kers (Netherlands). Very useful were the reports on innovation in map production technology, presented by the Commission at conferences since Warsaw.

Regrettably, its activities were hampered by a commitment, dating from 1976, to produce a Manual on Cartographic Techniques, to be compiled by the commission members, which was progressing slowly up to 1984. This is another example of a long term commission project that drains a commission's power! It is to be hoped that the commission will soon complete this Manual and will not further become submerged by a self-inflicted obligation to support the Hungarian project (EURTOP) to compile a *Twenty-four language Dictionary of European Topographic Terms*. Such over-ambitious projects are extremely oppressive and impractical.

In 1980 the misleading name of the commission – Cartographic Technology – was changed into the equally confusing title of Commission on Map Production Technology, under which name it was promoted to the level of a Standing Commission in 1984. It may be assumed that the new commission's name anticipates its merging with the sister commission on Automation or Advanced Technology. Since 1980 its terms of reference have included obligations extending far into the field of automation.

Thematic Cartography

In the period 1964-1968 member countries proposed the formation of new commissions on the following subjects: 1. Copyright, 2. Standardisation of conventional symbols, 3. Thematic

mapping, 4. Colour reproduction and 5. Cartographic bibliography, 6. Study of base maps for international thematic mapping projects. The choice was not difficult. Already at the Amsterdam Conference (1967), the Association, so far predominantly oriented towards topographic mapping, had extended its field by successfully including expanding thematic cartography in its programme. Further responding to the sharply increasing demands in this unexplored field, (also bearing in mind UNESCO's interest in the subject), in 1968 the Third General Assembly selected a Commission on Thematic Cartography from the palette of possibilities. Professor Victor Sotchava, geobotanist-cartographer, Head of the Geographical Institute in Irkutsk (USSR) was elected chairman. The Commission was launched with the following terms of reference: 1. To broaden and reinforce international cooperation in the studies of the problems of thematic cartography and to lend all possible assistance to its development, 2. As a first task to study questions of the improvement and possible standardisation for international thematic mapping in the fields of physical, human and economic geography.

From the very beginning the Commission suffered from this long-winded, diffuse task description. At Stresa (1970) Chairman Sotchava in an attempt to give concrete form to the problems to be faced presented a programme of present and future activities, which unfortunately complicated the matter even further. He recommended that the Commission should promote agreements with organisations involved in international thematic mapping, 2. To make an inventory of the thematic mapping projects, completed and in preparation, 3. To provide cartographic guidelines for thematic mapping projects for long term economic, social and geographical forecasting, 4. To organise seminars on the graphic principles applied in analytical and synthetic mapping, 5. To promote the standardisation of symbols on thematic maps, particularly on geomorphological, soil, geobotanical, tourist and transport maps, 6. To promote uniform approaches of generalisation of special information on thematic maps, 7. To stimulate the publication of national reports on the state-of-the-art in thematic mapping. Sotchava's report met a rather cool reception. Apart from the fact that this programme was considered much too extensive, some felt – as O'Brien (UK) put it – "it was too deeply concerned with standardisation of symbols and the promotion of official projects for international thematic map series, to the neglect of the role of thematic mapping in communication, teaching and research".

At Ottawa (1972) the Commission was taken over by Professor Sándor Radó (Hungary), advocate of thematic cartography and experienced in international cooperation. He was supposed to encourage the establishment of national working groups on thematic mapping, to promote the compilation of national reports on the subject and to improve and to perfect standard systems for mapping natural resources and human activities.

As far as the working groups were concerned, Radó mainly concentrated on Third World countries, without achieving more than vague promises. Apparently the time was not ripe for these actions. To stimulate the national reports Radó distributed an English version of a French state-of-the-art paper (presented at Ottawa 1972) to all member countries, without any encouraging response. Neither did chairman Radó succeed in arousing enthusiasm for standardisation of map symbols. What could not be achieved from Irkutsk was equally impossible for Budapest. In effect, the unwieldy body of thematic mapping proved to be unmanageable when approached within these general terms of reference.

Radó's re-election as Commission chairman in 1976 did not open new perspectives. On an ICA-UNESCO mission to Nigeria, where a seminar on Natural Resources Mapping was to be organised, the chairman and the President were involved in a car accident near Lagos, which resulted in a loss of impetus and the shelving of the project.

In more than one sense, however, the Radó commission left its mark. In his crusade for thematic mapping, Radó persuaded the UN Cartography Section to pay attention to thematic

mapping and to devote one of the issues of *World Cartography* (so far exclusively dealing with topographical mapping) to this subject. Further, it was upon Radó's initiative, that steps were taken to change the IGU Commission on National and Regional Atlases into a joint ICA-IGU Working Group on Environmental Atlases. In 1980 the Sixth General Assembly at Tokyo discontinued the experiment to establish a commission on the whole field of thematic cartography. With the creation of a new commission on "Thematic Mapping by the Aid of Remote Sensing" under Professor A. Ciolkosz (Poland), a successful new course was taken. At the Perth Conference (1984) the Commission presented a useful *Selected Annotated Bibliography on Application of Satellite Images to Thematic Mapping* compiled by A. Ciolkosz and T. Baranowska and edited by the Canadian members of the Commission A. Kesik and W. Kresovic. On the same occasion Jean Denegre (France) took over the chair of the Commission, which in view of the envisaged launching of the SPOT satellite seemed promising.

Cartographic Communication

The interest in cartographic communication i.e. the process of communicating chorological information by means of cartographic methods, has received much attention in recent decades. There is no doubt that the development of this new field has been fostered at ICA conferences, seminars and in publications. It all began when cartographers, wondering about the effectiveness of their products, started to draw parallels and to seek links between their discipline and the theory of scientific communication. In his article *Maps and Models* (1967) Dr. Christopher Board (UK) was one of the first who showed the resemblance between the cartographic system and the general model of communication. At the fourth ICA conference in New Delhi (1968) Antonin Kolacny (Czechoslovakia) presented an inspiring paper on cartographic information, based upon an elaborate research programme of the efficiency of cartographic symbols, and illustrated by a diagram of cartographic information that inspired discussion and has often been reproduced. The Executive Committee followed Kolacny's suggestion and established an ICA Working Group on Cartographic Information (later renamed Cartographic Communication) under his guidance. At the first meeting in Prague in October 1969 the Working Group, further consisting of Dr. Board (UK), Dr. Ostrowski (Poland), Professor Ratajski (Poland) and Ing. Hasek (Czechoslovakia) made a start on terminology clarification while at the same time research subjects were formulated to serve as terms of reference for a future commission. Unfortunately, Kolacny's leadership was shortlived because of his involvement in politics during the Prague Spring from 1968 onwards. Thus, he was unable to draw warmth from the fire he started. The profession, however, is still indebted to him for his vision and penetrating analysis by which he shed light on the problem of cartographic communication.

The chair of the working group was taken over by Lech Ratajski (Poland), whose name in the records of ICA will be associated with the efforts to strengthen the theoretical foundations of cartography, by treating it as a part of the science of communication. He was an inspiring leader of the Working Group, and later of the Commission, who, though drawing back from the integral application of information theory, continuously revived and stimulated discussion by launching new, challenging ideas. Among them was the introduction in Ottawa (1972) of the term "Cartology" i.e. the essential science of cartography, the theoretical superstructure of applied cartography (the practical activities involved in map making). Cartology – according to its initiator – includes the theory of cartographic transmission, which has its roots in the general theory of communication and is explained with the aid of models such as those of Board and Koláčný which he refined. Among other things, he added "the degree of transmission correctness" which in effect measures the loss of information in the transmission process. He succeeded in getting his working group promoted to a Commission on

Cartographic Communication by the Fourth General Assembly in 1972 with the following terms of reference:

1. To elaborate basic principles of map language,
2. To evaluate both the effectiveness and the efficiency of communication by means of maps and
3. To develop the theory of cartographic communication.

These ambitious terms of reference did not temper Ratajski's enthusiasm. He initiated a bibliographic inventory of relevant publications on the subject of his commission, which was completed by Dr. Board (UK) and presented to the Conference in Moscow (1976). With Board's assistance he organised the successful International Symposium on Cartographic Communication in London in 1975. Further, he had a keyword list prepared on 42 terms on theoretical cartography, together with their definitions, for inclusion into the MLD. The Commission's activities were rewarded by its continuation by the Fifth General Assembly in 1976, this time with the following more realistic terms of reference:

1. To prepare a working model of cartographic communication and a list of research problems in this field and
2. To compile a revised second edition of the bibliography.

At the first meeting of his second term in Hamburg in September 1977, the Commission agreed upon Ratajski's proposal that a volume of essays on cartographic communication be prepared by the collective effort of its members. His untimely death a few weeks later, in November 1977, was a severe blow to the Commission and to the Association as a whole. Neither the proposed revision of the bibliography nor the Volume of essays were ever completed. Dr. Board (UK), one of the pioneers in Cartographic Communication, was found willing at short notice to take over the Commission as acting chairman. His position was formalised in 1980 when the Sixth General Assembly at Tokyo extended the Commission for another four years with the following terms of reference:

1. To complete and publish a Bibliography of Cartographic Communication, as envisaged in the terms of reference, approved by the General Assembly in Moscow in 1976.
2. To prepare a publication on Cartographic Communication stressing the elements and processes within models of cartographic communication as an essential framework for future research tasks in cartography.
3. To initiate a publication on the application of the concepts and methods of cartographic communication. This publication was intended to provide guidance on the choice of the various graphic elements of map design.

Board's chairmanship coincided with increasing doubts as to the value of the work of the Commission. Critics, though admitting that the wealth of literature and the accompanying diagrammatic models (Board, Koláčný, Ratajski, Muehrcke and others) had contributed to the understanding of the process of map communication, stated that the results had very little to offer in the way of improving map design. The research of the workers in this field was criticised for being irrelevant to the realities of map making. Moreover, researchers had mainly concentrated on small scale and thematic maps and neglected topographic and relief maps. Board understood that work had to be done to explore the applications of the more abstract notions to the practical problem of map design, production and use. In 1983 he organised a second symposium on Cartographic Communication in London with the objective of demonstrating how theories of cartographic communication could be developed and tested in the practice of map production and map use. Hence, a number of experts – geographers, cartographers and psychologists – were invited to present opinions with regard to this interface between principle and practice. Their combined papers were published under the title *New Insights in Cartographic Communication* in Volume 21 of the Monograph series of Cartographica (1984) and presented at the Perth Conference. In 1984 the Commission on

Cartographic Communication was split up into two Working Groups, one concentrating on Concepts and Methodology under Professor Freitag (FRG), the other on Map Use under Dr. Board (UK).

Marine Cartography

The history of the Commission on Marine Cartography may serve as an example of the careful way commissions were launched. At the ICA conference held in Stresa (1970) a Round Table discussion was held under the chairmanship of Captain Aldo Machiavelli, Director of the Hydrographic Institute of the Italian Navy at Genua. It examined the problem areas of Marine or Oceanic Cartography, in particular those posed by the cartographic representation of oceanographic parameters, and investigated whether the creation of a special ICA Working Group or Commission would be justified. In its report the Round Table concluded that a real necessity existed to treat the problems related to marine or oceanic cartography within the organisation of the ICA, where they have so far not been accorded sufficient attention. It was therefore recommended that a small Working Group be formed to study the matter and present a report at the Conference in Ottawa (1972).

The Executive Committee gave the green light for the recommended working group on Marine Cartography and found Captain Victor A. Moitoret, US Navy (Retired), one of the three Directors of the International Hydrographic Bureau (IHB), Monaco, willing to take its chair. Moitoret, with plenty of drive, recruited his members and in consultation with the Canadians organised the envisaged session in Ottawa (1972), where eight speakers of Hydrographic and Oceanographic Offices introduced oceanic cartography as a separate subject area. Their collective papers were published under the title *Oceanographic Cartography* as ICA Publication nr. 1. From the beginning the Working Group confined itself exclusively to problems of portraying oceanographic data, other than those on navigational charts, in order not to overlap or duplicate the work of the IHO, which had already addressed itself to this area for more than 50 years.

Captain Moitoret was succeeded as Working Group chairman by the Canadian Hydrographer Adam J. Kerr, under whose equally efficient guidance the working group enjoyed a further encouraging response. At a meeting in London (1973), in cooperation with observers from the Scientific Committee on Oceanic Research (SCOR) and the International Hydrographic Bureau (IHB) the desirability was discussed of a more permanent international contact between oceanographers, hydrographers and cartographers in the form of an ICA commission, for which, anticipating the Executive Committee's reaction, the following task was recommended: 1. To advance the study of cartographic problems in oceanography, 2. To explore methods of cartographic representation of oceanographic data (such as the presentation of three dimensional water masses and, when parameters change with time, the presentation of the four dimensional aspects of the oceanographic environment), 3. To maintain close relation and liaison with SCOR and IHB.

In 1975 the Working Group held a joint session with the ICA Commission on Automation at ITC, Netherlands, during which another nine papers were presented. An important result of this meeting was the decision to produce a reference manual or guidebook on the use of cartography for oceanographers as a means of informing them of the possibilities of the graphic medium. This was to be the major objective of the group when, in recognition of its valuable contribution, it was promoted to Commission level with Adam Kerr as chairman in Moscow, 1976. The envisaged publication, entitled *The Dynamics of Ocean Cartography*, edited by Adam Kerr appeared as Monograph 25 of *Cartographica* in 1980 upon which chairman Kerr stepped down and was succeeded by Dr. Linton (UK). The latter concluded his first term of office in 1984 with yet another publication (together with NERC, London)

entitled *Methods of Display of Ocean Survey Data*, which was presented to the Perth Conference (1984).

Urban Cartography

The growing demand for detailed thematic maps of urban centres for administration and planning and the specific problems of representing densely packed, continuously changing three-dimensional urban data resulted in the establishment of a Commission on Urban Cartography in 1980. The commission was led by Professor Y. Masai (Japan) and Professor H. Pape (FRG), representing two leading countries in the field. From the outset it displayed great activity, demonstrating that a commission could be successful even without a preceding working group stage. Masai and Pape organised a series of meetings in Düsseldorf, Warsaw, Sofia and Perth and twice published a collection of papers. The commission was continued again under Masai as an Ad Hoc Commission for another term by the Seventh General Assembly at Perth (1984). As urban mapping may be considered one of the driving forces of present day cartography, the status of standing commission would undoubtedly be justified for this enthusiastic group.

History of Cartography

The Association, adhering to de Brommer's definition of cartography, would not be complete without – as Robinson put it – "giving recognition to the roots of its subject and taking official cognizance of the study of its heritage". A Working Group on the History of Cartography was therefore established in 1972. It would have been obvious to seek for cooperation or even amalgamation with the International Society for the History of Cartography, but owing to its many non-cartographic members, this idea was not feasible.



Figure 22. Carto-historians planning ICA's future. From left to right, Eila Campbell, Cor Koeman and Helen Wallis

The ICA Working Group, in 1976 promoted to Commission level, was capably chaired for 12 years by Dr. Helen Wallis, a welcome colleague in the predominantly male preserve of the cartographic community. Often against the background of exhibitions of ancient maps in the respective host countries, she succeeded in organising interesting conference sessions, which were welcome intermissions between the floods of technical papers and grew to become highlights of the programmes. As the Commission's main term of reference, Dr. Wallis accepted the task of investigating the history of cartographic techniques and map production before 1900. The Working Group chose to fulfil its obligations by preparing a historical

glossary of cartographic innovations and their diffusion, how processes and techniques began, when materials were first used and so on. From the first, the compilation of the Glossary was conceived as an international project, to include innovations in all countries and cultures. Assisted by Professor A.H. Robinson as a co-editor, Dr. Wallis succeeded through her commission members, in securing the collaboration of 98 scholars in 16 countries who together prepared 191 entries. In 1976 at the Moscow conference a preliminary study of 26 samples entries was presented to demonstrate the form and scope of the project. During further preparation work new facets of developments were revealed and new entries were added so that as it neared completion the glossary had grown into a real handbook. Due to the unavoidable delays inherent in every international project, progress was much slower than anticipated. However, at the time of writing the manuscript was complete and printing and publication in sight.

COMMISSIONS, WORKING GROUPS AND TERMS OF REFERENCE 1964-1984

ICA COMMISSIONS 1964-1968

Commission I: Training of Cartographers.

Chairman Ingénieur en-chef Stéphane de Brommer (France).

Terms of reference: 1. To collect information on the different systems of training of cartographers now used in all member countries; 2. To collate this information according to various technical and professional levels and age groups of those under training; and 3. To make this information available in as concise and convenient a form as possible.

Commission II: Definition, Classification and Standardization of Cartographic Terms.

Chairman Prof. Dr. Emil Meynen (Federal Republic of Germany)

Terms of reference: 1. To make a list of terms (to be defined) designating the principal cartographic documents; 2. To make a list, in a logical sequence, of the essential operations involved in the preparation of those documents and of the terms (to be defined) which describe such operations; 3. To prepare a short, but sufficient, definition of each of the terms chosen (for the documents and for the operations); 4. To prepare a classification of maps, charts and cartographic documents in accordance with a methodically established inventory; 5. To prepare a simplified glossary of the corresponding terms in the principal languages.

Commission III: Automation in Cartography.

Chairman Granville K. Emminizer (USA)

Terms of reference: To study and evaluate automated aids for the cartographer.

ICA COMMISSIONS AND WORKING GROUPS 1968-1972

Commission I: Education in Cartography.

Chairman: Stéphane de Brommer (France). Terms of reference: Having completed its initial task the Commission is invited to pursue the studies essential for the education of Cartographers, to collect the necessary information and to make appropriate recommendations.

Commission II: Definition, classification and standardization of cartographic terms.

Chairman: Prof. Dr. Emil Meynen (FRG) Terms of reference: 1. To make a list of terms (to be defined) designating the principal cartographic documents; 2. To make a list in logical sequence of the essential operations involved in the preparation of these documents and of the terms (to be defined) which designate such operations; 3. To prepare a short, but sufficient definition of each of the terms chosen; 4. To prepare a classification of maps, charts and cartographic documents following a methodically established inventory and 5. to prepare a simplified glossary of the corresponding terms in the principal languages.

Commission III: Automation in Cartography.

Chairman Morris M. Thompson (USA)

Terms of reference: To study and evaluate automated aids for the cartographer.

Commission IV: Thematic Cartography.

Chairman: Prof. Victor Sotchava (USSR) Terms of reference: 1. To broaden and reinforce international cooperation in the studies of the problems of thematic cartography, and to lend all possible assistance to its development; 2. To study questions of the improvement and standardization possible for international thematic maps in the field of physical, human and economic geography

Working Group: Cartographic Information.

Chairman: Dr. A. Koláčný (Czechoslovakia) Terms of reference to be determined.

ICA COMMISSIONS AND WORKING GROUPS 1972-1976

Commission I: Education in Cartography.

Chairman: Prof. Dr. Ir. C. Koeman (Netherlands) Terms of reference: 1. To prepare a second more selected and more detailed edition of the Catalogue of Institutions providing instruction in cartography; 2. To compile a Syllabus of Manuals for Instruction; 3. To consider the possibility of the preparation of a manual for instruction for international use for W4 level.

Commission II: Definition, Classification and Standardisation of Technical Terms in Cartography.

Chairman: Prof. Dr. E. Meynen (FRG) Terms of reference: 1. To start the preparation of a second revised edition of the Multilingual Dictionary immediately after the publishing of the first edition; 2. To collaborate with the National Working Groups in editing national dictionaries; 3. To encourage national standardisation of technical terms in cartography.

Commission III: Automation in Cartography.

Chairman Gordon E. Stine (USA)

Terms of reference: 1. To study the application of automated procedures, in particular of numerical mapping techniques; 2. To collect and disseminate at appropriate intervals information on the results of these studies to ICA member countries; 3. To develop and distribute a comprehensive bibliography on automation in cartography; 4. To produce and distribute a glossary of terms and definitions pertaining to automation in cartography

Commission IV: Thematic Cartography.

Chairman: Prof. Sándor Radó (Hungary) Terms of reference: 1. To propose standard systems of thematic mapping of natural resources and human activities; 2. To encourage the

establishment or development of national working groups on thematic mapping; 3. To encourage the compilation of national reviews of the situation and perspectives of thematic mapping; 4. To cooperate with other ICA and IGU commissions, especially with the commission on National and Regional Atlases of the IGU.

Commission V: Cartographic Communication.

Chairman: Prof. Dr. L. Ratajski (Poland) Terms of reference: 1. To develop a theory of cartography; 2. To elaborate on the basic principles of map language; 3. To evaluate of both the effectiveness and the efficiency of communication by means of maps.

Commission VI: Cartographic Technology.

Chairman Prof. E. Spiess (Switzerland) Terms of reference: 1. To review current techniques and processes; 2. To disseminate information on techniques and processes to member countries.

Working Group I: History of Cartography.

Chairperson Dr. Helen Wallis (United Kingdom) Terms of reference: To promote the study of the history of cartographic techniques and map production before A.D. 1900.

Working Group II: Oceanic Cartography.

Chairman Adam J. Kerr (Canada) Terms of reference: 1. To advance the study of cartographic problems of oceanography; 2. To facilitate representation of oceanographic data; 3. To maintain a close liaison with the Scientific Committee on Oceanic Research and the International Hydrographic Organisation with the object of promoting cooperation and avoiding duplication; 4. To confine the attention to Thematic Oceanic Cartography excluding navigational charts and inter alia to consider whether to recommend the establishment of a Commission on Oceanic Cartography by ICA General Assembly in 1976.

ICA COMMISSIONS AND WORKING GROUPS 1976-1980

Commission I: Education in Cartography.

Chairman: Prof. Dr. Ir. C. Koeman (Netherlands) Terms of reference: Preparation of a Multilingual Base Manual in Cartography for international use.

Commission II: Multilingual Dictionary of Technical Terms in Cartography.

Chairman: Prof. Dr. Emil Meynen (FRG)
Terms of reference: Preparation of a revised second edition of the Multilingual Dictionary.

Commission III: Automation in Cartography.

Chairman: Dean T. Edson (USA) Terms of reference: 1. To organise an International Seminar in East Africa in 1978 in close cooperation with the Executive Committee on the possibilities and requirements of cartography in developing countries. The seminar should concentrate upon problems related to the application of automated systems for natural resources inventories; 2. To cooperate with experts of the International Society of Photogrammetry in an Inter-Association Working Group on Automation in Cartography

Commission IV: Cartographic Communication.

Chairman: Prof. Dr. L. Ratasjki (Poland) Terms of reference: 1. To prepare a working model of cartographic communication and a list of research problems in this field; 2. To compile a revised bibliography of publications on Cartographic communication.

Commission V: Cartographic Technology.

Chairman: R. Groot (Canada)

Terms of reference: 1. To prepare publications on a) colour proofing systems, b) register systems and c) cartographic techniques; 2. To evaluate the techniques for the production of multicoloured maps in small runs.

Commission VI: History of Cartography.

Chairperson: Dr. Helen Wallis (United Kingdom) Terms of reference: 1. To compile a Historical Glossary of Cartographic Innovations and their diffusion prior to 1900; 2. To prepare and publish a third edition of the Directory of current research workers and projects in the History of Cartography.

Commission VII: Oceanic Cartography.

Chairman: Adam J. Kerr (Canada) Terms of reference: To prepare a publication of a set of reference papers to serve as a guideline to oceanographers involved in thematic mapping.

Commission VIII: Mapping of Natural Resources.

Chairman: Prof. Dr. Sándor Radó (Hungary) Terms of reference: To make recommendations regarding the international mapping of natural resources in close cooperation with UNESCO through the ICA administration.

Commission IX: Base Maps for International Thematic Mapping.

Chairman: Jean Carré (France)

Terms of reference: To make recommendations regarding the requirements of small scale maps to be used for the international mapping of natural resources, in cooperation with UNESCO, with special attention to matters such as scales, projections, base data, presentation and costs.

Joint ICA-IGU Working Group: on Environmental Atlases.

Chairman: Prof. Dr. F. Vazquez Maure (Spain) Terms of reference: 1. To accumulate documentation on existing environmental atlases and maps; 2. To analyse these atlases and maps in order to compare the subjects represented and the methods of presentation used; 3. To recommend directives for the production of environmental maps and atlases.

ICA COMMISSIONS AND WORKING GROUPS 1980-1984

General Responsibilities for All Commissions

1. To disseminate information on their subject matter to the ICA member countries.
2. To continue the implementation of the ICA Third World Policy by providing experts for workshops in developing countries when requested.
3. To coordinate their activities with other ICA Commissions, whenever possible.
4. To coordinate activities with Commissions of other international organizations if this is in the interest of the aims and objectives of ICA.
5. To appoint co-chairmen, who will be able to take over in case of illness, etc. of chairmen.

Commission A: Continuing Education in Cartography

Chairman: Dr. K.H. Meine (FRG) Terms of reference: 1. To study the need for and to recommend ways of promoting continuing education in Cartography; 2. To prepare course outlines and exercises to enhance the value of the Basic Manual of Cartography; 3. To develop a strategy to encourage fuller participation of women in Education and Training Programs in Cartography.

Commission B: Map Production

Chairman: Mr. K. Burmester (Denmark) Terms of reference; 1. To develop a technical exchange procedure between the members of the Commission at the Research and Development project level to insure that the Commission stay abreast of the state-of-the art of cartographic technology; 2. To report on computer techniques employed in the production of text, labels and names on maps; 3. To complete and to publish the Manual on Cartographic Techniques as envisaged in the terms of reference approved by the 5th General Assembly held in Moscow in 1976; 4. To complete and publish a review on shortrun multicoloured map reproduction as envisaged by the General Assembly in Moscow in 1976.

Commission C: Computer-Assisted Cartography.

Chairman: Lowell Starr (USA)

Terms of reference: 1. To develop a technical exchange procedure between the members of the Commission at the Research and Development project level to insure that the Commission does, indeed, stay abreast of the state-of-the-art technology and computer assisted techniques associated with cartography; 2. To establish a coordinating officer within the Commission to work directly with appropriate Commission representatives from the International Society of Photogrammetry and Remote Sensing (ISPRS) and Fédération Internationale des Géomètres (FIG) to implement the resolutions which were drafted at the joint FIG, ICA, ISP Conference in Zürich in 1979.

Commission D: Communication in Cartography.

Chairman: Dr. C. Board (UK)

Terms of reference: 1. To complete and publish a Bibliography of Cartographic Communication, as envisaged in the terms of reference, approved by the General Assembly in Moscow in 1976; 2. To prepare a publication on Cartographic Communication stressing the elements and processes within models of cartographic communication as an essential framework for future research tasks in Cartography; 3. To initiate a publication on the application of the concepts and methods of cartographic communication. This publication is intended to provide guidance on the choice of the various graphic elements of map design.

Commission E: Thematic Mapping by the Aid of Remote Sensing.

Chairman: Prof. A. Ciolkosz (Poland) Terms of reference: 1. To investigate methods of utilizing satellite imagery for the preparation of thematic maps; 2. To collect literature related to the theme and to publish a relevant bibliography; 3. To prepare a publication containing selected articles related to the theme.

Commission F: History of Cartography.

Chairperson: Dr. Helen Wallis (UK) Terms of reference: 1. The completion and publication of the English edition of the Glossary of Cartographic Innovations prior to 1900; 2. The development and promotion of revised foreign language versions of the Glossary.

Commission G: Marine Cartography.

Chairman: Adam Kerr (Canada) Terms of reference: 1. A review of Coastal Zone mapping on a global basis; 2. An examination of cartographic methods of depicting data collected by new data collection methods.

Commission H: Census Cartography.

Chairman: Prof. Dr. U. Freitag (FRG) Terms of reference: 1. To review existing procedures for pre-census mapping, especially the delineation of census areas, and establish guidelines for future work with special reference to the needs of developing countries; 2. Recommend methods and standards for post-census cartography with special reference to the application of computer-assisted cartography in census map compilation and production.

Commission I: Base Maps for International Thematic Mapping

Chairman: J. Carré (France)

Terms of reference: 1. To make recommendations regarding the requirements for base maps to be used in international thematic mapping. Special attention will be paid to matters such as scales, projections, data collection and presentation, costs, and delays. These recommendations should be directed towards interested international organisations through the ICA-administration; 2. To prepare a publication on the subject.

Commission J: National and Regional Planning Cartography

Chairman: Prof. B. Winid (Poland) Terms of reference: 1. To survey the specific cartographic aspects of graphical representation and production of national, regional and urban planning maps in view of the dynamic character of the various levels of planning; 2. To prepare and to publish a bibliography of atlases for national, regional and urban planning.

Commission K: Urban Planning and Urban Cartography

Chairman: Prof. Yasuo Masai (Japan) Terms of reference: 1. To review existing topics in urban and urban planning cartography in order to identify the topics and representations which seem to be generally required for this category of maps; 2. To prepare a recommended master legend for land use and planning restriction maps for urban planning at scales larger than 1:50 000 as an aid to international standardisation in cartography; 3. To identify future research required for planning cartography.

Inter Association Working Groups, 1980-1984

A. Joint ICA-IGU Working Group on Environmental Atlases

Chairman: Dr. F. Vazquez Maure (Spain) Terms of reference: 1. To continue the publication of reviews and essays on environmental maps; 2. To explore the means of presentation of environmental conditions and factors; 3. To explore the development of data bases for environmental factors; 4. To establish exchange of information among IGU and ICA commissions and Working Groups concerned with similar subjects.

B. Joint ICA-IFLA Working Group on Documental Aspects of Cartographic Materials

Chairman: To be nominated by IFLA Terms of reference: 1. To study the existing IFLA rules for the documentation of maps and related documents; 2. To give recommendations for a revised edition of these rules if necessary; 3. To study the consequences of the practical implementation of the possible new rules in map production.

C. Joint ICA-FIG-ISP Working Groups

Terms of reference for respectively three sub-working Groups 1. To study the classification of features for digital topographic mapping; 2. To study design and structure of data bases most suitable for digital topographic information systems; 3. To study basic capabilities needed in interactive editing systems for photogrammetric and cartographic applications in digital topographic mapping. The above mentioned Working Groups will report on the result of their work to the 11th ICA Conference In Warsaw, 1982 and of their work to the 1982 ISP Commission IV Symposium. ICA will be responsible for the Working Group mentioned under 1. The Chairman of this Working Group will be nominated by the Chairman of the Commission on Computer Assisted Cartography in consultation with the Executive Committee.

COMMISSIONS AND WORKING GROUPS ESTABLISHED BY GENERAL ASSEMBLY IN 1984

Commission on Training and Education

Chairman: Dr. K.H. Meine (FRG) Terms of Reference: 1. To produce an Exercise Manual to accompany the ICA Basic Cartography for Students and Technicians.

Long Term: 1. To conceptualise, design and assist in the implementation of workshops and seminars for the purpose of technology transfer, integration and updating.

Commission on Map Production Technology

Chairman: K. Burmester (Denmark) Terms of Reference: 1. To revise and publish the second edition of the ICA publication Colour Proofing Systems in Cartography; 2. To elaborate and publish a "Compendium of Cartographic Technology"; 3. To study and report on planning and control of map production and reproduction; 4. To support the Twenty-four Language Dictionary of European Topographic Terms and Abbreviations (EURTOP) which is to be published under the auspices of the commission.

Long term: 1. To report on manual cartographic production and reproduction at the research and development level; 2. To report on the application of proven computer technology in map production.

Commission on Advanced Technology

Chairman: L. Starr (USA)

Terms of Reference: 1. Continue the research and development report with plans for another issue coincident with the 8th ICA General Assembly; 2. Establish international collaboration and review of published national digital cartographic data standards, to facilitate the international exchange of cartographic information and data; 3. Actively participate in the organisation and facilitation of technology transfer symposia for any ICA member country (particularly developing countries) at their invitation. Long term: 1. Establish international standards for the exchanged digital cartographic data; 2. Establish a cooperative effort to develop a small geographic information system that can be used on an internationally available microcomputer.

Commission on the History of Cartography

Chairperson: Dr. H. Wallis (UK) Terms of Reference: 1. Publication in 1985 of Cartographical Innovations. An International Handbook of Mapping Terms to 1900, a glossary prepared by former Commission F; 2. Encouragement of the production of translations of the Handbook in other languages.

Long term: 1. To obtain from member countries bio-bibliographical records of their cartographers, to be compiled into an international dictionary of modern cartographers up to

the 1950's; 2. Complementary to this project, to establish and maintain an international archive of personal reflections in the developing history of 20th-century cartography.

Ad-Hoc Commission on Thematic Mapping from Satellite Imagery

Chairman: J. Denegre (France)

Terms of Reference: 1. To promote the use of space imagery in thematic cartography; 2. To collect, analyse and evaluate documents and information concerning remote sensing data acquisition, analyse and display cartographic information particularly that related to thematic mapping; 3. To collect material for a guide book (technical manual) presenting different techniques of elaboration of thematic maps based on remotely sensed data; 4. To organise a seminar on thematic mapping using remote sensing and spatial imagery in 1986.

Ad-Hoc Commission on Urban Cartography

Chairman: Dr. Y. Masai (Japan) Terms of Reference: 1. Inventorise, classify, define and make recommendations for urban maps and atlases – content and features, through a compilation and cataloguing of bibliographic citations and inventory of urban maps and atlases; 2. Create an inventory of urban cartographic features and design symbols and recommend internationally acceptable contents for urban maps and atlases.

Long term: 1. Design, develop and implement a pilot project and training program for urban cartographic systems in developing countries. Provide a team of experts and a resource system to support continuing development and training efforts for urban cartographic systems.

Ad-Hoc Commission on Tactual Mapping

Chairman: Dr. J. Wiedel (USA)

Terms of Reference: 1. To disseminate information on tactual and large print map design and production for the blind and visually impaired to ICA member countries to ensure the availability of cartographic products to all persons regardless of visual handicaps; 2. To develop a technical exchange procedure between the members of the Commission at the Research and Development project level to ensure that the Commission stays abreast of state-of-the-art technology in mapping for the blind and visually impaired; 3. To maintain and arrange for distribution a recently prepared (April 1984) bibliography on mapping for the blind and visually impaired to ensure the availability of current research materials for ICA member countries.

Ad-Hoc Commission on Marine Cartography

Chairman: R. Linton (UK)

Terms of Reference: 1. Consider the design and content of the new style ocean maps which would be based on data a magnitude more complex than has been available in the past (e.g., side scan sonar data, digital bathymetry, data from SEASAT, SAR, ocean current and wave data); 2. Review of the design and content of yachting and small craft charts in coastal waters and estuaries.

Ad-Hoc Commission on Population Cartography

Chairman: R. Marx (USA)

Terms of Reference: 1. To compile an inventory of maps used in conducting the collection of data on population in various countries, and to suggest an optimal methodology and design for the production of these maps; 2. To analyse existing population maps of metropolitan regions, to suggest methods, design and content, criteria for basic population maps

(population density, change, and fertility maps), and to prepare a set of population maps using suggested criteria for a selected metropolitan area in a Third World country.

Working Group on the Cartographic Enterprise

Chairman: G. McGrath (The Netherlands/Canada) Terms of Reference: 1. Enlist the participation of a variety of cartographers actively involved in the public, private and educational sectors of the cartographic enterprise in a variety of countries, to: a. Define market demands for cartographic information in both analogue and digital forms; b. Define the type of management information to meet the demands for cartographic information; c. Investigate the relationships between the definition of policy on the cartographic enterprise and its effects on the market for cartographic information; 2. To publish a special ICA publication in 1987 on the findings.

Working Group on Concepts and Methodology in Cartography

Chairman: Dr. U. Freitag (FRG)

Terms of Reference: 1. Compilation of a bibliography on the various concepts which were developed in and adapted to cartography over the last decades. Based on the work of the Commission on Communication the new commission should try to evaluate and systematically arrange the publication of the last decades in ways that clearly show the preference of specific concepts in various language regions; 2. Establishment of a new framework for the international cartographic bibliography which reflects the newly developed, the established, and the acknowledged concepts and methods in cartography; 3. Working out of a conceptual frame for the research work and need in experimental and empirical cartography and putting it for discussion to other ICA commissions. The frame could serve as a stimulus for the coordination of cartographic research in various member countries of the ICA; 4. The Working Group should closely observe the development of concepts and methodology in cartography and report on it to the ICA conference in 1987.

Working Group on Map Use

Chairman: Dr. C. Board (UK)

Terms of Reference: 1. Investigate the methods of map use with the intent to a. advance cartographic theory, b. improve the standard of map use, and c. improve the effectiveness of map design; 2. Detail how different types of readers use maps differently and catalogue such methods in a series of reports.

Joint ICA-IFLA Working Group on Documentation in Cartography

Chairman: Dr. J. Neumann (FRG) Terms of Reference: 1. To provide a standard for marginal information on cartographic materials; 2. To undertake a feasibility study for an international standard cartographic code, including the use of ISBN's and bar codes for maps.

Long term: 1. To collaborate in the design of a standard for the exchange of cartographic information in digital form; 2. To investigate and report on the implications of the new developments in cartographic information systems (geodata, cartographic data and remote sensing) for documentation and library records.

Joint ICA-IGU Working Group on Environmental Maps and Atlases

Chairman: D.P. Bickmore (UK)

Terms of Reference: 1. Prepare a detailed design study (with examples) for a Digital World Base Map for Environmental Science; 2. Present the plans at international meetings of associated disciplines; 3. Present a final report to both ICA and IGU at their next congresses.

Publications

REVIEW OF PUBLICATIONS

Introduction

Prior to the foundation of the ICA and in its early years, reports and proceedings of the Association were generously printed, published and distributed – ten copies to each member country – at very reduced costs by the *Institut für Angewandte Geodäsie* (IfAG) Frankfurt am Main, under the auspices of its Director Professor Erwin Gigas, Secretary-Treasurer ICA 1959-1964. In this way the proceedings of the Esselte Conference (1956) and those of the Chicago Conference (1958) were issued in the house journal of IfAG, the *Nachrichten aus dem Karten- und Vermessungswesen* while the report of the First General Assembly in Paris 1961 including the official addresses, the ratified Statutes and 23 country reports presented on that occasion, appeared in the so-called ICA Bulletins Nos 1 and 2, issued as special numbers of the IfAG journal mentioned above. The newly started series came to an end with the ICA Bulletins Nos 3 and 4 containing the 27 papers presented at ICA's First Technical Conference at Frankfurt am Main 1962. This was because the resignation of Professor Gigas as Secretary-Treasurer in 1964 meant that other publication media had to be found.

International Yearbook of Cartography

Another possibility presented itself in the form of the International Yearbook of Cartography (IYC), launched simultaneously with the ICA itself, but independent from it, by C. Bertelsmann Verlag, Gütersloh, FRG, famous for its atlas production. The publisher was supported by seven foreign co-publishers and worked in close cooperation with Professor Imhof who served the IYC as its Editor for the first five years.

The mainspring which activated the IYC initiators partly overlapped the motives which stirred the founder members of the Association. Like the ICA the IYC was intended first of all to provide the cartographic profession with a forum for the interchange of ideas, experiences and innovations for which, it was assumed, there was an urgent need. As such, right from the beginning though unable to support the yearbook financially, the young Association welcomed it as being essential to the realisation of its aims and objectives. The initiative to start a cartographic yearbook in the early Sixties gives credit to its organisers and bears witness to their vision in the development of cartography. The fact that the Yearbook was started as a trilingual publication with articles in English, French or German, with abstracts in the other languages, added a special dimension to their undertaking. In the preface to the first edition (1961) Imhof defining the scope of the IYC, which corresponded with that of the Association, focused on the design and preparation of maps and charts, on drawing and reproduction techniques, on training of cartographers as well as on the history of mapping and the use of maps and charts.

According to Imhof in his Preface to the 1962 Volume, the IYC intended to publish technical information and developments in the international cartographic world in a more comprehensive manner and in greater detail than the existing regional and national reviews. Further, the Editor expressed his intention to publish information and reports of cartographic conferences, a plan naturally welcomed by the ICA. Indeed, in 1964 the publishers of the Yearbook offered to publish all papers presented at ICA conferences. Since by that time publication by IfAG had to be discontinued, the offer was gladly accepted. In 1965 therefore for the first time the IYC contained the complete ICA proceedings (papers and discussions), in this case those of the Edinburgh conference (1964). The ICA-Bertelsmann cooperation was recorded on the title page. Imhof's successor Professor Konrad Frenzel (FRG) proceeded with this editorial policy. He soon discovered, however, that, as the contributions to the

conferences increased in numbers, it required re-thinking as publication of the papers, country reports and official addresses presented at New Delhi (1968) occupied no less than two volumes (1969 and 1970).

The ICA, convinced of the significance of the Yearbook and keen on strengthening its influence in IYC matters, started negotiations and reached the following agreement with Publisher Bertelsmann (represented by Dr. W. Bormann) and the Austrian editors Prof. dr. E. Arnberger and Dr. F. Aurada, who had succeeded Dr. Frenzel in 1971.

To express the close relation with ICA the notice on IYC's title page, formerly "In collaboration with" was changed to "Under the auspices of while the Editorial Board was extended to include a member of the ICA Executive Committee. Further, it was decided to start a new publication policy. Every second year the IYC was to contain papers and discussions of the preceding ICA Conference, while the intervening editions were available for contributions not presented at these Conferences. Finally, the system of automatic publication of all ICA Conference papers was abandoned. Editors were granted freedom to make a selection from conference papers on the grounds of quality and exclusiveness. The 1971 edition was the first that was issued under the auspices of the ICA while at the same time the ICA Secretary made his debut as co-editor mainly dealing with the collection of the conference papers.

The ICA was never financially involved in the IYC. From the beginning however, it welcomed the Yearbook as a medium for internal and external communication and as such as an essential instrument in the realisation of its aims and objectives. From 1964 onwards the Association annually bought a number of IYC copies at discount prices for distribution to member countries – two copies per country later reduced to one – hoping that this would be beneficial.

Transfer to Kirschbaum Verlag

For many years ICA tried to strengthen its ties with IYC, to get a foothold in the Editorial Board in order to share the responsibility of the yearbook's content. On the whole these efforts did not bear much fruit. With its limited financial resources, being entirely dependent on voluntary help and government assistance, the Association was not in a position to make its presence felt and could offer little more than its goodwill which does not normally impress publishers.

Unfortunately, in the hard world of publishing, the demand for the Yearbook fell short of expectations and by the late 1960's sales proved to be scarcely adequate to keep it alive. One of the reasons was the trilingual character of the Yearbook, judged by many as a progressive asset but considered by others as a strange phenomenon in a world where the command of languages other than the native one is a privilege for the fortunate few. Despite the fact that over 25 years (volumes 1961-'85) 246 (56.4%) out of 436 articles were in English against 127 (29,1%) in German and 63 (14,5%) in French, sales in the English-speaking world were disappointing. In 1975 the total circulation amounted no more than 1200 and three out of the seven initial co-publishers outside FRG had terminated their involvement. In the same year Bertelsmann Verlag also lost interest in the Yearbook and transferred its publication rights to Kirschbaum Verlag, Bonn-Bad Godesberg, FRG, a name well-known in German publishing. This company was willing to make another attempt at continuing the IYC. At the same time Messrs Arnberger and Aurada were relieved of their duties and Director Georg M. Kirschbaum, and Dr. K.H. Meine took over as Editors.

Agreement with Kirschbaum Verlag

In 1974 the first volume of the IYC under the new regime was issued and presented personally by Director Kirschbaum to the ICA Executive Committee on the occasion of the Madrid Conference. This gesture showed the willingness of the publisher to continue and strengthen the relations with the Association. It was the beginning of a new series of negotiations between the two, resulting in the following agreement which, in broad outline, was almost identical to the last contract with Bertelsmann Verlag.

1. The publisher will ensure the multilingual content of the Yearbook. The proportion of the contributions in English, French and German will be approximately equal to that of previous editions. 2. The Yearbook will continue to reflect the scientific activities of the Association. However, it will not undertake automatic publication of all papers from ICA Conferences, but there will be a selection of the best contributions. 3. The editor of the Yearbook appointed by the publisher, will be supported by a Board of Advisers, comprising members of various technical and scientific branches of cartography and representing the main language groups English, French, and German. 4. The text on the IYC's title page "Under the auspices of (unter dem Schirmherrschaft) of the ICA" occurring in the volumes 1971-73 will be replaced by "In cooperation with the ICA". 5. Regular contact will be maintained between the Editor and the Association's President and/or Secretary-Treasurer to ensure a smooth-running relationship. 6. the Association shall support the publisher by promoting subscriptions to the IYC and by stimulating sales in the member countries.

Though the agreement of 1975 on a most important point – the formation of a Board of Advisers – remained a dead letter, it initiated discussions on a number of vital issues with Editor Dr. Meine, resulting in a series of ICA contributions to promote the IYC's sales. The Association repeatedly urged national cartographic journals to support the IYC by free advertising, it assisted in seeking out new sales agents in the USA and in Australia, it emphasised the IYC's value at conferences and seminars, and finally prepared an author's index and a subject matter index for the IYC volumes I-XXV. The results of these efforts were limited. Imhof's ambitions of the early 1960's were no longer realistic ten years later in a professional world, well-served by a growing number of cartographic journals providing up-to-date information with frequencies against which the IYC with its yearly interval between publications had no chance in the long run. Additional shortcomings may have contributed to the stagnation. In languages other than German – to quote a review in the British *Cartographic Journal* in 1983 – "grammar is not IYC's strongest point and textual errors are frequent. Further its abstracts are not particularly informative". This criticism, however, does not remove the fact that for a number of years the Yearbook was the only publication where the papers presented at ICA conferences or a selection of the more pertinent ones could be found. As such it fulfilled an important function in the cartographic community and contributed to the realisation of the Association's aims: the exchange of ideas and the spreading of cartographic knowledge. Its successive publishers and editors deserve our sincere appreciation.

Publications Committee

Once the publication of the Conference papers, or at least a selection thereof, was safeguarded, a solution had to be found for the papers, reports, progress results etc. generated by the efforts of the commissions and working groups. In 1972 upon President Robinson's initiative, the Executive Committee, exercising the right laid down in the Statutes, started an ad hoc Publications Committee which had its first meeting in Budapest in 1973. This paved the way for a permanent ICA Publications Committee (PC) which was inaugurated by the General Assembly in Moscow in 1976.

The PC consisted of 5 members with experience in publishing, selected by the Executive Committee, while further the President and the Secretary-Treasurer acted as ex-officio members. In addition, in practice ad hoc members were recruited as advisers as was Dipl.Ing. Rolf Böhme (FRG) for the German-speaking area, where various publishing activities were generated. Böhme's Ad Hoc advisership lasted more than 8 years!

The task of the Publications Committee was threefold: a) to set up a series of ICA publications, b) to function as the collection centre for the manuscripts presented to the Association for publication and c) to function as an Editorial Board for these publications. The executive was lucky to find Mr. Russel Voisin from Rand McNally Publishing Company, Chicago, willing to guide the Committee's hesitating steps. In 1976 Voisin was succeeded by Mr. Harold Fullard, an old hand in cartographic publishing and since 1938 on the staff of George Philip & Son, London. For almost ten years Fullard presided over the Committee, consolidated it, drafted its rules and procedures, corresponded with commission chairmen, authors and publishers and regularly reported to the Executive Committee and the General Assembly. Under Fullard's guidance the foundations were laid for 26 ICA publications, listed further in this chapter and, spread over the following subjects: Education 3, Automation 5, Oceanic Cartography 4, Production techniques 2, Terminology 2, Cartographic Communication 2, Remote Sensing 1, Environmental Cartography 2, Urban Cartography 2, and General 3. For his fine contribution, Fullard was awarded the Honorary Fellowship of the Association in Perth (1984). Because of its weak financial position the ICA was largely committed to voluntary editorial and technical assistance. As far as the former was concerned it soon became apparent that it was no easy matter to process manuscripts from authors, editors and advisers of different nationalities with diverse cartographic background and experience, from distant lands with unequal local support. Some of the commission chairmen and editors managed to overcome problems of this kind. Among them was Professor Emil Meynen (FRG) who succeeded in preparing the manuscripts for the first and second editions of the Multilingual Dictionary of Technical Terms in Cartography (MLD) with the assistance of some 150 international experts divided over 14 language areas (2nd edition 24!) in 7 and 8 years respectively. Other commission chairmen with less local support were not so successful and their projects dragged along for years or were abandoned altogether.

As far as the printing and binding of the publications was concerned, the combined efforts of the members of the publications committee and commission chairmen generated a chain of activities resulting in reproduction and printing capacity becoming freely available. With the exception of the MLD published by Steiner Verlag, Wiesbaden, FRG and *Basic Cartography* Vol. I, and *La Formation des Cartographes*, both produced on ICA's account with the financial assistance of UNESCO, all other publications were printed by extral mural sponsors such as the American Congress of Surveying and Mapping (ACSM); the Instituto Geográfico Nacional in Madrid; the ITC, Netherlands; the Survey of India; the University of Toronto Press; the University of Waterloo, Canada, etc. However beneficial, this working method did not leave room for the special typographic wishes of the Publications Committee. As far as size, format, type face, cover etc. were concerned the sponsor's rules had to be followed resulting in a lack of unity in the publication series.

As the Association was not equipped to distribute its publications the PC recommended that the task be assigned to a private firm, preferably a bookseller with international contacts. Rudolf Muller International Booksellers, Amsterdam, a small but dynamic private firm, fulfilled these requirements and was found willing – awaiting a more definite solution – to store the publications and to sell them. This provision was to become semi-permanent and for more than ten years Rudolf Muller acted as ICA's sales agent performing the hardly

profitable task of selling small quantities of low priced books, mostly one copy at a time, to a worldwide spread of buyers – libraries, institutes and private cartographers – keeping up correspondence, explaining delays and cancellations and serving as distribution centre for free copies to member countries and review copies to journals. The beginning, with one or two books was easy enough. Matters got more complicated, however, as the number of publications and sponsors increased and the Publications Committee had to make different arrangements with each. This more than once led to confusion and to the inconvenience for the sales agent, who at time experienced problems even in persuading sponsors to ship the printed books to Amsterdam to be stored and sold. Once there, Muller's limited storage capacity started to become a problem. By the time of the Perth conference (1984) his shelves were fully stacked with 20 publication series and the need for a new solution was imminent. In early 1985 negotiations were started with Elsevier Publishing Company, Amsterdam, to take over Rudolf Muller's task. In the meantime all concerned agree that sales agent Muller deserves warm thanks for his significant contribution to the promotion of the Association's aims and objectives. Moreover, and not unimportant, over the years 1974-84 Muller's assistance in selling ICA publications yielded for the Association a sum of Dfl. 40.000, or (based on an average rate of 2.8) some US \$ 15.000.

ICA Newsletter

Thanks to the kind cooperation of Professor Hans Boesch, IGU Secretary-General from 1956-68 and a great friend of cartography, the ICA was granted ample free space for communication in the semiannual Newsletter of the International Geographical Union, in 1969 renamed IGU Bulletin. To mark the affiliation with the ICA, the IGU kindly allotted the major part of the 1965 nr. 2 Newsletter issue to the ICA, in order to introduce itself to the geographic community and express its views on the opportunities of a closer collaboration. From then on for almost twenty years the IGU Newsletter/Bulletin contained a substantial section of ICA material, varying from 8-20 pages, collected and edited by the ICA secretariat, and carrying official business news, commission reports, titles of ICA publications, news from member countries etc. From its total circulation of about 10 000 copies, about 1000 were sent by IGU free of charge to the National Committees of ICA member countries, who were then responsible for further distribution to libraries, institutes and individual cartographers.

The free use of the IGU communication channel for many years contributed significantly to the coherence of ICA member countries. Apart from Professor Boesch, we pay tribute to his successors, the Secretaries-General Professor Chauncy D. Harris (1968-76) and Professor Walther Manshard (1976-84) and Mrs. Susan Squires (UK) assistant and later executive editor of the IGU Bulletin with all of whom there was a smooth operation. From 1972-76 the Bulletin was printed in the Netherlands and supervised and proof-read at the ICA Secretariat as a return gesture for its free use. Only in 1982 did the IGU request the Association to pay a share of US \$ 1000.- in the printing costs of the Bulletin for the period 1980-84, a request directly granted by ICA.

As the publication of the IGU Bulletin, owing to rocketing printing costs (estimated for 1980-84 at US \$ 35 000), was restricted and at times only appeared once a year, it gradually lost its function as a cartographic news medium. If the ICA had made a reasonable offer to share in the printing costs, most probably the regularity of the Bulletin could have been maintained. The Association, however, chose the alternative of creating its own separate Newsletter. The matter was raised at the Sixth General Assembly of Delegates in Tokyo, 1980, but for various reasons its realisation was delayed. Thanks to the initiative of Bernard V. Gutsell (Canadian member of the Publications Committee and founder and editor of the Canadian journal *Cartographica*) supported by Roger Anson (UK) (Chairman Elect of the Publications

Committee) and the cooperation of the University of Toronto Press, obstacles were removed and in June 1983 the first issue of the ICA Newsletter saw the light. The new publication which is issued in English twice a year contains communications of the Executive Committee, reports of the Commissions and Working Groups, information on ICA and other international conferences and General Assemblies and the inevitable Calendar of Events. Single copies are sent to ICA member countries, chairmen of Commissions and Working Groups, sister organisations and to editors of cartographic journals. Each of the recipients is requested to promote further distribution to interested agencies, institutes or individual cartographers. Comments on the appearance of the Newsletter have so far been complimentary and all of them constructive. It is gratifying to note that within a year of its launching two national journals have reproduced the ICA Newsletter in full in the original version. It is taken for granted that the ICA Newsletter will further serve its purpose and generate contacts between member countries, committees and commissions and working groups of the Association. It is further hoped that sister organisations, particularly IGU, ISPRS and FIG will draw freely on material contained within the Newsletter and will also supply details of their own activities for presentation in our documents, a practice that should lead to improved cooperation between practitioners in associated disciplines.

PUBLISHERS AND EDITORS IYC

Publishers:

1961-1973: Kartographisches Institut Bertelsmann, Gütersloh, FRG.

1973-present: Kirschbaum Verlag, Bonn-Bad Godesberg, FRG.

Editors:

1961-1966 Professor dr. E. Imhof, Switzerland 1967-1970 Professor dr. K. Frenzel, FRG

1971-1973 Professor dr. E. Arnberger/Dr. F. Aura-da, Austria

1974-1980 G.M. Kirschbaum/Dr. K.H. Meine, FRG

1981-1985 K. Kirschbaum/Dr. K.H. Meine, FRG

PUBLICATIONS COMMITTEE 1974-1984

1974

R.L. Voisin (USA) - Chairman, W. Kümmerly (Switzerland), H. Fullard (UK), Mr. Lendvay (Hungary) -Observer, F.J. Ormeling¹⁾ and A.H. Robinson¹⁾

1975

as for 1974 plus O.W. Hedbom (Sweden)

1976

H. Fullard (UK) - Chairman, R. Böhme (FRG) -Adviser, R. Cuenin (France), O.W. Hedbom¹⁾ and F.J. Ormeling¹⁾

1976 - Walter Kümmerly (Switzerland) resigned

1977

H. Fullard (UK) - Chairman, R. Böhme (FRG) -Adviser, R. Cuenin (France), F. Depuydt (Belgium), O.W. Hedbom¹⁾ and F.J. Ormeling¹⁾

1978

H. Fullard (UK) - Chairman, R. Böhme (FRG) -Adviser, R. Cuenin (France), F. Depuydt (Belgium), B. Winid (Poland) - Observer, O.W. Hedbom¹⁾ and F.J. Ormeling¹⁾

1979

H. Fullard (UK) - Chairman, R. Böhme (FRG) -Adviser, R. Cuenin (France), F. Depuydt (Belgium), B. Winid (Poland) - Observer, O.W. Hedbom¹⁾ and F.J. Ormeling¹⁾

1980

H. Fullard (UK) - Chairman, R. Böhme (FRG) -Adviser, R. Cuenin (France), F. Depuydt (Belgium), B.V. Gutsell (Canada), O.W. Hedbom¹⁾ and F.J. Ormeling¹⁾

1980 - Prof. B. Winid (Poland) resigned

1981

H. Fullard (UK) - Chairman, R. W. Anson (UK), R. Böhme (FRG) - Adviser, R. Cuenin (France), F. Depuydt (Belgium), B.V. Gutsell (Canada), O.W. Hedbom¹⁾ and F.J. Ormeling¹⁾

1982

H. Fullard (UK) - Chairman, R.W. Anson (UK), R. Böhme (FRG) - Adviser, R. Cuenin (France), F. Depuydt (Belgium), B.V. Gutsell (Canada), O.W. Hedbom¹⁾ and F.J. Ormeling¹⁾
December 1982 - M. Osche (France) was elected to succeed R. Cuenin

1983

H. Fullard (UK) handing over to R.W. Anson (UK) -Acting Chairman, R. Böhme (FRG) - Adviser, F. Depuydt (Belgium), B.V. Gutsell (Canada), Mr. M. Osche (France), O.W. Hedbom¹⁾ and F.J. Ormeling¹⁾

1984

R.W. Anson (UK) - Chairman, H. Fullard (UK) -Past-Chairman, R. Böhme (FRG) - Resigning Adviser, F. Depuydt (Belgium), B.V. Gutsell (Canada), M. Osche (France), Helga Ravenstein (FRG), O.W. Hedbom and F.J. Ormeling

1985

R.W. Anson (UK) - Chairman

R.J.M.J. Bertrand (Netherlands)²⁾, H. Fullard (UK) - Adviser, F. Depuydt (Belgium)²⁾, B.V. Gutsell (Canada), M. Osche (France)²⁾, Helga Ravenstein (FRG), J. Shupe (USA), J. Szep (Hungary)²⁾, J.L. Morrison¹⁾ and O.T. Pearce¹⁾

¹⁾ Member ex-officio

²⁾ Corresponding member

ICA AND RELATED PUBLICATIONS

In Print

Bulletin Nos. 1-4 Association Cartographique Internationale/International Cartographic Association. Reprints from the Nachrichten aus dem Karten und Vermessungswesen, Reihe V - Hefte 1, 3, 4 und 5.

Oceanographic Cartography

Kerr, A.J. and Kordick, A. (Eds). Papers presented at the Sixth ICA Conference, Ottawa (Canada), 1972, 132 pp.

ICA Bibliography 1956-1972 Meynen, E., 1972, 129 pp.

Multilingual Dictionary of Technical Terms in Cartography. Compiled by E. Meynen, in 14 languages, 1973, 573 pp. Steiner Verlag.

Automation in Cartography

Wilford-Brickwood, J.M.; Bertrand, R.J.M.J., and Zuylen, L. van. Papers presented at the Technical Working Session of the Commission on Automation and the Working Group Oceanic Cartography, Enschede, 1975, 371 pp.

Bibliography of works on cartographic communication. Ch. Board (Ed.). Provisional edition, 1976, 147 pp., ISBN 0 85328-052-5.

Computer-assisted Cartography

Zuylen, L. van (Ed.). Papers presented at the seminar in Nairobi, Kenya, 1978, 347 pp. Illustrations.

Colour Proofing Systems in Cartography Palm, C, 1980, 120 pp.

Examples of Environmental Maps Compiled by the IGU/ICA Working Group on Environmental Atlases, Vazquez Maure, F., 1980, 44 pp.

Glossary of Terms in Computer-assisted Cartography Third Edition with definitions in English and French. Compiled by D. Edson and J. Denegre, 1980, 157 pp., ISBN 90.70310.04.

Review of registration systems

Kers, A.J. Reprint from ITC Journal, 1980,-1. ITC, Enschede, Netherlands.

The Dynamics of Oceanic Cartography Kerr, A. (Ed.). Published as a special issue of Cartographica (Canada), Vol. 17, Monograph 25, 1980, ISBN 0-919870-25-2.

Perspectives in the Alternative Cartography: cartographic computer technology and its applications. D.P. Bickmore (Ed.). Published as special issue of Cartographica (Canada), Vol. 19, No. 2 (Monograph 28), 1982, 191 pp. ISBN 0-919870-25-2.

Urban Cartography. Compiled by the Commission on Urban Cartography. Papers of the Düsseldorf Meeting 1982.

Y. Masai and H. Pape (Eds.), 1983, 149 pp. Limited circulation.

Methods of Display of Ocean Survey Data, R.H.W. Linton (Ed.). Published jointly by ICA and NERC, 1983, 133 pp. ISBN 90.1875.51.1.

Urban Cartography II. Compiled by the Commission on Urban Cartography. Papers of the Sofia Meeting 1983.

Y. Masai and H. Paper (Eds.), 1984, 48 pp. Limited circulation.

Basic Cartography for Students and Technicians Compiled by the ICA Commission on Continuing Education in Cartography, Vol. 1, 1984, 206 pp. Illustrations. ISBN 90.70310.05.

National and Regional Atlases: A Bibliographic Survey
Compiled by W. Stams, 1984, 250 pp.

Computer-assisted Cartography; research and development report
Compiled by Lowell Starr, 1984, 124 pp. ISBN 90-70310.08.2.

Further Examples of Environmental Maps Compiled by ICA/IGU Working Group on Environmental Atlases. D.P. Bickmore (Ed.), 1984, 58 pp. 21 maps in colour, 15 figures. ISBN 90-70310-07-4.

New insights in Cartographic Communication. C. Board (Ed.). Proceedings of the ICA Seminar, London, 1983. Published as a special issue of Cartographica (Canada), Vol. 21, No. 1 (Monograph 31), 1984, 138 pp. ISBN 0-919870-31-7.

Selected Annotated Bibliography on the Application of Satellite Images to Thematic Mapping A. Kesik and W. Kresovic (Eds.), compiled by A. Ciolkosz and T. Baranowska, University of Waterloo (Canada), 1984, 178 pp.

Proceedings of the Seminar on Professional Education and Training in Cartography and Remote Sensing in Indonesia. Sponsored by ICA and the Ford Foundation, August 1984. PUSPICS, Gadjah Mada University 129 pp. limited circulation.

Computer-assisted Cartography. Proceedings of the International Seminar in New Delhi in 1983 Survey of India, Dehra Dun. Published in cooperation with ICA, 1985, 121 pp.

La Formation des Cartographes

Compte rendu du séminaire de Rabat, Maroc, 1984. R.J.M.J. Bertrand (Ed.), 1985, 254 pp. ISBN 90.70310.09.0.

International Yearbook of Cartography, Table of Contents (Authors Index) Vol. I-XXV, 1985, 40 pp.

Coastal Zone Mapping

Roland Perrotte (Ed.). Part I. Review of coastal Zone Mapping, initiated by ICA Commission on Marine Cartography; Part II. Coastal Zone Mapping in Canada: papers selected from a seminar at the Bedford Institute of Oceanography. Published as special issue of Cartographica (Canada) Vol. 23, No. 1 (Monograph 34-35), 1986. ISBN 0-919870-35.

International Yearbook of Cartography Vols. I-XXV Edited by Kirschbaum, G.M. (after 1980 Kirschbaum, K.) and Meine, K.H. Kirschbaum Verlag Bonn - Bad Godesberg, FRG. ISBN 3 7812 1161.

In Preparation

Basic Cartography for Students and Technicians, Vol. II (see above)

Cartographic Innovations: an international handbook of mapping terms to 1900
Edited by Helen Wallis and A.H. Robinson

Compendium of Cartographic Techniques

International Yearbook of Cartography, Subject Index
Vol. I-XXV, 1985, Compiled by R. Böhme, 40 pp.



Figure 23. A selection of ICA and related publications 1974-1984

New responsibilities

THIRD WORLD POLICY

Adoption of Third World Resolution

The foundation of the African Association for Cartography in Addis Ababa in 1975 demonstrated to ICA that something was missing in its relationship with the Third World countries. The opening statement of the first president of the new Association that there had been several cartographic organisations and now for the first time there was one dealing specifically with Africa, made ICA realise that for its continued existence a collective responsibility for the direct needs of the emerging countries had to be developed. A first step in improving this awareness was the so-called Third World Policy Resolution, initiated by the UK and adopted by the Fifth General Assembly at Moscow (1976). It contained the decision to devote part of ICA's efforts to the strengthening of cartographic communities in Third World Countries by disseminating cartographic knowledge *in situ*.

Third World Seminars

The resolution resulted in the organisation of a series of ICA seminars with a duration of 8-10 days, successively in Nairobi (1978), Jakarta (1980), Wuhan (1981), New Delhi (1983) and Rabat (1984) and taken care of by teams of 6-8 ICA lecturers. The first four dealt with Computer-Assisted Cartography, the last one was on Education. The one in Nairobi, led by Dean Edson (USA), chairman of the Commission on Automation, was technically and socially an immediate success. Its fame spread and shortly after China, Indonesia and Nigeria offered to host similar seminars. After the successful seminar in Rabat (1984) the African Association for Cartography offered to host combined seminars in the coming years. Thus, in a comparatively short time the Third World Policy developed as one of the main assets of the Association.



Figure 24. Third World Seminar Nairobi 1978. In the foreground, organiser Absaloms. Further, lecturers Kadmon (left) and in the background Gottschalk, Edson, Johannsen.

Planning of Seminars

The Seminars were carefully planned and prepared. Programmes were designed in cooperation with the host countries, taking into account existing experience and focusing on their problem areas. Lecturers were carefully selected and briefed well in advance, so that

each of them had a clearly defined task, knew what was expected and could prepare his paper in good time. In all five cases team leaders organised final rehearsal sessions prior to the seminars. The careful preparation gave great satisfaction in the respective host countries. In all venues ICA teams were cordially welcomed and shown warm hospitality. Authorities and the media were full of interest. In Rabat street banners greeted seminar participants! In all cases meetings were expertly arranged by local organisations, materially as well as socially, leaving room for personal contacts, technical tours and cultural excursions. The numbers of seminar participants were deliberately restricted to a maximum of 125-140 persons. In Nairobi the audience consisted of some 120 participants, representing 36 different organisations from 15 African countries. In Rabat other French speaking Arab countries were represented, while in Wuhan the audience was exclusively Chinese; India and Indonesia invited a number of colleagues from neighbouring countries. The range of backgrounds of the participants was impressive. They included cartographers engaged in various stages of map production, producers of topographical maps and users of thematic maps, educators, research workers, as well as policy planners and environmental specialists.

The CTTTW

The negotiations with the host countries, the drafting of the programmes and the selection of lecturers was initially left to the commission chairmen. In order to guarantee further success, at the VIth General Assembly in Tokyo, 1980, an experimental Committee on Technology Transfer to the Third World (CTTTW) was created. The Committee under the chairmanship of R. Groot (Canada), proceeded with great foresight and consideration and was responsible for the successes of the seminars in Wuhan (1981) and New Delhi (1983), as the reports of the host organisations further in this chapter will testify. In India – chairman Groot believed – that three significant goals had been achieved: 1. The Indian colleagues had taken the opportunity to reflect on the experience of other countries in digital cartography and to develop an agenda for action, 2. The seminar had brought together the producers of maps (topographical and thematic), with the map users, essential for the effective development of the new technology, 3. An Indian network of specialists had been set up and linked to experts in the region and other countries. This would be beneficial in the future to all concerned.



Figure 25. ICA Seminar, Jakarta 1980. Host Ir. Asmoro thanks lecturer Professor van Zuylen, who now holds the record for lecturing at Third World Seminars.

Financing of Seminars

It will be clear that the Association, with its limited means, was not able to finance this type of operation. With its vast network of contacts with governmental and non-governmental bodies, however, it succeeded, time after time, to act as a co-organiser, catalyst and fund raiser. As a rule, lecturers, selected by the CTTTW, were sponsored by their home institutions, while the local infrastructure, including transport and accommodation for the lecturers, was taken care of by the host countries. The Nairobi and Rabat seminars were co-sponsored by UNESCO, while the Swedish government financed the shipment of a Kongsberg plotter to Nairobi, together with technicians, for demonstration purposes. In four of the five seminars the presented papers were issued in book-form and sent to the participants. Up to Rabat in 1984 the following countries provided lecturers for these five seminars: Canada 4, France 5, FRG 7, Belgium 1, India 1, Kenya 1, Mexico 1, Netherlands 6, Poland 1, Spain 1, Sweden 1, UK 3, USA 6, and Thailand 1.



Figure 26. Third World Seminar, Morocco 1984. From right to left Host Director Belbachir, Ormeling and Serigne Thiam, President African Association for Cartography

Never change a winning team! In 1984 the General Assembly upon recommendation of the Executive Committee, disregarded this wisdom and fearing that the dynamic CTTTW would surpass the ICA Commissions, disbanded Groot's Committee. The future will learn whether the Third World Policy will profit from this decision and whether the Commissions will resume the initiative.

THE ICA SEMINAR IN WUHAN

Report prepared by Staff of Cartography Department of Wuhan College

Upon the invitation of the Chinese Society of Geodesy, Photogrammetry and Cartography, the International Association of Cartography held its Third Seminar on Computer-Assisted Cartography (CAC) in the Wuhan College of Geodesy, Photogrammetry and Cartography (hereafter referred to as the Wuhan College, *Renamed Wuhan Technical University of Surveying and Mapping in 1984.*) from October 19 to October 24, 1981. This was the first time that Chinese cartographers had had direct and extensive contact with foreign colleagues involved in map production activities. Being part of the ICA's technological transfer policy to the Third World countries, this Seminar contributed greatly to the friendship between cartographers.

Preparations

At the beginning of 1979, Professor Ormeling, President of ICA, and Mr. Hedbom, Secretary Treasurer, came to China on invitation and talked with the leading members of the Chinese Society of Geodesy, Photogrammetry and Cartography (CSGPC) about the sponsoring of a seminar there on computer-assisted cartography. Soon afterwards, CSGPC wrote a letter to the Executive Committee of the ICA containing a formal invitation. In the same year during its visit to ITC, Netherlands, the Chinese Delegation on Education in Surveying and Mapping held further talks with Ormeling and exchanged views concerning sponsorship of the Seminar. In 1980, when attending the Tenth Conference of the ICA in Tokyo the Delegation of CSGPC, headed by Honorary Chairman Mr. Wang Dajun, discussed the Seminar in more detail with the ICA Executive Committee, and the Commission on Computer-Assisted Cartography. Agreement was reached on the time and objectives of the Seminar and on the principle that the hosts would offer free transport, accommodation and food for all lecturers during their stay in China. It was decided that parties involved should keep in touch with each other through the intermediary of Mr. Richard Groot, Canada, Chairman of the Committee on Transfer of Technology to Third World Countries (CTTTW), who was responsible for the details of the Seminar. Under the care and with the support of the China National Bureau of Surveying and Mapping (NBSM) and CSGPC, the Wuhan College did much work in preparation for the Seminar. It sent out questionnaires to the relevant research institutes, educational institutions and production units, soliciting their opinions and suggestions as to what should be covered in the Seminar. After sorting the replies the Wuhan College mailed them on to Mr. Groot, to enable him to compose his team of lecturers and to make up the programme. In the meantime the College had the collection of articles on CAC, presented at the Nairobi Seminar (1978), and the lecture notes on *Introduction to Computer-Assisted Cartography* of ITC, Netherlands as well as the *ICA Glossary of terms in CAC* translated and printed in Chinese as reference material to be used during the Seminar.

From June, 1981 onwards, the lecturers of the Seminar, invited by Mr. Groot, started to send their lecture notes in English (with a few exceptions in German) to Wuhan and by 10 October, their total volume had reached 500 pages, amounting to 300 000 words. By 19 October, when the Seminar started, all of them had been translated into Chinese, and printed and bound in volumes, ready for distribution among the participants. The translation of the lectures, the above-mentioned Nairobi papers, the ITC lecture notes and of the Glossary of CAC terms totaled 600 000 Chinese characters.

From a material point of view, the Wuhan College had perfected its simultaneous interpretation system, its film, slide and overhead projection. To ensure smooth preparatory work, the Wuhan College at the same time kept up correspondence with Prof. Ormeling and Mr. Groot. In the light of the requirements put forward by the Chinese cartographers, the

invited lecturers discussed their respective tasks and finally the two parties decided on the precise date and programme of the Seminar.



Figure 27. Getting acquainted with the Chinese Association of Geodesy and Cartography. Secretary Hedbom serving Peking duck, Peking 1979.

The Seminar

On the afternoon of 19 October, the Seminar opened at the Wuhan College. Prof. Ji Zengjue, President of the Wuhan College, Prof. Ormeling, President of ICA, and Mr. Groot, chairman of the committee on Transfer of Technology to Third World Countries delivered speeches at the opening ceremony. After that, the Seminar activities took place as scheduled and the lectures and discussions lasted until the morning of 24 October. After the closing ceremony the lecturers of the Seminar and the whole audience had their group picture taken as a memento.

The activities of the Seminar centred on six main topics covered by the following 16 lectures:

1. General problems in cartography.

Types of present-day maps (Ormeling).

2. General principles of CAC.

Introduction to CAC (Van Zuylen) Why CAC (Anderson)

3. Specific problems in CAC.

Data base management (Groot) Cartographic systems, hardware, software, configurations (Hoinkes)

Raster processing techniques (Weber) Scan digitising and coding and editing (Lee)

Automatic generalisation (Weber) Hardware and software maintenance (Lee) Updating data base (Lee)

4. Applications of CAC.

Topographic and utilities mapping (Van Zuylen) Aeronautical charting (Anderson)

5. Applications of remote sensing.

Satellite and other remote sensing applications (Poulain)

Resources and environment mapping (Poulain)

6. Education in cartography.

Education and development of cartographic staff (Ormeling)

Staff development (Anderson)

On the whole, the Seminar was conducted in simultaneous interpretation, and was supported by slides, overhead projection and films, thus ensuring a lively atmosphere. Each lecture was attended by the other members of the teaching group, and sometimes interrupted by their questions and answers to elucidate a specific point. This spirit of readiness to cooperate with and learn from each other, left a fine impression on the audience.

In addition to lecturing, time was also allocated for panel discussion, with participants and lecturers breaking up into three groups. Lecturers answered questions and at the same time asked some of their own in the exchange of views and information. Further, the teaching group displayed atlases, maps produced by automation and different kinds of thematic maps, map designs and remote sensing images which they had brought to the seminar. Participants came in groups to study the exhibits and to hear the teachers' comments before and after the lectures. On one of the occasions Prof. van Zuylen, spoke entertainingly on the applications of the automatic plotter and the digitiser in utilities mapping in the Netherlands, a welcome supplement to his lecture. The participants greatly appreciated the hard work of the experts. In order to adapt their lecture notes to the specific occasion, some lecturers took much trouble to rewrite the captions to many illustrations, and even had a rehearsal before lecturing, others added extra material and made amendments, some even rewrote their whole manuscript. The Seminar was attended by 124 people. The audience was recruited from research institutes, educational institutions and production units in surveying, cartography and geosciences in various provinces and autonomous regions of China. The bulk of the participants were technicians, engineers, researchers and teachers who had been engaged in cartography for many years. Some of them were already involved in the research and teaching of computer-assisted cartography, others, though not engaged in CAC, showed keen interest in this new technology. They all benefited from the different topics presented in the seminar.

The members of the teaching group emphasised that CAC should be developed step by step in the light of the actual situation of each country. They also stressed that practical computer knowledge was necessary. They noted that at the present stage, CAC could only replace a certain amount of manual work, and full automation was reserved for the future.

In the panel discussion, some participants asked whether the lecturers could recommend one or two sophisticated and complete automatic systems so that they could be introduced to China when conditions were appropriate. To this question, Mr. Groot, Mr. George Lee and Mr. Anderson pointed out that one could not expect to have a ready-made, completely automatic system which could produce maps just by pressing buttons. In their experience, software and hardware had to be developed gradually according to specific needs. In talking about research in automatic aeronautical charting, Mr. Hoinkes introduced the system in use at the Technological University in Zürich. Mr. George Lee elaborated on his experiences in developing automatic systems at the USGS.

Social Activities and Sightseeing

On arriving in Beijing (Peking) on 15 October, the *ICA Teaching Commando* was taken by their hosts – NBSM and CSGPC – to see the major scenic spots. After their arrival in Wuhan, a welcome dinner was given in honour of the guest-lecturers on 19 October, by Mr. Wang Dajun, Director of NBSM and Honorary Chairman of the Council of the CSGPC. Also present were leading members of the Educational Department of the Hubei Provincial Government and the President, Vice President and some professors of the Wuhan College. During their stay in Wuhan the lecturers visited the Cartography Department, its library,

some laboratories and the production plant of the College. They also visited the Memorial Hall of the 1911 Revolution in Wuhan. To increase their contact with the Chinese participants, they had lunch in the teachers' cafeteria of the college on three occasions. A friendly atmosphere prevailed in their animated talk over the meals. The guests also visited the school and *Kindergarten* attached to the College for the convenience of the teaching staff. After the Seminar, the experts were invited to visit the the Gezhouba Water Conservancy Project underway in the Jangtze River, which deeply impressed them by its grandeur. Shanghai, China's biggest metropolis and Hangzhou, the beautiful scenic city and the provincial capital of Zhejiang were also on their itinerary. In the last city, they visited the Provincial Bureau of Surveying and Mapping and discussed common problems with the technicians. On 1 November, Mr. Groot and his team of lecturers left Hangzhou for Hongkong as scheduled.

Conclusion

The ICA Seminar gave the Chinese cartographers a better insight into the functions, significance and status quo of CAC. It played an active role in introducing and disseminating the new technology in a friendly atmosphere. In this sense, the ICA Seminar was a good model for international cooperation and therefore deserves to be promoted.



Figure 28. Third World Seminar, Wuhan 1981. Host Professor Ji explains Chinese scanner-planimeter to overseas lecturers

List of the Lecturers

Mr. N.M. Anderson, Hydrographic Survey, Canada

Mr. R. Groot, Department of Energy, Mines and Resources, Canada; Team leader

Mr. Dipl. Ing. C.K. Hoinkes, Federal Technological University, Zürich, Switzerland

Mr. G.Y.G. Lee, USGS, USA

Prof. Dr. F.J. Ormeling, ITC, Netherlands

Mr. Ing. J. Poulain, Institut Géographique National, France

Dr. W.W. Weber, IfAG, FRG

Prof. Ing. L. van Zuylen, Topographic Service and ITC, Netherlands.

INDIA AND THE ICA

G.C.Agarwal (Surveyor General of India; Vice-President of ICA 1984-1987)

In its laudable and well recognised role in the furtherance of knowledge and application of Cartography the ICA has made significant contributions since its inception. We are particularly appreciative of the role ICA has played in providing a forum for exchange of scientific information and for being a focus for growth and development of the processing of source material, design, construction and reproduction techniques of maps and associated forms of graphic communications, and in the initiation and coordination of cartographic research and training.

The cartographic activities in India are being carried out primarily by Survey of India, the national mapping agency. Other organisations involved are: National Atlas & Thematic Mapping Organisation, National Remote Sensing Agency, Naval Hydrographic Department, Directorate of Military Surveys and the Census Organisation. The ever increasing mapping demands are outpacing the production, though every attempt is made to fulfil the needs of tasks of national importance. The important task of completing the topographic cover on 1:50 000 scale has been accomplished and in addition maps on larger scales are being provided – to the extent that resources permit – for developmental projects.

The expanding cartographic activities in India led to the establishment of the Indian National Cartographic Association in March 1979, with the aims of cooperation with professional organisations of cognate disciplines, and of promoting academic interaction within an interdisciplinary frame, promotion of teaching of cartography at all levels, and generally to take such measures as may help to secure for cartography its legitimate place in national life and to strengthen among cartographers a sense of national responsibility and professional efficiency. The Association has held a number of national conventions and has taken root.

As an active member of ICA, India had the proud privilege of hosting the 4th ICA Conference and 3rd General Assembly in Vigyan Bhawan, New Delhi in December, 1968 which was declared open by Dr. V.V. Giri, the then Vice-President of India. In his inaugural speech Dr. Giri pointed out the contribution of the Survey of India and of Indian cartography in the survey of natural resources and the planning of development of the country. He had further remarked during the course of his speech that the map had become the fundamental and indispensable tool and the starting point of all development. Nineteen countries participated in the Conference providing an opportunity to discuss mapping problems in general and future trends in the field of cartography.

In keeping with the rhythm of progress in cartography, many structural and technological changes have taken place in the Cartographic Agencies in India. The Survey of India is now having the latest in machinery, Doppler Satellite Receiver Sets for augmentation of high order control network, Analytical Photogrammetric Plotters, Orthophoto equipment, scribing equipment and latest printing machines besides other sophisticated instruments. The Survey of India has also adopted scribing to a fairly large extent and is trying to develop indigenous scribe coat and peel coat films to save on imports. The country has acquired Automated Cartography Systems and for the time being these are being used partly in R&D and partly in a production environment. Large frame computers find their place in all adjustment and other computational work.

In recent years, with a view to bringing the cartographic agencies and map users to a common platform and to create greater awareness of the important role that maps play in national development, Survey of India organised Map User Seminars in various regional Centres. This ensured greater user satisfaction in the map user community in India.



Figure 29. Third World Seminar, New Delhi 1983. From left to right, van Zuylen, Nepalese student, Needham, Karkey, Bickmore, Pothak, Ottoson, Poulain and teamleader Richard Groot

Cartographic interests are varied: besides topographic and large scale mapping thematic maps find an important place. In this direction, National Atlas and Thematic Mapping Organisation (set up in 1957) – an organisation primarily engaged in the thematic mapping of the country – has produced a National Atlas. Survey of India brought out a comprehensive School atlas which became the basis for practically all school atlases since produced and now, in collaboration with a university, produced the *Economic Atlas for the State of Andhra Pradesh*. This has become quite a trendsetter.

The Survey of India has always participated actively in ICA affairs and has now contributed a compilation of the equivalent terms both in Devnagari (Hindi Script) and in Roman transcription pertaining to technical terms in Cartography for the Multilingual Dictionary of Cartographic terms being brought out by ICA. It has also brought out the Multilingual Dictionary in English and Hindi (national language). This will further the growth of cartography in the country.

The increased demand for cartographic data in various forms in this computer age necessitated Survey of India organising an International Seminar on Computer Assisted Cartography in collaboration with and with the help of International Cartographic Association and this was held at New Delhi from 22nd to 29th Nov. 1983. In keeping with the commitments of the Committee for Technology Transfer to Third World Countries. Experts of ICA from countries like UK, France, USA, Netherlands and Thailand participated in the Seminar and rendered valuable assistance in identifying problems and offering solutions to them.

The seminar provided an opportunity for exchange of information between Indian and foreign experts. There were sessions which introduced well defined subjects thus giving the audience the benefit of approaches that have been made in other developed countries. Some of the important recommendations of the seminar were:

- a) Establishment of a National Digital Cartographic Data Base.
- b) Map Revision process in a Digital Environment.
- c) Need for frequent interaction between map makers and users.
- d) Establishment of a Geographical Information System.

Training of personnel is of paramount importance for any such programme and ICA could well assist the country in this direction at various stages of implementation by providing the necessary technical expertise.

In the country itself, cartographic education has been brought into focus and advance level courses are being run at Osmania University, Hyderabad and at the Centre for Survey Training and Map Production – Survey of India, Hyderabad. A university Chair of Professor in Cartography is being established in the State of Gujarat.

Thus the future looks bright and we wish the ICA steady growth and all the best in the years to come.

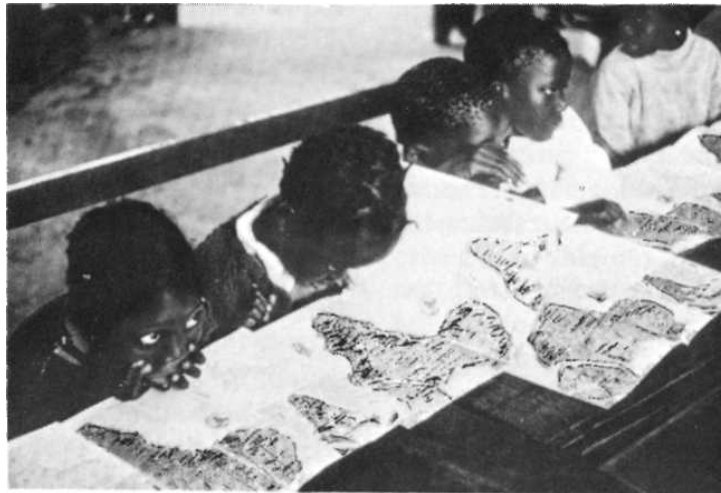


Figure 30. Benefits of Third World Policy.

External relations

AFFILIATION WITH IGU

Preparatory phase

Geography and Cartography are closely associated and have common interests. Of old cartography – as Max Eckert said – was the distinguished sister and the indispensable helpmate of geography in exploration, in research as well as in teaching. Likewise, geographers have largely contributed over the decades to the improvement of maps, to a better graphic presentation, generalisation and relief presentation and to the development of thematic cartography. At their international congresses in the late 19th century geographers gave valuable impulses to various worldwide mapping projects. Long before the foundation of the ICA, exhibitions of topographical and thematic maps were an integral part of geographical conferences. Further, from the first International Geographical Congress in Antwerp in 1871, a Cartographic Section was included as one of the established items of the conference programmes and which for decades dealt primarily with geodesy and mathematical cartography. The initiators of the Association in the late 1950's realised the importance of maintaining close contacts with geography. After the Esselte Conference (1956) approaches were made to the IGU to investigate the possibilities of cooperation. As set out in the Chapter Foundation and Consolidation, the ensuing negotiations resulted in a proposal for affiliation between the two to be ratified by their General Assemblies. Anticipating this ratification ICA had agreed to hold its Second General Assembly followed by its Second Conference at the same places (London and Edinburgh) as, and slightly overlapping, the XXth IGU Congress. The decision was made to facilitate the liaison between the two and to serve as a precedent for future meetings. ICA participants could attend the IGU Cartography Section meetings in London while geographers were welcome to the ICA Conference in Edinburgh which was classed as a Symposium of the IGU Congress. The arrangement worked well. Care was taken that papers for both meetings did not overlap. In general, the papers presented in London were mainly of use to geographers who were interested in cartographic problems in the presentation of their research data, while in Edinburgh the papers dealt with more technical cartographic subjects. As set out in Chapter I, the affiliation proposal in both General Assemblies was ratified without any problems in July 1964. As a guide to the actual meaning of the affiliation it was stipulated that: 1. The two organisations should be independent in all matters including finances, establishing commissions, etc., 2. Contacts be established between the Executive Committees of IGU and ICA in such a way that a representative of the other organisation be invited to meetings and that an active exchange of information, bulletins etc. be made, 3. That the two organisations should try to coordinate the place and date of their international congresses in a similar way as was done in 1964 in London and Edinburgh, thus enabling geographers with cartographic interests or the reverse to attend both happenings without extra travel costs, and 4. That the two organisations should consult each other about all matters of common interest and find a solution by which all concerned would benefit most.

The affiliation in practice

Expectations of the affiliation in both camps ran high. IGU and ICA officials – President Troll (FRG) and his successor Professor Shiba P. Chatterjee (India) as well as President Imhof (Switzerland) and his successor Brigadier Thackwell (UK) – all valued the closer ties and the mutual benefit which it could bring. Professor Salichtchev (USSR) who succeeded Brigadier Thackwell, did not miss an opportunity to express in word or in writing the need for collaboration between the two disciplines particularly in thematic mapping. Among the

supporters was Professor Hans Boesch (Switzerland), IGU Secretary-General from 1956-1968, who proved to be an indispensable guide and a valuable friend of ICA in its early years. He attended ICA Executive Committee meetings, provided clerical and even financial assistance, and procured access for the ICA to the IGU Newsletter. Further, it was Boesch who introduced the Association to UNESCO and assisted in formulating programmes in Education and Thematic Cartography, to be incorporated into UNESCO contracts. Finally, through the intermediary of Secretary Boesch the ICA obtained access to the world embracing, highly distinguished non-governmental International Council of Scientific Unions (ICSU), champion of non-discrimination of scientists, of which the IGU was a member. The mere coincidence that IGU and ICA executives lived relatively close together, with Boesch and Imhof in Switzerland, Gigas and Troll in FRG, Thackwell in UK and Ormeling in the Netherlands, fostered contacts between the two organisations. After Boesch retired (1968) and other executive posts were spread worldwide the contacts gradually became less frequent. In the late 1970's they shrivelled to the reading of each other's reports in the IGU Bulletin.

In 1971 the ICA participated in the IGU Regional Conference for Europe in Budapest, which coincided with the Centenary of the Hungarian Geographical Society. Together with the Hungarian National Committee for the ICA, the Association acted as host organisation for the sessions on Thematic Cartography. Under the guidance of Professor Sándor Radó 33 papers were presented. For more than one reason the experiment was successful. Geographically, Budapest proved to be a unique meeting place for cartographers from western, middle European and eastern countries, who had seldom or never had the opportunity to get acquainted.

In New Delhi (1968) – the first combined IGU-ICA Conference since the affiliation (1964) – a joint session was held to promote collaboration. It presented an attractive programme introducing the ICA commissions, explaining their terms of reference and a main address by Professor Salichtchev on Thematic Cartography in which its dual character was emphasised. The speaker stressed the need for cooperation between cartographers and geographers and demarcated their spheres of interests in thematic mapping, providing a sound basis for their cooperation. Further, joint sessions were held at subsequent conferences in Montreal, Moscow and Tokyo. In Montreal (1972) Salichtchev presented his essay *Contribution of Geographical Congresses and the International Geographical Union to the Development of Cartography*, which could be considered as the culmination of his views on the cooperation necessary between the two disciplines. This presentation coincided with the centenary celebration of the International Geographical Congresses. Further, Wreford Watson (UK) and Arthur H. Robinson (USA) spoke on the subject "Map Makers and Map Users" both considering the relationship between physical reality, its mental image and how to represent it on maps. The joint session at Tokyo (1980), the last of its kind, was chaired by both presidents, Wise (IGU) and Ormeling (ICA). It presented a programme ranging from communication problems between geography and cartography to satellite systems and maps for environmental exploration and management. Though these joint sessions were well prepared, in general their attendance was disappointing, owing to the fact that they were held at the tail end of IGU conferences when geographers were about to leave, while cartographers had just arrived and were recovering from jetlag.

Apart from actual cooperation between ICA and IGU in the joint editing of the IGU Bulletin, cartographers used to participate in various standing IGU commissions such as those on National and Regional Atlases, World Land Use Survey, Geographical Data Sensing and Processing and Geomorphological Survey and Mapping, although not in an official ICA capacity. The first one, from 1956-1972 under the chairmanship of Professor Salichtchev was

very successful. It was founded with the objective of furthering the production and quality of national atlases and in 1960 extended its interests to complex regional atlases. A series of national atlases in the world were made in conformity with the Commission's recommendations. Though it was almost exclusively staffed by cartographers, it remained an IGU commission till 1976 when at ICA's repeated insistence, it was transformed into an IGU-ICA Inter-association Working Group on Environmental Atlases, subsidised by both IGU and ICA, under the chairmanship of Dr. F. Vazquez Maure (Spain) and after his untimely death in 1982, of D.P. Bickmore (UK). The aim of the Working Group was to promote collaboration between geographers and cartographers both facing different problems in environmental mapping. The Working Group did good work and issued two publications in 1980 and 1984 both containing essays and sample maps from international sources. Both were printed by the courtesy of the *Instituto Geográfico Nacional*, Madrid.

Other IGU commissions which also depended on the assistance of cartographers remained under exclusive IGU management. The Commission on Geographical Data Sensing and Processing, exploring the scope of geographical data handling in digitised form, would have offered excellent prospects for fruitful cooperation between IGU and ICA.

One of the consequences of the separatism of Cartography was that the IGU Congress organisers in Montreal (1972) withdraw the Cartography Section, which had been a regular congress item since 1871, from their programme. Moscow followed its example. Despite this decision – Salichtchev wrote – "cartography presented itself at the XXIIIth Congress as never before. It penetrated everywhere, became an organic part of many sections, benefited their scientific content and practical recommendations and happened to be one of the best decorations of the congress".

Moving apart

In practice the good intentions of cooperation between IGU and ICA displayed in the early 1960's did not prevent the moving apart in subsequent years. It is difficult to give a concrete reason for this trend. Partly, it was brought about by the growth of both disciplines and their increasing diversification and specialisation, so that – as Professor Scott, IGU President 1984-1988 said – areas of mutual interest had narrowed. Further, one of the main reasons of the estrangement between cartography and geography seems to have been the so-called "quantitative revolution" that invaded geography in the 1960's and that dealt a severe blow to the practice of mapping and map use in geographic methodology. The quantifiers rejected maps because of their supposed lack of elementary accuracy and their liability to erroneous reading and subjective interpretation. Maps – they said – were subjective and descriptive, not explanatory and their frequent use in the past had damaged the prestige of geography.

Therefore they had to be replaced by quantitative spatial analysis and model building. The long-winded production process of maps and their rapid obsolescence in this seething world, further contributed to the scepticism shown towards maps by all users who needed quick, up-to-date information. In the 1970's, due to major developments in modern cartography the pendulum swung back again and a new rapprochement between the two disciplines broke through. The advance of the computer in map production, and the ensuing development of geographic information systems as well as the increasing application of computer processed satellite imagery provided creative means for geographic analysis and led to a revival of interest in maps. The same computer, however, that brought about the rapprochement democratised map generation, enabling geographers, even without a background knowledge of graphics, to call up cartographic images.

In the 1980's an unforeseen event further contributed to the loosening of ties between IGU and ICA. The agreement to hold four yearly overlapping conferences, made in 1964, had

started from the assumption that for a long period, countries would be willing to host both IGU and ICA conferences. In preparing for the Tokyo conference, however, where the decision on the venue of the conferences in 1984 had to be taken, it turned out that France had invited the IGU for 1984, but a French invitation to ICA had failed to come. It was indicative of the estrangement between the two organisations that no one seriously tried to save the common conferences. In practice this meant the end of what might be regarded as the main asset of the affiliation. Fortunately for the ICA, there was the Australian invitation to convene in Perth. This offer was unanimously accepted by the General Assembly in Tokyo in 1980. This meant that for the first time in their common history, IGU and ICA congresses drifted apart. Ties were further reduced when it became known that as Australia intended to invite IGU for its Bicentenary year 1988, the earliest year in which the former situation could be reinstated would be 1992, provided that the both ICA and IGU would be invited by the same country. Further, taking into account the developing cooperation with ISPRS and FIG, the Association decided to change its programme of events as had been suggested by its new partners and to advance its planned 1988 conference by one year to 1987. Thereafter it would maintain the four year cycle with intermediate meetings in between. This meant that the practice of organising the 4-yearly overlapping IGU and ICA congresses in the same location would definitely be discontinued. Moreover in 1983 ICA started its own Newsletter. From 1984, the IGU Bulletin, no longer carries ICA material other than that which the Editor selects from ICA Newsletters, while the ICA Newsletter contains such items from the IGU Bulletin as the Editor deems appropriate. To compensate for the loss of contact the ICA Executive Committee proposed that IGU should establish annual joint executive meetings to discuss matters of common interest and to intensify contacts between related ICA and IGU Commissions and Working Groups. These suggestions were taken over by the new Executive Committee under President Morrison (1984-1987). As a preliminary step Morrison and former Secretary Hedbom presented a list of issues of mutual concern to the IGU Executives at the XXVth Geographical Congress in Paris in August 1984. At the same Congress a new effort was made to establish closer ties between the two disciplines by a joint Symposium.

RELATIONSHIPS WITH OTHER SISTER ORGANISATIONS

Introduction

Right from the start, ICA has tried to bring the cartographic fraternity into closer contact with photogrammetrists, their immediate precursors on the assembly line of topographic map production. However, though the president of ISP, Mr. Paes Clément (Portugal) attended the first ICA General Assembly in Paris, 1961 as an observer, working contacts between the two organisations were long in coming. The sixth ICA Conference in Ottawa (1972) presented ICA executives with the possibility of fruitful orientation talks on closer contacts between the two with ISP President Dr. Gamble (Canada). A start was made when at the Madrid conference (1974) ISP provided ICA with two prominent speakers, Dr. F.J. Doyle (USA) and Dr. J. Bodechtel (FRG), both lecturing on space cartography. Since then, the ideas of further cooperation matured, though not without a number of setbacks.

First working contacts

In 1976, an agreement in principle was reached between the EC's of both organisations to establish joint working groups, to coordinate activities in related problem areas, such as computer-assisted cartography, photomaps, map revision and education. Further, it was decided to investigate the possibility of extending these working groups with representatives of the Fédération Internationale des Géomètres (FIG). These steps were approved by the General Assemblies of respectively ISP at Helsinki (1976) and ICA at Moscow in the same

year. Upon ICA's initiative and profiting from a good personal relationship between FIG President Ternryd and ICA Secretary Hedbom, both living in Stockholm, a first experimental meeting was organised during the FIG Congress in that city in 1977. It was attended by the executives of ISP, FIG, IAG and ICA. The idea of joint working groups did not get any further, as ISP representatives declared that they had all the working groups they needed. However, the practical issue of timing and location of future conferences did succeed in arousing the interest of all concerned. The meeting agreed to exchange information regularly on planned events including commission meetings, and to organise a second round of talks.

During a follow-up meeting between the presidents Jean Cruset (ISP) and Ormeling (ICA) in Paris in 1978 concrete proposals for further cooperation between ICA, ISP and FIG were worked out. It was agreed to hold a joint symposium on overlapping interests in digital mapping, to be prepared by the ICA Commission on Computer-Assisted Cartography in cooperation with ISP, in Zürich in July 1979. Further the ISP supported the ICA proposal to include a joint ICA-ISP session in the programme of the ISP Congress in Hamburg in 1980.

The planned symposium at Zürich (9-13 July 1979) was attended by some 30 experts from ICA, ISP, and FIG. It was decided that three Joint Study Groups should be set up subject to approval of the respective General Assemblies, with one international society taking the lead role in each. The allocated subjects were as follows:

1. Classification of features for digital topographic mapping (led by ICA);
2. Design and structure of data files as data bases most suitable for digital topographic information systems (led by FIG), and
3. Basic capabilities needed in interactive editing systems for photogrammetric and cartographic applications in digital topographic mapping (led by ISP).

It was recommended that these groups should meet at the 1981 FIG Congress in Montreux, to discuss progress. They would also submit written reports for the 1982 ICA Conference in Warsaw and the 1982 ISP Commission IV Symposium. In Tokyo (1980) the ICA gave its blessing to the envisaged cooperation with ISP and FIG in the field of digital map processing. Regrettably, though the ICA and ISP study groups made some progress, the inter-association efforts on digital mapping, agreed upon in Zürich, did not materialise. The joint report to be submitted to the Warsaw conference was not ready in time and in fact never got ready. This was unfortunate as much time and energy had been invested in the Zürich meeting.

Increasing cooperation

Subsequent joint board meetings, however, succeeded in overcoming this setback. The second one, held in Hamburg (1980) during the ISP Congress (where the name of the ISP was changed into ISPRS) was satisfactory. In 1981 when ICA, FIG and ISPRS met for the third time under the FIG President Professor H. Matthias in Montreux, Switzerland, a range of common problems was approached that would occupy the minds for a longer time to come. First of all came the conference calendar. The fact that the four yearly ISPRS and ICA conferences took place in the same year, thus drawing heavily upon institutional budgets, was considered one of the shortcomings of the present system. This also discouraged commercial exhibitors from participating at both events, thus depriving conference organisers from stand-fees. It was suggested that ICA as the younger association should revise its conference calendar, and advance its planned 1988 conference by one year.

Further, the UN Regional Cartographic Conferences were discussed. With their vast programmes, ranging from surveying up to the printing of maps, they overlapped and partly duplicated conferences of the sister organisations. Attempts to adjust the programmes and

dates of the UN conferences were recommended. As it was realised that contacts with UN were difficult to achieve for non-governmental organisations, joint action was proposed.

Further, there were discussions on the desirability of avoiding double or even triple work in the compilation of the Multilingual Dictionaries of Technical Terms (MLD) and Bibliographies, so far separately undertaken by various organisations. It was noted that the ICA was working on the second edition of its MLD, while the FIG dictionary in 17 volumes (including one volume on cartography) with definitions in three languages, was being updated with German funds at IfAG. It was agreed that each society should continue with its own efforts. In order to prevent duplication of work however, themes that clearly belonged to one specific profession would be covered by only one organisation. It was recognised that a certain overlap was unavoidable and even useful. There appeared to be a need to establish a common Documentation Centre for collecting information on the status of the world's surveying and mapping manpower and training facilities, to take over the UN sponsored work so far undertaken by Professor Brandenberger at Laval University (Canada). Further the meeting agreed to organise a joint ISPRS, IAG, FIG, ICA Seminar on common education problems in Graz, Austria, hosted by IAG in 1982. Significant for the growing cooperation was the decision to invite representatives of each sister organisation to speak at the opening sessions of respective conferences, thereby manifesting mutual allegiance. At the Fourth Joint Board Meeting in Graz (the venue of the planned Seminar) the International Society for Mine Surveying (ISM) was welcomed as a new member. The meeting opened new horizons for cooperation between the Associations. ISPRS proposed that the IAG-FIG-ISPRS-ICA-ISM Group should be gathered under the patronage or umbrella of an organisation with the status of a recognised scientific union. The proposal was well received and seen as a future goal for all five sister organisations. As a first step the Joint Board Meetings were institutionalised. They should become the first consolidated corner stone of the future Union.

Formation of the IUSM

In June 1983 in Sofia the Fifth Joint Board Meeting under FIG President Professor V. Peevsky (Bulgaria), agreed on further development and consolidation of cooperation between the sister organisations by the proposed umbrella organisation. A working group was established under ISPRS President Dr. Doyle to prospect difficulties to overcome and to draft guiding principles. As to the name of the new organisation, after having considered various alternatives – International Union of Geometronics, International Union of Theoretical and Applied Geodesy and Surveying, Union of Geomapping – the meeting agreed on International Union of Surveys and Mapping (IUSM). The suggestion brought forward by ICA to consider a permanently staffed common secretariat was apparently "a bridge too far" and brushed aside. The FIG proposal to revive the Zürich agreements and to organise a joint ICA-FIG-IAG-ISPRS symposium on digital mapping of Sofia in 1985 was welcomed.

During the sixth Joint Board Meeting in Hannover in 1984, Guiding Principles of the planned umbrella organisation, henceforth known under the name of International Union for Surveys and Mapping (IUSM), as drafted by ISPRS President Dr. Doyle, were discussed and agreed upon. Shortly after, they were ratified by the ISPRS and ICA General Assemblies, as well as by the Permanent Committee of FIG and the International Society of Mine Surveying (ISM). The IAG, already represented in the IUGG, did not formally join the IUSM, but continued to participate in its activities. In September 1985 at the eighth Joint Board Meeting at Harrogate (UK) the IUSM was formally initiated.

To the ICA the new Union has distinct advantages. By reuniting all branches of surveying and mapping, which were inseparably connected in the past, with parallel scientific, technological and educational interests, the Association can only gain in prestige. Through the IUSM, it will have easier access to international bodies such as the United Nations, the International Council of Scientific Unions and others. Article 2 of the guiding principles stating that the IUSM subscribes to the ICSU's principles concerning political non-discrimination, fully corresponds with the ICA tradition. When, as expected, the IUSM is accepted as a member of ICSU, it will take its place next to other scientific Unions with all advantages thus provided. There is no danger of loss of independence for the Association as the Guiding Principles explicitly state that member organisations shall retain their individual identity, offices, budgets, administrative and technical functions as defined in their own statutes.

As has been stated in the preceding chapter, ICA took seriously the suggestion by the partners to revise its conference calendar. In 1984 the Executive Committee decided to advance the planned 1988 conference by one year and further to maintain the 4-year cycle with intermediate gatherings in between. The proposal was circulated to the member countries and without further ado adopted by the Seventh General Assembly in Perth in 1984.

Once the timing of the conference is satisfactorily settled, discussion is likely to start in the new union to coordinate conference programmes and commission work of the participating organisations in order to avoid duplication and fragmentation.

Apart from revising the conference schedule for practical reasons, there was a wish to demonstrate to the sister organisations that ICA was taking the cooperation seriously, a gesture well appreciated by the partners. The price paid by relinquishing the overlapping conferences with IGU, was not considered too great as the relations with IGU were cool, mainly restricted to civilities only and the advantages of the overlapping conferences were doubtful. The affiliation with IGU did continue to exist, and any loss of contacts could easily be compensated for by intensifying joint commission and working group efforts, as had been done in the case of the IGU-ICA Working Group on Environmental Atlases.

Cartographic periodicals

CARTOGRAPHIC PERIODICALS OF THE WORLD IN THE MID-1980's

AN ANALYTICAL SURVEY

Konstantin A. Salichtchev (Translated from Russian manuscript completed mid-1985 by Marcia Levenson, USA.)

The steady growth of periodical and serial publications on the subject of cartography, provides an excellent reflection of how contemporary cartographic science and production have developed. The publications are of great importance. Their focus is broader than just providing information about new ideas, processes and achievements in cartography and they are not restricted to simple analysis and evaluation. They address problems in the field of cartography, strive to increase understanding and to find better solutions and further to improve cartography with regard to economic, cultural and social needs. Considering the diversity of these periodicals and serials, the different languages used and their wide geographic distribution, an overall survey and analysis are desirable.

This is the second time that I am trying to realise this task. In 1966 I published the article, *Die kartographischen Zeitschriften der Erde*, (*The Cartographic Periodicals of the World*) in that highly respected journal, *Petermanns geographische Mitteilungen* (*Petermanns Geographical Communications*) with a comparative and critical review of 17 strictly cartographic and 12 cartographic-geodetic journals and anthologies. Some geographic and surveying (cadastral) journals, which systematically address cartographic problems, were also included in this review.

After 12 years I have returned to this theme. The article, entitled *Periodicals and Serial Publications on Cartography*, has been published twice: in 1978, in Volume 8 of the Journal *Results of Science and Technology – Cartography*, (in Russian); and again in 1979, in Volume 16, No. 2 of *The Canadian Cartographer*. Simultaneously, the annual bibliography on cartographic literature (*Bibliographia Cartographica*, Volume 3, 1976), was published in West-Berlin and contained a list of some 188 periodicals and serials related to cartography subjects. It goes without saying, that the 1978-1979 article was more informative than its predecessor. In it some 90 journals related to cartography were taken into consideration, 28 of which were purely cartographic, more than 20 cartographic-geodetic, and about 40 geographic. It was not intended as an exhaustive survey. The real purpose was far more modest, to provide a short guide to fundamental publications with a limited description of their specific characteristics. Thus, the user was offered something like Ariadne's Thread, a two way guide for escaping from the labyrinth of modern cartographic literature by topic and by country of origin.

Since that time, periodical and serial literature relative to cartography, has become even richer and more diverse. In 1983 the tenth volume of *Bibliographia Cartographica* listed 274 periodical and serial issues. This number included more than 40 which can be regarded as strictly cartographic, some 30 or which were cartographic-geodetic, roughly the same number purely geodetic, and about 100 geographical journals. This publication also included articles on new aspects and achievements of science, such as remote sensing. However, there were some gaps in the *Bibliographia Cartographica*. There is a natural desire to reassess periodical and serial literature on cartography and give a comparative review of its new developments, qualities and aspects. Debate on theoretical questions of cartography which arose in the mid 1970's, lends further merit to such an analysis. Therefore in 1983, when the President of

the International Cartographic Association, Professor F.J. Ormeling, proposed that the 1978 and 1979 articles be updated in the light of the latest materials and trends and published to coincide with the 25th anniversary of the ICA, I accepted gladly. The proposal responds to the spirit of the ICA, to its goals of promoting research and exchange of scientific information.

What I would particularly like to stress, is the increasing significance of international contacts, not only for the exchange of information and the initiation of dialogue on burning issues, but also for the promotion of mutual understanding, essential to world peace. In this respect, it would be wrong to underestimate the role of the specialised periodicals.

To what degree have we reached our goals already? A survey of the literature is certainly feasible if it is limited to purely cartographic and even cartographic-geographic as well as cartographic-geodetic publications. However, we must be realistic and not try to "embrace the unembraceable" by providing an exhaustive list of all periodical and serial publications, where there is a mention of cartographic materials. The list is already extraordinary long because of modern trends in cartography, which include the advance of computers and related technology and of remote sensing, the expansion of thematic cartography as well as the research in theoretical cartography.

Automation of production is the most important feature of this modern area of science and technology. Its main aims are to increase productivity, to improve the quality of the end-product and to reduce the workload. Not only have computers and other automated equipment been introduced into cartography, but it is incumbent upon the profession to strengthen its scientific basis by implementation of the achievements of digital mathematics, cybernetics, and mathematical statistics, so that cartographic data can be more efficiently processed. It will be obvious that the interchange of ideas among these various disciplines explains the appearance of articles on cartographic subjects in publications of the aforementioned field.

Remote sensing and space imagery in particular have flooded cartography with an unending flow of spatial-temporal information, and have made a significant contribution to topographic and thematic mapping. The unique nature of remote sensing has given birth to several journals specialising in the study of the earth's surface from outer space, including cartography. Cartography in turn, has been enriched by the utilisation of space imagery to such an extent that some people are even beginning to make reference to space cartography, space geodesy and photogrammetry. Implementation of remote sensing methods in cartography is only possible by automation which leads to mutual enrichment of the two. Today's publication of periodical and serial literature reflects this phenomenon.

However, the main factor contributing to the expansion of cartographic periodicals and serials on such broad front, lies in the rapid development of thematic cartography, which intersects and interacts with sister sciences. This process is not confined to disciplines which have long used mapping in their research, such as geology, soil science, geobotany, economics etc. We are already witnessing the rapid growth of new types of mapping – geomorphological, landscape, medical – and so on. Maps are increasingly used for information and analysis of the real world. They are vital to all natural and social sciences which, in one form or another, utilise a spatial-temporal approach to the phenomena they are investigating. The social sciences are particular subject areas which sustain this theory. The same can be said for history, philosophy, economics, statistics and law. As a result, it has

become possible to identify cartographic themes, often quite unexpectedly, in other scientific literature far removed from cartography itself.

Yet another factor influencing the appearance of cartographic subject matter in other fields of literature, is due to the international development of cartography. With its theoretical investigation and experimental research, it draws from philosophy, semiotics, psychology, linguistics, mathematics, and physics. It makes far reaching use of achievements made in the natural sciences as well as from the graphic arts. There is a feedback of ideas emanating from cartography into these sciences, which in turn is reflected in the corresponding scientific literature. However, there are cases known where new, and cartographically significant ideas, have been published in non-cartographic sources. A typical example is the introduction in the Bulgarian journal, *Philosophical Thought* of maps as a model of the real world.

Taking this all into consideration, it is clear why our survey has been limited to cartographic, cartographic-geographic, and cartographic-geodetic literature. Despite the fact that cartographically important material can be found outside these three fields, such "nuggets" are infrequent and scattered among a great number of journals, investigation of which would require an enormous amount of systematic labour and which would not provide any guarantee that it has done them justice in the end. This is a job laid aside for specialised bibliographic publications, such as those mentioned previously – the West German *Bibliographia Cartographica*, and the Soviet *Referativnyi Zhurnal Kartografiya*. But we will make two exceptions, much in the way that a cartographer, when compiling a map, may sometimes interrupt the neat line to include an interesting feature that would otherwise fall beyond the established dimensions. We will also interrupt the boundaries of our survey to include new features in contemporary periodicals: first, dealing with journals from other disciplines which make use of cartography to focus vital current problems – management and conservation of natural resources and environment, information science, state-of-the-art of equipment and technology, such as in the Italian quarterly *Informática per il Territorio*; second, papers and other materials emanating from various regularly organised conferences, symposia and seminars. These meetings, the annual spring and autumn conventions held by the American Congress of Surveying and Mapping (ACSM) and the *Auto-Carto* and *Euro-Carto* symposia for example, are indicative of the current stage in science and technology. They reflect the drive towards the information exchange concerning problems of cartographic science and technology.

As in the previous survey, this summary is divided into two sections according to country of publication. The first covers the socialist countries, and the second encompasses the non-socialist and developing countries. Except for China, which the author has never visited, he is more well versed in the socialist countries and so they are listed first. For the reader's convenience, they are arranged in alphabetical order, while the non-socialist together with the developing countries have been split up into continents – Africa, the Americas, Asia, Europe, then Oceania.

SOCIALIST COUNTRIES

Bulgaria

When the cartographic-geodetic service and land survey were reorganised and emerged as the unified Central Administration of Geodesy, Cartography and Surveying (GUGKK), this also resulted in the fusion of a number of independent publications previously produced by different administrative departments such as *Collection of Articles on Cartography* (*Sbornik ot statii po kartografiya*, in Bulgarian), which was incorporated into the official quarterly

communication of the GUGKK, *Bulletin – Geodesy, Photogrammetry, Cartography, Surveying, and Construction of geodetic instruments* (*Byuletin -geodeziya, fotogrametriya, kadast'r, geodezichesko instrumen-tostryene*, established in 1982). It is divided into three sections: official GUGKK documents, scientific papers and reports, and short reviews of selected articles culled from foreign journals. Almost every issue contains articles on cartography but, up till now, they have not yet managed to establish any particular cartographic value or character to this *Bulletin*.

Predictable, but also versatile in its content, is the well edited bi-monthly journal, *Geodesy, Cartography and Land Management* (*Geodeziya, cartografiya, zemeustroystvo*, established in 1961, in Bulgarian), a publication of the GUGKK Scientific-Technical Union of Bulgarian Geodesists and Land Planners, the Military-Topographical Survey and the National Society for Agriculture and Industry. It includes articles on cartography – 25 during the past five years (1979-1983) – mainly dealing with the mapping of Bulgaria. It also contains articles on synthetic maps and on the introduction of the systems approach to cartography. The quarterly geographical journal of the Bulgarian Academy of Sciences, *Problems of Geography* (*Problemi na geografiyata*, established in 1974, in Bulgarian) sometimes includes articles on thematic cartography as well as articles covering the history of Bulgarian cartography. Finally, the *Yearbook of the Higher Institute for Architecture and Construction* (*Godishnik na Visshiya institut po arkhitektura i stroitelstvo*) must be mentioned. The institute is responsible for the education of engineers in geodesy, cartography, and land management. In this yearbook which, in actual fact is mostly published only once every two years, there is a section, "Geodesy and Land Management", in which one may find articles on mathematical cartography. Given such a kaleidoscope of cartographic publications, it would be preferable if the above mentioned journals developed a somewhat stronger profile.

China, People's Republic of

We are aware of two Chinese journals which contain articles on cartography. The first is the quarterly, *Chinese Journal of Geodesy and Cartography*, (*Acta Geodetica et Cartographica Sinica*) – Several articles published by Chinese scholars on the development of cartography and on the cartographic/ geodetic education system in the People's Republic of China, which appeared in the International Yearbook of Cartography from 1981-1983 make no mention or give any information on Chinese periodicals – which has been in existence since 1957. From 1958-1966 it was published under the English sub-title, Chinese Journal of Geodesy and Cartography. Its content is mainly geodetic, but there are also articles on computer-assisted cartography, hardware, associated software, and projections. It is published in Chinese with summaries in English. The second is another quarterly, *The Chinese Geographical Journal* (*Dim siuebao Acta Geographica Sinica*) first published in 1934, also written in Chinese with summaries in English. It includes individual articles on topics such as cartographic presentation and systems, which are recommended for cartographic research, education, and production. Finally, it should be mentioned that the Wuhan Technological University of Surveying and Mapping started its own journal in 1983. No further information on this is available.

Cuba

From 1975 *Geodesy and Cartography* (*Geodesia y Cartografia*) has been a semi-annual publication of the Cuban Institute of Geodesy and Cartography. It focuses on topics of geodesy, cartography, topography, photogrammetry, remote sensing, and surveying. Articles on cartography, which account for about a third of the journals content, pay particular attention to the history of cartography, Cuban atlases, geographical names and thematic maps. Articles on cartography are also published in geographical serial publications – the

annual *Earth and Space Sciences (Ciencias de la Tierra y de Espacio)* issued by the Cuban Academy of Sciences, and in the *Geographical Review (Revista Geografica)* from the University of Havana, which deal primarily with various topics of thematic mapping (geomorphological, soil, and others).

Czechoslovakia

An increase in interest in cartography forms one of the basic characteristics of Czechoslovakian cartographic-geodetic and geographic periodicals. The monthly publication of the Czech and Slovak Administration of Geodesy and Cartography, *Geodetic and Cartographic Review (Geodetický a Kartografický Obzor)*, established in 1955, has made a noticeable increase in the number of articles on cartography, as many as 12 each year. Generally, they deal with thematic cartography, automation, map language, equipment and technology for production, and terminology. The scope of journal topics has been broadened to include discussion on theoretical questions and the application of remote-sensing. However, up till now, little space has been given to thematic cartography and other activities which do not fall under the administration of the state cartographic-geodetic service, such as mapping for geology, water resource management, agriculture, meteorology or geophysics.

The following geographical journals carry occasionally articles on cartography:

Proceedings of the *Institute of Geography of the Czechoslovakian Academy of Sciences (Zprávy Geografického ústavu CSAV, Brno)*, established in 1964, with 6 issues per annum, and which deal chiefly with thematic maps of nature;

Geographical Review of the Institute of Geography of the Slovak Academy of Sciences (Geografický časopis, Bratislava), established in 1949, with 6 issues per annum, and containing original publications on digital thematic mapping, map language theory, etc.;

Journal of the Czechoslovak Geographical Society (Sborník Československé geografické společnosti, Prague), established in 1894, with 4 issues per annum, and which include articles on geographical maps as well as on the significance of automated cartography for geography. A handful of articles on various topics can be found in the publications of institutes of higher education, such as the *Journal of the Charles University, Geography (Acta Universitatis Carolinae, Geographica, Prague)*, 2 issues annually).

Of the serial publications, one of the more important is *Geographic Research (Studia Geographica)*, established in 1969, Geographic Institute of Brno. Of its 85 volumes, already published 6 deal solely with cartography (Nos. 15, 32, 41, 45, 55, and 84) while a further 5 are devoted, in part, to that subject. This is where Czechoslovak cartographic research for the International Geographical Union is published – on standardisation of agricultural maps in national atlases and principles for geomorphological mapping. The most recent volume on cartography, No. 84, deals with theoretical aspects of standardisation in automated cartography.

Technical cartographic problems, especially those on large-scale topographical or cadastral maps, are attended to in *Series of the Geodetic, Topographic, and Cartographic Research Institute (Edice Vědeckého ústavu geodetického, topografického a kartografického)*.

German Democratic Republic

Long-established German cartographic standards and traditions have achieved natural continuity, development, and fresh content in the cartography of the GDR and its periodicals. The substantial monthly, *Survey Technology (Vermessungstechnik)*, established in 1953, is published under the sub-heading of the *Journal of Geodesy, Photogrammetry and Cartography of the GDR (Wissenschaftlich-Technische Gesellschaft für Geodäsie,*

Photogrammetrie und Kartographie) as the official journal of the Scientific-Technical Society for Geodesy, Photogrammetry and Cartography. Much of the space in its pages is devoted to articles written by the employees of the state cartographic-geodetic services, as well as to reports of scientific-technical and production activities in geodesy and topography, which gives the journal a geodetic overtone, but there are one or two cartographic articles in each issue. Topics treated during 1982 and 1983 include: remote sensing applications in cartography, automation in cartography, (in particular line- or matrix-printed maps), as well as issues on economic and management problems. Among the new items, one may take note of the articles on the theory of cartography and environmental maps.

The world-famous *Petermanns Geographical Communications* (*Petermanns geographische Mitteilungen*, established in 1855) has been a permanent medium for cartographic articles for more than a century. It is one of the world's oldest geographical journals, matured in the fertile cartographic soil provided by the Justus Perthes publishing house and is now published quarterly by its successor, the Hermann Haack Geographic-Cartographic Institute in Gotha (VEB Hermann Haack Geographisch-Kartographische Anstalt, Gotha). From 1941, the contributions on the subject of cartography have been assigned to a special section in the journal which contains scientific articles, reviews, and a bibliography. Later on, as was indicated in our 1978 survey, this medium was substantially reduced. The bibliography was faded out, while the number of articles devoted to thematic maps of nature and comprehensive atlases dwindled to some 4 or 5 per year. However, since the late 1970's, the cartographic component has again increased, and includes a detailed survey of the maps produced for the GDR National Atlas, accompanied by map inserts. Articles have been published on the theory of cartography, the use of maps in planning, and also on the application of space imagery for mapping.

Among the other geographical periodicals we should mention the *Geographical Reports* (*Geographische Berichte*, established in 1955), and the quarterly journal of the Geographical Society of the GDR, *Communications of the Geographical Society of the GDR* (*Mitteilungen der Geographischen Gesellschaft in der DDR*), which include articles on cartographic themes almost every year (in 1982-1983 on particular maps in the GDR National Atlas). Taking into consideration, the scientific journals published by university departments amongst them, the most important from a cartographic point of view are:

Scientific Journal of the Technical University of Dresden (*Wissenschaftliche Zeitschrift der Technischen Universität Dresden*), which every year devotes one issue to the activities of the geodesy and cartography sub-faculties of the university, where the geodetic and cartographic specialists of the GDR are educated. In the main it includes articles on cartographic technology and theory.

Scientific Journal of the Martin Luther University in Halle-Wittenberg (*Wissenschaftliche Zeitschrift der Martin Luther Universität Halle-Wittenberg*), which from time to time publishes articles on the problems concerning thematic cartography and which have been subject of research at the university, such as those involving agricultural, environmental, and geomorphological problems.

In 1982 the previously mentioned sub-faculty of the Technical University of Dresden, celebrating its 25th anniversary, started to publish a series known as *Cartographic Materials* (*Kartographische Bausteine*, which can be literally translated as "Cartographic Bricks"), in which its research papers are published. So far, five volumes have appeared and there are plans for publishing one or two volumes per annum.

Hungary

The journal *Geodesy and Cartography* (*Geodézia és Kartográfia*) has been in publication since 1949. It is issued by the Central Land and Cartographic Department, in cooperation with the Geodetic and Cartographic Society. With its 6 large-format issues per year, which run to about 80 pages per issue, it may be regarded as a major periodical. In accordance with the functions of these organisations in the cartographic-geodetic survey and land management of the country, this cartographic-geodetic journal appears to be well-balanced in terms of its cartographic and geodetic contents. It covers a wide range of cartographic themes – topographic and thematic mapping, compilation and use of maps, application of automated and remote-sensing methods, development of digital data banks for mapping and surveying, standardisation of cartographic work. It also includes articles on statistics and resource conservation. However, specific theoretical articles are few and far between. Among other things, the general review section of the journal points out the activities, tasks and future prospects for cartographic research and production in Hungary, the contribution of cartography to the country's economy, as well as the international activities of Hungarian cartographers. The journal repeats the titles in English, German, and Russian, and summarises fundamental articles in one of the above mentioned languages, usually English. This is very important, as the Hungarian language is a specifically regional one. The dual affiliation of the journal with both a civil cartographic-geodetic service and a scientific society has helped expand its scope. This cooperation also benefited the organisation of the annual international thematic conferences and exhibitions held in Budapest from 1962-1977, on the initiation of Professor S. Radó. Currently they are held every four years.

The quarterly journal of cartographic information *Cartactual* (established in 1965 by Radó) now enjoys an international circulation. It contains, in graphic form and with legends in four languages (English, French, German and Hungarian), information about changes of political and administrative boundaries, transportation and energy development, and also covers other political, economic and physical-geographical topics. This unique publication, the only one of its kind, gained world-wide recognition as a valuable aid for the compilation and revision of small-scale maps and atlases. It has been sponsored by the International Cartographic Association since 1983. In 1971 *Cartactual* started to include a textual section, *Cartinform*, – a current bibliography on new atlases, important maps, and selected cartographic and geographic literature: useful, but somewhat lacking in the desired degree of completeness.

Among the serial publications, the *Hungarian Cartographical Studies* (in English) is of special importance. Its volumes have been prepared by the Hungarian National Committee on Cartography for the International Cartographic Conferences in 1970, 1972, 1976 and 1980. This series – a prime example of international cooperation – promotes an appreciation of the achievements reached by Hungarian cartography. The Chair for Cartography at the Loránd Eötvös University publishes the *Studia Cartológica* in Hungarian with an English table of contents at irregular intervals. There are also articles on cartography which are sometimes published in other journals, such as the *Geographical Bulletin* (*Földrajzi közlemények*), which covers high school cartography.

Poland

Polish periodicals on cartography continue to be highly acclaimed, and therefore deserve a thorough review. *Polish Cartographical Review* (*Polski Przegląd Kartograficzny*), first published in 1969, is the only journal in the socialist world directed exclusively to cartography. It is issued quarterly as a joint publication of the Cartographic Commission of

the Polish Geographical Society (Komisja Kartograficzna, Polskie towarzystwo geograficzne) and the State Cartographic Enterprise. The combination of academics and professionals on the journal's editorial board ensures that it is endowed with a good blend of those aspects appertaining to theoretical and applied cartography. Theoretical problems, which were first posed by L. Ratajski and other Polish scholars in the 1970s, have since received further attention. It was this journal that took a leading role in organising and conveying the Eleventh International Cartographic Conference in Warsaw in 1982, and the subsequent publication of its proceedings. Many believe that preparing for this conference, as well as the conference itself contributed to enhancing the prestige of Polish cartography in general and of this journal in particular.

There are three journals which demand immediate inclusion in the list of Polish cartographic-geodetic periodicals. They are respectively *Geodesy and Cartography*, *Geodetic Review*, and Transactions of the Institute of Geodesy and Cartography (Geodezia i Kartografia, Przegląd Geodezyjny, and Prace Instytutu Geodezji i Kartografii).

The first of these, a quarterly theoretical journal which first appeared in 1952 is published by the Geodetic Committee of the Polish Academy of Sciences, and deals mainly with geodesy. On average, each issue contains at least one cartographic article aimed at the fairly constant theme of cartographic projections. One issue, No. 1 of 1982, focused on cartography in connection with the Eleventh International Cartographic Conference in Warsaw. Other topics, such as large-scale thematic maps or map reproduction technology, are few and far between. The monthly *Geodetic Review* is one of the veteran geodetic journals, dating from as early as 1929. It is currently published by the Society of Polish Geodesists (Stowarzyszenie Geodetów Polskich). With its sub-title, *Journal of Geodesy, Photogrammetry and Cartography*, it includes occasional articles of interest for geodesists on theoretical and applied topographic cartography and its relevant technology, and which can be found in about every other issue. Subscription to the journal also includes *Bulletins*, one on cartography (*Biuletyn Kartograficzny*), dealing with editing, composition and publication of topographic maps, as well as large-scale thematic maps, produced by the Administration of Geodesy and Cartography. The journal also reports on conferences and seminars of interest to geodesists, held in Poland or abroad, and reviews textbooks, other journals, etc.

The quarterly *Journal of the Institute of Geodesy and Cartography* has an administrative accent. Its theoretical and scientific-technical articles on cartography are directed to the research topics of the Institute: new types of maps, sources and methods of collecting information for map compilation, improvements in methods and technology for compiling, printing and updating maps, as well as standardisation of map content and style.

Articles on cartography appear sporadically in such geographic journals as *Geographical Review (Przegląd Geograficzny)* and *Geographical Journal (Czasopismo geograficzne)*. Geographic cartography comes under the previously mentioned *Cartographical Review*.

The variety of Polish geodetic and cartographic research activities is illustrated by the multifarious periodicals on the subject. (For example, cartographic research is carried out at the Institute of Geodesy and Cartography, in the Information Centre of the Department of Geodesy and Cartography, the Cartographic Laboratory of the Institute of Geography and Spatial Planning of the Academy of Sciences (Pracownia Kartograficzna Instytutu Geografii i Zagospodarowania Przestrzennego), and in the cartography divisions of the Universities of Warsaw, Lublin, Wrocław, Kraków, Gdańsk, Poznań, the Warsaw Polytechnic and others.)

It is also exemplified by the many conferences, symposia and seminars organised (independently or in cooperation with government agencies) by the Cartographic Commission of the Polish Geographic Society, the Cartographic Section of the Society of Polish Geodesists, the Photogrammetry Section of the Polish Academy of Sciences, and

others. Some of the material presented during these meetings, or published as conference proceedings, are able to function by themselves as continuing publications. One of these is the *Materials of the National Cartographic Conferences (Materialy Ogólnopolskich Konferencji Kartograficznych)*, which was issued after each conference from 1968-1980. Since then, as a direct result of the well-known difficulties of the time, there has been some delay in the appearance of later issues.

Thus it can be seen that Polish periodical literature dealing with cartography is extensive and multi-faceted. Although this is a good thing, it does complicate the task of the foreign reader wishing to acquaint himself with it all. Foreign scholars would certainly welcome a multi-sided and well-balanced account of Polish theoretical and practical cartography, topographic as well as thematic.

Romania

Very occasionally, an article on cartography – on average about one-and-a-half per year – appears in the geographic series of the *Romanian Journal of Geology, Geophysics and Geography (Revue Roumaine de Géologie, Géophysique et Géographie; Série Géographie)*, published since 1954 by the Academy of Sciences. Each year, an annual volume in the geographic series is published. This is done singly or, more often than not, in two parts. Reviews of Romanian thematic maps – geomorphological, hydro-geographical, climatological, population, etc. – dominate the cartographic coverage. In the 1970s a series of articles appeared in connection with the National Atlas of Romania. Here and there are a few scattered articles on cartographic projections.

USSR

A planned socialist economy together with the enormous extent of its territory, preordained the energetic development of cartography in the USSR. It was surprisingly fast in its growth, scope, variety and scientific ideas. Although it is spread over a great number of publications, the large volume of scientific and production-technical literature has always been and still remains an important prerequisite as well a demonstration of the result of this progress.

Geodesy and Cartography (Geodeziya i Kartografiya), the monthly journal of the Main Administration of Geodesy and Cartography (GUGK) of the Council of Ministers of the USSR, was founded in 1925 under the name *Geodesist*. It was the first cartographic-geodetic journal in the world. Its role within the establishment as well as the systematic increase in effectiveness of the USSR state cartographic-geodetic service has placed it in a position of high regard. We have already pointed out the relative weakness of its cartographic component in our previous literature reviews which is demonstrated by the modest number of articles on cartography (an average of two per issue), the thematic disparity of the articles as well as the underestimation of the principal questions of cartography, such as its methodological foundations, the development of thematic and complex mapping, etc. Currently, the journal has assumed the responsibility for dealing with such cartographic problems as supplying programme and project maps for the economic and social development of the USSR, multi-purpose mapping of natural resources using space imagery, improvement of maps and atlases, automation of map production, etc. In 1983 the journal stepped up the number of cartographic articles to some degree, but still has not managed to overcome the previously mentioned weak points. However, some issues have already appeared which investigate specific questions, in more depth such as topographic mapping of the continental shelf in 1982, No. 3, and the use of space imagery in thematic mapping in 1983, No. 2.

The geographic journals exhibit a steady interest in cartography, despite the fact that the extent of this interest varies considerably between them. The bimonthly *Moscow University Bulletin: Geography Series* (*Vestnik Moskovskogo universiteta. Geografiya*) (established in 1946), which systematically includes 2-3 cartographic articles in each issue, such as on geographic cartography, multi-purpose mapping and atlases, cartographic research methods, and remote sensing applications, has taken on the character of a geographic-cartographic journal. Somewhat more modest, in terms of cartographic interest, is the *Leningrad University Bulletin* (*Vestnik Leningradskogo universiteta*) (established in 1946) in its quarterly series *Geology and Geography* (*Geologiya i geografiya*), which on average publishes one article per issue on marine cartography, thematic maps, cartometry, use of space imagery, etc. The bimonthly *Proceedings of the All-Union Geographic Society* (*Izvestiya Vsesoyuznogo Geograficheskogo obshchestva*) (established in 1965) from time to time contains articles on cartographic methodology, landform mapping, the history of cartography and the like. The quarterly journal *Geography and Natural Resources* (*Geografiya i prirodnye resursy*), which in 1980 replaced the Papers of the *Institute of Geography of Siberia and the Far East* (*Doklady Instituta geografii Sibiri i Dal'nego Vostoka*) (1951-1976), contains some two cartographic articles per issue. The institute, which now bears the rather cumbersome title, "Institute of Geography of the Siberian Division of the Academy of Sciences of the USSR", numbers among its aims: the exploration of the principles and methods for thematic map and atlas production for development planning in Siberia.

The cartographic articles in its journal are primarily directed towards research methods for natural resources mapping including remote sensing applications. It is rare to find cartographic articles in the bimonthly *Proceedings of the Academy of Sciences of the USSR, Geography Series* (*Izvestiya Akademii Nauk SSSR. Seriya geograficheskaya*) (established in 1951), which has noticeably thinned its pages on cartography. On average it contains about two articles a year, articles which have no particular bearing on thematic orientation. (The Institute of Geography of the Academy of Sciences of the USSR, which publishes this journal, does maintain publication of its own occasional but significant examples of cartographic research results. Illustrations of these are the 1:2 500 000 Geomorphological Map of the USSR and the Atlas of Snow and Ice Resources of the World.)

The bimonthly *Proceedings of Institutions of Higher Education. Geodesy and Aerial Surveying* (*Izvestiya vysshikh uchebnykh zavedeniy, Geodeziya i aerofotos yemka*), established in 1957, is published by the Moscow Institute of Geodetic, Aerial Surveying, and Cartographic Engineering (MIIGAİK). Its bearing leans strongly towards geodesy, and it has an old-fashioned tendency to regard cartography as being just a part of geodesy. It carries one or two articles on cartography per issue, as a rule these are confined to projections, automation, map publication, and mapping of the planets. Certain issues focus upon a single topic, such as "Aerospace Methods of Research on Land and Ocean Resources", (1982, No. 1).

Certain offshoots of thematic cartography are sporadically addressed in the appropriate specialised journals – geologic cartography in *Soviet Geology* (*Sovietskaya Geologiya*) (established in 1933), soil mapping in *Soil Science* (*Pochvovedeni*) (established in 1899), and so forth. The V.L. Komarov Botanical Institute of the Academy of Sciences of the USSR provides us with an excellent example. It has published the annual *Geobotanical Mapping* (*Geobotanicheskoye kartografirovaniye*) since 1963, the only journal in the world that specialises in the thematic mapping of nature. It reveals a good idea of the state-of-the-art in

the USSR and abroad in its scientific articles, reviews, and bibliographies. Among other related periodicals, the new bi-monthly journal – *Study of the Earth from Space* (*Issledovaniya Zemli iz kosmosa*), established in 1980, deserves acknowledgement. It gives broad coverage to the multiple uses of space imagery and other information obtained from space. In particular it concentrates on qualitative interpretation, spatial data gathering and photogrammetric processing as well as its uses in various fields of thematic cartography.

One specific type of periodical, which is available in the USSR and which finds no counterpart in other countries, is that specialising in cartographic reference information. The first such a series has an independent distribution as a monthly journal, *Cartography* (*Kartografiya*), which has been published since 1954 by the All-Union Institute of Scientific and Technical Information as a sub-section of the *Reference Journal, Geography* (*Referativnyi zhurnal. Geografiya*), established in 1964. Another of these periodicals is the compilation series *Results of Science and Technology. Cartography* (*Itogi nauki i tekhniki, Kartografiya*) (established in 1964) and issued by the same Institute but which only appears at two-yearly intervals. It would appear that the task of the periodical *Cartography* is to serve as a broader reference review of the world's cartographic literature, as well as being the sounding board for articles on cartography which have been published in other journals, such as those covering general science, and technical or economic publications. Although *Cartography* does not purport that it represents an exhaustive overview of all interesting cartographic publications, its 1500-2000 citations per year (compared with 2500-3000 registered entries in the *Bibliographia Cartographica*) give an all-round illustration of trends and developments within the field of cartographic science and production. *Results of Science and Technology. Cartography* seeks to provide a systematic outline as well as a critical analysis of the most recent achievements in highly relevant issues concerning cartographic theory and practice. Recent volumes have focused on such themes as: *Ideas and Theoretical Problems in Cartography in the 1980s* (*Idei i teoreticheskiye problemy v kartografii 80-x godov*) (Vol. 10, 1982) and *Aerospace Methods of Mapping and Geographic Research* (*Aerokosmicheskiye metody kartografirovaniya i geograficheskikh issledovaniy*) (Vol. 11, 1984). The issues of the aforementioned Results coinciding with the conferences of the International Cartographic Association lend them the significance of international publications.

In our previous survey we noted how the *Journal of the F.N. Krasovskiy Central Scientific-Research Institute of Geodesy, Remote Sensing, and Cartography* had faded in significance during the 1970s. It had previously played a prominent role in the establishment of geodesy and cartography in the USSR.

Yugoslavia

Yugoslavia has not been included in our previous surveys. Though it is a member of the International Cartographic Association, it does not produce any cartographic or cartographic-geodetic journals of its own. However, it is possible to find traces of cartographic subject matter in geodetic and geographic journals. Since 1945, the Yugoslavian Union of Geodesists and Surveyors has maintained the quarterly *Geodetic Journal* (*Geodetski list. Glasilo Saveza geodetskih inženjera i geometara SRF Jugoslavije*), published in Zagreb by the Society of Croatian Geodesists (Savez Drustava geodeta Hrvatske). The Slovenian Geodesists Union publishes its own quarterly journal in Ljubljana, *Geodetic Bulletin* (*Geodetski vestnik, glasilo geodetov Slovenije*, established in 1955). Since 1970, the Geodetic Administration of the Serbian Republic (Republike geodetske uprave Srbije) has distributed a compendium, *Geodetic Service* (*Geodetska sluzba*) three times a year.

The geographical serial publications of the republic's geographical societies include: *The Bulletin (Glasnik)* in Serbia since 1912, *Geographical Bulletin (Geografski glasnik)*, Croatia, 1925), *Geographical Bulletin (Geografski vestnik)*, Slovenia 1925) and the *Geographical Review (Geografski pregled)*, Bosnia and Herzegovina, 1951). Since 1974, the Military Geographic Institute in Belgrade (Vojnogeografski institut u Beogradu) has published its own *Collected Papers (Zburnik radova)*, some of which deal with cartography. Lastly, the Geodetic Department of the University of Zagreb (Geodetski fakultet Sveucilista u Zagrebu), which has its own Institute of Cartography (Zavod za kartografiju), has published *Collected Papers (Zbornik radova)* since 1963. Some of these are cartographic in nature.

It would appear that these publications are not well known in cartographic circles outside Yugoslavia. Whatever the case, the Bibliographia Cartographica only mentions two of the abovementioned journals in its list of available periodicals, the *Geodetski list*, and the *Geodetski vestnik*.

NON-SOCIALIST COUNTRIES

Africa

Morocco

The cartographic-geodetic journal *The Topographer (Le Topographe)* belongs to the National Association of Topographic Engineers (Association Nationale des Ingenieurs Topographes). It is published erratically, no indication being given when the next issue will appear and tries to promote unity between state employed topographic engineers and surveyors and those in the private sector, by protecting their interests, and encouraging professional development. We have this journal's fourth issue, from March 1984, which contains a review of topographic-cartographic, geodetic, photogrammetric, and surveying projects in Morocco, as well as articles by Canadian specialists on remote sensing and automation in cartography.

Nigeria

The Nigerian Cartographic Association made an announcement that the first issue of a journal called *The Nigerian Cartographer* would appear in time for its fifth annual conference in November 1983. This would represent the first cartographic periodical on the African continent. However, we have not been able to obtain a copy of this publication.

The Americas

Brazil

The development of cartography is of particular significance for this country, with its great economic potential, the fifth-largest in the world in surface area. The Brazilian Cartographic Society has played a major role in this development. Since 1970 it has published the *Brazilian Journal of Cartography (Revista Brasileira de Cartografia)* twice a year, in Portuguese. The journal focuses most of its attention on national cartography – its history, current status, and future prospects, both in individual sub-fields and regions as well as the subject as a whole. The activities of the Society and its biennial conferences are regularly addressed. The journal's greatest appeal to the foreign reader, lies particularly in its coverage of Brazilian cartography. In addition, the journal also contains articles on new cartographic methods, such as automation and remote sensing.

Canada

In our previous survey, Canadian periodicals, publishing literature on cartography were thoroughly reviewed and were given a most favourable evaluation. We will reiterate certain facts. The semi-annual journal, *The Canadian Cartographer*, has been in circulation since 1964, edited by Professor Bernard V. Gutsell of York University. Thanks to his energy it has earned considerable respect for its high scientific calibre, awareness of the needs in the field, wide range of papers by Canadian and international authors, who represent many schools of thought in cartography, as well as for its excellent coverage of cartobibliography, news and reviews. Gutsell's initiative gained even greater acclaim in 1971, when he undertook publication of substantial separate monographs under the general title *Cartographica*, which appeared as many as three times a year in conjunction with *The Canadian Cartographer*. However, in 1980, Gutsell transferred ownership of the journal and monographs to the University of Toronto Press, and the two series were combined into a single quarterly publication *Cartographica* which includes some separately numbered monographs and continues the tradition of *The Canadian Cartographer*. (Monograph titles are as follows: No. 19, 1977, The Nature of Cartographic Communication; No. 20, Computer Cartography in Sweden; Nos. 21-22, 1978, The Riel Rebellions: A Cartographic History; No. 23, 1979, The Purpose and Use of National and Regional Atlases; No. 24, 1979, Index and Abstracts, of The Canadian Cartographer Volumes 11-15; No. 25, 1980, The Dynamics of Oceanic Cartography; No. 26, 1980, Concepts in the History of Cartography; No. 27, 1981, Maps in Modern Cartography: Geographical Perspectives on the New Cartography; No. 28, 1982, Perspectives in the Alternative Cartography, Computing Technology and its Applications; Nos. 29-30, 1983, Mapping for Development: The Contribution of the Directorate of Overseas Surveys.)

Keeping Gutsell on as the journal's editor has ensured the continuance of its status as the foremost publication of its kind, past or present. In addition, *Cartographica* has been endorsed as the journal of the Canadian Cartographic Association and as such reflects its interests to a certain degree. Issues of *Cartographica* usually contain 6 to 7 articles. Currently recurring themes are: automation in cartography, cartographic design, and the history of cartography. However, the overall range of articles remains just as diverse as before. Generally speaking, the new version of *Cartographica* is a unique hybrid of journal and monograph, and retains its international interest and appeal. (It is appropriate to note here that Professor Gutsell's and the University of Toronto Press' commitment to the development of international ties in cartography have found yet another outlet in the foundation of a new cartographic publication, the ICA Newsletter. This bulletin is published by the International Cartographic Association, and is prepared and printed in Canada (cf. the review of international publications).

Publication of two newsletter-journals also attests to the vitality and growth of cartographic activity in Canada. Since 1975 the Canadian Cartographic Association has published a quarterly *Newsletter*, which describes Association activities and projects in detail, as well as its external ties and international actions. The latest issues of the *Newsletter* have reprinted the *ICA Newsletter* in full.

The Quebec Association of Cartographers (l'Association Québécoise de Cartographie) publishes its own newsletter-journal in French, *Carto- Québec*, which brings together the French-speaking cartographers of this Canadian province. There have been seven issues in 5 years. Along with information on cartographic activities in the province, the journal also contains popular-science notes and entertaining material. Judging by the seventh issue (1984), the further continuation of this journal remains in some doubt.

United States of America

The post-war establishment and development of cartographic periodicals in the USA was described in detail in the 1978 survey. To give it a brief review, it began in 1941 with the

quarterly cartographic-geodetic journal *Surveying and Mapping* of the American Congress on Surveying and Mapping, (ACSM), which is made up of members from four speciality areas – cadastral mapping, engineering, geodesy, and topographic cartography. This gave it a rather varied, but somewhat simple character. However, in 1974, rapid progress in cartography, especially in thematic areas, caused the ACSM in 1974 to separate the cartographic material and to start another journal especially for this purpose, *The American Cartographer* (published twice yearly, 96 pages per issue). With the leader of American Cartographic science, Professor Arthur Robinson, as editor (1974-1976), the journal took on an academic, theoretical point of view and acquired an international reputation. It came to serve as a unique outlet for publication of doctoral dissertations and MSc theses. This theoretical research, pursued outside the world of practical cartography, was mainly focused on cartographic communication and psychophysical experiments in map perception/comprehension. It did not live up to general expectations and in addition, served to distract attention away from the more pressing problems of cartography – research on new kinds of maps and their applications, implementation of automation, remote sensing, and other modern technology, or the relationship between cartography and the earth sciences. So, when Professor Mark S. Monmonier (in 1985 succeeded by Professor A. Jon Kimerling.) took over the editorship in the 1980s, it was possible to detect a shift in the aim of the journal towards cognitive cartography and applied cartographic technology. An indication of its breadth of influence can be distilled from the issues published in 1983. These ranged from the contemporary goals and tasks of cartography in the United States, to a review of technological innovations in map production. They also covered theoretical analysis of spatial interpolation methods to thermal mapping. A detailed bibliography of articles on cartography, primarily those in English, appears in each issue. They are grouped under the headings: analysis, atlases, automation, communication and design, education, etc.

In addition, *Surveying and Mapping* continues to publish articles on large-scale topographic cartography. Topics include: automation, data banks, cadastral mapping and problems of accuracy.

The bimonthly *ACSM Bulletin* is the third, and largest journal published by the American Congress on Surveying and Mapping. It focuses on the activities and professional interests of the Congress, with its varied membership hailing from four different speciality areas and various social backgrounds – employees of government agencies and private firms, and freelance specialists. The *Bulletin* gives an accurate representation of the status and needs of the profession in the USA; for the foreign reader it is only in this sense that it is of any use. In contrast, a notable publication are the *Proceedings* – of the semi-annual ACSM meetings – but they will be discussed later as a serial publication.

The appearance of single articles on cartography in geographical journals declined after the establishment of *The American Cartographer*, which tended to absorb contributions from university cartographers. However, this process seems to have reversed itself. It has been acknowledged that the loss to geographical sciences through a neglect of geographic cartography and cartographic research methods in general, is prompting a return to cartographic topics in geographic journals. First among them are the *Annals* and the *Proceedings* of the Association of American Geographers, where one can find discourses on geographic cartography, ecosystem mapping, and other methodological topics. We also mention *Geographical Analysis: An International Journal of Theoretical Geography*, a quarterly journal which includes papers covering questions of cartographic theory; *Economic Geography*, a quarterly which from time to time, devotes space to problems of economic

cartography; and the *Journal of Geography* of the National Council on Geographic Education, (9 issues per year), for geography instructors, with cartography-related coverage primarily on didactics and map interpretation.

The quarterly *Bulletin* published by the Geography and Map division of the Special Libraries Association since 1947, is unique in various respects. It aims towards the exchange of information, news, and research results in the areas of cartographic bibliographies and library activities, reader assistance projects, and promotion of new literature in geography and cartography. The professional cartographer can benefit from its information on the organisation and activities of cartographic libraries and archives, the bibliography of new maps and atlases, and a special column on map catalogues and other cartographic-geographical publications.

Articles of cartographic interest find their way into the journals of related technical sciences, of which we will mention two: 1) *Journal of Surveying Engineering*, published twice annually by the Surveying and Mapping Division of the American Society of Civil Engineers. It publishes articles on cartography applicable to engineering, such as for road construction, hydrotechnical projects, etc. and 2) *Photogrammetric Engineering and Remote Sensing* a respected monthly journal of the American Society of Photogrammetry. It deals with questions of photogrammetric and remote sensing applications to topographic and thematic cartography, especially where interpretation and digital processing of remotely sensed imagery is concerned. (In 1984 publishers V.H. Winston & Sons launched the first issue of the new translation journal *Mapping Sciences and Remote Sensing*, intended to provide translation from articles in Russian and other foreign languages on themes of interest to mapping scientists and remote sensing specialists. The journal, to be published quarterly, may be considered a modernised modification of *Geodesy, Mapping and Photogrammetry* (started in 1959 under the title *Geodesy and Cartography* and twice renamed since) as well as a spinoff of the journal *Soviet Geography* (1960).)

Finally, we must include the new journals born of scientific-technical progress in computer technology and space research, such as *Computers and Geosciences* and *Advanced Space Research*, which frequently attend to topics such as quantitative spatial models, use of space imagery, and their applications in cartography.

Moving now to serial publications pertaining to cartography, we will refer to the previously mentioned *Proceedings* of the Annual Meetings and Fall Conventions of the American Congress on Surveying and Mapping. These have appeared since 1968 in rota-print, and consist of papers presented at the various sessions of these conferences on pre-determined topics. The conference section on cartography focuses on the basic trends of current development in cartography within the USA. (Topics from the 1982 Convention can serve as examples: *Methodology Used in Cartographic Research*; *Standards for Digital Cartographic Data*; *Towards Conceptual Models for Education in the Mapping Sciences*; *Map Producer-User Interchange: Communication, Marketing, and Public Relations*; and *Geological Cartography*.)

Another member in this group of serial publications are the *Proceedings of the Auto-Carto Conferences, International Symposia on Automated Cartography*. They are published by the American Congress on Surveying and Mapping about once every two years (issues 1-6 appeared respectively in 1973, 1975, 1978, 1979, 1982 and 1983), occasionally in cooperation with other organisations.

Asia

India

The National Cartographic Association of India was founded in 1979 at the First National Cartographic Conference in Hyderabad, and it published the proceedings of this conference under the title of *The Indian Cartographer; Journal of the Indian National Cartographic Association*. (Vol. 1, 1980). This volume contained a thorough review of the status and prospects of Indian cartography in all its varied manifestations. With the exchange of ideas, experience, and new technology, as well as the coordination of Indian cartographic work as its goals, the Association expressed hopes for the continued publication of the journal on a regular basis. In 1983 the National Atlas and Thematic Mapping Organisation (NATMO), Calcutta, started a *Newsletter* in English and Hindi, a most useful publication containing information on present activities and future programmes and publications of NATMO. Issue No. 2 of the *Newsletter* has been received in 1984.

Of the general periodicals containing articles on cartography, we mention *The Indian Surveyor* of the Indian Society of Surveyors, and which appears semi-annually.

Japan

The civilian cartographic-geodetic service of Japan, the Geographical Survey Institute, has published a journal four times a year since 1963 for the Association of Japanese Cartographers called *Map (Chizu)*. It appears in Japanese with English summaries and coloured map inserts. The journal has retained its broad scope, noted in our previous survey, such as combining interests in both theory and practice, as well as thematic and topographic mapping. The Tenth Conference of the International Cartographic Association in Tokyo in 1980 promoted a further consolidation of the journal. Naturally, the journal concentrates on Japanese cartography and its ramifications, reflecting the physical and economic characteristics of the country. It examines maps for environmental protection and conservation, land use, and the surrounding seas, and ways of improving map design, content, compilation methods, and applications of such maps. It also contains information and articles on developments in cartography abroad. In our opinion, this journal ranks among the best cartographic periodicals in the non-socialist world. Unfortunately, being published in Japanese characters impedes its usefulness.

From this point of view, the *Bulletin of the Geographical Survey Institute* can be most useful. It is published as an English-language periodical (irregularly from 1948-1958, generally about twice a year from 1960-1973, and annually since 1974). It reflects the scientific research activities of the cartographic-geodetic Survey Institute, which involves thematic cartography, including field surveys. (Following the Tenth ICA conference in Tokyo in 1980, a number of other cartography journals provided their readers with an account of this Institute's activities, i.e., *Bulletin of the French Cartographic Committee*, No. 89, 1981). In this respect the Institute is quite unique and therefore when *Bulletin* issues containing cartographic articles appear, they attract considerable attention. The *Bulletin* publishes evaluations of cartography activities in Japan every three years.

Europe

Austria

During the Austro-Hungarian empire, Vienna, as its capital, served as the focal point for a variety of cartographic activities. Cartographic standards and traditions fostered at that time, have survived up to the present day. After World War II they bore fruit in the rich regional

and national atlases of Austria as well as in certain other publications related to scientific research on cartography. Austrian cartographers, as members of the Cartographic Commission of the Austrian Geographical Society, began to contribute articles on cartography in 1949. In the main, they dealt with school maps, atlases, and the history of cartography, and were published in the *Proceedings of the Austrian Geographical Society* (*Mitteilungen der Österreichischen Geographischen Gesellschaft*) which up to 1981 was published semi-annually, and from then on, annually. During the mid 1960's, the range of cartographic subjects became broader. This was due to the inclusion at that time of thematic maps, while more recently; articles have appeared on computer and remote sensing applications in cartography. In general, this geographical journal contains from 2 up to 6 or 7 cartographic articles each year including articles written by the nation's leading cartographers. This has still remained the case, despite the announcement in 1976 that *Cartographic News* (*Kartographische Nachrichten*), published since 1951 in the Federal Republic of Germany, had become a joint publication of the West German and Swiss cartographic Societies together with the Austrian Cartographic Commission. It now publishes regular accounts of cartographic activities in Austria.

Denmark

The Journal of the *Danish Cartographic Society* (*Tideskrift for Dansk Kartografisk Selskab*), for specialists and non-specialists, began a small format publication in 1983. It was small in volume (32 pages) and gave no indication of anticipated frequency of publication. It appeared in Danish and had no foreign language summaries, marking it as a journal with only national significance. Towards the middle of 1984 three trial issues were published by offset methods. This made it possible to print four-colour illustrations, with short articles on fairly diverse subjects; the history of cartography, maps of Denmark, automation and utilisation of satellite information, terminology, training of specialists, printing processes, etc. It is expected that the journal will become a periodical. It is an interesting example of cartography gaining recognition in a small country.

Federal Republic of Germany

It would appear that in terms of periodical and serial publications on cartography, the Federal Republic of Germany ranks as number one among the non-socialist countries. Seniority for prolonged and meritorious service goes to the bimonthly *Cartographic News* (*Kartographische Nachrichten*). It first appeared in 1951 as the journal of the Cartographic Society of the Federal Republic of Germany; since 1976, it has taken on an international identity with the additional sponsorship of the Cartographic Society of Switzerland and the Cartographic Commission of the Austrian Geographic Society. Thanks to participation of cartographers from the academic world, scientific institutions, and the professional world, it presents a rich variety of theoretical, practical and regional interests, although the overall character is professional-technical. It contains about four original articles per issue. Numbered among these and worthy of note are those reflecting modern trends in cartographic development (including automated and remote sensing methods), the status and course of cartographic activity in West-Germany, new developments in production technology, the training of specialists, etc. Rather than going through a full list of the journal's topics, suffice it to say that the only ones not touched upon are precisely those of the geographic foundations of cartography and its role as a method for scientific research. Supplementary sections are well presented: announcements of the German Cartographic Society (*Deutsche Gesellschaft für Kartographie*), as well as those of the Austrian and Swiss counterparts, a calendar of national and international cartographic events, reviews and, in particular, a bibliography of

articles on cartography in other journals and which could well be considered the most complete of its kind.

Another abounding and valuable source of scientific-technical information on cartography belongs to the Institute for Applied Geodesy in Frankfurt am Main (Institut für Angewandte Geodäsie). As this is the central West German agency responsible for the supply of geodetic support and national topographic maps, the Institute has a function which influences the character of its serial publications, issued under the common title, *Cartographic and Geodetic News (Nachrichten aus dem Karten- und Vermessungswesen)*. These include 2 (formerly 5) series. They are 1) Original Articles (Originalbeiträge) and 2) Translations (Übersetzungen). The first of these consists largely of monographic works and collected articles on cartography which have direct bearing on the Institute's research and production activities. Approximately 100 volumes have been published since 1956, for the most part focusing on theoretical and applied issues relevant to development and improvement of the national maps of the Federal Republic of Germany. A great deal of attention is paid to automated map production and corresponding questions of digital image processing, generalisation, and symbolisation. By 1984 the second of these series had a total exceeding 40 volumes published in English. Predominantly, its pages are filled with publications prepared by West German cartographers participating in international meetings, including conferences and seminars of the International Cartographic Association (vol. 41, 1983). Also worthy of note are the presentations on European remote sensing research and satellite geodesy (vols. 39 and 40).

Articles on cartography are scattered throughout the related periodical literature. In geography, they can be found in *Earth Science, Geographic Review, Research and Land Management (Erdkunde, Geographische Rundschau, Raumforschung und Raumordnung)*; in geodesy, the *Journal of Surveying (Zeitschrift für Vermessungswesen)*, *General Surveying News (Allgemeine Vermessungsnachrichten)*; and in aerial surveying, *Photogrammetry and Aerial Surveying, (Bildmessung und Luftbildwesen)*. Taken as a whole, they cover a wide range of information, with concentration toward thematic maps in the geographic journals, large-scale topographic maps in the geodetic journals, and on cartographic applications of space imagery in *Photogrammetry and Aerial Surveying*. A fairly complete bibliography of such articles can be found in *Cartographic News (Kartographische Nachrichten)*.

Among serial publications of related institutions we will note first of all, the cartographic focus of two series published by the Academy of Regional Research and Planning (Veröffentlichungen der Akademie für Raumforschung und Landesplanung): 1) *Papers (Abhandlungen)*, and 2) *Reports on Research and Meetings (Forschungs- und Sitzungsberichte)*. It may be recalled that Werner Witt's voluminous monograph, *Thematic Cartography: Methods and Problems, Tendencies and Tasks (Thematische Kartographie: Methoden und Probleme, Tendenzen, und Aufgaben)*, was published in the first of these (Band 49, 1970), along with surveys of research on computer applications in thematic cartography. The second has published a number of research summaries on thematic cartography.

The Polytechnic in Karlsruhe (Fachhochschule Karlsruhe) has added a new series, *Cartography and Geography (Kartographie und Geographie)* to its serial publication *Earth Sciences Publications (Karlsruher Geowissenschaftliche Schriften)*. Its first issue, *Contributions to Cartography (Beiträge zur Kartographie, 1983)* continues along the path of traditional cartography with, among other materials, a beautifully illustrated article by E. Imhof, *From my Cartography Studio, (Aus meiner kartographischen Werkstatt)*, and an essay

by H. Bosse, *Development of Cartography in the Federal Republic of Germany*, (*Entwicklungen der Kartographie in der Bundesrepublik Deutschland*).

France

The quarterly cartographic journal, *Bulletin of the French Cartographic Committee* (*Bulletin du Comité Français de Cartographie*), was established in 1958, and has now passed its hundredth volume. It leaves a clear and unique mark in the development of worldwide cartographic periodicals. In presenting a clear picture of the status and development of French cartography (which is also of particular value to the foreign reader), this journal has contributed to better communication among French cartographers. It has also guided them in their choices of topics for research and development, and has successfully taken on the role of French representative in the international cartographic community. Its structure has not changed since we described it in our previous surveys: committee activities, international and national information, scientific and technical articles, and bibliographies. However, several issues now contain a scientific-technical section, frequently focusing on actual problems or themes. Topics in this section have included: cartographic communication (no. 75, 1978), topographic cartography (no. 80, 1979), marine cartography (no. 81, 1979), cartography in the Federal Republic of Germany (no. 88, 1981), cartography in Japan (no. 89, 1981), and British cartography (No. 91, 1982). Of particular importance for the foreign reader are those special-topic issues, addressing individual problems in French cartography, such as cartographic education (No. 87, 1981), and cartographic documentation in France (No. 87, 1981). In addition, original articles on thematic cartography – soils, vegetation, the environment, utilisation of remote sensing methods and automatic equipment – are to be found in many issues. Also of interest, are the special issues covering the proceedings of the International Cartographic Association conferences and participation of French cartographers in them – the 1978 conference in the USA (No. 78, 1978), the 1980 conference in Tokyo (No. 88, 1981), the 1982 Warsaw conference (Nos. 93 and 94, 1982), and the Perth Conference (Nos. 101 and 102, 1984). These represent a useful contribution to the field of international cooperation.

The bibliography of the *Bulletin of the French Cartographic Committee* contains a full and therefore valuable, national survey of scientific-technical journals from other disciplines which, to one degree or another, contain material on cartography. We should note at least three of them:

- The quarterly *Bulletin of the French Society of Photogrammetry and Remote Sensing* (*Bulletin de la Société Française de Photogrammétrie et de Télédétection*), which gives wide coverage to applications of photogrammetry and space imagery in cartography;
- *Information Bulletin of the National Geographic Institute* (*Bulletin d'Information de l'Institut Géographique National*). This institute serves as the national mapping organisation of France and therefore its *Bulletin* examines many issues involving the status, tasks, methods, and prospects for mapping the country;
- The monthly journal *Surveyor. Monthly Review of the Order of Survey Experts* (*Géomètre. Revue mensuelle de l'Ordre des géomètres-experts*) specialises in modern and automated methods of large-scale surveying for cadastral purposes and land-use planning.

Since the end of 1979, reference is made to the *XYZ-Journal of the French Topographic Association* (*XYZ-Revue trimestrielle de l'Association Française de Topographie*). It focuses on the development, role, and modern methods of topography.

In contrast to its thorough review of the scientific-technical journals, the *Cartographic Bulletin* only provides incidental information on the cartographic contents of geographical journals. There are many geographic journals in France, but the amount of cartographic material in them has been greatly reduced. This is due to the schism that has developed between the geographic sciences and cartography. This divergence became clear in 1984 when separate conferences were convened for the International Geographical Union in Paris and the International Cartographic Association in Perth, Australia. (During the Congress of the International Geographical Union in Paris, 1984 an effort was made to establish closer ties between the two in the joint symposium, "Cartography, Geography, and Remote Sensing," which included discussion on "The Role of Cartography in the Perception and Presentation of Geographic Space.")

Italy

The *Bulletin of the Italian Cartographic Association (Bollettino dell' Associazione Italiana di Cartografia)*, owes its establishment in 1964 to the founding of that organisation one year earlier. The Association's major purpose was the unification of a group of Italian cartographers working in different government departments and in private companies. The government agencies are: the Military Geographic Institute (Istituto Geografico Militare, Florence, established in 1872; topographic mapping); the Navy's Hydrographic Institute (Istituto Idrografico della Marina, Genoa, 1872; nautical charts), the Geological Service (Servizio Geologico Italiano, Rome, established in 1872); the private enterprises are: the Geographic Institute of Agostini (Istituto Geografico De Agostini – Novara, 1901; maps and atlases for mass distribution), and the cartographic department of the Italian Automobile Association (Touring Club Italiano, Milan, 1914; road maps, guides and atlases). The annual meetings of the Association, convened in different cities each year and covering a central theme, provided a venue for Italian cartographers to meet and to exchange information. Conference themes have included: "Thematic Mapping and Regional Planning," Florence, 1977; "Cartography at Geographical Scales," Novara, 1978; "Evolution and Modern Development of Cartographic Technology," Parma, 1979; "Environmental Mapping, 1981; and Thematic Mapping in Local-Level Planning, in Scientific research, and in Education," Trieste, 1982. The bulk of the *Bollettino* is filled with papers presented at these conferences, although other topics are also discussed, such as the history of Italian cartography, and the system of cartographic education. Useful to the foreign reader are its annual lists of publicly and privately produced maps. Since 1972, abstracts in English have made the journal easier to use. The general level of Italian scientific research on cartography indicates that the *Bollettino* primarily plays a national role. This is where its principal value lies. Unfortunately, due to the economic crisis, Italian cartographers were unable to keep it going.

Other Italian journals with possible relevance to cartography can be referred to' briefly. *The Universe (L'Universo)*, a bi-monthly journal founded in 1920, is published by the Military Geographical Institute, Florence, which is the national cartographic-geodetic service. It is a geographical journal, with only a token number of articles on cartography, perhaps 1 or 2 a year, but which occasionally carries useful information on the Institute's latest publications, including its topographic maps and aeronautical charts. Similar information is to be found in a quarterly journal of the same institute the *Bulletin of Geodesy and Related Sciences (Bollettino di Geodesia e Scienze Affini)*, which is wholly dedicated to articles of a mathematical-geodetic nature.

We should also mention the quarterly, *Bulletin of the Italian Society of Topography and Photogrammetry (Bollettino della Società Italiano di Topografia e Fotogrammetria)*. It is

primarily a topographic-geodetic journal, but occasionally deals with topographic maps and plans, including large-scale and city surveys on scales of 1:500 and 1:2000.

The respected geographical journal, *Bulletin of the Italian Geographic Society (Bollettino della Società Geografica Italiana)* was formally a monthly, but it now appears in quarterly or even semi-annual editions. It had limited amounts of cartographic content, occasionally including reviews of maps, atlases and literature, although the fourth-quarter issue for 1982 (Nos. 10-12) was fully committed to articles on cartography. The first one stressed the necessity of strengthening international ties between cartographers and geographers, and the second (11), in conjunction with an analysis of modern conceptions of cartographic science, argued that in these questions, Italian cartographers are trailing in the wake of a formal, narrowly communicative understanding of the substance and tasks of cartography. Only time will tell whether this shift towards cartographic coverage in the journal will endure. In any case, there is an instructive article on geomorphological mapping of Portugal in issue 4-9 of 1983.

Lastly, we will mention a new type of periodic publication, *Information for the Territory. A Quarterly, (Informatica per il territorio. Quaderni)* undertaken and curated by the Directorate of Scientific Research (Direzione Ricerca Scientifica). It is a compilation of articles, mostly on modern research methods – remote sensing, mathematical modelling, etc. – and the environment and environmental components in territorial development. Occasionally cartography is featured in this periodical as it relates to these topics.

The Netherlands

Historically, the contribution of the Netherlands to world cartography is enormous, but the modern limitations placed on a small country have an unavoidable constricting effect on its sphere of influence. Therefore, the determination of Dutch cartographers and their achievements in the development of a periodic literature are all the more remarkable. As early as 1958, the Cartographic Section of the Royal Netherlands Geographical Society, upon the initiative of its founder members Dr. Koeman and Dr. Ormeling sr., introduced a permanent cartographic section into the Society's Journal, which was also distributed separately under the name *Cartography (Kartografie)*. Following the reorganisation in 1975 of the Cartographic Section into an independent Netherlands Society of Cartography (*Nederlandse Vereniging voor Kartografie*), it immediately started publication of the quarterly *Cartographic Journal (Kartografisch Tijdschrift)*.

When we prepared our 1978 survey of cartographic periodicals, we had only just received the first issues of the *Cartographic Journal* and were unable to provide a detailed idea of its scope and intent. Before us we now have 36 issues of this large-format, beautifully printed journal, complete with frequent colour inserts. Economic difficulties notwithstanding, this journal has increased in size from 32 pages at its inception to 66 and to 96 pages in 1984. The Society brings approximately 500 individual cartographers together from many different Dutch organisations and agencies and has 100 corporate members. The journal's orientation to an internal Dutch readership is evidenced by its detailed information on Society activities, Dutch cartography, and the fact that it is published in Dutch. From 1982, it started adding abstracts in English and in 1984 also in French. Its chief merit lies in its breadth of cartographic subject matter, its punctuality and the scientific-technical relevance of its contents. Journal issues, originally erratic in content, have become more sharply focused over the years. Among other things, they include papers presented at the annual short courses and cartographic conventions conducted by the Society. Themes of recent short courses have

included Atlas cartography, Symbol Design and Legends. Cartographic convention themes have included Automation in Cartography, and New Map Series. The Society's topical publications, such as *Technology of Map Production*, and *Environmental Maps*, all reflect original research, including that carried out on large-scale maps. When one also considers the social and organisational role played by the *Cartographic Journal*, it can justifiably be regarded as a model for cartographic periodicals published in small countries.

Another Dutch journal which intermittently deals with cartography is *The ITC Journal*, established in 1973, in English with abstracts in French and Spanish. It is the official quarterly publication of the International Institute for Aerial Survey and Earth Sciences (renamed International Institute for Aerospace Survey and Earth Sciences in 1984). Among other things, it describes the activities of the institute's cartography department in education, training and research on scientific/technical problems, needed for map production in developing countries. In connection with the International Cartographic Association conferences of 1978, 1980 and 1982 special editions of the journal were published dealing solely with cartography.

The latest offspring of Dutch cartography is the quarterly journal *Caert-Thresoor* which started in 1982 and is devoted to the History of Cartography in the Netherlands. *Caert-Thresoor* is published in Dutch with brief summaries in English. Finally the *Bulletin of the Cartography Department of the Geographical Institute (Bulletin van de Vakgroep Kartografie van het Geografisch Instituut) of the State University in Utrecht* should be mentioned. Since it started in 1975 it has been published irregularly and so far, a total of fifteen issues have appeared. It contains research results from students and staff, mainly on thematic cartography, the application of automation in map production and on the history of cartography.

Norway

The quarterly journal, *Map and Plan (Kart og Plan)* established in 1970, bears a sub-heading which indicates its contents – *Norwegian Journal of Cadastral Mapping and Surveying (Norsk tidsskrift for jordskifte og landmåling)*. But as in other journals of this type, cartographic articles are also to be found, primarily those on topographic cartography, i.e. on map revision, use of orthophotomaps etc. In addition, recent issues have begun to include more articles on thematic cartography, such as maps on natural resources, socio-economic maps for planning, etc. Scattered cartographic articles – on the national atlas, or resources maps – can also be found in the *Norwegian Geographic Journal (Norsk Geografisk Tidsskrift)*. The journal has been published annually since 1926 by the University of Oslo.

Spain

The cartographic journal, *Bulletin of Cartography (Boletín de Cartografía)* 3 issues yearly, established in 1961, was discontinued after publication in the 1960s by the Seminar of Cartographic Research of the Spanish Association for the Advancement of Science (Seminario Español de Estudios Cartográficos, Asociación Española para el Progreso de las Ciencias). Material circumstances, and possibly a shortage of original contributions prevented the journal from getting off the ground.

The quarterly *Information Bulletin of the Geographical Service of the Army (Boletín de Información. Servicio Geográfico del Ejército)* was established in 1968 under quite a different set of conditions and on a different financial basis. In compliance with the interests of the Geographical Service, it concentrates on topographic maps of Spain – their history and current status, new methods and future possibilities for cartography – and provides regular information on the Service's projects and published maps.

Topographic Technology (Técnica Topográfica), established in 1973, is the unique bi-monthly journal of the College of Topographic Engineers (Colegio de Ingenieros, Técnicos en Topografía). It presents a broad and colourful spectrum of themes, including scientific-technical articles on geodesy, topography, surveying and very rarely cartography (i.e., on the history of old city plans, cartography in Czechoslovakia), popular geography, with extraordinary colour illustrations, and notes on cartographic philately. It contains a bibliography of Spanish cartographic publications, which is useful to foreign readers.

Sweden

In the 1979 review we made particular note of the popular science journal *Globus (Globen)*, established in 1922, as being the first-born in the world family of cartography journals. For professional cartographers elsewhere its information on new maps and atlases published in Sweden proved interesting. In the 1970s, the journal had a circulation of 5000 but ceased its publication in 1978 due to financial difficulties. Current publications specialising in cartography are the reports of the Swedish Cartographic Society, which are published at approximately ten-yearly intervals (1923-1932, 1933-1947, 1948-1957, 1958-1966, 1968-1977). However, expansion of the Society has raised the question whether it should publish its own journal.

Geographic Chronicle (Geografiska Annaler) has been published since 1919 by the Swedish Society of Anthropology and Geography (Svenska Sällskapet för Antropologi och Geografi). Currently, it comes out 4 times a year in English, and contains hardly any articles on cartography – similar to another Society publication, the annual *Ymer*; in the 31 years between 1951-1981, only 31 articles on cartography have appeared. Starting publication in 1966, *Ymer* has assumed a monographic character with articles in each issue grouped around one central theme. The 1984 volume, *Maps and Society*, strikes us as interesting, with articles on geomorphological and geobotanical maps of Sweden.

In recent years, the bimonthly *Swedish Surveying Journal (Svensk Lantmäteri Tidskrift)* has received attention. It continually increases its number of cartographic articles on a variety of subjects – from digital cadastral maps and city plans to thematic maps (including their use as a source of information for planning purposes) and marine cartography. No. 5, 1982 was a special cartography issue, with popular appeal yet with thorough evaluations of topographical and geological maps, together with hydrographic surveys of Sweden.

Switzerland

Among the many geographical journals where articles on cartography might be found, we will mention only *Swiss Geography (Geographica Helvetica)*. It is published under the sub-heading *Swiss Journal of Geography and Ethnography (Schweizerische Zeitschrift für Geographie und Völkerkunde)*, and has been published quarterly since 1946 by the Geographic-Ethnographic Society in Zürich (Geographisch-Ethnographische Gesellschaft, Zürich), and addresses cartographic issues more often than others.

United Kingdom

As was noted in the previous survey, good coverage of English cartography is provided by *The Cartographic Journal* of the British Cartographic Society, which has been published semi-annually since 1964. This society brings cartographic specialists together from University institutes, a broad spectrum of government agencies – Ordnance Survey, Military Survey, Directorate of Overseas Surveys, Hydrographic Department of the Admiralty – and

cartographic sections within other government departments, as well as from private-sector companies such as Bartholomew, Philip, etc. It was founded in 1963 in an effort to rectify shortcomings in British cartography resulting from its lack of internal coordination and proper training of personnel, and as well as the absence of a scientific research centre. The journal is an effective medium for information exchange, dealing with theoretical research, propagation of new ideas and work methods. These include cartographic communication and automation. In this respect it has earned a good international reputation, attracting a wide range of foreign authors. The journal has continued its multi-faceted treatment of contemporary studies in cartography – from mathematical theory to technical map production, from general questions of organisation of cartographic research, education, and production to analysis of cartographic presentation methods. In addition, right up to the 1980's a strong tendency could be observed towards theory with less attention being paid to technology and applications (which, incidentally, was pointed out in the journal itself in 1980, Vol. 17, No. 1). Only recently, has it gradually shifted from the fascination of communication flow models and psycho-physical experiments towards development of scientifically based methods of processing the entire spectrum of spatial and temporal information and implementing modern map production technology. Although subscribing to the old-fashioned view of cartography as an art, a science, and a technology, the journal limits itself to questions of map creation, excluding from its agenda the development of methods for using maps as tools for scientific research. The disregard for foreign languages in Great Britain, and the USA contributes in giving an impression of one-sidedness in the *Journal* – it pays little attention to publications in any other languages but English.

The atypical *Bulletin of the Society of University Cartographers* (semi-annual, since 1967) in its unassuming rotaprint, is fully dedicated to the interests of Society members. Detailed analytical surveys of major cartographic productions, especially atlases, often-critical reviews of cartographic-geographic literature, maps and atlases, bibliographic compendiums for various topics in cartography, and descriptions of cartographic equipment and materials make up the basic content of the *Bulletin*.

With well-known reservations, it is possible to include two historical-cartographic journals, published in England to the list of cartographic periodicals, *Imago Mundi* and *The Map Collector*. The first of these, *Imago Mundi, A Review of Early Cartography* was founded by L.S. Bagrov in 1935 as a serial publication on the history of early cartography. Even during Bagrov's lifetime, his creation, conceived as an annual, was forced to change its publishers, country, and frequency. After Bagrov's death, the difficulties increased, but beginning with Volume 27, in 1975, it was revived as an annual. It is published now in England (Lympne Castle, Kent) under the patronage of the International Society for the History of Cartography, which meets every second year and publishes various conference papers in the annual. Undoubtedly, its value lies in its presentation of new information on the history of maps and map-making, although not much of it is to be found among the historical publications registered in the *Bibliographia Cartographica*.

The second of these, *The Map Collector*, has been published annually since 1977 for amateur enthusiasts and collectors of early maps. It is certainly beautiful to look at and represents a unique blend of science and commerce. For example, articles by famous historians appear side by side with commercial advertising for map sales and auctions – a map-lover's dream and frequently a vehicle for commercial speculation.

Formally speaking, the departmental quarterly *Survey Review* should be included among British cartographic-geodetic journals. It has been published since 1931 by the Department of

Overseas Surveys which, under the banner of technological cooperation, carries out topographic-geodetic research in countries which in the colonial period belonged to the British Empire. This work is mainly focused on production of relatively small-scale topographical maps, but the journal, packed as it is with theoretical articles on geodesy and photogrammetry, appears to be indifferent even to topographic cartography. One can only hope that the incorporation of the Directorate of Overseas Surveys into the Ordnance Survey (the National Mapping Agency of the United Kingdom) in 1985 will alter the journal's profile for the better.

Among British geography periodicals, the one most suited to cartography is *The Geographical Journal* of the Royal Geographical Society, which formerly paid systematic attention to cartography, including dissemination of ideas on the production of the International Map of the World (IMW) 1:1 000 000. In 1960 a special section, *The Development of Cartography*, was even added to the journal to cover the major developments of world cartography and its new products. This section was renamed in 1967 (after the appearance of the *Cartographic Journal*) to *Cartographic Survey*, and reviews of cartographic literature and atlases continued. One can occasionally find highly relevant articles on cartography in *The Geographical Journal*. (One such article is "The Future of the Ordnance Survey", which in the light of the government's financial situation, discussed possibilities for transferring the service out of the government budget to self-supporting status, or even handing over its functions to private firms under the coordination of the National Mapping Agency. See the *Geographical Journal*, July, 1982.)

Oceania

Australia

The Australian Institute of Cartographers, a public society, formed to support development of Australian cartography, has published the journal *Cartography* twice a year since 1954, which covers sources and trends of development in the cartographic profession on the fifth continent. Outmoded views previously circulating in Europe persisted there for a long time, to the effect that (a) making a topographic map consisted solely of taking geometric measurements, or surveys, in a locality, and (b) preparing the maps themselves was the work of cartographic draftsmen operating independently in their own workshops. The Institute of Cartographers introduced integrated methods of advancement in Australian cartography which influenced the nature of its journal – its concern with problems of cartographic education, implementation of developments in science and technology, including automation, answering the needs of planning and land management for thematic maps of the environment and natural resources, frequent articles on specific maps of Australia and the cartographic history of Australia and Southeast Asia. Undoubtedly, this is a progressive trend, although the journal, in our opinion, perceives the role of automation in cartographic research and development too narrowly and simplistically neglects the interconnections between cartography and the other sciences, especially geography, and underestimates the role of the map as a research tool and medium for gathering knowledge. (This profile of interests was apparent in the programme of the 1984 Twelfth ICA Conference but, even in this conference the interrelationship of geography and cartography figured as an independent theme for discussion. The conference undoubtedly provided a good stimulus for progress in Australian and South-East Asian cartography.)

In addition to scientific articles, the journal features detailed information on Institute activities, news and concerns of Australian cartography. It also gives some space to reviews

and indexes of cartographic literature. Papers from Institute conferences are presented as articles. Materials submitted from outside the Institute and from abroad are encouraged.

Prior the Twelfth ICA Conference organised in Perth in 1984, the Western Division of the Australian Institute of Cartographers published an additional bulletin called *Carto News*. It provided a calendar of cartographic activities in Australia, information about the International Cartographic Association and lists of newly published Australian maps.

New Zealand

In terms of its goals, the semi-annual *New Zealand Cartographic Journal* resembles a younger brother to its Australian counterpart, being newer, having a smaller-format and carrying fewer pages, usually 20-30. It has been published since 1971 by the New Zealand Cartographic Society. It is interesting for the foreign reader because of its well-rounded coverage of New Zealand cartography – topographic and thematic, public sector and private.

INTERNATIONAL PUBLICATIONS

This section includes publications of international organisations, such as the United Nations, and international scientific organisations – unions, associations, and societies – as well as those national publications which are dedicated to broad international cooperation.

The Cartography Section of the U.N. Department of Technical Cooperation for Development, previously under the jurisdiction of the U.N. Economic and Social Council, produces five serial publications: the compendium *World Cartography* (since 1951), three similar series covering the proceedings of the United Nations Regional Cartographic Conferences for Asia and the Pacific (formerly Asia and the Far East), Africa, and the Americas, as well as a series covering the proceedings of the United Nations Conferences on the Standardisation of Geographical Names.

World Cartography was conceived as an annual giving global coverage of the plans, activities, and results of work in cartography in its broadest sense, starting with surveys and ending with map printing. This broad programme proved to be unworkable, publication became irregular, and partly due to the inclusion of proceedings from the regional conferences, it lost its journal-like nature. *World Cartography* became almost like a topical abstract journal addressing the status of world topographical coverage according to official data (vol. 10, 1970, vol. 14, 1976). It also deals with the availability of cartographic and geodetic specialists and their training (vol. 16, 1980), and with mapping issues in the Third World such as utilisation of aerial surveys (vol. 12), cadastral surveys (vol. 13) and thematic cartography (vol. 15, 1979).

The U.N. regional cartographic conferences organised for Asia and the Pacific (first Conference – Mysore, India, 1955; 2nd - Tokyo, Japan, 1958; 3rd - Bangkok, Thailand, 1961; 4th - Manila, Philippines, 1964; 5th - Canberra, Australia, 1967; 6th Teheran, Iran, 1970; 7th - Tokyo, Japan, 1973; 8th - Bangkok, Thailand, 1977; 9th - Wellington, New Zealand, 1980; 10th Bangkok, Thailand, 1983.), Africa (first Conference – Nairobi, Kenya, 1963; 2nd - Tunis, Tunisia, 1966; 3rd - Addis Abeba, Ethiopia, 1972; 4th - Abidjan, Ivory Coast 1979; 5th-Cairo, Egypt, 1983.), and the Americas (first Conference – Panama, 1976; 2nd - Mexico City, Mexico, 1979; 3rd - New York, USA, 1985.), convened with participation of official delegations and government officials from cartographic and geodetic services, represent theoretically at least, an ideal opportunity for exchanging information, experience on technological development, as well as for developing and coordinating programmes in all branches of cartography, including cartographic data collection, processing, and reproduction, and national mapping policies and management. Proceedings from these U.N. conferences are published in two volumes. One contains a conference report, including protocols and resolutions. The other contains representative technical reports of cartographic developments in the participating countries. The range of topics includes geodesy; aerial surveying and photogrammetry; large-scale topographic, cadastral, and urban mapping; small-scale topographic cartography; thematic cartography; national and regional atlases; hydrographic surveys and satellite data; revision, reproduction, and printing of maps; geographical names; cartographic education; relationships between map makers and users; policies and management of national mapping agencies: and much more. The variety of topics could suffice for a cartographic encyclopedia. The volume of technical papers is impressive, but their quality and content is determined by the ability and interest of the contributing agencies, as well as by the judgment of the official delegations as to their suitability.

Much attention – both nationally and internationally – is directed to the U.N. conferences on geographical names (first Conference – Geneva, Switzerland, 1967; 2nd - London, United Kingdom, 1972; 3rd - Athens, Greece, 1977; 4th - Geneva, Switzerland, 1982.), whose proceedings are also published in two volumes – one with official documentation, and the other with scientific and technical reports and resolutions. Topics of interest include the principles and processes of national standardisation of geographical names, including those of countries with several official languages and national minorities; transliteration systems (i.e. from Cyrillic to Latin and vice versa) and international standardisation of names; use of exonyms (traditional names), agreement on the names of geographical features (rivers, mountain ranges, etc.) lying between two or more countries; names in non-written languages, interpretation of geographical terminology and standardisation of technical terms; automation of data processing and publication of dictionaries and gazetteers, and certain other topics. Presentation in the conference proceedings of research and experience from many countries, and the results of systematic work by U.N. experts on geographical names not only facilitates development of national and international cartographic toponymy (which is particularly important for cartography of Third World countries), but also makes a significant contribution to the science of toponymy and even onomastics in general.

Among international journals which owe their origins to international activities, *The International Yearbook of Cartography* is outstanding. It was organised in 1961 by Professor E. Imhof, the first president of the International Cartographic Association, for international exchange of scientific achievements and expertise in the field of cartography. Right up until 1974, the bulk of its contents was taken up by the proceedings of the ICA conferences, which crystallised the ideas, achievements and trends in cartography in the participating countries. The *Yearbook* was characterised by the principle of equal opportunity. The situation changed in 1974 when, after the *Yearbook* passed into the hands of a new publisher and editors, the management began to select authors at its own discretion, and, only in part, to make use of material of the ICA. The intention was to transform the *Yearbook* into a forum for international debate on problems selected by its editor. These problems were announced, apparently with no prior discussion, in the prefaces of selected volumes of the *Yearbook*, but in terms of their overall content were not representative of a carefully conceived, integral system. In its most recent volumes the *Yearbook* has returned to the material provided by the ICA. Volume 22, 1982 includes papers prepared under the auspices of the ICA Commission on Continuing Education, and Volume 23, 1983 contains several papers presented at the ICA Conference in Warsaw, mostly translations from German, and additional articles on cartographic education.

Generally, the IYC is a summary, published by a German publishing house (Kirschbaum Verlag, Bonn-Bad Godesberg, FRG) with contributions from various foreign authors. As far as coverage of ICA affairs is concerned, it ranks behind the *Bulletin of the French Cartographic Committee*.

The *International Hydrographic Review* is noteworthy among those international publications which systematically include cartographic material. It is published semi-annually, with French and English language edition, as the official journal of the International Hydrographic Organisation, Monaco. It contains results of original research in hydrography, oceanography, cartography, photogrammetry, geodesy, navigation, and other topics pertinent to these sciences, such as automation. (News items and a hydrographic calendar, reports from national agencies, lists of navigation charts and other reference materials, reviews and other information are published in a special journal, the monthly *International Hydrographic*

Bulletin.) There is usually about one article on cartography in each issue, but the increasing role played by the ocean in regard to human life and the advent of topo-hydrographical and other new types of marine maps, are adding to the significance of the cartographic component in this journal. Recently, this section has exhibited a leaning toward design theory (for example, see "A Methodological Approach to Nautical Chart Design", IHR, No. 1, 1984.) and new map-making technology for nautical charts. (National hydrographic journals beyond the scope of this review have taken on similar characteristics, i.e., The Hydrographic Journal, London and the Canadian journal The Lighthouse.)

The Cartographic Commission of the Panamerican Institute of Geography and History (PAIGH) which has its headquarters in Mexico City, has published the *Cartographic Review* (*Revista Cartografica*) semi-annually since 1952. The journal has a predominantly topographic-geodetic orientation; the articles are in Spanish and more rarely in English.

The last, but certainly not least, group of international publications consists of bibliographies of maps and cartographic literature. Incidentally, it is now necessary to use the past tense when speaking about map bibliographies. The annual *International Cartographic Bibliography* (*La Bibliographie cartographique Internationale*) was published in France in cooperation with the International Geographic Union from 1949 to 1979, when volume 33 was issued carrying information for 1975. The increase in the number of maps and the organisational difficulties involved in gathering the information necessary for such a venture, and, in the end, the increasing time lag between a map's publication and the corresponding bibliographical entry led to the termination of this valuable publication.

The situation for bibliographies of cartographic literature presents a different situation. Both *Bibliographia Cartographica*, the annual bibliographic register published in the Federal Republic of Germany, and the cartography section of the Soviet monthly *Reference Journal; Geography* (*Referativnyi Zhurnal; Geografiya*) keep leading positions.

Bibliographia Cartographica (established in 1974, and issued as *Bibliotheca Cartographica* between 1957 and 1972) is prepared by the State Library of the *Prussian Cultural Centre* in West-Berlin (*Staatsbibliothek Preussischer Kulturbesitz*) in cooperation with the German Cartographic Society and published by *Verlag Dokumentation Saur* in Munich. In its latest volumes, it carries an annual register of more than 2500 cartographic entries. Even this quantity does not give a complete picture of the actual progress in cartographic literature. As noted previously, there are still more periodical and serial publications containing cartographic material which do not enter into the examination's sphere of this annual. It has retained an almost unchanged structure since *Bibliotheca Cartographica* (1957 – 1972):

1. Bibliography, map collections, documentation
2. General publications
3. History of cartography
4. Cartographic institutes and organisations
5. Cartographic theory
6. Cartographic technology
7. Topographical and chorographical cartography
8. Thematic cartography
9. Atlas cartography
10. Uses of maps
11. Relief models and other cartographic forms
12. Globes.

Although this structure ensures continuity, it does not reflect present-day fundamental changes in theoretical aspects of cartography, its scientific and practical applications, or the effect on cartographic methods of the explosion in automated and remote sensing technology.

In concluding the survey of international cartographic periodicals we shall mention the *ICA Newsletter*, the semi-annual information bulletin of the International Cartographic Association, published since 1983 in English by the Publications Committee of the ICA. Its purpose is to provide up-to-date information about ICA activities, its commissions and working groups, related international organisations, and national cartographic developments of general interest. This journal is a continuation in an enriched form of the information which the ICA previously published in its section in the *Bulletin of the International Geographical Union*, and similar to the latter, it is distributed primarily through the offices of national cartographic organisations.

Conclusion

Our survey has covered approximately 150 journals and serial publications, including 52 cartographic and cartographic-geodetic journals, and 55 geographical and surveying-cadastral journals which provide continuous coverage of cartographic issues. It is, more or less, complete in terms of cartography and cartographic-geodetic periodicals. However, it is possible that there may be omissions due to publications which have only appeared recently and, or, those which are unknown to the author. Geographic and surveying-cadastral journals have also been noted where, their cartographic component warrants inclusion. Naturally, the author's selection is subjective. Interdisciplinary and technical journals (such as environmental protection or remote sensing research methods) which every now and then deal with cartographic questions, have been referred to in specific cases where there is reason for special interest. A systematic survey of the latter category, requiring an extensive and carefully formulated plan of investigation, would provide an interesting undertaking for specialists coming from the appropriate thematic areas of cartography, and for cartographers who are concerned with support of interdisciplinary problems.

Journals have been described in varying degrees of detail. Certainly, one of those degrees, is the function and significance of that particular journal, to what extent its publication is known in the language in which it is printed. These factors have a greater influence on journals from small countries, which are often unique in their national character. However, this last point is not always the case. Much depends upon the general economic and scientific development of the country in question, a factor that has the greatest influence in determining the level of its cartography. An analysis of cartographic literature shows that the limited geographical extent of a language has no bearing on the value of the journals published in that language. It is easy to find examples of this among the socialist countries of Europe. Therefore, it is essential that all periodicals are evaluated according to their scientific use. We have often expressed the opinion that language barriers can and should be overcome in the modern world of science, something which can be achieved by collective effort.

The very existence and development of cartographic periodicals rely precisely on such a collective effort. In this context, it is appropriate to make particular note of the Soviet *Reference Journal; Cartography* (*Referativnyi zhurnal; Kartografiya*). Thanks to the cooperation of many scholars, this journal promotes familiarity with the contents of hundreds of cartographic publications in many languages, something which enables the Russian-speaking reader to avoid the first stage of the language barrier. However, this convenience

has a price tag in the time and effort necessary to compile and publish the journal. It also does not give any protection against language difficulties in the next stage, when the reader turns to the original articles, which have caught his interest. Therefore, taking the tempo of development in modern cartography into account, the scientifically active cartographer must keep up-to-date with literature dealing with his/her own specialism. For example, a person interested in complex or multi-purpose mapping or cartographic research methods must monitor primarily the Soviet literature, while those concerned with psychophysical experiments, or automation in cartography would start with periodicals from the USA. In our analysis, we have tried to point out these characteristic features and basic ideas belonging to each journal.

On top of this, each journal is unique in its individual character, depending on the "soil" in which it has been nurtured. It is rather like a classic wine, in which one can always detect the soil and climate of the vineyard from its taste and bouquet. A connoisseur is well acquainted with these qualities, but they are difficult to describe in words. This is equally justified and true for the individual nuances in the properties of actual journals. They are always perceptible, but their perception is subjective, and describing them would lead this survey away from all permissible lengths.

But, among all varieties of cartographic periodicals, one can define three general characteristics in their overall significance. First, an extremely energetic and diverse development; second, rapid reaction to highly important achievements in science and technology; and third, the appearance of many new periodical publications crossing boundaries and intersections between sciences. All this evokes satisfaction and a sense of pride, not only for one's own journal, but for the science and profession of cartography as a whole, and generates confidence in its successful development on the threshold of the third millennium.

Distinguished Contributors to ICA

Carl M:son Mannerfelt

Olof W. Hedbom

Carl M:son Mannerfelt was born in Goteborg, Sweden on April 10, 1913. His father was Mans Mannerfelt, a captain in the Swedish army. In 1939 he married Ebba Ekman. They have one daughter and three sons.



Figure 31. Carl M:son Mannerfelt

At school Carl Mannerfelt showed much promise as a sportsman and was a frequent winner in athletics. He held various Swedish school records in hurdle racing and later even became the Swedish and Nordic academic champion in this sport. He was (and still is) an excellent skier.

He matriculated in Stockholm in 1933 and in 1938 he graduated (BA) at the Stockholm University (geography, geology, mineralogy and meteorology). In 1940 he passed his final university examination in geography. Between 1935 and 1945 he made various field and air photo surveys of the Swedish and Norwegian mountain regions. In 1936 he was a member of the Swedish-Islandic Vatnajökull expedition under Professor Hans Ahlmann, who studied glaciers as indicators of long-term climatological changes. In 1942 Carl Mannerfelt was employed as map editor at *Generalstabens Litografiska Anstalt, Esselte*, and there he immediately started to improve and rationalise production techniques, as well as to modernise Swedish map design. He had an excellent ability to visualise geographic phenomena, which was also evident in his photography.

Carl Mannerfelt graduated in 1945 with his Ph.D. dissertation: *Some Glaciomorphological Forms and their Evidence as to the Downwasting of the Inland Ice in Swedish and Norwegian mountain terrain*. This learned essay contained many new ideas and was illustrated by high-quality maps, photos and, for the first time in Sweden, by anaglyph photo-maps and pictures.

While employed as a cartographer at Esselte he was also Assistant-Professor in the Department of Geography at the Stockholm University. For one year (1947) during the absence of Professor Ahlmann, he was Head of that Department. In 1949 he was appointed Director of the Cartographic Division at Esselte. In this function he was responsible for the

production of school-atlases, wall maps, world atlases, historical atlases, route maps for airline passengers, tourist maps and road atlases.

Mannerfelt had a lifelong involvement with geography. For 40 years he was active on the board of the Swedish Society for Anthropology and Geography (1943-1983) and was its president three times, 1960-62, 1974-76, 1979-80. For eight years he was a member of the board of the Swedish Cartographic Society and its president from 1955-60.

Carl Mannerfelt's geographic and cartographic commitments naturally included much travel outside Sweden, always with his wife Ebba. This charming and active couple make friends easily, generously receiving them in their home at Djursholm outside Stockholm.

Inspired by the turbulent development of cartography and the multitude of technological innovations, Carl Mannerfelt invited a number of foreign colleagues; most of them engaged in practical map production, to a meeting at Tollare, Stockholm: the Esselte Conference on Applied Cartography, July 27-August 2, 1956. Thirty-six experts from 12 countries accepted his invitation. They were brought together to discuss developments in cartography and reproduction techniques.

At the end of the successful meeting Mannerfelt introduced the idea of more permanent contact between cartographic experts in the form of an international cartographic association. The concept was well received. With his Swiss, American, West German and French colleagues Mannerfelt gradually succeeded in converting the idea into a reality. Although the road was not easy he took each hurdle in his stride. In 1959 the ICA was founded in Bern.

In 1962 Mannerfelt left the Esselte Cartographic Division and became Managing Director of the Stockholm Division of the organisation. Two years later, he was appointed President and Chief Executive Officer of the whole Esselte Group with 7500 employees. After 10 years of executive work, he advanced in 1974 to Chairman of the Board of Directors. At the age of seventy (1983) he officially retired from Esselte. He could then look back on 40 years of continuous development of the firm. From a small printing, bookbinding and publishing company, Esselte had grown into an international group with about 17 000 employees in 22 countries, engaged in a broad range of information-handling activities, including publishing and cartography.

Even after 1962, Mannerfelt followed the development of cartography and the growth of the ICA with great interest. This was illustrated by the fact that as initiator of the Association, he gave his name to its highest distinction, the Dr. Carl Mannerfelt Medal. This award was proposed by the ICA and established in 1979 at a reception in Stockholm by the Swedish Academy of Sciences, while the effigies of the great explorers A.E. Nordenskiöld and Sven Hedin looked down upon the scene.

In March 1981 in the Town Hall of Stockholm at an annual Swedish cartographic conference, Carl Mannerfelt was awarded the medal carrying his own name. It was presented by President Ormeling, who read the following citation:

"In recognition of his bold initiative in convening the first international cartographic Conference in 1956, thus bringing together groups of cartographers of different nationalities, and of his vision in proposing an international body of professionals in cartography. In acknowledgement of his perseverance in pursuing this vision and establishing an international cartographic association, thus creating new opportunities for research and education, raising the status of cartography and contributing to a growing awareness of its professional identity and hence to a new "joie de vivre" for many individuals.

In appreciation of his efforts in breaking the barriers of controversies and differences and thus uniting cartographers of different political and cultural backgrounds."

Eduard Imhof (1895-1986)

Translation of article in Dutch in Kartografisch Tijdschrift, 1986, nr. 3 by F.J. Ormeling Sr.

Youth in Graubiinden (Grisons)

Eduard Imhof was born on 25 January 1895 in Schiers, at the foot of the Ratikon in the centre of the impressive mountainous region of the Swiss Canton of Graubiinden (Grisons). He was fortunate that he was born and grew up in a country that was not split by political polarisation, revolution or war, something exceptional for any European during the first half of the Twentieth Century, and so he was able to develop his talents without hindrance.

Events during his youth in Graubiinden had a considerable influence on his career, if not determining it. His father, a geography teacher, ranked as one of the foremost authorities on the surrounding Bündner Mountains. Commissioned by the Swiss Alpine Club (SAC), he compiled travel guides for mountain tourists, guides which demanded careful field survey. Son Eduard, who appeared to possess an exceptional talent for drawing, was fascinated by his father's work, and took part in his mountain expeditions from childhood, through which he became familiar with the then current 1:50 000 Siegfried map as well as with its imperfections. Sketch book and drawing materials became inseparable companions of the young mountain climber who, as a high school scholar from Zürich and later, as an undergraduate, helped Imhof Sr. with drawing. Following his father's death, he even edited the SAC guide for the Ratikon mountain chain himself (1936). The thoroughness with which he worked is evident from the fact that he discovered 14 different routes for climbing the Schesaplana (2985 m.), the highest peak of the Ratikon, all of which were drawn in on a sketch map of that massif.

The pinnacle of Imhof's career as an alpinist was formed during his years as an undergraduate. His operating range extended far outside Graubünden, way into the Bernese Oberland and Valais. Sometimes alone, sometimes with friends, he was away for weeks at a time, while Imhof Sr. took care of provisioning, supplies being left at previously agreed locations.

After becoming established as a professor and as a family man, the opportunities for mountain expeditions decreased. However, during official tours of duty and representative trips abroad, the passion of youth was re-kindled. In Turkey, where he was an advisor to the Topographical Survey, he climbed Mount Ararat. A cartographic conference in Chicago gave him the opportunity to travel through the Rocky Mountains. In China, he mapped the region of the Minya Konka (7590 m.). From Stockholm, where he was attending a geographers' conference, he climbed Norway's highest mountain, the Galdhoppig. An awe-inspiring collection of water colours, sketches and lithographs, demonstrate the artistic spin-off effect of his mountain trips. On the occasion of his 90th birthday, 1985, the SAC, an organisation within which he held office on several committees, and which had installed him as an honorary member, held an exhibition comprising 60 examples of his work in the Art Gallery of Steffisburg, nearby Thun. During the memorial service on 2 May 1986, in the Evangelical Church at Erlenbach, hometown of the deceased, the President of the SAC delivered the last honours.

Undoubtedly, it must have been difficult for high school pupil Imhof to choose which field of study to follow: the academy of art or engineering. His art teacher was of the opinion that his

terrain sketches were "too topographical, too scientific, insufficiently artistically minded". His later teacher of topography, Professor Fridlin Becker, whom he worshipped, considered his sketches as "too artistic, insufficiently topographic". Finally, the decision was made in favour of studying geodesy at the Federal Institute of Technology (ETH) in Zürich, and it will not be surprising that, partly under the influence of Professor Becker, himself a zealous promoter of relief representation, he specialised in mountain topography and cartography, a subject in which he found it possible to direct his talents towards a single goal. Further, studying at the ETH provided him with an extremely useful basic knowledge of geography, which, in later years as an atlas editor, gained so much depth that geographers regarded him as one of their own. From 1936 to 1939, he was President of the United Swiss Geographic Societies.

In 1919, Imhof received his degree in engineering and was appointed as an ETH assistant, responsible for giving practical geodesy lessons to architectural, civil engineering and geodesy students. Three years later, as a result of Professor Becker having fallen ill, (he died in 1923), he was commissioned to deputise for him, taking over the full teaching load of his subject area. This was followed in 1925 by his being appointed associate professor (later turned into a full chair) in topography as well as surveying and map drawing. In that same year, with the support of the ETH, he founded the Cartographic Institute on the top floor of the Geodesy building without much fuss or ceremony, the first academic cartographic training and research institute in the world. In the beginning, this new creation, which he would head for 40 years until his retirement, spatially, did not have much flesh on the bone. Even during the early Fifties, it only had a single professor, one assistant, 3 rooms and an annual budget of 200 Swiss francs at its disposal. However, under Imhof's leadership, the institute developed into the authoritative focal point of cartography, an institute which an increasing number of foreign colleagues visited, curious about Imhof's success. In order to canalise this growing interest, he organised international Advanced Courses in 1957 and 1960 in cooperation with the Swiss Federal Office of Topography, in which groups of 20 persons took part, in the main, foreign cartographers holding leading positions in their own country, while the host, as head teacher, took care of the lion's share of the lecturing. It will be obvious, that these participants ensured the worldwide spread of his name and fame.

Imhof, the Teacher

As a teacher, Imhof was held in high esteem. His successor, Professor Ernst Spiess, voicing the feelings of two generations of students during the memorial service held on 2 May 1986, praised his didactical talents. The engineers remembered his practical exercises, in which he tried to bring home the principles of orderly technical drawing, and of graphic and aesthetic clarity. The cartographers remembered how they used to work together in small groups, drawing and discussing and through the medium of maps and slides, became aware of the essence of the discipline, cartographic design: the interplay of graphic elements. Both groups of former pupils could remember Imhof's lucid manner of speaking, his total rejection of high-flown wording, written or oral. Several of his forceful expressions are firmly etched in the memory: "Those who want to make maps have got to learn first" or "Making maps does not begin with a computer, but with sharpening the end of a pencil". Then, of course, one remembers his didactical trickery, when he exhibited good and bad solutions side by side, or demonstrated graphic enormities, as well as his charm and ease in producing drawings of rock formations as if by magic using chalk or pencil.

Cartographic Design

A review of Imhof's whole cartographic work establishes the fact that he was intensely occupied with all aspects of cartographic design: symbolisation, generalisation, use of colour, position of text, relief representation, and so on. Starting from the principle that the core of cartography was responsible graphic presentation, he strived to achieve a system of simple symbolisation and lettering. He laid down rules for the application of geometric and figurative symbols and for the use of colour. He designed a special group of stylised symbols for those minor, and often neglected relief features such as moraines, small hills, or holes characteristic of limestone topography, that can upset the earth's surface in such a significant manner. He made a study of the generalisation concerning different forms of human settlements, and was the first person to analyse the various aspects of cartographic lettering, for which he laid down certain rules of application. Repeatedly, he pointed out the necessity for a reasonable combination of graphic elements, to attune the content of the map to its scale – and to the needs of the user. "No map can show everything" He battled against overloading the map's image and the degeneration of its contents (tourist information and the cattle fodder industry on one and the same map!), the prevention of which was a geographic as well as a graphic responsibility. Using the principle "Less often means more", he advised cartographers to delete all those items which did not make any significant contribution to the map, but only served to clutter it up. Besides this, his concern was in reaching the map user. In fact, his first major publication *Gelände und Karte* (1950), sponsored by the armed forces, was aimed at raising the level of observations in the field, together with the closely allied reading and interpretation of maps, an exercise which fitted the alpinist and reserve artillery man Imhof like a glove.

Relief Representation

There is no other area in which Imhof's influence had such far reaching consequences than that of relief representation. His name remains associated with that particular system which is known throughout the world as the "Swiss Manner", a title which is not particularly popular in Switzerland itself, as the word "Manner" reeks of affectation. What we understand under the title "Swiss Manner", is the method of relief, or hill shading using oblique illumination for the upper left-hand side, with perspective hypsometric tints. Applying this method and further enhancing it by contour lines, rock drawings – one of the most striking aspects – and minor land form symbols, Imhof created an illusion of unequalled three-dimensionality. He fiercely dismissed all other methods, such as hill shading, with vertical illumination on the principle "the steeper, the darker". As far as altitude tinting was concerned, he dismissed all the existing colour scales which incorporated the system of "the higher, the lighter" or "the higher, the darker", and also the much used variant running from green through light green, to yellow and brown, and on to red-brown. Similarly, he disassociated himself from the theories put forward by the Austrian cartographer Peucker, whose opinion was, that colour variations conjure up a stereoscopic effect. Imhof's aerial perspective hypsometric tints are based upon the experience that in normal vision nearby landscape colours are brighter than those further away. Looking down from a great height, the lower regions appear to be grey-blue, the hills and middle ranges from blue-green to green and yellow-green, while the mountainous regions are yellow and light yellow, with the peaks emerging as white.

The adage that "easy reading is hard writing" is, also applicable to cartography. Admirers of Imhof's relief presentation know that his success was the result of years of experimentation. The first occasion that he applied the oblique illumination technique, was in the Twenties, on wall maps of various cantons for educational purposes. From 1932, this method was also applied to some of the maps in the *Schweizerische Mittelschulatlant* (*Swiss High School Atlas*), of which he had been editor since 1927. During the ensuing years, the method was

further developed graphically. It was refined, and reproduction and printing techniques were tried out on several sorts of maps in the *Mittelschulatlas* which thus served as an experimental nursery. The breakthrough came in 1962. In the 13th edition, the new methods were integrally applied to all the maps, including those of small scale.

Thanks to its penetrating graphic effect, this new relief presentation was well received, both in Switzerland and abroad, not only in cartographic circles, but also in the teaching profession, despite the fact that there were objections to the dark grey-blue low lands. The "Swiss Manner" added considerable weight to the image of Swiss cartography, which was already held in high esteem. In the Netherlands, the rather critical cartographer Jan Schokkenkamp, with a wealth of experience behind him, working for Shell, called the *Mittelschulatlas* a "beautiful piece of mapping, a masterpiece of cartographic art and reproduction techniques". In his own country, Imhof managed to persuade the Federal Office of Topography to publish alternative versions with hill shading of the new topographic map series 1:25 000 and 1:50 000, the production of which was established upon his instigation in the 1935 Federal Mapping Act. In practice these sheets eventually proved most popular with the users. Topographical services in other countries followed this example, despite the fact that this laborious system of hill shading was often felt to be a heavy work load. In atlas cartography, the Imhofian system of relief presentation sounded the death knell for the traditional hachuring methods. One after another, publishers of atlases switched over to shading mountain slopes with oblique illumination, with varying success to be sure, as in this sector, it was also impossible to pluck talented shading artists out of the blue. Imhof himself, who in the 1960's was the editor responsible for the *Mittelschulatlas*, the *Sekundarschulatlas* as well as the *Atlas der Schweiz (National Atlas of Switzerland)*, also had his hands full. In order to broaden his range, he recruited a group of promising young cartographers, taught them the new shading technique and, under his supervision, turned them loose on the various projects on hand in his studio in Erlenbach. Taking into consideration how the later careers of these shading artists blossomed, it can be established that their labour as wage earners with Imhof, was well worth their while. In 1965, as a conclusion to the operation, Imhof's authoritative book *Kartographische Geländedarstellung (Cartographic Relief Presentation)* presented a theoretically warranted justification of the "Swiss Manner", methods for its application, and a thorough analysis of all previously used methods of relief representation and altitude tinting. This work received high praise from the professional community. Representative of this eulogy, was the literary review by Dr. Fritz Holzel, the German hill shader *par excellence*, who wrote: "It is not a publication produced by an abstract scientist, but that of a human being, whose humour, and occasional waggish criticism, quickly brings about contact between author and reader".

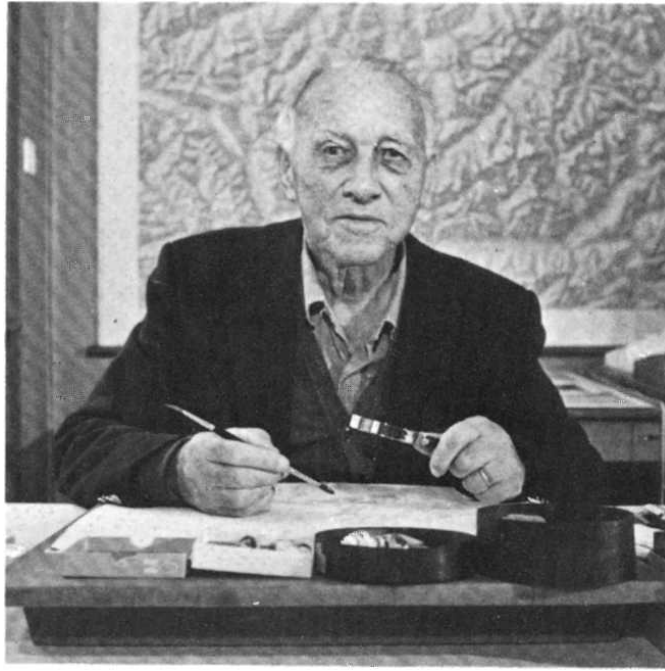


Figure 32. Eduard Imhof in his studio in Erlenbach, Switzerland

Thematic Cartography

As is well known, as a result of a changing viewpoint in the teaching of geography during the years 1950-1960, it became apparent that there was an increasing need for thematic maps. The *Mittelschulatl* could not escape this phenomenon either. This resulted in the editor Imhof having to pay increasing attention to the taxonomy and composition of these types of maps. At that time, this was an unexplored area, but one however, with which Imhof had been brought into contact as a contributor to the *Atlas zur Geschichte des Kantons Zürich, 1951 (Atlas of the History of the Canton of Zürich)*. It is obvious, that thematic cartography, an area in which there were few rules and, often as not, a multitude of solutions, provided fertile ground for the graphically gifted Imhof. It is evident, from the rapid growth in the thematic map section of the *Mittelschulatl*, that he made full use of the chances. In the same way in which he conquered the field of relief depiction, he compiled the findings of his struggle with thematic subject matter in a book. In 1972, his third major work, *Thematische Kartographie (Thematic Cartography)* was published. Despite the fact that it was announced as a "simple and concise textbook", it is predominantly a personal view of the complex subject matter of thematic cartography. The author proposes that the field should be divided up according to graphic structural types, such as isoline maps, dot maps, flow maps, etc. instead of by map themes, which may be unlimited. According to Imhof, this structural approach should form the core of the science of thematic cartography, because only on this basis, is it possible to build up a clearly structured methodology. Although the book had all the allure of a pioneering work and its division into structural types was generally accepted, it was however, less enthusiastically received than *Kartographische Geländedarstellung*. In the periodical *Kartographische Nachrichten* (FRG) it was even subjected to – a cool criticism, which caused consternation among the German speaking disciples of the Grand Master.

Atlas der Schweiz

The whole range of Imhof's graphic talents was revealed in the *Atlas der Schweiz*, the National Atlas of Switzerland, for which the Federal Council gave the green light in 1961, after much insistence from the master himself. At the age of 67, Imhof accepted the appointment as manager of this voluminous project, becoming Chairman of the editorial

committee as well as Editor in Chief. The realisation of all this work was published in 12 instalments, spanning a period of 17 years. Upon its completion, in 1978, the National Atlas comprised approximately 500 maps based upon the latest research and statistics, together with profiles, diagrams, tables and an explanatory text in three languages. In total, approximately 140 experts from different disciplines worked on the project with whom Imhof was in close contact. According to Spiess, he led the operation with supreme authority. He succeeded in inspiring his colleagues, brought them to a "common denominator" and, when necessary, got them to bend to his will. The graphic composition and didactical presentation in all parts of the atlas betrayed the hand of the master and, as such, it became his *Magnum Opus*. The atlas was enthusiastically received throughout the professional world. Although it is hardly possible to make comparisons with other national atlases, each bearing its own particular stamp, the majority opinion was, that the Swiss Atlas was a world leader for its graphic composition, didactical presentation and technical cartographic quality. Naturally, there was criticism as well, particularly regarding the large number of analytical maps and the limited range of synthetic maps as well as the lack of problem-orientated chapters. This does not remove the fact, that during its period of publication, interest in the atlas increased to such a degree that the print run for instalments was raised from 4500 to 6000 copies.

Imhof and the ICA

Due to his authoritative international standing, Imhof was predestined to play a role in international association life. Since the mid-fifties, he took part in discussions with German and French colleagues concerning a suggestion made by the Swedish cartographer, Carl Mannerfelt, whose idea it was to found an international cartographic society, a plan which did not meet with much sympathy from geographers and photogrammetrists. Gradually, Imhof's part in these discussions grew, and finally, he had a decisive influence. Together with Mannerfelt, he managed to persuade the sister organisations that cartographers had their own specific problem area and a right to form a separate organisation. The International Cartographic Association (ICA) was founded in Bern in 1959 with Imhof as its first president. Two years later, acting as a charming host, he presided over the first General Assembly of delegates in Paris, where the statutes of the Association were approved. In the years to come, he and Mannerfelt tactfully promoted the entry into the ICA of the Eastbloc countries. Although the Swiss are above suspicion as far as their democratic attitude is concerned, during the unsure early years of the young Association, in which swift decisions had to be taken, the first President showed sufficient authority to ensure its consolidation. At meetings the set limits he allowed for discussion – were the words "Discussion opened" and "Discussion closed" following each other in quick succession – will remain firmly imprinted in the memory. In appreciation of his pioneering work, the ICA awarded its first president with their highest distinction, the Mannerfelt medal. The author was privileged to pay the final honours to the deceased on behalf of the ICA during the funeral service held at Erlenbach.

Conclusion

The impact that Imhof has had on cartography, is based on the combination of scientific sense, artistic talent and technical proficiency, something that is rarely found in a single person. Through this combination, his horizon was broader and he had a better overview of the whole subject than most of his colleagues. In addition, these qualities were combined with a fighting spirit, often disguised by a disarmingly gentle approach, by which he was able to achieve much more for cartography than would have been possible for most others. In appreciation of his work, he was inundated with honorary memberships and distinctions, including an Honorary Doctorate bestowed by the University of Zürich, major geographic

medals (David Livingstone, Martin Behaim and Alexander von Humboldt) and he was made a Freeman of Erlenbach.

Some have misleadingly called Imhof the "Rembrandt of Cartography", thereby giving the impression that map making is an artistic occupation, an indefensible idea, and one that Imhof also firmly rejected, although he liked to juggle with expressions such as "Mapping artist" and "the Beauty of Maps". After all, art – as he put it – demands freedom of expression, a demand which maps, inexorably fixed to geometric or statistical basic data, or to standard colour symbols, could never be able to satisfy. However, it can be said that to optimise the quality of cartographic representation, it is desirable to have the assistance of a well trained, perhaps artistically minded, graphic artist at one's disposal.

Imhof could look back on a rich and fulfilling life, surrounded by friends, dedicated students and former pupils, as well as silent admirers. His robust health made it possible for him to remain active to a ripe old age. At the age of 82, he finished the Swiss Atlas; as an 85 year old, he put the finishing touches to an impressive 1:200 000 relief map of Switzerland and, shortly before his death, he wrote the article *Glanz und Elend der Kartographie (Glory and misery of Cartography)* that was published, posthumously, in the 1986 *International Yearbook of Cartography*, a publication which he initiated in 1961. It remains for us to express our gratitude for all that Imhof stood for, brought about, and passed on to us all. The best way of paying tribute to his memory, is to hand on his theories and rules to those, who are now on the threshold of the computer age and who will be able to use them to combat the limitations of electronic image formation.

Stéphane de Brommer (1905-1972)

Stéphane de Brommer was born in Paris on 23 February 1905. He attended grammar school in Bordeaux and was admitted to the famous *Ecole Spéciale Militaire (Special Military School)* of St-Cyr in 1925. He graduated in 1927 as an infantry officer and in 1931, upon his request, was transferred to the *Service Géographique de l'Armée (Military Geographical Service)*, where he took part in topographical surveys in Provence and in Syria.



Figure 33. Stéphane de Brommer

From the outset he demonstrated particular interest in reproduction and printing techniques and in 1933 he was appointed to the Cartographic Section of the *Service Géographique*. One year later he was put in charge of its Section of foreign relations. In 1940, when the Military

Geographical Service was transformed into the civil *Institut Géographique National* (IGN), he was employed in the division of Geographic Engineers. For many years he directed with authority and competence the Reproduction and Printing Department of the Institute. In 1957 he was called to serve at Direction level, where he was responsible for dealing with problems related to cartography. In 1964 he was appointed Director of the *Ecole Nationale des Sciences Géographiques* of the IGN, a position that he held till his retirement in 1971. Convinced of the good cause of mapping and its important function in modern society, he devoted much of his energy, enthusiasm and organisation talent to promoting national and international cooperation in cartography. He was one of the founder members of the International Cartographic Association, which he served as its Vice-President for eight years. As chairman of the Commission on Education (1964-1972) he succeeded in winning the financial support of UNESCO, which enabled him to do innovative work for the Association. The publications of the commission and its repeated presentations to plenary conference sessions considerably stimulated the growing awareness of the significance of a responsible education in cartography.

He was an indefatigable worker with great knowledge and experience in technical matters. As a good organiser, he managed to find time to attend courses on new developments in photography, reproduction and printing, adhering to the principle that it is necessary to have a full knowledge and understanding of the matter in question before one can delegate the work to others. Moreover, he was an excellent teacher. The students of the *Ecole Nationale* who were fortunate to have him as their guide, admired his teaching flare and appreciated the solid content of his lessons.

International relations played an important role in de Brommer's life. He represented his country and the Association with style and tact. At the same time he was amiable and charming and with his fine sense of humour he was greatly liked. Participants of the UNESCO Seminars in the 1960's have nostalgic memories of the social evenings organised by Madame and Stéphane de Brommer in their home in Avenue Emile Deschanel. Stéphane passed away on 15 December 1972, victim of a heart attack.

Erwin Gigas (1899-1976)

Rolf Böhme

Professor Dr. Ing. Erwin Gigas was one of the promoters of the International Cartographic Association and its first Secretary-Treasurer. At the beginning of his professional career he was mainly concerned with geodesy. In 1928 he joined the *Reichsamt für Landesaufnahme*, the then central organisation for surveying and mapping in Germany. He became one of the outstanding specialists in trigonometrical surveys and during the first years after World War II he became widely known for his contribution to the unification of the various national European triangulation networks into one European system. But Gigas' genius was wide-ranging; he was one of the last Universal Men. He did not limit himself to geodesy; his interests also embraced photogrammetry, cartography and even reproduction. In the second half of his life, his involvement in international cooperation and the problems of developing countries became dominant. In 1952 he was appointed Director of the *Institut für Angewandte Geodäsie (Institute of Applied Geodesy)* in Frankfurt am Main. In this position he succeeded in transforming the institute into a Federal Office.

His international contacts started in 1955, when he represented his country at the first United Nations Regional Cartographic Conference for Asia and the Far East in Mussoorie (India). When the discussion on international cooperation in the field of cartography proper was initiated by Dr. Mannerfelt in 1956, Gigas became one of the most active supporters. He was

elected a member of the so-called *Committee of Six*, with Dr. Mannerfelt as chairman. Subsequent conferences at Evanston, Chicago (USA) and at Mainz (FRG), both in 1958, pointed the way, increasingly clearly and convincingly, to the eventual formation of the ICA in Bern in 1959. Thus, the ICA was born. At its first General Assembly of Delegates in Paris in 1961 Professor Gigas was elected Secretary-Treasurer of the young Association with Professor Imhof as President.



Figure 34. Erwin Gigas

One year later the United Nations convened the *UN Technical Conference on the International Map of the World 1:1 000 000 (IMW)* at Bonn it was the first UN conference held in the Federal Republic of Germany. Gigas was elected President of the conference, which elaborated new specifications for the compilation of the IMW, still valid today. In the same year Prof. Gigas organised the First Technical Conference of the ICA in his institute in Frankfurt am Main. At the ICA conference in London/Edinburgh (1964), both Imhof and Gigas retired from their ICA duties. They were succeeded by Brigadier Thackwell (UK) and Dr. Ormeling (Netherlands) respectively. Thus, after the foundation period of the ICA as an international non-governmental organisation, a period of consolidation began, making ICA the world-renowned association.

Parallel to his activities for ICA, Professor Gigas was in much demand as a specialist in seminars and conferences of the United Nations. Thus we find him at the UN seminar in Teheran (Iran) in 1957 and at the UN Regional Cartographic Conference for Asia and the Far East in 1962 in Bangkok.

In 1964 Gigas retired as Director of the *Institut für Angewandte Geodäsie*, but no one was astonished that he remained very active. He had cultivated an interest in automation and after his retirement worked for two years with the US Coast and Geodetic Survey in Silver Spring, Maryland. Here he worked on automated procedures for data processing for the preparation and maintenance of aeronautical charts.

Many of his publications deal with cartography proper, with automation in cartography and with promoting cartography in developing countries. The last years of his life were spent in southern Spain, where he left the great family of cartographers in 1976.

Dennis E.O. Thackwell

Harold Fullard

Brigadier D.E.O. Thackwell was born in Poona, India, on the 18 March 1909. His father was Brigadier O.M.R. Thackwell R.E. who had spent the major part of his Service life in India. He went to Rosall School in Lancashire, UK, and completed his academic education at Corpus Christi, Cambridge. On 31 January 1929 his military career began when he was granted a regular army commission as 2nd Lt. Royal Engineers at Chatham.

In World War II he served firstly in Survey of India and then in various military roles and latterly as Assistant Director Survey in G.H.Q., India, in the 4th Army and in the 12th SEAC. In 1946 he returned to civil employment in Survey of India. From 1948 to 1963 he was in charge of divisions of the Ordnance Survey UK and in 1959 was promoted Brigadier and appointed Director Map Production OS, Gazetted C.B.E. in January 1963 and retired in June 1963.

In addition to his distinguished service to military and civilian survey and mapping, he served the cartographic community in many ways such as by his work on the Royal Society Cartography Committee, on the UK committee devising a new specification for the 1:1 Million Map of the World (1962), on the Executive Committee of the newly formed ICA and as the founded President of the British Cartographic Society in September 1963 and on to 1966. On 6 September 1983 at the Royal Society in London, the President of the ICA, Professor F.J. Ormeling, presented him with the Honorary Fellowship of the Association and the following is an extract from his address:

"Brigadier Thackwell was elected President of the Association by the Second General Assembly in Edinburgh in 1964 when the Association was five years old. He succeeded Professor Imhof, first President and one of the founder members of the ICA. His administration was soon characterised by a series of actions and decisions which strengthened the Association and resulted in a healthy growth of prestige. To minimise confusion in allied disciplines such as geodesy, photogrammetry, graphic arts, geography as to aims and objectives of the Association, Thackwell started to stake out the area of interest, the sphere of influence of cartography. He made it clear that cartography had a specific problem area, distinct from, but closely related to surveying and photogrammetry. He introduced the Technical Meetings between the 4-yearly conferences, the first of which was held in Amsterdam in 1967. Under Thackwell's administration the first three commissions (Education, Terminology and Automation) started their work. Together with de Brommer (France), Chairman of the first mentioned commission, he initiated a series of successful UNESCO conferences on Education in Cartography in Paris. Further it was Thackwell who managed to bring the extravagant ambitions of the Commission on Terminology to workable dimensions, thus laying the foundation of the Multilingual Dictionary of Technical Terms. Together with Professor Boesch, Secretary General of the IGU, he strengthened the relationships with the geographers by introducing joint sessions on subjects of common interest during overlapping conferences.

The years of Thackwell's Presidency in many respects were of a decisive nature for the Association. His cool leadership and clear judgement inspired confidence, attracted new member countries and brought outlying members into active collaboration. As a token of gratitude and respect the Executive Committee upon recommendation of the Committee for the Selection of Award Recipients decided to confer the Honorary Fellowship on Brigadier Thackwell. I am honoured to announce this decision."



Figure 35. Dennis E.O. Thackwell

Konstantin A. Salichtchev

Prepared by Bernard V. Gutsell for IC4 Newsletter nr. 7, May 1986 from an article by Joel L. Morrison entitled "The 80th Birthday of an Eminent Cartographer" published in Mapping Sciences and Remote Sensing 1985.

For many years the development of Soviet cartography has been connected with the name of Konstantin Alexevitch Salichtchev, head of the Soviet school of geographic cartography, outstanding scholar and cartographic educator, honorary member of the USSR Geographical Society and Past President of the International Cartographic Association. It is appropriate and an honour to recognise Salichtchev's accomplishments at the time of his 80th birthday on November 20, 1985. The lines of research outlined by Salichtchev, his colleagues, and numerous followers and students will contribute greatly to future progress in both cartography and geography.

Early training and fieldwork

Salichtchev's career is a model of dedicated and multifaceted service to his native country and its scientific institutions. Born in Tula, 150 km south of Moscow, in 1905, at 16 he enrolled in the Moscow Surveying Institute which, one year after his matriculation, initiated a programme in cartography and geodesy. At that time it was the only school of advanced cartography in the world, and included within its curriculum the study of mathematical projections, map compilation and editing, and map production. In addition, the curriculum included such diverse topics as geology, physical geography and topography, economic and human geography, and field methods.

K.A. Salichtchev's years of study at the Institute coincided with the establishment of the organisational and methodological basis for a new Soviet cartography, contained within a decree by Lenin of March 1919 establishing a topographic-geodetic and cartographic service for the USSR, and a proclamation by the USSR Council of People's Commissars in August 1919 concerning the preparation of maps, diagrams and other graphic devices for educating the general public about the development and administration of the country. In particular, the new government was interested in the application of cartography in national economic development.

During 1926-1930, Salichtchev participated in two geographical expeditions to the virtually uncharted northeastern corner of the Soviet Union. The discoveries were documented by him in Transactions and Reports, on maps at scales of 1:2 500 000 and 1:1 000 000, and in a paper stressing the importance of air survey in mapping new areas. As Director of the Cartographic-Geodetic Section of the USSR Arctic Institute from 1932 to 1936, Salichtchev devoted his research to the methods and results of astronomic, geodetic and cartographic work in the Arctic, and the applications of aerial surveys for small-scale mapping.

The great Soviet atlas project and Soviet atlas cartography

From 1936 to 1938 Salichtchev worked on the *Great Soviet Atlas of the World (Bol'shoy Sovetskiy atlas mira)* project, under the direction of the USSR Central Executive Committee, where he soon became leader of the cartographic section and a member of the atlas editorial board. Participation in the *Great Soviet Atlas* was a turning point in Salichtchev's career, and atlas cartography became one of the major directions of his scientific and administrative activity. He chaired the editorial board of the *Historical Atlas of Geographic Exploration and Research (Atlas istorii geograficheskikh otkry i issledovaniy)* in 1959, and was a member of the editorial boards of the *Marine Atlas (Morskoy atlas, 1950-1953)*, *Atlas of the World (Atlas Mira, 1954)*, and the *Physical-Geographic Atlas of the World (Fizikogeograficheskiy atlas Mira, 1964)* – each representing a milestone in Soviet cartography. Salichtchev also participated actively in the compilation of the recent three-volume *Atlas of the Oceans (Atlas okeanov, 1974-1980)* – an encyclopedia of knowledge about the nature of the oceans unequalled anywhere else in the world. In 1981, Salichtchev was awarded the State Prize of the USSR in recognition of his accomplishments in the field of atlas cartography. In 1956, when the IGU convened in Moscow, Salichtchev was named chairman of the Commission on National and Regional Atlases, a position he held for the next 16 years. He examined the problems and principles involved in the compilation of national atlases at the regular plenary sessions of the Commission from 1958 to 1976 and advanced his views on complex national atlases, both as a means for acquiring knowledge and as a reflection of his country's level of geographic and cartographic development. His book *National Atlases*, 1960 originally published in the USSR in Russian and French, later translated into English in Canada and published as *Cartographica Monograph No. 4*, 1972, was awarded the Herman Haack Medal of the Geographical Society of the German Democratic Republic. For over 30 years Salichtchev has directed Moscow University's Laboratory of *Complex Mapping and Atlases*, a part of Moscow University Faculty of Geography, where complex scientific reference atlases are compiled. The results of the Laboratory's experience are summarised in the major monograph *Complex Regional Atlases* prepared by a collegium of Moscow University cartographers and geographers headed by Salichtchev, who has always shown a great concern for a common sense of purpose among geographers and cartographers. Major cartographic projects have become at the same time significant geographic endeavours, opening new possibilities for joint research.

Maps in Higher Education

As early as 1950-1954 Salichtchev, as chairman of an editorial board responsible for directing the work of the Main Administration of Geodesy and Cartography on a series of maps for use in higher education, participated in the compilation of five series of maps: hypsometric maps of major orographic regions of the USSR, general reference maps for the regions of the USSR and foreign countries, thematic maps of nature in the USSR, general-purpose desk maps, and series of topographic maps. At the time, this was an unprecedented experiment in the compilation of a comprehensive system of maps for higher education. Salichtchev's constant efforts to improve major trends in the development of geographic

cartography and maps for higher education were rewarded again some 20 years later in plans by the Ministry of Higher and Middle Special Education for a renewed emphasis on maps for higher education, based on far-reaching research into the demand for maps covering a variety of types, subjects and purposes. Once more, as head of the Scientific-Editorial Board for Maps in Higher Education, he coordinated the activity of this collegium of cartographers, geographers, geologists and historians in producing a unified and compatible series of maps of value not only as an instructional project in Soviet universities and technical institutes, but as a reference work synthesising much of the present geographic and cartographic knowledge about the USSR and the world.

The cartographic method of research

By focusing his attention on actual cartographic products and techniques of mapping, Salichtchev has been able to see in cartography not just a technical discipline, a concept which was widespread in the past, but a science of knowledge about the world. He was the first to promulgate and develop the idea of a cartographic method of research which he perceived as a uniquely scientific and concrete manifestation of the dialectical method of Marxist thought, a concept that has greatly influenced cartography, promoted the development of new trends in research, and strengthened the view of cartography as a cognitive science. In his writings, Salichtchev has emphasised in particular the idea that geographic maps provide researchers with concrete methods of obtaining new knowledge and establishing relationships in the locations and interactions of features and thereby forecasting their development. Subsequently, he developed the concept of the cartographic method of knowledge, and gave it a more detailed definition. He repeatedly addressed problems of map use in papers published in the USSR and presented at international conferences. His work on theory and methodology have addressed cartography's place in the system of sciences, its content, structure and linkages with other disciplines; the problems of cartographic generalisation; the language of maps; cartographic modelling; automation; systems analysis; mapping from space, and many other issues. In 1967, Salichtchev was awarded the USSR's D.N. Anuchin Prize for his research on cartographic theory. Among this works of lasting significance are his contributions to the monograph series *Results of Science and Technology: Cartography* published by the USSR Institute of Scientific and Technical Information.

Remote sensing and information systems

Salichtchev possesses the most valuable attribute that a scientist can have – a constant intellectual curiosity and a predilection for seeking out the new. He has devoted steadfast attention to the introduction of remote sensing and automated compilation and map use methods into cartography. Realising that remote sensing in essence has revolutionised the practice of map compilation, Salichtchev helped establish a Laboratory of Remote Sensing at Moscow University, which has operated since 1953 under his direction as Chair of the Cartography Department.

There is yet another trend that K.A. Salichtchev has helped bring to life in the Soviet Union and other countries – the automation of cartography and the formation of geographic data banks. He considers, with some justification, that the future of the discipline is linked with automated information systems. In 1976, upon his initiative, an Automation Laboratory was set up in the Cartography Department of Moscow University, which functions as a centre of intensive research on principles for the establishment of geographic data banks.



Figure 36. Professor and Mrs. Salichtchev aboard Wolga steamer during conference excursion 1976.

Salichtchev as a geographic educator

He is not only a renowned scholar, but also an outstanding teacher – the organiser of geographic-cartographic education in the USSR. His involvement with teaching began in 1931 in the Geography Faculty at Leningrad University where he taught a course on Map Compilation and Design in a newly organised cartography programme. In 1936 he was appointed to the Cartography Faculty of the Moscow Institute of Geodetic, Aerial Survey and Cartographic Engineering (MIIGAİK), first as a professor and then as the director of the Chair of Map Compilation and Design.

For over 40 years, Salichtchev has been affiliated with Moscow University, originally appointed in 1941 to teach courses to prospective cartographers. In 1947 he was transferred within the university, first as a Vice-President for instruction, and then as Vice-President for the Natural Science Faculties (1947-1954). In 1949 he headed the Department of Geographic History, and in 1950 assumed the Chair of the Cartography Department. Over the 35 years elapsing since that time, the department has been transformed into a large educational and research centre, occupying an eminent position in Soviet and world cartography. The departmental laboratories are supplied with modern equipment and are extending the research frontiers of cartography. In 1978, F.J. Ormeling Sr., then President of the International Cartographic Association, having completed a special study of cartographic education across the world, noted that "it is generally recognised that the Department under K.A. Salichtchev's leadership developed into one of the leading cartographic centres in the world in the areas of education and research".

K.A. Salichtchev is the author of several of the principal textbooks used in the universities of the Soviet Union. The *Foundations of Map Science* texts have been republished several times after revision and the addition of new material. His general text for geography students, *Cartography*, was first published in 1955, a second edition in 1966 and a third edition in 1982. In 1976 his new textbook *Map Science* was published, with a second edition in 1982. His most recent contribution to the theory and practice of map compilation, *The Design and*

Compilation of Maps, 1978 provides a theoretical basis for and systematic analysis of laboratory methods of map-making.

Administrative activity

Salichtchev has been able to combine intensive research and teaching with energetic administrative activity. He contributed greatly to the development of the USSR Geographical Society and has played an active part in many All-Union cartographic conferences. From 1964-1972 he chaired the USSR National Council of Cartographers. In these capacities he devoted much of his attention to consolidating the position of Soviet cartography in the international arena, enhancing its reputation and actively publicising its scientific achievements. He was elected ICA President for the period 1968-1972 and Vice-President from 1972 to 1976 during which periods he worked to develop and strengthen ties between cartography and geography. The close ties between IGU and ICA during those years are a reflection of his efforts.

As evidence of the high esteem with which Salichtchev's work is regarded we need only to mention that he is an honorary member of numerous scientific societies in Europe and North America as well as in the USSR, and he holds honorary doctorates from the Humboldt University in Berlin and from Warsaw University. He received an Honorary Fellowship in the ICA, and in 1981 during a special session at the Moscow University in the presence of its Pro-Rector on behalf of the Association President Ormeling presented him with the Carl Mannerfelt Medal in recognition of outstanding service in promoting international cooperation among cartographers.

An enduring legacy

K.A. Salichtchev is a scientist with an international reputation, an internationalist as well as a devoted Soviet citizen, and a scholar who applies all his knowledge, energy and creativity in the development of cartography. For more than half a century Salichtchev's scientific activity and work have indelibly shaped the development of Soviet Cartography, indicated new directions for research, and established new theoretical principles. Under his leadership new ideas have emerged, conferences convened, and basic cartographic works published. As an author and teacher he has been instrumental in training the present generation of geographers and cartographers for employment and in focusing advanced research on the present problems in the discipline. As time passes and current trends in the development of cartography continue into the future, Salichtchev's contributions will remain of continued importance not only in his native land but throughout the world.



Figure 37. Presentation of Mannerfelt Medal to Professor Salichtchev, Moscow 1981. From right to left, Salichtchev, Komkov, Ormeling and Hedbom

Arthur H. Robinson

Bibliography of Prof Robinson generously supplied by the US National Committee for ICA

Arthur H. Robinson was born January 5, 1915 in Montreal, Canada, of American parents. His early education was in Northfield, Minnesota and later in Oxford, Ohio, where his father was Professor of History. In his early teens during his father's two sabbaticals he lived in England, and attended the Friend's School Saffron Walden for one year.

He entered Miami University, Oxford, Ohio, in 1932 and obtained the degree of Bachelor of Arts in January 1936, with a major in history and a minor in geography. After graduating, he served six months as secretary to a member of the Ohio Board of Liquor Control, but in August 1936 he decided to enter graduate school. He obtained a graduate teaching assistantship in the Department of Geography at the University of Wisconsin, Madison, studying under Professors V.C. Finch, G.T. Trewartha and J.R. Whitaker. His interest in cartography was kindled during this period when he had the first (and only) course in cartography from Professor Finch and a field mapping course from Professor Trewartha. He was granted a Master of Arts degree in 1938.

In the same year he began work toward the Ph.D. degree in the Department of Geography at The Ohio State University, Columbus, studying primarily under Professors G.H. Smith and R. Peattie. His minor field was geomorphology in the Department of Geology. On December 23, 1938, he married Mary Elizabeth Coffin. They have two children: Stephen M. and Patricia A., born respectively in 1942 and 1948. While pursuing his graduate studies at Ohio State University, he began doing free lance cartographic work, such as for R. Peattie's *Geography in Human Destiny* (1940) and for Scott, Foresman and Company, publishers of *This Useful World* (1941), and the *Our World series*.

He completed his qualifying examinations for the Ph.D. in the spring of 1941 and planned to begin work on a dissertation in September, but chance interfered. Professor R. Hartshorne, newly appointed Chief of the Geography Division of Colonel Wm. Donovan's agency, Coordinator of Information (later to become the Office of Strategic Services, OSS), happened to stay overnight with R. Peattie while en route to Washington, DC. Hartshorne was looking for a geographer-cartographer and Peattie recommended Robinson. In October of 1941, Robinson went to Washington and some months later was named Chief of the Cartography Section of the Geography Division. In a subsequent reorganisation of the Research and Analysis Branch of the OSS, a Map Division was created with Robinson as its Chief. It consisted of four sections, Cartography, Map Intelligence, Topographic Models and Photography. In addition to serving the needs of the OSS, especially the Research and Analysis Branch, the Map Division, OSS, prepared most of the strategic maps for the Joint Chiefs of Staff and prepared the base materials for the daily situation maps for the Operations Division of the War Department.

The Map Division, primarily Map Intelligence and Cartography, had overseas offices in the principal theaters. Robinson served as the Chief Map Officer for the American delegation at the two Allied Quebec Conferences and the Cairo Conference. While in the OSS he was commissioned Captain and rose to Major in the Army of the United States.

In the summer of 1945 Robinson accepted the offer of an assistant professorship in the Department of Geography at the University of Wisconsin, Madison, and began his teaching

duties in January of 1946. Meanwhile he had changed his plans for a dissertation and proposed a new topic having to do with cartographic methodology. It was approved and the degree was awarded by Ohio State in 1947. The dissertation was revised and became his first book, *The Look of Maps, an Examination of Cartographic Design* (1952), published by the University of Wisconsin Press.

During his 35 years in the Department of Geography, he taught physical geography and established the instructional program in cartography. Through his efforts a mapmaking establishment was formed, growing from a small organisation in the late 40s to become the official University of Wisconsin Cartographic Laboratory in 1966. He also led the drive which culminated in the University offering Bachelors and Masters degrees in Cartography. He retired from teaching and was granted emeritus status in 1980.

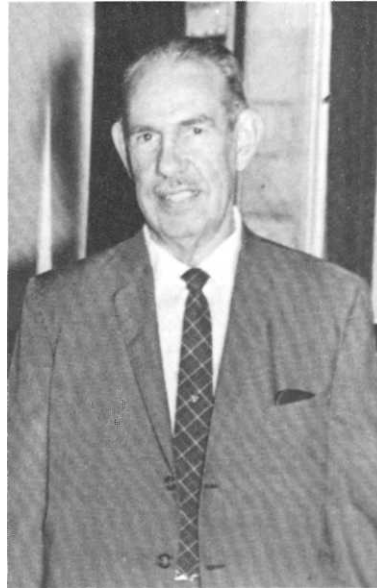


Figure 38. Arthur H. Robinson

The first edition of his *Elements of Cartography* (John Wiley and Sons) was published in 1953. The fifth edition (with R.D. Sale, J.L. Morrison and P.C. Muehrcke) was issued in 1985. Altogether he is the author or co-author of 16 books and monographs, including *The Look of Maps*, *Elements of Cartography* (5 editions), *Fundamentals of Physical Geography* (3 editions), *Elements of Geography* (2 editions), *The Fidelity of Isopleth Maps*, *Dot Area Symbols in Cartography*, *The Atlas of Wisconsin*, *The Nature of Maps*, *Early Thematic Mapping in the History of Cartography*, more than 50 professional articles, and numerous maps in books, editorials, reviews, encyclopedia articles, etc.

He has been active professionally, both in cartography and geography. He served as President of the International Cartographic Association (1972-76), was a member of Commissions II and IV and is currently a member of the Commission on the History of Cartography for which he is serving as co-editor of the *Glossary of Cartographic Innovations Prior to 1900*. In the American Congress on Surveying and Mapping he served on the Board of Directors, was Chairman of the Cartographic Division and was editor of *The American Cartographer* during its first three years. He was President of the Association of American Geographers (1963-64). He was instrumental in the establishment of the Office of the State Cartographer in Wisconsin and served as first Chairman of the Committee on State Cartography.

Professor Robinson has received numerous honors and awards, including the United States Army – Legion of Merit (1946); Association of American Geographers -Citation for

Meritorious Contributions (1953); Geographic Society of Chicago – Distinguished Service Award (1959) and the Helen Culver Gold Medal (1983); Guggenheim Foundation – Research Fellowships (1964 and 1978); American Congress on Surveying and Mapping – Earle J. Fennell Award (1977), Honorary Member (1978), and Cartography Division Award for Meritorious Service (1979); University of Wisconsin, named Lawrence Martin Professor of Cartography (1967) and its map collection was named the Arthur H. Robinson Map Library (1982). He is the recipient of two honorary degrees: Miami University – Doctor of Letters (1966) and The Ohio State University – Doctor of Science (1984).

On 25 February 1981 during a special session of the ACSM Spring Convention in Washington DC Arthur Robinson was presented the highest ICA distinction: the Carl Mannerfelt Medal. During the ceremony President Ormeling addressed the meeting as follows:

Mr. President, Ladies and Gentlemen, Speaking on behalf of the International Cartographic Association I would like first of all to express my appreciation for the gesture of the American Congress of Surveying and Mapping in granting me the opportunity to mount this platform. The more so as this presentation will take place, though for reasons of an altruistic nature, upon the explicit initiative of the ICA itself.

The reason of this intrusion is the decision of the Executive Committee of our Association, upon recommendation of its Committee for the Selection of Award Recipients to pay tribute in public to an American scientist who is internationally esteemed for his promotion of the discipline of cartography.

No location was considered to be better suited for this ceremony than the home country of the scientist concerned, i.e. his national professional environment, thus enabling colleagues and friends to attend the presentation and to rejoice in the tribute paid to their compatriot. Further no occasion was thought to be more suitable for the ceremony than an ACSM convention, where, contrary to the situation in most other parts of the world, the collective surveying and mapping community in all its diversity and unity participates.

The distinction that will be presented is a medal, a bronze medal – only photogrammetrists could afford gold – and bears the name of the Swedish scientist Dr. Carl M:son Mannerfelt, who initiated the International Cartographic Association in the fifties. The medal was established during a meeting of the Executive Committee in the Swedish Academy of Sciences in Stockholm where the inspiring portraits of great explorers such as Nordenskjöld and Sven Hedin were looking down upon us. So far the medal was only presented to the Swiss cartographer Eduard Imhof, who was the first president of our Association.

After this background description of the present ceremony it is time to unveil the identity of its beneficiary, Dr. Arthur Howard Robinson, Lawrence Martin Professor in Cartography at the University of Wisconsin, Madison, Honorary Member of the American Congress of Surveying and Mapping and recipient of many American distinctions.

In the records of the International Cartographic Association, Dr. Robinson's name is highly recognised for his valuable contribution to the development of the discipline of cartography. There are three distinct sectors of cartographic activity in which he has distinguished himself: 1. Scientific research, 2. Education and 3. Management

In the scientific sector Dr. Robinson repeatedly emphasises the central core of cartography i.e. the presentation of spatial data. His message is that amidst the dramatic technological modifications of the map production process, the fact should not be overlooked that maps are

utilitarian, that they are communication devices i.e. instruments for understanding and communicating environmental data. Fully realising that map making continues to depend heavily on technology, he emphasises that the functions of technical operations have to be considered in relation to the main objective of the map. His concern for the function of communicating environmental data has resulted in a long series of research publications and masters and doctoral theses on communication and perception in cartography. These publications have led to better insight of practical information transmission and at the same time to a better understanding of the nature of maps. Almost needless to say that Dr. Robinson in this field is considered an authority of international reputation.

In his search for a general theory of cartography, Dr. Robinson became further deeply involved in the study of the history of cartography, particularly of thematic cartography, in which field he discovered that many of our current methods have a long and interesting history. It is no exaggeration to state that Dr. Robinson is the dean of the historians of cartography in North America if not of the Western World.

In the field of education Dr. Robinson's name stands for a combination of a precise command of language and subject matter. He has the gift to explain complicated problems in simple, lucid words. Undoubtedly this talent has also contributed to the success of the cartographic curriculum at the University of Wisconsin, Madison, which developed under his guidance into one of the leading centres of cartographic education in the Western World, and where many students from overseas have been enrolled under Robinson's supervision. The same teaching talent underlies the success of the textbook *Elements of Cartography*, undoubtedly one of Robinson's most valuable contributions to international cartography. The book first came out in 1953, since then with great regularity, every 8-9 years new editions have appeared. The present fourth edition was written in collaboration with Dr. Morrison and Mr. Sale. It is a rare privilege in the publishing world to be an author of a textbook on an ever changing subject such as cartography which after almost 30 years is still in great demand. It is a hallmark of the capacity of the main author Dr. Robinson to keep abreast with the technological innovations and to merge them into a textbook which still serves as a guide par excellence for a growing population of cartography students in the English speaking world. In the field of management special mention should be made of Dr. Robinson's contributions to the International Cartographic Association, of which he was President from 1972 to 1976. He was a fine President. Upon his initiative, an ICA Publications Committee was created, which has successfully started a series of ICA Publications since then. It was under his presidency that the Commissions were properly organised for specific time periods with well-defined terms of reference. Also during his Presidency the so called Third World Strategy of the Association was adopted, which resulted in a series of seminars held in developing countries. Undoubtedly his scientific authority contributed much to maintain order and discipline in the Association which, due to diverging political structures and interests of its member countries, is not always easy, particularly not in an Association devoted to a subject such as cartography.

Further the international cartographic community has greatly benefited from Dr. Robinson's initiative in establishing *The American Cartographer* in the early seventies. Under his editorship and later under that of Dr. Judy Olson the journal with its well-balanced selection of articles, reports and reviews, rapidly became one of the leading bulletins in the western world comparable only with a few sophisticated publications such as the British, Canadian and West German sister journals.

The ICA Committee for the Selection of Award Recipients in reviewing Dr. Robinson's curriculum vitae and publications had to overcome one particular problem. It discovered that the distinguished professor started his career long ago in the thirties as secretary of the Ohio Board of Liquor Control, which made him rather suspicious in the eyes of some, and overzealous in the eyes of others. The fact that Dr. and Mrs. Robinson at mature age settled on biblical ground in Wisconsin in the township of Mount Horeb (Hebrew for Mount Sinai), reconciled the conflicting opinions in the Committee.

Dr. Robinson, it is said that a prophet is not honoured in his own country. From the very fact that an impressive number of awards and honours have been bestowed upon you in the past in your home country, it follows that either this rule does not apply to you or the qualification of prophet does not fit you, which I am sure you will appreciate most. However, for your friends in the international cartographic community your word stands for wise and philosophical understanding and as such has a prophetic connotation.

As a token of the deep appreciation of the International Cartographic Association for your promotion of the profession, I am honoured to present you the Dr. Carl Mannerfelt Medal, the highest distinction we have, it bears the inscription in Latin "Ob Merita Egregia" which means "Acquired by Extraordinary Merits".

Before presenting you the distinction I may finally read the citation of the Medal Committee which once more underlines our appreciation.

"In recognition of his scholarly contributions to the theory and development of cartography and of his leadership in cartographic education and research, in particular in the fields of the History of Cartography, Communication and Perception in Cartography, as reflected by the long series of his research publications and of those Master and Doctoral theses produced under his supervision, which have greatly contributed to the recognition of cartography as a profession in its own right and to the formation of a new generation of academically educated cartographers who are now dispersed over the world further stimulating progress in the profession."

Emil Meynen

Emil Meynen, born in Cologne on 22 October 1902, studied at the universities of Cologne, Leipzig, Innsbruck and Berlin and obtained his doctor's degree in geography at Cologne in 1926. After having been assistant to Professor Albrecht Penck in Berlin, he was awarded a Rockefeller Fellowship for three years of study in the United States (1929-1932). These were years in which he gained great experience. After his habilitation in Cologne (1935) he went to the university of Berlin as a lecturer, where in 1942 he was appointed Assistant Professor in geography. In 1937 he became scientific secretary of the *Zentralkommission für wissenschaftliche Länderkunde Deutschlands* (Central Committee for Regional Studies of Germany) and at the same time editor of its *Forschungen zur deutschen Landeskunde* (Regional research studies of Germany). He held this post until 1970, editing the amazing total of 186 volumes. In 1942 Emil Meynen was appointed Head of the newly founded *Abteilung für Landeskunde im Reichsamt für Landesaufnahme* (Department of Regional Geography of the Land Survey Office) in Berlin, a position which he retained without interruption after 1945 at various temporary locations. The Department continued under his guidance until it was taken over by the Government of the new FRG and established in Bonn-Bad Godesberg (1953) under the name *Institut für Landeskunde* (Institute of Regional Geography), later renamed *Bundesforschungsanstalt für Landeskunde und Raumordnung*.

(Federal Research Institute for Geography and Regional Planning). He retired in 1969 as Director of this Institute.

In 1942 Meynen founded and edited the *Berichte zur deutschen Landeskunde* (Bulletin of Regional Studies of Germany) containing papers and documentation on geographic literature and since 1944 also on topographic and thematic maps. Another serial publication was the *Bibliotheca Cartographica* (1959-1972), an international bibliography of cartographic literature started by the *Institut für Landeskunde* in cooperation with the *Deutsche Gesellschaft für Kartographie* (German Society for Cartography).

Among Meynen's tasks was the preparation of thematic maps (for instance of electric power lines, gas supply and water distribution at scales 1:300 000) for government administration and planning.

In cooperation with the *Statistisches Bundesamt* (Federal Office of Statistics) the *Institut für Landeskunde* published in 1970 a National Atlas entitled *Die Bundesrepublik Deutschland in Karten* (The Federal Republic of Germany in Maps) based upon census results and mainly containing maps at the scale 1:1 Million. It is worth remembering that Meynen introduced thematic computer mapping into his Institute as early as the 1960's.

In 1949 Meynen founded the biennial *Geographisches Taschenbuch* (Geographical Pocketbook) and in 1966 the *Orbis Geographicus* (Geographical World Dictionary), publications of great value for geographers and all who have a professional interest in geography.

From 1952-54 Meynen was chairman of the Committee on Geographical Names of the *Deutsche Gesellschaft für Kartographie*, while from 1954-1977 he was chairman of the *Ständiger Ausschuss für Geographische Namen* (German Permanent Committee on Geographical Names). For many years (1967-1984) he was a member of the UN Group of Experts on Geographical Names. His *Bibliography of Gazetteers and Glossaries 1947-1979* is considered a standard work.

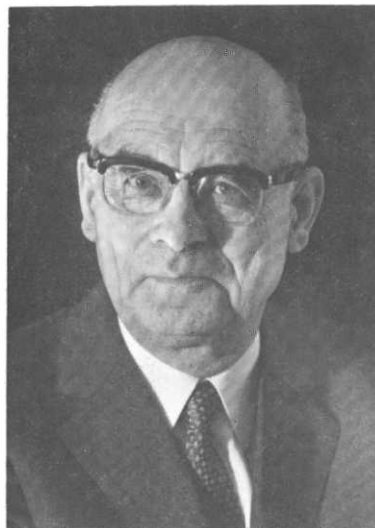


Figure 39. Emil Meynen

In 1962 on the occasion of the UN-Conference on the IMW 1:1 000 000 in Bonn, Meynen prepared a bibliography of literature on this map series and at the end of the conference he surprised participants with a printed copy of the IMW legend in colour, produced overnight, which the meeting had just agreed upon. With regard to ICA, Professor Meynen attended the First General Assembly in Paris in 1962 as member of the FRG delegation. He participated in all ICA conferences until 1982 and prepared the *ICA Bibliography 1956-1972*, one of the first

ICA publications. On the proposal of Past-President Imhof he was elected chairman of the ICA Commission on Definition, Classification and Standardisation of Cartographic Terms in 1964, which resulted in 1973 in the publication of the *Multilingual Dictionary of Technical Terms in Cartography*, with 1400 terms and definitions, the former in fourteen, the latter in five languages. Soon after its appearance Meynen started working with his commission on a second, even more extensive edition, the manuscript of which was completed in the early 1980's. For his extremely valuable contribution to cartography and to the Association in particular, President Ormeling presented him with the Honorary Fellowship during a special session of the Deutsche Gesellschaft für Kartographie in Kiel in 1983.

For obvious reasons it was not his only distinction, in 1955 he became Honorary Professor of the University of Cologne. He was honoured with the Robert Gradmann Medal in 1967, the Alexander von Humboldt Medal in gold (1969) and the Carl Ritter Medal in gold (1978). He was elected Honorary Member of the Deutsche Gesellschaft für Kartographie (1969). The Central Committee on Regional Studies on Germany elected him as their Honorary President (1986) and the IGU Working Group on the History of Geographical Thought made him its Honorary Member. His has been a career to be proud of.

Olof W. Hedbom

To express its gratitude for Olof W. Hedbom's important contribution to the flourishing of the Association in the successive capacities of Vice-President (1972-1976) and Secretary-Treasurer (1976-1984) the Executive Committee, upon recommendation of the Committee for the Selection of Award Recipients, had decided to confer upon him the Honorary Fellowship on the occasion of the Seventh General Assembly in Perth, Australia, 1984.



Figure 40. Olof W. Hedbom

Regrettably, but understandably, Hedbom refused to accept the distinction from the Executive Committee from which he had long been a member himself. Had he accepted, the following citation by the ICA President would have been delivered at the presentation ceremony:

"After working for many years with ICA it is easy to describe the profile of an ideal Secretary-Treasurer. First of all the official concerned should have knowledge and experience in traditional and modern cartography; further he should have good contacts with related disciplines, he should have experience in handling finances, he should know that when one drops a coin it always rolls away from and never towards you, and finally he should have the

support and encouragement from his employing organisation and/or preferably from his national committee, both financially and in terms of time to undertake ICA duties.

This would appear to be an adequate package of requirements for success, but from experience I assure you that a few essential qualifications are missing in this list, and in case you are doubtful as to which, just look at the person of our Secretary-Treasurer Hedbom with whom I have collaborated for 12 years.

During this period I have learned to appreciate his skill in managing of international relations, his intuitive perception in what is fitting and what is the right thing to say, his adroitness in dealing with circumstances or persons, his talent for giving sudden intellectual pleasure by unexpectedly combining or contrasting ideas or just talking informally. He has displayed these talents on many occasions in a wide variety of circumstances, in China and Mexico, Senegal and Finland, Indonesia and the Soviet Union, Australia and the United States. Combined with his erudition, and knowledge of the history and economic background of the countries visited, his approach has facilitated contacts and often moved people to abandon their reservations and formal approach that so often freezes human interaction. Thank you Olof!"

Harold Fullard

Born in a distant part of Europe, he was naturally surrounded by family interest in foreign lands and geography, and, as it happened prophetically, had a Philip's globe for a ninth birthday present. At university he read Geography, Geology and Anthropology with a view to entering the Colonial Service but when entry to that Service was restricted, he turned to research in Anthropology, and then, in 1938, to Cartography when the firm of George Philip & Son in London required a Geographical Assistant to their Cartographic Editor.

The war years inevitably interrupted this activity. He served in the Royal Artillery in 1940, in the Royal Engineers (Field) in 1941-42 and in the Royal Engineers (Survey) 1942-1946. He was engaged in the mapping of Normandy from November 1942 to March 1944 using air photographs, in mapping and survey in Normandy, Belgium and Holland in 1944-45 and in air survey revision of German maps 1944-45. He was posted to India, then Ceylon and Singapore, for mapping of parts of S.E. Asia in 1945-46. He considers that he was indeed fortunate to have been in the R.E. Survey and to have worked, both during the war and since, with such skilled professional and practical men.

He returned to Philip in 1946 as Assistant Cartographic Editor, was made Cartographic Editor in 1955, and Director and Cartographic Editor in 1965 of both the publishing and printing companies of the Group. In 1969, he helped to establish Mitchell Beazley Ltd as a new and innovative publishing house in London, and, in 1970, to found and become a director of George Philip O'Neil Pty. in Melbourne. He retired officially in January 1980 and has continued to serve the firm as a consultant cartographer.

In the course of some forty years he edited for the firm, and through them for several other publishers throughout the world, educational atlases and maps, globes and relief models at all levels from primary to university. He also edited thematic atlases and maps of many kinds: geological, vegetation, climate, economic, historical, transport and navigational, and the *Geographical Digest* annually from its start in 1963 to 1980.

The Royal Geographical Society presented him with the Murchison Award in 1976 for contributions to educational cartography.

Throughout his busy career, he still made time for contributions to cartography in general. He was a founder member of the British Cartographic Society, was Treasurer and member of Council from 1963-1968, Vice-President in 1969, President in 1970, and was made Honorary Member of the Society in 1981. He attended the first general assembly of the ICA in Paris in 1962, lectured at the first technical meeting of the ICA in Frankfurt in 1967 and has participated in every biennial meeting since then. He has been a member of the Publications Committee of the ICA since its inception in 1974, and its chairman since 1976.

The ICA presented Harold Fullard with the Honorary Fellowship for his valuable contribution over the years, particularly in the capacity of chairman of the Publications Committee, during the Seventh General Assembly in Perth, Australia, 1984. On this occasion he was addressed by President Ormeling in the following way:

"There is one in our midst whose merits and achievements deserve special attention. When we established the Publications Committee in the early Seventies we had to find a capable chairman with experience in mapping and publishing who was also willing to undertake ICA duties. We found one in Britain in the person of Harold Fullard. By that time Fullard had been in mapping and publishing since 1938. As a young geographer he entered into the service of publishers Philip and Son, London, where he specialised in atlas cartography and climbed the ladder from geographical assistant to Director and Cartographic Editor in Chief. Since 1938, he prepared, edited and supervised the production of over 130 atlases, covering many countries and most of them excelling in clarity and legibility, used by millions of people in schools, libraries and offices all over the world. In doing so he became a man of international repute, whether he liked it or not. It is not ICA's custom to advertise, not even to mention, names of commercial publishers but the combination of Philip-Fullard is so unusual that an exception to this rule seems to be justified.



Figure 41. Harold Fullard and Roger Anson, Outgoing and Incoming Chairman of the Publications Committee in City dress.

We caught Fullard on the summit of his career, a happy state of affairs which continued to be effective for a long time. He was familiar with ICA as a participant of what is called in ICA

history, the Chicago conference in 1958. He attended the birth of ICA and with his experience in international cartography he further served it in an excellent way. I even venture to say that if the experiment of the Publications Committee was successful, it was due to his effort. He moulded it into shape, drafted and revised its guidelines, chaired its meetings in his modest but efficient way, and reported to Executive Committee meetings and General Assemblies. Moreover he corresponded with authors with diverging backgrounds and experience in cartography; not always easy, as became obvious during the preparation of the publication *Basic Cartography for Technicians and Students* (1984), which, without Fullard's assistance would not have appeared.

As a token of gratitude and respect, the Executive Committee upon recommendation of the Committee for the Selection of Award Recipients, has decided to confer the Honorary Fellowship of the Association to Harold Fullard and I am honoured to present him with the accompanying diploma which once more reflects our appreciation.

Speaking of evolution Fullard once said that specialisation leads to increasing lack of adaptability to changing circumstances and those unsuitable forms are doomed to be succeeded by simpler and more adaptable ones. "A bony fish" he said "can never evolve into any other form than bonier fishes". The statement does not apply to the distinguished Fullard himself, as during his specialisation or perhaps better "bonification", he never lost his range of vision and mental attitude which characterises the generalist. It was this combination that made him irreplaceable!"

Rolf Böhme

Rolf Böhme was born in Leipzig on 17 January 1917. After a classical education he studied first at the Technical University at Dresden and after the interruption of military service in World War II he went to the Technical University in Hannover, where he graduated as Dipl.Ing. in 1948. For a few years he was employed with the private Land Survey Office (later renamed Land- und Seevermessung Oro-Hydrographie) in Frankfurt am Main and then settled down at the *Institut für Angewandte Geodäsie* in 1956, where he stayed until his retirement in 1982. From 1972 Böhme was in charge of practical cartography in IfAG with the title of Scientific Director, to be promoted in 1979 to Head of the whole Cartography Division. His main tasks included the permanent revision of small scale topographic map series (1:200 000, 1:500 000 and the IMW) and the compilation of a new map series 1:500 000 in collaboration with IGN, France.

Over the years he became increasingly involved in geographical names, and he gained considerable experience and expertise in automated name processing. Since 1977 he is a member of the UN Group of Experts on Geographical Names (UNGEGN) and from 1977-1982 he was chairman of its Working Group on Automated Data Processing. He represented FRG at the UN Conferences in Athens (1977) and Geneva (1982). Further he represented UN at the first Training Course in Toponymy in Cisarua (Indonesia) organised by Professor Ormeling Sr. in 1982.

From 1960-1972 he was chairman of the Hessen subdivision of the German Cartographic Society and from 1975-1979 he was its Secretary. Further, for a few years he was a member of the editorial board of the bimonthly periodical *Kartographische Nachrichten*. Numerous articles, reports and reviews by his hand appeared in German and international periodicals,

including the *International Yearbook of Cartography*. Among his publications the *Gazetteer of the Federal Republic of Germany*, completed in accordance with UN recommendations, deserves special mention. Now retired, he is currently concentrating on an *Inventory of World Topographic Mapping*, a large undertaking intended to be completed and published in the near future.

His involvement in ICA dates from the First Conference in Frankfurt am Main in 1962, the organisation of which was his responsibility. He was elected Vice-President of the Association in 1976 by the Fifth General Assembly in Moscow, 1976 and re-elected in Tokyo for another term. From 1976-1984 he was adviser of the ICA Publications Committee. He represented ICA at various conferences as session chairman or as speaker including the UN Regional Cartographic Conferences for Africa. As Vice-President in Joint Board meetings with FIG and ISPRS, he actively contributed on behalf of ICA to the formation of the International Union of Surveys and Mapping.

As a token of appreciation of his work he was awarded the Honorary Fellowship of the Association in Perth in August 1984. In presenting the distinction President Ormeling addressed him as follows:

"One of the shortcomings of the Statutes of ICA is undoubtedly the fact that the duties of Vice-Presidents are only vaguely defined. According to Article 12, Vice-Presidents have to assist and stand-in for the President in his different tasks. For most of them, living far away from the President, this remains a dead letter.

When presidential tasks accumulate, however, it can become dangerous for those Vice-Presidents who live within a day's journey of the Presidency. This misfortune befell Rolf Böhme, near Frankfurt am Main, FRG, elected Vice-President in 1976 in Moscow and re-elected in Tokyo 4 years later. He carried it bravely.



Figure 42. Rolf Böhme – delighted recipient of Fellowship Award.

As an exponent of German cartography, Böhme was of great importance to ICA. For more than 15 years he worked as a cartographic staff member under Professor Erwin Gigas, founder member and first Secretary-Treasurer of ICA, from whom he may have acquired the taste for international contacts. Böhme's origin as geodetic engineer from Hannover and his wide experience and interest – from automation up to geographical names, ensured him good relations with neighbour sciences in surveying and mapping. His command of languages, including Russian and his *savoir-vivre* enabled him to tread in the footsteps of master Gigas

and to become an advocate of international cooperation. His worldwide network of personal relations made him a valuable partner in the ICA management team. In his capacity as Vice-President, he represented the ICA in numerous meetings and conferences hosted respectively by FIG, ISPRS, DGfK or UN, at venues varying from Abidjan to Sofia, from Jakarta to Washington. Though often snowed under by ICA mail, particularly during the long sickness of the President in 1982, he was always ready to assist in new tasks. He was an appreciated member of several committees and working groups among which was the ICA Publications Committee in which he served as advisor for 10 years. Most important was his contribution as an intermediary with the German speaking cartographic community, a trendsetter in European, if not world cartography, from which various interesting ideas and initiatives originated.

As a token of appreciation, the Executive Committee upon recommendation of the Committee for the Selection of Award Recipients, has decided to confer the Honorary Fellowship of the Association to Rolf Böhme and I am honoured to present him the accompanying document which once more reflects our gratitude".

Messages from sister organisations

INTERNATIONAL CARTOGRAPHIC ASSOCIATION – 25 YEARS

Frederick J. Doyle

President ISPRS 1980-1984

Twenty-five years ago the ICA was founded in Bern, Switzerland, following discussions which took place in Stockholm, Sweden and Chicago, USA, and Mainz, FRG. The occasion of the twenty-fifth anniversary of an international society should be an appropriate time for introspection about the goals, present situation, and future directions, both for the Association and the discipline which it represents. Perhaps the perspective of one who is outside the Association, but also deeply concerned with its activities, will be useful.

It is interesting to note that even at the original meeting in Chicago, those in attendance were not unanimously in favour of a new international society, arguing that existing organizations such as the Federation Internationale des Géomètres (FIG), the International Geographical Union (IGU), and the International Society for Photogrammetry (then ISP, now ISPRS) had sections or commissions which included some or all parts of cartography. Although a fruitful twenty-five year history demonstrates that the ICA was a useful, if not essential creation, cartographers continue to have difficulty in defining the scope of their discipline.

Starting as early as 1948, the United Nations defined cartography as the totality of data collection, processing and presentation involved in making a map. According to this definition cartography includes geodesy, topographic surveying, aerial photography and photogrammetry, toponymy, and many aspects of geography. This broad definition has been given some credibility by the fact that, in recent years, U.S. federal mapping agencies have been reclassifying most of their scientific and technical personnel as Cartographers rather than Engineers or Physical Scientists.

The Office of Personnel Management in the United States has written new standards for Cartographers which do indeed include higher science and engineering requirements. If this definition of Cartography is accepted, ICA could reasonably subsume the activities of ISPRS, FIG, IGU and the International Association of Geodesy (IAG). The fact that this has not happened is reflected in the uneasy feeling held by many Engineers reclassified as Cartographers, that somehow they have been downgraded.

The ICA itself adopts a more limited definition of cartography as "the totality of scientific, technical, and artistic activities aiming at the production of maps and related presentations on the basis of data collected by other disciplines. Further, cartography includes the study of maps as historical and scientific documents". This definition is compatible with the existence of the other international societies who represent (in ICA eyes) the data collection disciplines which provide input to cartography.

In recent years, the other international societies have also become sensitive to the fact that they do not exist in a vacuum, and that the interests and activities of all of the societies overlap to some degree. A survey of membership shows about a thirty percent overlap between the several societies. Indeed, whether one attends a Congress of ICA, ISPRS, FIG, or IAG, one sees a certain group of the same people. One assumes that these are the people with the broadest interests, while the others, who attend only one of the international

Congresses, have a more limited scope, and are in fact often the technicians rather than the scientists.

The officers of the several societies have recognized this overlap and organized a "Joint Board" for the purpose of coordinating their activities and meeting dates. On the Board's initiative a Joint Symposium on Digital Cartography was convened in Zürich, Switzerland in 1979, and attended by representatives of ICA, ISPRS, and FIG. The Symposium adopted resolutions attempting to carve up digital cartography into areas which could be assigned exclusively to each of the three Societies. As might have been expected, this was unsuccessful, and a proposed second symposium never came to pass. This simply points up the fact that a topic like digital cartography is of total interest to all the Societies and cannot be fruitfully divided.

A second activity sponsored by the Joint Board was the International Symposium on Education held in Graz, Austria. IAG was the host for the symposium but it was well attended by people from ISPRS, FIG, and ICA. It was by all measures a success, and pointed out that education in this field must be integrated to contain geodesy, photogrammetry and remote sensing, surveying, and cartography. To the extent that an educational program is integrated, it will be productive. One cannot but feel that this will also be true of the international societies' activities. At the Graz symposium a proposal was submitted to form an International Union which would represent the combined disciplines of Surveys and Mapping before the International Council of Scientific Unions, the United Nations, and other international organizations. This proposal was received cautiously, but a committee from the members of the Joint Board was appointed to draft a set of guidelines for such an international union. Also at the Graz meeting the International Society for Mine Surveying was admitted to the Joint Board.

At the meeting of the Joint Board in Hannover, FRG, the guidelines for an International Union of Surveys and Mapping were accepted. These must now be approved by the governing bodies of the several societies. The guidelines maintain the integrity of the separate societies but do provide a sound basis for extended cooperation and coordination.

It is too early to predict the future course of integration of the several disciplines which make up the profession of Surveys and Mapping. But a course has been set in the right direction. As more and more individuals recognize the synergism of working together instead of in separate cubbyholes, we can expect greater accomplishments and more widespread recognition of the unified profession.

GREETINGS FROM ISPRS

Gottfried Konecny

Address by Professor G. Konecny, President of the International Society for Photogrammetry and Remote Sensing (ISPRS) (1984-1988) at the opening ceremony of the 12th ICA Conference, Perth 6 August 1984.

Your Excellencies, President Ormeling, Organisers of the Congress, Honoured Guests, Ladies and Gentlemen. It is my special privilege to have come to the Conference of the International Cartographic Association on behalf of the International Society for Photogrammetry and Remote Sensing (ISPRS), from my home country the Federal Republic of Germany. Our Society has existed since 1910 and has 73 national, or regional members.

As newly elected President of your sister society for the next 4 years, this visit to Perth, Australia, is my first official duty. The Councils and Boards of the International Societies and Associations of Surveying, of Mine Surveying, Geodesy, Photogrammetry and Cartography, have long desired to cooperate in order to avoid duplication and to broaden their horizons. After all, what concerns us is a professional outlook in the fields of surveying and mapping. For this reason at the last Joint Board Meeting of the Sister Societies in April 1984 in Hannover, we decided to put forth a draft charter to create an International Union for Surveys and Mapping, subject to the approval of the participating societies.

I have pleasure in reporting that the General Assembly of the ISPRS has recently unanimously approved the proposed charter which is intended to strengthen the prestige of the united survey and mapping branch and to facilitate its access to governments and international organisations such as the United Nations, UNESCO and the International Council of Scientific Unions (ICSU). Professor Ormeling your President, and Mr. Hedbom your Secretary-Treasurer, have been strong supporters of this union and much of the credit for the preparation goes to them as well as to my predecessor in the International Society for Photogrammetry and Remote Sensing, Dr. Fred Doyle. I am very happy to hear that the General Assembly of the ICA also adopted this proposal yesterday.

Now, we can go ahead working independently, but cooperating in symposia on digital mapping and on integrating remote sensing technology into the fields of mapping and cartography. Besides, we can take direct action rather than simply studying and monitoring developments in Land Information Systems.

I do hope that many of you will come to the 16th ISPRS Congress which will take place from July 1-12, 1988 in Tokyo, Japan. We are lucky as scientists and technologists in surveys and mapping to be able to arrange our own "Olympic Games" free of political pressures and to meet here our colleagues from all parts of the globe, as the impressive audio-visual opening show of this Congress has illustrated. In this way we not only promote progress in our disciplines, but we strengthen friendship ties thus making this world – the only world we have – more habitable and peaceful. In the name of the International Society for Photogrammetry and Remote Sensing, I would like to express our interest in and our wholehearted support for your work with our best wishes for a successful conference.

CARTOGRAPHY AND GEOGRAPHY

Walther Manshard

Professor Dr. Walther Manshard, Secretary-General IGU 1976-1984

On the occasion of the 25th Anniversary of the International Cartographic Association, the International Geographical Union looks back on a fruitful cooperation with its sister organisation. This is evident not only in the joint publication of the IGU Bulletin and in various joint congresses and conferences, but also in some of our commission research programmes. Many environmental problems result from the interchange between nature and society. Cartographic environmental data presentation therefore plays an important role in our work both as geographers and cartographers.

A number of examples of this "symbiosis" between the IGU and ICA may serve to illustrate this point. The Joint IGU-ICA Working Group on "Environmental Atlases" (Chairman: D. Bickmore, UK), the start of which was delayed by the untimely death of its first chairman (Dr. F. Vazquez Maure), has made a constructive contribution in the field of environmental

cartography. Since several international bodies (e.g. UNEP, UNESCO, FAO, ICSU etc.) require this kind of mapping, there is a good chance of achieving multifarious benefits. Another important study which is now nearing completion is the *Geomorphological Map of Europe* (1:2 500 000), in 16 sheets, which was prepared by the IGU Working Group on "Geomorphological Survey and Mapping" (Chairman: Professor H.Th. Verstappen, Netherlands). The accompanying book entitled *The Geomorphology of Europe*, which was published in 1983, serves not only as an explanation, but has independently made a fundamental contribution to the subject. In addition, new working groups (Geomorphology of River and Coastal Plains; Morphotectonics) have been formed as a result of this work. The Working Group on "Cartography of the Dynamic Environment" (Chairman: Professor A. Journaux, France) has focused on developing countries in the tropics, where new cartographic methods and approaches in research and training have been tackled. At its XXVth Congress in Paris (1984) the IGU, taking into account an obvious need for detailed climatic maps (similar to those representing other components of the environment e.g. soils) established a Study Group on "Topoclimatological Investigation and Mapping" (Chairman: Professor J. Paszynski, Poland).

In the past, the Commission on National and Regional Atlases successfully contributed to the creation and improvement of the quality of atlases. Studies of the specific problems of complex atlas cartography (types of atlases, their purposes and contents) were undertaken. In summing up, the close relationship between cartographers and geographers is clearly manifested by the work undertaken by a number of IGU Commissions and Working Groups. Besides the examples mentioned here, it is obvious that also all other IGU Commissions and Working Groups must be keen to obtain the best cartographic methods to present the results of their diverse research. It is hoped that a drifting apart of our sister organisations can be avoided, and that we can look forward to more joint programmes and, therefore, continued and closer ties between geography and cartography.

A GREETING FROM IGU

Peter Scott

Address delivered on the occasion of the opening of the 12th ICA Conference in Perth, Australia, August 6, 1984 by Professor Peter Scott, First Vice-President IGU; President 1984-1988

Mr. Chairman, Your Excellencies, Ministers and Members of the Parliament, Deputy Lord Mayor, Professor Ormeling, Distinguished Guests, Ladies and Gentlemen. I have the honour to extend to delegates greetings from the International Geographical Union and to wish you all a highly successful and memorable Conference. This year, the ICA celebrates its first quarter of a century, and for much of this period, and certainly until fairly recently, the links between our two organisations have been appropriately strong and close. We on the IGU Executive Committee regret the parting of our ways in respects of this year's ICA Conference and the IGU Congress. But we recognise that in the last quarter of the 20th century many bodies that are closely related whether by birth or marriage, or co-habitation, tend to separate long before the lapse of 25 years. We are delighted with the outstanding progress that your Association has made since its inception in 1959, a note for pleasure that carried vitality and the current initiatives of your Association which auger well for your future. Indeed, there are many aspects of the functioning of your Association which sister international bodies might with profit, seek to emulate. I would cite first and foremost your third-world policy which has resulted in and presumably will continue to, effect the transfer of modern cartographic technology to third-world countries. I would also comment on the recent initiative to launch

the *ICA newsletter*, even though the geographers would not wish to see any reduction in the reporting of the ICA activities within their IGU bulletin. Again I would endorse and applaud the initiative taken by your Executive Committee through the good offices of your President to foster improved working relationships between the ICA and IGU Executive Committees. It is planned that a joint meeting be held in Paris at the end of this month, between our two Executive Committees and that this will be the first of regular joint meetings. There is ample scope as Professor Ormeling has pointed out elsewhere, for close linkages between our two organisations of the grassroots level, i.e. between your or at least some of your 11 Commissions and selected IGU Commissions; we have 14 at present and they all seemed to be multiplying and we have 23 working groups which in future I understand are likely to be called study groups. In recent years we have seen fruitful cooperation in the activities of the joint working group on Environmental Atlases and members of both organisation will participate in the International Symposium on Special Data Handling to be held in Zürich immediately prior to the Paris Congress. Cartographers are active in the work of many IGU Commissions and Working Groups and Geographers are active in the work of several ICA Commissions. Such productive working relationships should be promoted at all levels and the IGU Executive looks forward to a resurgence of highly productive, collaborative enterprise. I can only hope that future relationships between the IGU and the ICA will be to our mutual benefit and satisfaction. Meanwhile, on behalf of the IGU, I wish you all a highly successful Conference.

ABOUT THE INTERACTION BETWEEN GEODESY AND CARTOGRAPHY

Vassil Peevsky

Translated from a German text by Professor Dr. Vassil Peevsky, President FIG 1982-1984

The celebration of the anniversary of the ICA is an appropriate moment to draw attention to the place of modern cartography in relation to other sciences and especially to its neighbouring disciplines. The interaction between surveying and cartography has gradually developed in such a way that one can observe distinct changes and diverging trends in successive periods.

Professor Salichtchev (USSR) declared geodesy and geography to be the "mother sciences" of cartography, aptly pointing out the closeness of cartography to these sciences.

Over a long period of time, after cartography had grown into an independent discipline, interaction was clearly taking place between geodesy and cartography, for example from geodesy came geodetic networks, field surveys and map projections while cartography provided methods of presentation, symbolisation and generalisation.

These relations still exist. Nowadays the ties between geodesy and cartography are particularly close and developments in one science are likely to have a direct influence on the other. For example the raising of accuracy levels in mapping demanded higher standards of geodetic surveys.

During the past few years the use of automation in map design and map compilation has become widespread. This brings cartography even closer to geodesy in that, in many cases both collect their data digitally, either in the field or from existing plans and maps.

The close connection between the two sciences is especially evident in geodetic education, because surveyors and cartographers are often trained at the same educational institutes, following the same curricula. The differentiation between them takes place in the practice, during their respective professional specialisations.

In map production, however, geodesy and cartography are inseparable. Most mapping organisations combine the whole cycle of map production activities (even reproduction and printing) under one roof. This includes all necessary preparatory geodetic, photogrammetric and cartographic work. This tendency has become formalised in most governmental surveying and mapping agencies.

Clearly, cartography, geodesy and photogrammetry constitute a unity because of shared scientific-theoretical and technological interests, closely linked educational activities and practical professional inter-dependence.

These unifying factors are strong grounds for the promotion of more collaboration between the professional organisations of surveyors (FIG), photogrammetrists (ISPRS) and cartographers (ICA).

The anniversary of the ICA is a suitable reason to take initiatives which can contribute to even stronger ties and closer cooperation between these allied organisations.

GREETINGS FROM FIG

Ch.H. Weir

Address delivered on the occasion of the opening of the 12th ICA Conference, Perth, 6 August 1984 by Ch.H. Weir, Vice-President FIG (1982-1984) and President (1984-1987)

Your Excellencies, Mr. President, Honoured Guests, Colleagues, Ladies and Gentlemen. It is an honour for me to bring greetings from the International Federation of Surveyors and its 57 member associations to wish you success in your 12th International Conference of the ICA. Professor Peevsky sends his special greetings to you Mr. President and through you all members of the ICA. Our congratulations go to the membership of the Australian Institute of Cartographers, in particular the Conference Director and his staff for the undertaking of this very large responsibility of hosting an International Conference of this stature. I look forward to attending the sessions, social events and touring this wonderful city of Perth. A few words about FIG: the International Federation of Surveyors was formed in 1878 in Paris by the delegates of 7 National Professional Survey organisations from Belgium, France, Germany, Spain, Italy, Great Britain and Switzerland. Today it is a Federation of Survey Organisations from 57 countries with correspondents from 12 other countries. Its structure consists of the General Assembly, the Permanent Committee or Council, the Bureau or Executive which deals primarily with the policy administration and holding of tri-annual Congresses. Professional work is carried out by 9 technic-scientific Commissions and several working groups. The present bureau is located in Sofia, Bulgaria, and will be replaced by the Canadian Bureau which will be located in Edmonton, Canada, for the years 1985-87. FIG held its 17th Congress in Sofia, Bulgaria in June 1983. The Congress included over 300 technical papers, a large display of national, scientific industrial exhibits and many tours and social events. The 18th Congress will be held in Toronto, Canada on June 1-11 in 1986 to which I cordially extend an invitation to everyone here.

The boundaries that separate the disciplines which make up the surveying and mapping spectrum are becoming less distinct with the passage of time. This becomes apparent when one realises that the same national association in many countries such as Canada is a member association for each of several international organisations. Similarly, the individual members of those national associations have an interest in many of the subjects dealt with at the Congresses in each of the separate international organisations. This became particularly evident to me during my three year term as FIG President/Vice-President when I visited many countries. The spirit of cooperation which exists among the international surveying and

mapping community is a reflection of the aims and objectives of the member associations and of each of the individual members who are dedicating their training and experience and life work towards improving our knowledge and use of the land and its many resources, all for the betterment of mankind. The establishment of modern day settlements require the input of many individuals, agencies, organisations and surveyors and cartographers have an important role to play. One subject which serves to illustrate the need for an integrated approach is Land Information Systems (LIS) with the planning, implementation and application of these systems and in fact for not only the members of the surveying and mapping community but also those involved in geography, computer science, engineering, to name but a few. Because of the importance of surveying and mapping to land information systems, surveyors and cartographers have an opportunity and I would say an obligation, to take a lead role in the planning and implementation of them. FIG has recognised the importance of LIS by devoting one Commission to it exclusively. In October of this year, we are having a major International Symposium on LIS, and several Australian colleagues are presenting key papers based on the experience gained here in Australia and I would say that the Australian Surveyors and Cartographers are among the leaders in the world in the developing of these systems. This was the experience in my attendance at your Austra-Carto Conference of two days ago.

Again, I would like to thank you Mr. President for your kind invitation and I look forward to an informative and a lot of fun Conference.

Developments in private and institutional cartography

COMMERCIAL CARTOGRAPHY IN WESTERN EUROPE

Harold Fullard

Manuscript completed mid 1984

Introduction

A characteristic aspect of European cartography is its strong commercial activity of very long standing. This activity dates from the introduction of paper making in Europe, the application of engraving techniques for illustrative purposes and, last but not least, the invention of book printing about 1450. So writes Professor Cor Koeman in his introductory chapter to *Basic Cartography* Vol. I, published by ICA in 1984.

During the European Age of Discovery and Exploration from about 1450 to 1650, map production was favoured by an increasing amount of geographical information. Various publishers and printers in different countries, often in fierce competition, published world atlases, one edition after another. Of all nations, the Dutch developed the biggest commercial atlas production of the seventeenth century. The first regularly produced world atlas appeared in the Southern Netherlands in 1570, and the biggest World atlas ever produced was published in Amsterdam in 1662. The professional map maker was also employed on special tasks for clients, mainly royalty, aristocracy and rich landowners, until the industrial revolution, when maps were more widely demanded for works on canals, railways, roads and new towns, then, later, for education, general interest, map games and advertising.

Nineteenth century developments

By the early years of the nineteenth century, after the disruptions and damage of the Napoleonic Wars had been repaired, Western Europe entered into a period of social reform, economic development and expansion of trade. Several family cartographic firms were founded about this time, for example in Scotland in 1826, in Sweden in 1833, and in England in 1834, and added to the already existing houses in the Netherlands, Central Europe, Switzerland, Italy and Spain. They were well placed and organised to take up the mapping required for the sudden increase in shipping, in railways and roads, in enlarging of towns, and, later, in the use of these communications by businesses, cyclists, motorists, then air travellers and tourists. Parallel with these developments was an insatiable curiosity about the world in general engendered by the discoveries in Africa and other unknown territories, and by scientific expeditions and proselytising missions. As one result, the demand for maps and atlases increased apace. The start of universal education more than a hundred years ago also required atlases, maps and globes not only for the home countries but also for many countries overseas which had no commercial cartographic organisations of their own.

There was a long-established and solid tradition of geography in the European education system, which formed a sound basis for the development of cartographic products for education – a development, in our part of the world, controlled by the private sector. School atlases are obligatory purchases in most schools – consequently atlas sales are impressive. For example, in the Federal Republic of Germany, the leading atlas sells some 400 000 copies annually; in the Netherlands some 200 000 atlases a year are sold; in the United Kingdom over 500 000 a year. A few years ago these figures were considerably higher; the declining birth rate and, even more, cuts in funds allocated to books in schools have reduced sales to the present levels.

The effects of wars, economic depressions and inflation

This actively expanding commercial cartographic world was disrupted first by World War I, then by the economic depression of the 1930's and again by World War II. One way or another, most of the organisations survived and, in the recent post-war years, enjoyed the yet greater activity and prosperity arising from the greater demand for maps from a public made aware of maps by their service in the Forces, by the interest in the World at large brought to their daily attention by radio, T.V. and newspapers, by ever faster communications and by overseas vacations.

This pleasant scenario was too good to last. Perhaps if Schumacher were here today, he would say I told you so! To most of us, the first real jolt was the increase in oil prices in 1973/74. This fuelled inflation and escalation of costs. In the British Cartographic Society, we looked, in January 1976, at the effect of this inflation. The dire effects were perhaps worse for the UK than for some of our European neighbours but were evident throughout to some extent, and certainly resulted in the whole industry being less able to withstand the world-wide economic recession of the past three or four years. The effects of this are still being felt and some will bring about a permanent change in the structure of the industry.

The present state of the industry

The present industry in Western Europe consists of about 120 organisations in which cartographic productions are an important or even an exclusive part of their commercial activity. The principal countries are the Federal Republic of Germany, the United Kingdom, The Netherlands, Switzerland, Sweden, Spain and Italy, with fewer organisations in France, Belgium, Norway, Denmark, Austria, Portugal and Greece. In addition, there is an increasing number of freelance draughtsmen, who work either for the above organisations, or wholly independently. It is difficult to arrive at even an approximate figure, because many of the draughtsmen and women work partly for state organisations and partly commercially. By extrapolation from figures for UK, FRG and Switzerland, the number must be over 400 and may be as many as 700. A further means of obtaining assistance in cartographic drafting has been taken by some firms who have been jobbing out their work to lower wage countries in Southern and East Central Europe, for example to Cartographic Enterprises in Budapest. Only very few organisations are engaged in most types of cartographic production: they specialise mainly in one or two types, e.g. in road maps or town plans, air survey mapping, navigational maps and charts, educational atlases and maps, globes, general world atlases, tourist maps and guides, thematic atlases, star charts, book illustrations, diary maps, advertising and news maps for the media.

Recent changes

Turning to recent changes in the industry, one which has been common to a number of industries since World War II has been the shifting of both financial and executive control from the educated scientific or practical cartographer to professional managers, lawyers or accountants. This has in some cases been the saving of firms who would otherwise have been liquidated. In other cases, the effect has been to stultify innovation and production through concentration on activities giving quick profits. When, however, the decision-makers give sufficient freedom of action to the professional leaders of departments – editorial, cartographic and others right through to sales – good results can be obtained both cartographically and commercially.

Another change in post-war years has been the increasing co-operation between publishers both in Europe and overseas in educational cartography. This is shown notably in the number

of editions of foreign atlases adjusted to other national needs both in content and language. These are, for example, French, English and German versions of an Austrian atlas, at least ten versions of a German atlas and three or more of English atlases, three versions of a Dutch atlas, and several versions of a Swedish school atlas.

The recent recession following inflation and cost escalations has had certain effects. Turnover has generally stagnated and this in turn has meant that organisations are limiting the number of draughtsmen, and cartographers whom they employ. The incidence of certain taxes and redundancy regulations are making the limitations more severe. Related to this is the increasing jobbing-out of work to freelance draughtsmen, who are increasing in number. This seems to be because in some cases they prefer to work on their own, perhaps at home, so saving time and cost of travel. They have lower overheads and so can offer lower prices for their work, especially perhaps if they work for state organisations or authorities and do freelance work in their "spare" time.

One or two state organisations with strong commercial sectors encourage and organise a "cottage industry" of draughtsmen and women who they ensure have been properly trained to a satisfactory level – probably having worked initially for the central organisation itself. They offer flexibility of working hours, which is socially valued, and, in brief, all are very well satisfied with the arrangement.

Technical developments

Technically, scribing on pin-registered, coated plastics is almost universal, as is peel-coat for open window masks. Photo-set type, ready set, produced by draughtsmen themselves or computer set by local typesetters is the norm for lettering. Independent small drafting units are thus easily set up, and are especially versatile if they have their own small studio facilities or have the use of a small reprographic studio nearby.

A development of the past twenty years or so has been the greater attention paid to presentation of cartographic products. This, coupled with the growing concern for the interests of the map user, and the increasing appreciation of the value of maps in communicating spatial phenomena has led to better and more legible maps. Graphic artist/designers have been recruited by cartographic organisations and publishers, and when of the highest calibre and closely integrated with the cartographer, typographer and reproduction staff, have produced some outstanding advances in presentation. Mitchell Beazley Ltd. from 1969 was among the most brilliant innovators and exponents of this development and set a style which has been followed by several publishers. Similar advances have improved European maps generally, and they now rank high in legibility and aesthetic appearance.

The photography of coloured map originals for four colour separations has been more frequent as costs have been reduced, although the stripping of masks and laying down of mechanical screens continue, especially for maps between which critical comparisons are to be made and which are likely to be revised frequently.

Printing has become expensive in most of Western Europe, and attempts to find cheaper printing overseas have been made; for example, much printing for UK is done in Hong Kong. However, the installation and use of modern fast four colour presses and use of web offset machines for longer runs have enabled much printing to be retained in most of the home countries.

Use of computer assistance

To date, the advances in computer science have impinged to a small extent only on small scale commercial cartographic production. As Professor Ormeling stated in his recent keynote address to Autocarto VI, when speaking on automation in educational cartography, "There is a great difference between the production environment in governmental mapping where C.A.C. has been implemented fastest and in private cartography, which has not exposed itself to the hazards of C.A.C. experiments and has been watching the innovations from a safe distance. One branch in private cartography is barely touched by C.A.C. and that is educational (school) cartography. From their very nature school atlases, with their great number of maps (500 or more in one atlas is no exception), most of them thematic and predominantly socio-economic, at different scales and originating from diverse data collected independently for different purposes, do not readily lend themselves to computerisation. A few firms (Kummerly & Frey, de Gruyter, for example) have, however, moved into the C.A.C. field, and interesting developments may be expected." Large indexes to atlases have been computerised by several firms for more than fifteen years and savings in time and effort have been considerable. Control of warehousing, sales and distribution is now normally computerised.

State mapping organisations and private photogrammetric houses are the principal users of computer assistance in mapping so far and have developed systems of high quality and practicality. Some photogrammetric houses have organised their mapping from air photographs into almost totally automated systems and are reducing their costs to the extent that they are competitive anywhere in the world. For some, 90% of their production is for overseas countries. The rapidly expanding digitising of some topographical series, and the availability for sale of this and other data, will result soon in the greater use of computers in some aspects of commercial cartography when such use is proved to be viable. One may assume that private cartography will then adapt quickly and profit from the experiences of governmental agencies. A few specialist organisations able to obtain funds from a variety of sources, for example universities, state-funded scientific councils and the like, have been making interesting advances in thematic cartography, and some have been published and are on sale. Good examples are *People in Britain – a Census Atlas* edited by Professor D. Rhind, and *Census Atlases* by the IGN.

State and private mapping

State mapping organisations in Europe have always varied and still do vary in the extent to which they produce maps and atlases in competition with the private companies in their countries. Such activity is distinct from one of their principal tasks, i.e. to provide the public with large scale and topographic maps which they sell commercially – trying always to recover the cost of production of the maps but rarely succeeding. This does not matter, as the public exchequer funds the short-fall in receipts, the public generally supporting this as payment for a valued service. In the UK, until recently the Ordnance Survey concentrated almost exclusively on its prime function of survey and mapping at large scales and, from them, derivation of smaller scale topographic maps. In the last few years, however, it has started to compete with the private sector by publishing and actively marketing road maps and atlases. The private sector says this is unfair competition, that all costs are not taken into account, and so on. There will certainly be much consideration of this, especially as the private sector is at the same time forced to pay royalties to the Ordnance Survey and the scale of these has rapidly increased over the last few years.

In contrast to the UK, France, apart from the Michelin road mapping and guides so efficiently organised more than fifty years ago and maintained to a high standard of accuracy, apart too from a number of air survey companies, the centralisation of mapping at the Institut Géographique National has meant that the IGN is also a big commercial producer and supplier of maps. Perhaps because of this dominance, private commercial cartography is very limited and the bases of small scale atlases are chiefly provided by other European cartographic houses in UK, Austria, Switzerland, Italy and The Netherlands. This seems a curious loss to European cartography in view of the outstanding flair of French designers and book illustrators. In the Federal Republic of Germany the situation is similar to that in UK; in Italy, Switzerland, The Netherlands and Austria not dissimilar, and other countries range from this situation to the east central European pattern of solely centrally-controlled state mapping.

Education and training

Education and training for cartography saw a remarkable increase, in the twenty years about 1955 to 1975, in the number of courses offered in technical schools and colleges. The larger cartographic houses and state organisations continued their thorough in-house training of the maximum number of trainees that they were allowed or could take. This expansion ended in the late seventies – partly in reaction to the previous two decades and partly because of cutting back by organisations to meet escalating labour and other costs. The present position is that there are an adequate number of well-trained cartographers and technicians for all present traditional cartographic needs. Some re-education and training for use of computers is now required and new students are being taught computer science and are being trained in the use of computers in cartography.

The future

The future for commercial cartography in Europe is, in my opinion, bright. The depression of activity of the past three or four years should be seen as a natural reaction to the over-activity of the post-World War II decades. Adjustments have been made and the industry in what may be described as the scribing/photo set lettering/strip masking era, is now ready to face the next great development, namely computer assistance.

Information is now available in several data banks, and commercial cartography needs to look urgently at ways of using this. A variety of thematic maps can now be produced to a state of up-to-dateness much better than that to which we have been accustomed. Cost of computer systems is considerable, but one way to spread this cost would be for organisations to cooperate, set up bureaux and share the time on the equipment.

There is also a need to develop new styles of cartography for the increasing use of visual display screens. The time scale for cartographic information and production has changed dramatically. Some cartographers even go so far as to predict the early demise of many kinds of maps on paper. Certainly for systems in offices, schools and colleges, on T.V. programmes in the home, in aircraft, and in road vehicles, maps on screens are or could be more useful. Imagine a pilot in an aircraft doing twice the speed of sound – he has no time to study a map on paper!

There is need too to tackle vigorously the problem of the developing world. One way in which help could be given is by providing maps on a large enough scale to aid efficient planning and development. Small scale mapping too is needed for their children's education in the form of school atlases and maps, in tourist maps and national atlases and, in this

connection, mention may be made of the past and present considerable activities of various firms in producing many such maps and atlases for developing countries: e.g. Philip, Nelson, Macmillan, Collins, Longman, Esselte, Michelin, and others.

To those of you who wish to know more about cartography in Europe, I commend you to the national reports on their cartographic activities produced by the member states of the ICA at the time of each General Assembly. The last set of reports was produced for the Perth meeting in August 1984, and the next reports, for the years 1984-1987, will be produced for the next meeting in Morelia in October 1987.

SOME EFFECTS OF THE COMPUTER ON EDUCATION AND QUALITY IN CARTOGRAPHY*

A.H. Robinson

Manuscript completed early in 1985.

It is a real pleasure to contribute to this jubilee publication marking the 25th anniversary of the International Cartographic Association. The organisation has come a long way in even that short period, and so has the discipline of cartography. Especially notable has been the enormous impact of the computer. Quite apart from the electrifying (!) changes it has made possible in obtaining, processing, and displaying data, its mechanical manipulation has forced us to analyse logically the nature of many of the procedures, breaking them down into step-by-step operations so that they can be programmed. With respect to the display process, one hopes that when the separate steps are followed, the resulting creation will be as anticipated. But sometimes, however logically we may proceed, the sum of the parts seems less than the whole it should be, that is, the resulting map, objectively arrived at, often appears somehow lacking in some hard-to-define quality. Perhaps we should always bear in mind the admonition attributed to Charles F. Kettering, the renowned engineer-inventor: "Beware of logic, it is an organised way of being wrong with confidence". Certainly, up to now, anyway, there has always been an element of artistry blended with the scientific and technological elements of cartography. We must learn how to incorporate that in our machine processing.

The capability of electronics has transformed cartography in numerous ways, most of which we thoroughly enjoy. Like electrostatic copying, we wonder how we ever got along without it. It has been less than thirty years since those of us who are old enough were standing out on a winter night to watch and wonder at Sputnik; yet now we see the real time displays of weather conditions on television and think nothing of it. Landsat and other scanning devices have provided us a wealth of mappable data. Electronics and computer capabilities are invaluable aids for every discipline concerned with the earth.

For this glimpse at some of the consequences for cartography of the computer and of electronics in general, it is important not to stray into how electronics and computers have affected fields which provide and process the data used by cartographers, and which are clearly associated with cartography, but which are quite dissimilar. It is important to keep in mind that the broad area of geographic information processing consists of three main subdivisions: data gathering, data management, and data display. For example, surveyors, photogrammetrists and other engineers and specialists concerned with photography and other remote sensing are the data gatherers. They measure things such as distances, directions, radiation, and so on. Those who work with the management of data are concerned with its

manipulation, statistical analysis, conversion to appropriate formats, storage and the other processes necessary to make the information useful.

Those kinds of mensurations and processing can be exceedingly complex and require extraordinarily intricate operations. Electronics has been immensely useful and has opened entirely new opportunities; but basically, numerical data often in the form of useful digital records or measurable images are the end products.

A digital record on tape is by itself of no value; the data must be made available. This may be done in several forms but for geographic information it is often desirable to display the data in map form. This is the responsibility of cartography.

To those who worked in the profession of cartography before we had computers and electronics, or even plastics, the changes, like the claims for most proprietary remedies, have brought immediate relief. Much of what we formerly did required painstaking diligence, and the only satisfaction associated with it, besides correctness and neatness, lay in the conceit arising from the fact that you knew how to do what a lot of others didn't. The extraordinary capability of the computer has removed much of the drudgery, and since there is no action without reaction, an important question is: what are the consequences? Certainly, we are in or entering what we might call the "fast map" phase of cartography, and one cannot help but wonder whether there may be a parallel with similar developments in other fields, such as robots in manufacturing or the fast food industry. Are we going to be like a cartographic McDonalds, dispensing "Big Maps" and other good quality but undistinguished food for the eyes? No one knows, of course, but the prospect of remarkable change raises serious questions about cartographic education and quality. The profession must consider such problems if it is to maintain control over its development instead of wandering off to some unknown future enticed by an electronic Pied Piper functioning in the guise of captivating hardware and enchanting software.

The total field of cartography includes many professionals, such as map librarians, teachers, historians, and so on, but to consider some of the effects of the computer on education and quality in a reasonable context calls for a definition of cartography. Any such premise will not please everyone and, if extensively examined here, would detract from the main concern. Briefly, for this purpose I define map making as encompassing all the possible operations involved in producing a map, given the data, through its compilation, simplification, generalisation, symbolisation, and so on, to the ultimate graphic form of the display, however that may be done. Thus, cartography as an activity by a mapmaker is restricted to the operations following the acquisition and primary management of the data and which focusses on its treatment and display. The last is often what is meant by the use of "design" as an inclusive verb in mapmaking, but not universally; in various mapmaking circles these activities are referred to by a variety of terms, even the somewhat demeaning "map finishing". At any rate, I think what I postulate as cartography for this purpose is clear, and we can get on with looking at the questions of education and quality in cartography in the electronic age.

All maps, by definition, are some sort of fractional representation of reality. In terms of ultimate utility and meaning, there is probably no more important aspect of cartography than scale. It controls the precision and amount of what can be displayed in the case of general maps, and a choice of scale is critical to effective communication for many thematic maps. Twenty years ago it was suggested that there may well be an optimum scale for every

objective in thematic cartography. Although the display to reality ratio is straightforward, scale is not simple, and a thorough understanding of how it can and does vary and the several consequences of that variation in terms of geometry should be an integral part of cartographic education. The ease with which electronic displays can be enlarged or reduced makes the understanding of the consequences even more important. Furthermore, if one is not to waste much of the advantages of electronic manipulation, the relation of scale differences to the simplification and generalization of the various classes of data must be carefully considered. For example, in cartography it has always been recognized that for every scale there was an appropriate degree of simplification and generalization; one does not simply enlarge or shrink a given delineation as though zooming with a camera. One can reason that since the capability for the alteration of scale is greater in electronic technology, therefore the need for education to understand the consequences is greater.

Any representation of the earth on a near plane, whether it be a sheet of some kind or the surface of a monitor, involves "map projection". Until the electronic era, all conventional maps were compiled on a graticule that someone had constructed tediously with straightedge, beam compass and curve from formulae or tables. Only occasionally were photographs of globes or strictly diagrammatic representations used. Happily, things are different now. The production of a graticule for any commonly-used projection system – equatorial, oblique, polar or transverse – by computer and plotter is so quick and easy as almost to bring tears to the eyes of one who has done it the hard way. The coasts, boundaries, etc., can be plotted on it with equal facility, although not necessarily appropriately simplified. The fact that it is so easy may seem to suggest that an understanding of projections is not so important now. Quite the contrary.

In the past, choices were limited primarily on the basis of difficulty and availability. A great many small-scale general and thematic maps were made on certain projections because the graticules could be copied or were relatively simple to develop. Now, since a great many are available and equally accessible, a choice is necessary. To make a choice that fits the objective, one must understand the properties (e.g., equal-area), the attributes (e.g., horizontal parallels), and the kinds and patterns of the inevitable distortions. In the electronic era the specialist will do the programming, so the cartographer now needs to know much less about construction but more about characteristics. For larger-scale maps, such things as the employment of grid systems and the fitting of satellite data makes the intelligent use of the maps in terms of their dimensional characteristics more dependent on a knowledge of projections than formerly was necessary. It would appear reasonable again, as it was with scale, that in the electronic age we need more education about map projections, not less.

Let us look at one more standard component of maps, the names, which have always been one of the more complex elements of the cartographic display. If we restrict ourselves only to the recent stick-up period of the history of cartography, and if we ignore the attempts to adapt electronics to effective type-placement, we find nevertheless that electronics is having a profound influence. Ever since type triumphed over calligraphy in mapmaking, a primary element in cartographic design has been the selection of styles, forms and sizes of type to fit the communication objectives and the graphic constraints of a map. Until relatively recently in most mapmaking establishments, the problem of choice was eased by being restricted to the relatively few that were readily available, either in-house or commercially. Even photo lettering machines were severely limited in styles and sizes. Now, however, any available style can be produced in any size and elongated, shortened, condensed, expanded, and slanted forward or backward in any combination desired. In effect, the cartographer has or will soon

become a partial designer of alphanumerics. To carry out that operation successfully, the cartographer will need far more exposure to the typographic tradition and to an understanding of the controls of legibility and perceptibility. As in the case of scales and projections, more education is required.

The effects of the electronic revolution will be the same upon the educational requirements for the other major operations in cartography: the processing of data and its simplification and generalisation; the selection and employment of symbolization systems to fit the objectives of the map, and the nominal, ordinal, interval or ratio characteristics of the data; the effective modulation of the primary graphic variables, namely, hue, value, size, shape, spacing, orientation, and location; and, of course, the fundamental operation of meshing all the choices with the constraints of the display system.

Increasing complexity leads to increasing specialisation, and this will surely continue an already quite apparent trend. Just as in other professions which combine science, art, and technology in varying degrees, such as medicine and architecture, one can only build an effective specialisation upon a thorough basic education. There seems little doubt, then, that if we are to have good quality maps in the electronic age, fundamental education in the elements of cartography must increase.

A key term in the preceding sentence is "good quality" and the question of what effect our entering the electronic age may have on the quality of maps is just as important as the question of its effect on education for cartography. A discussion of that subject is far more difficult than the topic of education.

Everyone can agree that to make a good quality map a cartographer must compose the right mix of scale, projection, symbolisation, lettering, and so on, and put it all together with good graphic judgement. But "right" and "good" are subjective evaluations and have no absolute definitions. Nevertheless, most professionals do not hesitate to evaluate objects within their field, and we can at least suggest some of the effects the electronic capabilities may have. Mapmaking is a visual art, science and technology, and the creation of an effective map requires skill on the part of the cartographer. Assuming one has the talent, then if what is wanted can be accomplished more easily by computer or manual methods is immaterial.

An important kind of capability has to do with the computer-driven mechanical production of map displays. There is considerable variety. On the one hand the capacity for accuracy of position, register, and quality of line has been greatly increased. High precision plotters, computer output on film, laser platemakers, and so on, provide many advantages, and place no restraints on the creativity of the cartographer unless the system is directed to do things for which it is not (yet) suited. On the other hand, displays on printers and on not very versatile monitors with few if any gray levels or colour go to the opposite extreme. With such computer-driven equipment, the constraints on creativity are severe at present.

The application of the computer is very great, and the range of capability is very wide. We can do many things much better than formerly, but computers have almost no ability to make intelligent judgements based on unique sets of circumstances, a very common procedure in cartography. Nevertheless, they will be widely used, of course, and along with the positive results we can anticipate some problems.

One of the consequences we can expect is that cartographers will use the computer for processes for which its present capabilities are not suited. This can lead to unfortunate results. Two examples will suffice as illustrations: lettering and shaded relief. Let us look at lettering first. Even if we assume that all the names for a map are available in the most desirable styles, forms and sizes and that they are all efficiently organized in the data bank with the coordinates of the locations to which they refer, there remains the problem of positioning them on the map. Organizing their positioning in crowded places, and in general following the precepts which have grown up to provide the greatest legibility and information, is a skill. Good manual techniques are time intensive, and computers are faster than people; but computers are not skillful. If we do it interactively with a computer to achieve the same quality as by manual means, we have gained little or no advantage. Consequently, when we use the computer to save time, we may expect more horizontal lettering, more angled names, fewer curved names, fewer names and not such a good fit in tight places. We may confidently assume that continued research and development will bring the computer-placement of lettering closer to the best manual practice and probably better than poor manual results. Whatever level of computer placement of lettering becomes "acceptable" as a standard, it is likely to be lower than the "best" and we can probably look forward to a dependable mediocrity.

Quite a different kind of problem is illustrated by computer-produced shaded relief. Given a digital elevation model (a square matrix of elevations), the computer can calculate and direct an appropriate output of reflectance for any slope in any direction relative to the azimuth and elevation of an incident illumination. The problem arises because the most effective rendering of shaded relief depends upon the skill of the manual artist who can take into account such factors as less fortunate arrangements and exposures, and accomplish the desirable enhancement or minimization of particular features, the lessening of shadows, and so on. The more interactive the computer operation is to obtain these ends, the less is the value of the computer. Furthermore, because one must work from a digital elevation model, a very serious problem, and one so far intractable, is how to simplify a large-scale digital model in a non-linear fashion for appropriate output at various smaller scales. We can expect that computer-produced shaded relief generated with economical interaction often will be too detailed or poorly simplified, again a level of dependable mediocrity.

Another consequence of the availability of the computer is that we can manipulate large amounts of data very quickly, an enormous boon to one who must process masses of information to put it in mappable form. There is, however, the obvious danger that because we can handle large amounts of data, we may conclude we might as well display more information on the map. In the electronic age it is becoming the rule that we have more data than we need for most maps, and the real problem is how to simplify things so as to make the map effective. This is true of most kinds of mapmaking, but it is especially significant in a large share of sophisticated thematic mapping where the objective is to display the magnitude variations and the basic structural characteristics of a distribution. Theoretically, there should be an ideal level of detail for each such map problem; if one exceeds that, then the focus shifts to the trees and away from the forest, so to speak. Although it may seem blasphemous, more information than is called for by the objective is a real danger in much cartography.

A final example of the possible consequences for cartography brought about by the availability of the computer is provided by instances when we do things we ought not do simply because the computer makes it possible. An illustration is provided by the no-class choropleth map. In this symbolic system a full range of tones is employed, and each

enumeration unit is given a tone fitted exactly to its numerical value, instead of separating the range into classes and then shading all members of a class with the same tone. The first choropleth maps made more than 150 years ago tried to do no-class shading with smooth tones; but they were unsuccessful because the technology was incapable of meeting the demand, and the attempt was soon dropped. Today, the computer can direct smooth tonal output with a number of levels beyond visual discrimination, and consequently such no-class choropleth mapping with smooth tones is now possible. On the other hand, computer-driven line plotters cannot produce much in the way of a range of tones, but they can hatch or crosshatch with a given line width with precise variation of the spaces between the lines. By equating the percent area inked obtained by varying the spacings with the corresponding equivalent black-white ratios in a tonal range, a computer can direct a plotter to produce a mathematically correct but visually ineffective no-class choropleth map. The problem is that hatching and crosshatching are not seen as tones unless the lines are extremely fine and close together. There are other things visually wrong with substituting line patterns for smooth tones, but the fact that only a part of such a map may possibly be seen as having tones is enough.

This essay has tried to point out a few ways that the computer is likely to affect cartography, especially in terms of its effects on education and the quality of maps. The computer and other electronic devices have increased immeasurably the capabilities of cartography and the associated disciplines. It does not take a gifted prophet to see that, barring human self-destruction, great changes will continue to come rapidly. Twenty-five years ago when the ICA was formed, the computer era in cartography was just beginning. Cartography seems to have kept reasonable pace with the developments, and one can hope that it will continue to do so and continue to be innovative in its own right. Some fields resist change while others get so interested in everything new that they are ready to discard the old standards, forgetting that those have developed during long periods of trial and error.

Legend has it that Thales of Miletus, a cosmographer of some 2500 years ago, was so intent on looking at the stars, he fell into a well. Even though we can be fascinated by what is ahead, we ought to watch carefully where we are going.

ICA – THE FUTURE

Joel L. Morrison, President ICA 1984-1987

Manuscript completed mid 1985

Having come to the milepost of twenty-five years, the ICA has the right to reflect and feel proud of its accomplishments. The foresight of its founder in identifying the needs of the cartographers of the world for an international forum and in creating that forum in the form of the ICA organisational framework can only be heartily congratulated. It is correct for us to honour that past, but it is our concomitant duty not to ignore our future.

It is difficult, but at the same time interesting, to try to capture the essence of a body of knowledge at one instance in time, yet that is what I want briefly to do with respect to the science of cartography. These remarks are purely my perspective on cartography at this time in its history.

We must acknowledge the premise that cartography has evolved over the past 5 000 years from a cottage craft or art with no technology to a highly sophisticated science with a highly sophisticated technology. This is neither surprising nor rare (note the medical professions).

Further, as with many other disciplines, many levels of cartography continue to be practiced, and through the years cartography has not dispensed with previous technologies as it has evolved. People in the technologically advanced nations of our planet still draw spatial depictions of important relationships, i.e., crude maps, with sticks in the sand, or on the backs of napkins in restaurants, while at the same time information from satellites is processed through a computer to direct peripheral equipment to make an image of a spatial relationship. Each instance is communicating information and each is a valid cartographic product in the late twentieth century.

History teaches us several important lessons. As we study the history of cartography we can identify at least two patterns of cartographic activity, which are important in explaining cartography today and with which we must deal in assessing the cartography of tomorrow. The first pattern that emerges in the history of the cartographic discipline demonstrates that cartography has responded to two types of innovations. The availability of new data that are suited for cartographic purposes has generally resulted in an increase in the development of new conceptual methods for manipulating and displaying that data. In a similar manner the discovery of new technological innovations suited for cartographic purposes have generally resulted in the use of these technological innovations for the production of "better" maps. New data and new technological innovations, usually preface an increased utilisation and production of maps.

The second identifiable pattern of activity is that these innovations have normally come from outsiders to the cartographic discipline. An innovation is brought into the discipline from another discipline and initially a number of the outside practitioners carry the innovation beyond its cartographic usefulness and then leave the cartographic discipline as abruptly as they entered. For example, in the late 18th and during the 19th century many new thematic mapping methods were developed by statisticians and medical professionals who were concerned with the spatial spread of communicable diseases. Many of these newly developed methodologies were adopted by cartographers and today represent some of our most common thematic mapping procedures. Fortunately, cartography has usually taken the best and discarded the worst and has steadily improved on each innovation that has come forth. It is not surprising then that at any given time the discipline has several data sources and several usable technologies operating.

It must be recognised as with life in general the pace of this activity or its rate of change in the discipline of cartography has increased. The frequency of innovation has increased dramatically or at least that is the prevailing impression which we hold. Furthermore, we are experiencing a time when both types of innovation, data and technology, are being introduced simultaneously into the discipline. Therefore, we may in fact be experiencing an unique situation.

The major innovations that the discipline of cartography has experienced can be summarised as follows within the history of Western civilisation. The important data revolutions number at least three. The consequences of each are readily apparent and well-known. The first data revolution came about as a result of man's learning to accurately measure the earth. The rise of cadastre type maps, of Ptolemy's list of the latitudes and longitudes of cities, and finally, the rise of the portolan chart in Western Europe were some of the direct results of the incorporation of new more accurate data sources about the physical characteristics of our planet into the discipline.

The second data revolution dates from the end of the 18th century and the beginning of the 19th century when censuses first began to be conducted and data about man's activities on the earth were thus for the first time recorded. The cartographic results of this second data revolution were primarily the development of thematic mapping methodologies which became used to map non-physical data distributions. The third cartographic data revolution is currently in progress. It is the ability to capture and analyse highly accurate data about the earth and some of man's activities by electronic means. The results, of course, are only partially known at this time. But we can be certain that they include the ability to map more accurately distributions and relationships of earth phenomena, some of which we have never before been able to map (e.g., surficial temperatures using thermal sensor data).

Major technological innovations are equally important in cartographic history. One such innovation was the invention of the printing press. This resulted in the capability to produce multiple copies of maps easily and that meant that more of the human race could possess accurately made maps than ever before. A second major technological innovation was photography. This innovation allowed the cartographer to bring the field into the laboratory on one hand and to more accurately reproduce the map itself on the other. Finally, today we are in the midst of a third major technological innovation; the use of computers in cartography. The results of this technological innovation are only partially apparent, but it is certain that new cartographic products are now possible and that the full extent of this innovation is uncharted as yet.

I have dwelt rather at length on this historical introduction because I sincerely believe that cartography today is in the midst of simultaneous revolutions in both data collection and map production technology. Perhaps never before has a revolution in data collection coincided with a revolution in map production. Never before have cartographers had so wide a range of technologies available to make a map or map product.

This is where the cartographic discipline is today. It is, therefore, imperative that the ICA provide the world community of cartographers with leadership, facilitating the incorporation of new data and new technology, as appropriate, by providing forums for the exchange of knowledge about these innovations, and also, by promoting research into the effective and efficient use of cartographic methods and techniques. Finally, it is ICA's responsibility to take the lead in promoting the cartographic profession worldwide.

The future responsibilities of the ICA fall logically into three categories: (A) the promotion of cartographic research; (B) the facilitating of the transfer of cartographic knowledge among the cartographers of the world; and (C) the promotion of the discipline of cartography in the world. As ICA matures during its next quarter century, its success will undoubtedly be judged against these or similar categories of activity.

The primary way in which the ICA has promoted cartographic research in the past has been through the establishing and facilitating of international commissions, ad-hoc commissions, and working groups. While there have been notable successes by some of the past commissions and working groups, there have also been failures. The work of these groups has been very loosely managed by the ICA Executive Committee, and it is clear that through better management and more attention to the initial terms of reference of these groups, that our future success rate can be improved. The establishment of an international commission to study an important question or problem in our discipline should only be done after

discussion, justification, and the outlining of a plausible set of steps to reach the postulated goal.

There exists a broad range of potential cartographic topics in need of international study. What is most often lacking is the leadership and the pre-planning necessary to ensure a successful venture. The ICA Executive Committee will have to assume the role of a research committee from time to time to promote these activities. At some future date, it may be necessary to establish a research committee, independent of the Executive Committee, but the ICA is not at that stage of development, as yet.

ICA must provide oversight with the intent to reduce redundancies in cartographic research. ICA can facilitate cross-cultural studies and is already promoting cross-disciplinary work in several of its current ad-hoc commissions and working groups. One important way to reduce potential redundant research efforts, and at the same time promote interdisciplinary studies, is by facilitating the transfer of cartographic knowledge which is a second major area of responsibility for ICA.

There are three vehicles which ICA regularly can use to transfer knowledge; 1. conferences, 2. workshops and seminars, and 3. publications. Over the past 25 years ICA has been moderately successful in this area. Impressive sequences of world conferences, the General Assemblies and Technical Conferences have been held since the founding of ICA. These will and should continue. Complementing these has been an increasing number of regional conferences. The Auto-Carto Series (7 conferences) in North America, the Euro-Carto Series (3 conferences) in Europe, and the Austra-Carto (1 conference) in Australia are examples. In addition, a worldwide Auto-Carto, London is planned in the fall of 1986.

In the future, the number of these regional ICA sanctioned conferences will increase and ICA must play a significant role in encouraging and coordinating these speciality conferences. Left alone, it appears quite possible that the number of speciality conferences could proliferate and seriously cause a fragmentation of the cartographic discipline. Encouraged and coordinated by the ICA, these regional speciality conferences can be a primary means to affect the transfer of the entire world cartographic community. ICA must play a lead role in this area.

The ICA has actively supported training seminars and workshops in third world nations. To date, five seminars have taken place and the success rate has been high. The model that the ICA follows seems to be working well and must be promoted even more vigorously in the future. The emphasis must be slightly shifted as it is not only the third world nations that can profit from the transfer of knowledge that takes place in these seminars. Often all nations, developed, underdeveloped, and developing can learn from the experience.

In the area of publications, the ICA has greatly expanded its efforts during the past few years. For the past two years, the ICA Newsletter has helped to spread information about cartography. It is necessary to ensure a wide distribution of this Newsletter and, also, to ensure that its contents are current and meaningful.

The publication of cartographic research is primarily done through a large increase in the number of national cartographic journals. Some of these are excellent in quality, and the ICA need play no active role in their continued publication. The publications of the ICA commissions and working groups have also greatly increased in numbers. In the future, ICA

must take the steps necessary to assure the quality of these publications, while continuing to encourage their number.

Several basic cartographic reference works have been supported by the ICA. The Multilingual Dictionary of Technical Terms in Cartography, published in 1973, was the first of these. The Basic Cartography Manual, Volume 1, which appeared in 1984, is another basic reference work. Volume 2 of Basic Cartography is now nearing completion. More basic works are needed. For example, ICA should publish sample basic curricula for the training of cartographers and cartographic technicians. It would be an excellent resource if a comprehensive cartographic "Abstracts" could be started and published on a regular basis. The ICA does endorse the CARTACTUAL which publishes important changes to the world maps. Utilising new technology, ICA could facilitate the construction of computer-compatible cartographic data bases at scales that would serve the modern world's needs in the same way that the IMW once served the needs of the world. Another area of international cartographic concern should be geographic names standardisation. As one can see, there is literally no end to the projects which the ICA could undertake that would result in publications that would serve to facilitate the transfer of cartographic knowledge.

ICA needs to promote the image of the discipline of cartography in the world today. Internationally, ICA must adequately acknowledge and reward our leaders and the important events that occur. These must be a series of brochures which explain ICA and cartography as practised in the world. Additionally, cartography must establish its unique identity in the world community of science. This can only be earned by substantive research which results in demonstrable benefits to humanity. This impels ICA to attempt new programs and/or to continue the programs outlined above. Sample curricula for the training of cartographers and cartographer technicians, a comprehensive Manual of Cartography which demonstrates the breadth and depth of the field, and the presence of ICA working with and within international organisations such as the UN, IMF, UNESCO, WHO, etc., will provide the necessary visibility to the profession. For example, when a boundary dispute is heard by the World Court, that body should automatically come to ICA for expert testimony and assistance.

Finally, it must be recognised that the ICA, at its founding, had many representatives of the private cartographic community as its leaders. It would appear that to some extent the ICA does not now have the same degree of input from the map printers and publishers of the world. ICA should take steps to remedy this situation. Similarly, ICA enjoys only varying degrees of acceptance with the various national military mapping agencies of the nations of the world. ICA should strive to serve the worldwide community of cartographers: this includes national military and civilian mapping agencies, private or public mapping establishments, academic cartography and to some extent the community of map librarians and distributors and major map users.

Maturing is difficult. We are maturing not as cartography, but as a science. The transition from a cottage craft (art) to a rigorous science employing sophisticated technology has been accomplished. It remains only to continue the rigorous pursuit of our science and to explore and explain its many helpful contributions to mankind. It is an exciting time to be associated with cartography. Cartography remains a science small in its number of participants, yet vitally necessary in the world of the late 20th century. Today we are experiencing the data collection innovations and the technological innovations necessary to take a quantum step forward in the history of our discipline. Let us not miss this opportunity, or worse yet, allow

others with no appreciation for the long history of cartography to take the lead in the profession.

The future of ICA does not lack tasks to be accomplished. The direction to the accomplishment of many of these tasks is clear. ICA is no longer a young organisation. At this stage in its history, ICA must continue to accomplish the basic tasks required of an international scientific organisation. By so doing, and by doing so well, its place among the scientific organisations of the world will be assured in the future.



Figure 43. Presidents, past and present and advisors. From left to right, President Morrison (elected 1984), Vice-President Rhind (elected 1984), Mrs. Regina Ormeling, President Ormeling (resigned 1984), Professor P. Scott (elected IGU President 1984) and Secretary-Treasurer Hedbom (resigned 1984)

ICA NEWSLETTER



EDITORS: R.W. Anson / Oxford Polytechnic / Oxford OX3 0BP / United Kingdom
B.V. Gutsell / University of Toronto Press / Downsview M3H 5T8 / Canada

Number 1, June 1983

A MESSAGE FROM THE PRESIDENT ICA

Dear Colleagues: It is a pleasure to introduce the first issue of the Newsletter of the International Cartographic Association. The idea of such a publication was conceived at the Sixth General Assembly in Tokyo, 1980. It was generally felt there that the irregular, infrequently appearing *Bulletin* of the International Geographical Union, in which ICA news has been published since 1964, did not fulfil its purpose as an adequate cartographic record. Consequently, a separate ICA newsletter was recommended. Due to various circumstances, the realisation of this project was delayed. The initiative of Bernard V. Gutsell (the Chairman of the ICA Publications Committee, the editor of the journal *Cartographica*), and the generosity of the University of Toronto Press, was removed, and now the manuscript of the *Newsletter* is ready for printing.

The *ICA Newsletter* will be issued twice a year. For economic reasons, it will be published in black and white only. Single copies of the Newsletter will be sent to ICA member countries, chairmen of regional commissions and Commissions, sister organisations (e.g. IGU, etc.) and to editors of cartographic journals. Each of the recipients is requested to pass on the distribution by photocopies or other means to interested agencies, institutes or individuals.

May the *ICA Newsletter* serve its

XITH INTERNATIONAL CARTOGRAPHIC CONFERENCE 29th July – 4th August, 1982, Warsaw, Poland

The 1982 Conference in Warsaw was a remarkable success in view of the political uncertainties in Poland. Participants numbering 437, representing 38 countries made the journey to Warsaw and their efforts were repaid by a meeting noted for a variety of interesting papers, a magnificent exhibition and hospitality from the host country that surpassed any-
ors could have expected.

Papers were presented in 9 sessions during the session. Most of the lectures dealt with the presentation of known cartographic facts and situations and there was little evidence of new and original research. The quality of the visual presentation of many papers left much to be desired. During the Tokyo Conference, cartographers were supposed to be masters of communication and underestimated the range of visibility of transparencies. For the Perth Conference, guidelines and specifications for the preparation of materials for projection and illustration will be formulated in order to avoid the problems that occurred both in Tokyo and Warsaw. The President of ICA, Professor Emeritus J.F. Shaver, gave an account of the Conference in his report which is summarized below. He also reported on ICA activities in the two-year period since the 10th Meeting in Tokyo and the



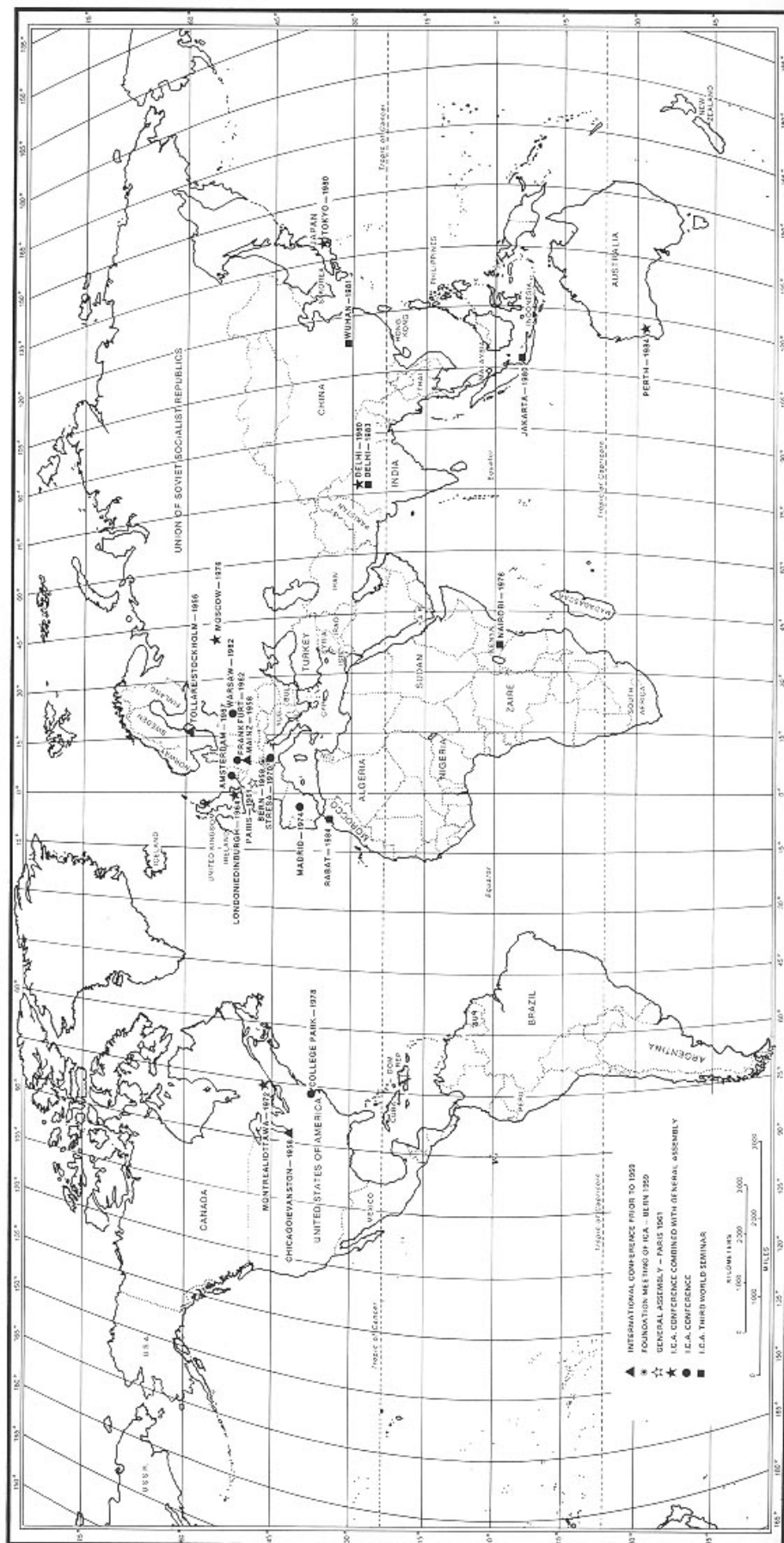
Figure 44. Bernard V. Gutsell, initiator, producer and editor of the *ICA Newsletter*.

Figure 44. Bernard V. Gutsell, initiator, producer and editor of the *ICA Newsletter*.

1984



I.C.A. CONFERENCE LOCATIONS 1959 - 1984



LIST OF ABBREVIATIONS

ACSM = American Congress of Surveying and Mapping
CAC = Computer-Assisted Cartography
CBE = Commander of the Order of the British Empire
CERCO = Comité Européen des Responsables de la Cartographie Officielle
CFTC = Comité Français de Cartographie
CRT = Cathode Ray Tube
CSGPC = Chinese Society of Geodesy, Photogrammetry and Cartography
CTTTW = Committee for Technology Transfer to Third World Countries
DMA = Defense Mapping Agency
EC = Executive Committee
ECU = Experimental Cartographic Unit
ETH = Eidgenössische Technische Hochschule
FAO = Food and Agricultural Organisation
FIG = Fédération Internationale des Géomètres
FRG = Federal Republic of Germany
GA = General Assembly
GDR = German Democratic Republic
GEBCO = General Bathymétrie Chart of the Oceans
GHQ = General Headquarters
IAG = International Association of Geodesy
ICA = International Cartographic Association
ICAO = International Civil Aviation Organisation
ICSU = International Council of Scientific Unions
IfAG = Institut für Angewandte Geodäsie
IFLA = International Federation of Library Associations
IGN = Institut Géographique National
IGU = International Geographical Union
IHB = International Hydrographic Bureau
IHO = International Hydrographic Organisation
IMF = International Monetary Fund
IMW = International Map of the World
ISBN = International Standard Book Number
ISM = International Society of Mine Surveying
ISP = International Society for Photogrammetry
ISPRS = International Society for Photogrammetry and Remote Sensing
ITC = International Institute for Aerospace Survey and Earth Sciences
IUSM = International Union for Surveys and Mapping
IUGG = International Union of Geodesy and Geophysics
IYC = International Yearbook of Cartography
JOG = Joint Operations Graphics
LIS = Land Information Systems
MLD = Multilingual Dictionary of Technical Terms in Cartography
NBSM = National Bureau of Surveying and Mapping (China)
NCIC = National Cartographic Information Center (USA)
NDCDB = National Digital Cartographic Data Base (USA)
NMD = National Mapping Division (USA)
OAS = Organisation of American States
ORSTOM = Office de la Recherche Scientifique et Technique Outre-Mer

OS = Ordnance Survey
OSS = Office of Strategic Services
PC = Publications Committee
RE = Royal Engineers
SAC = Swiss Alpine Club
SAR = Synthetic Aperture Radar
SCOR = Scientific Committee on Oceanic Research
SEAC = South-East Asia Command
SEASAT = Sea Satellite
SLAR = Side-Looking Airborne Radar
SORSA = Spatially Oriented Referencing System Association
UK = United Kingdom
UN = United Nations
UNEP = United Nations Environment Programme
UNESCO = United Nations Education, Scientific and Cultural Organisation
USA = United States of America
USGS = United States Geological Survey
USSR = Union of Socialist Soviet Republics
VP = Vice-President
WMO = World Meteorological Organisation

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