HISTORY

OF THE

INTERNATIONAL UNION FOR VACUUM SCIENCE, TECHNIQUE AND APPLICATIONS

UNION INTERNATIONALE POUR LA SCIENCE, LA TECHNIQUE ET LES APPLICATIONS DU VIDE

INTERNATIONALE UNION FÜR VAKUUM-FORSCHUNG, -TECHNIK UND -ANWENDUNG

BY

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SECOND EDITION

2001

PREFACE TO 2nd EDITION

In 1986, Dr James M. Lafferty, having been active within IUVSTA since 1971 and President from 1980 to 1983, wrote a History of the IUVSTA. During my own participation in the affairs of the union from 1980 to 2001, including my time as President from 1995 to 1998, I found this History to be of such value that I offered to collaborate with him to produce a 2nd Edition which would be current up to the year 2001. I expected that the main task would involve updating the existing material but, perhaps not surprisingly, it has been found that many new topics have had to be introduced. This reflects the continuing expansion of the Union's activities over the past fifteen years.

The early history of our Union has not altered. Thus there have been no substantial changes in sections 1 to 5. All other sections within the 1st Edition have been extended and updated and a discussion of various new activities has been added to cover the Highlight Seminars, Short Courses, IUVSTA-sponsored Conference Series, our Archives and our interactions with ICSU, ICTP and UNESCO. It should be mentioned that some sections have been renumbered and new sections (10, 12, 13 and 16) have been added to describe our National Membership, our Website and Electronic Communication, the IUVSTA Workshops and Schools, and the IUVSTA Prizes.

By necessity, a history has to concentrate on new developments, how and why they were initiated and, where possible, the principal instigators. In general, space prohibits the recording of full details of on-going activities and participants. However, an exception will be found in section 9 where relatively extensive details of the successive triennial congresses are recorded. These details reflect, and thus illustrate, progressive changes in the fields of interest of our Union, changes in research activity in these fields, and developments within the Union itself.

The IUVSTA currently has a website which contains a comprehensive compilation of detailed information about the Union, its members and its activities. The URL of this website is: http://www.iuvsta.org. Whilst this will probably change over the coming years, as information technology continues to develop, there is sure to be an easily accessible equivalent site from which detailed information can be obtained. This site also has links to equivalent sites maintained by the majority of our member National Vacuum Societies.

I owe a debt of gratitude to many people who have prompted my memory on various issues and have checked the authenticity of what I have recorded here. Unfortunately they are too numerous to acknowledge individually but each has received my personal thanks. Nevertheless I must take final responsibility for what has been written and I apologise for any omissions or inaccuracies of fact. My main source of information has been the minutes of the General Meetings and the Executive Council Meetings and the Division and Committee minutes and reports. Indeed I have found these generally to be quite comprehensive and thus my thanks also extend to the various people who have produced these over the years.

The IUVSTA has a rather unique character compared to the majority of international scientific unions. Perhaps this is because it, like its member vacuum societies, has been developed by the people who use its services, rather than by a professional society. One of its unique features is that it provides an opportunity, twice per year, for a representative from each of our member societies, currently (October 2001) involving 30 nations, to meet personally to

exchange ideas and to influence every facet of our activities. Our Union's strength lies in this participation by its members.

I trust that through reading these pages, people who are not vacuum society members will come to understand the objectives and activities of our Union and perhaps see how they can participate in this multidisciplinary organisation to our mutual advantage. I also trust that our existing vacuum society members will gain an appreciation of how the IUVSTA had been developing over the past forty two years and that this will inspire them to contribute to its further development. No organisation stands still - if it is not moving forward, it is sliding backwards.

This History has been written whilst our membership stands at 30 nations. However, it is expected that this number will increase to 31 when the Pakistan Vacuum Society is formally admitted to the Union at the General Meeting in November of this year, 2001. Clearly the Pakistan Vacuum Society has not had an opportunity to contribute to IUVSTA activities during the period of this History. However, where possible, reference to its anticipated entry during the final months of this period has been included.

In the 1st Edition, there was an Appendix which contained short histories of the majority of the IUVSTA's member societies. Updated short histories of all 30 of our current member National Vacuum Societies have again been obtained but the document is now too large to be included as an Appendix. It will be published separately, including an entry from the Pakistan Vacuum Society.

In conclusion, I wish to make one acknowledgement and that is to my friend and colleague Jim Lafferty with whom it has been a pleasure and inspiration to collaborate on many IUVSTA activities in addition to the updating of this History.

J. L. Robins
Perth, Australia.
October 2001

PREFACE TO 1st EDITION

The International Union for Vacuum Science, Technique and Applications will celebrate its 30th anniversary during its 1986-1989 triennium. In commemorating this special occasion, Prof. J. Antal, President of the Union, asked me to prepare a history of the organization. This has not been an easy task since I did not become formally involved with the Union until 1971.

The history of the Union had its beginning on 13 June 1958 in Namur, Belgium, at the conclusion of the First International Congress on Vacuum Technology. This meeting, organized under the leadership of Prof. Emile Thomas, was the first large international meeting of vacuists with over 500 participants from 26 countries. The meeting met with such enthusiasm that Mr. Medard W. Welch, then President of the American Vacuum Society, suggested the creation of an international committee that would organize future such congresses in different countries. This led to the formation of the International Organization for Vacuum Science and Technology (IOVST) with Prof. Thomas serving as President.

At that time only three or four countries had their own national vacuum societies, and consequently the IOVST was able to attract individuals and corporate members from many countries that had no other platform for the exchange of information on vacuum science. The IOVST made every effort to encourage the creation of additional national vacuum societies and was quite successful in doing so. On 8 December 1962 the IOVST revised its statutes to exclude private membership and became an international confederation of national vacuum organizations with 10 founder members. It changed its name to the International Union for Vacuum Science, Technique and Applications (IUVSTA). The Union maintained the legal status which had been granted to the IOVST under Belgian laws and continued to maintain its Secretariat in Brussels. This paper describes the organizational structure of the IUVSTA and the development of its scientific divisions. Historical background is given for a number of the Union's activities including the Welch International Scholarships, News Bulletin, Visual Aids Project, and International Vacuum Congresses. Appendix I contains brief histories of the National Societies and Committees that make up the IUVSTA membership. These documents add valuable background to the IUVSTA history. Grateful thanks are due to all of those authors who have contributed to the collection.

A collection of photographs will be found in Appendix II. Submitted by various individuals, they highlight meetings and events of interest in the Union's history.

In writing this history I have relied greatly on the IUVSTA News Bulletins and the minutes of the Executive Council Meetings and the General Meetings. In addition I have received helpful information from the following: H. Adam, P. Choumoff, B. Dayton, M. Berthaud, R. Dobrozemsky, J. Hengevoss, H. Jahrreiss, L. Preuss, J. de Segovia, E. Thomas and A. Venema.

In particular, I would like to thank Mlle. Madeleine Berthaud for sending me a 79 page handwritten copy of her "History and Philosophy of Vacuists' Associations" covering the thirty year period from 1944 to 1974.

J. M. Lafferty
Schenectady, N. Y.
March 1986

HISTORY OF THE INTERNATIONAL UNION
FOR VACUUM SCIENCE, TECHNIQUE AND APPLICATIONS

CONTENTS

LIST OF FIGURES AND TABLES

HISTORY OF THE INTERNATIONAL UNION FOR VACUUM SCIENCE, TECHNIQUE AND APPLICATIONS

J. L. Robins / J. M. Lafferty

1. INTRODUCTION

Vacuum science and technology has a unique and interesting history. Believing that "nature abhors a vacuum", ancient scholars denied the concept of a vacuum and the possibility of a void. The belief that vacuum was impossible existed well into the 17th century although early in that century sceptics were beginning to question the ancient "fear of vacuum" concept. This was motivated by the failure of siphons and the inability of pumps to "suck" water above heights of about 10 meters. By mid-century, piston vacuum pumps were in use and vacuum science was on its way. It is not surprising that these early pumps resembled the water pumps that preceded them (not unlike the way in which the first automobiles resembled horse-drawn buggies).

The next two hundred years were spent in improving these pumps and in measuring and characterising vacuum. Progress was very slow by today's standards. However, at that time there was not an urgent need for vacuum although a few scientists began to use vacuum as a tool for their research. The study of electrical discharges at low pressures was an early example of a study that continued all through the evolution of vacuum science and technology.

By the latter part of the 19th century, vacuum technology had advanced to the point where pressures of 0.1 Pa or better were achieved, thus making possible the discovery of the electron, thermionic emission and x-rays, and the invention of the incandescent lamp. The commercial implications of these developments created an unprecedented need for the production of vacuum on an industrial scale. Consequently vacuum technology advanced at an almost explosive rate by the turn of the 20th century and was followed by many new innovations in the production and measurement of vacuum for research and industrial purposes.

In general, in those early days vacuum technology was practised by scientists and engineers who lacked training in the field and whose main pursuits were research and technology in other fields. Under such circumstances, it was not too surprising that vacuum technology came to be known as black magic with string, varnish, sealing wax, and all the rest. It was clear that professionalism was lacking in the practice of vacuum science and technology and that there was a need for professional vacuists and vacuum societies devoted exclusively to this field. Because the practice of vacuum technology encompasses all of the physical sciences and engineering, there was no single scientific organisation that fulfilled the need of the vacuists.

The French were the first to formally organise a national vacuum society in 1945 following a suggestion made by F. Holweck (F)* as early as 1939. They were followed by the Americans in 1953 and the Japanese in 1958. By the mid 1960's numerous countries had formed independent professional vacuum societies or national committees devoted to vacuum within the hierarchy of their existing national scientific organisations.

It was natural that, as national vacuum organisations came into existence, the leaders of these groups began to think in broader terms about international cooperation and exchange of ideas

relating to vacuum. By the mid 1950's there was already considerable interaction between the French, Americans, West Germans, Japanese, Spanish, Italians and Belgians. As early as 1948 Robert Champeix (F)*, a member of the French Vacuum Society, proposed a plan for an International Vacuum Conference in 1949 or 1950, but the plan had to be abandoned because of financial constraints.

[* See Table I for code giving peoples' country of origin.]

2. THE FIRST INTERNATIONAL CONGRESS ON VACUUM TECHNOLOGY

A Belgian group, "Vacuum Techniques Section" formed in 1954 within the framework of the Research Committee of the Société Royale Belge des Ingénieurs et des Industriels, also gave serious thought, in 1956, to holding an international vacuum congress. They appointed a Congress Organising Committee to study the matter further under the leadership of Emile Thomas, Director of the Centre for Nuclear Sciences at the Royal Military School. In January 1957, this Committee conceived the idea of holding the First International Congress on Vacuum Technology on 10-13 June in Namur, Belgium, in connection with the 1958 Brussels World Fair. The official languages of the Congress were to be French, English and German and Congress proceedings were to be published. The necessary funds to get the Congress underway were to be supplied by Belgian, Luxembourg and Swiss industrial organisations. These plans were reviewed inside and outside Belgium and, with the cooperation of several scientific societies, it was agreed to proceed with the Congress.

The First International Congress on Vacuum Technology (Premier Congrès International des Techniques du Vide) held in Namur in June 1958 was judged to be a huge success. The meetings were attended by 522 participants from 26 countries. There were 164 papers presented on all phases of vacuum science and its applications. For the first time vacuists from all over the world had a chance to meet and discuss their common interests informally as well as formally. There was an air of excitement and international fellowship and an earnest desire by the participants to meet again on a periodic basis. All of this encouraged M. W. Welch, President of the American Vacuum Society, to recommend, at the opening session of the Congress on 10 June 1958, the creation of a permanent international committee that would continue the work of the organisers of the Congress. He also suggested that the seat of such a committee be established in Belgium and that future congresses should take place in different countries. These suggestions were later reproduced in a draft resolution submitted to the participants at the closing session of the Congress by J. Yarwood (GB)*, R. Champeix (F) and G. Oetjen (D), which was unanimously adopted. This resolution recommended an Executive Committee composed of E. Thomas (B) (President), A. S. D. Barrett (GB), K. Diels (D), J. M. Dunoyer (F) and M. W. Welch (USA) with the following duties:

(1) to establish an international organisation for vacuum science and technology, whose aims would be:

   (a) to organise and hold in various countries once every three years an international congress on vacuum science and technology;

   (b) to promote the dissemination of information and the advancement of education in vacuum science and technology;

(c) to affiliate with other national and international bodies to achieve these objectives;

(2) to organise and call the Second International Congress on Vacuum Science and Technology;

(3) to submit to the participants of the Namur Congress for approval by mail a draft constitution and bylaws.

Clearly, this action was the most important accomplishment of the Congress and would lead to the formation of an organisation which would eventually become the International Union for Vacuum Science, Technique and Applications (IUVSTA).

3. THE INTERNATIONAL ORGANISATION FOR VACUUM SCIENCE AND TECHNOLOGY (IOVST)

Immediately after the First International Congress on Vacuum Technology, an international secretariat was set up in Brussels under E. Thomas to handle daily operations and coordinate the work of the Executive Committee created at the Congress. The Executive Committee wrote a draft constitution and by-laws which, as agreed, were submitted to the participants of the First Congress and to many societies and to persons interested in vacuum science and technology who had not attended the Congress. Their comments and suggestions were incorporated in the drafts with minor changes. The new organisation, called the International Organisation for Vacuum Science and Technology (IOVST), was constituted in conformity with the Belgian laws for international scientific organisations seated in Brussels. The IOVST was officially registered and granted civil rights by a Belgian Royal Decree on 7 August 1959.

The IOVST Executive Committee consisted of the following officers and members:

President	E. Thomas (B)	
Vice President	M. W. Welch (USA)	
Secretary	A. S. D. Barrett (GB)	
Treasurer	G. Lovinfosse (B)	
Executive Committee Members	G. Brogren (S),	K. Diels (D),
	J. Dunoyer (F),	A. Venema (NL).

The membership of the IOVST was composed of individual and corporate members, including non-profit institutions and scientific organisations as well as commercial and industrial corporations and businesses. The finances of the organisation were derived from membership dues and grants from institutions. The IOVST was administered by a General Meeting, an Executive Committee and the Secretariat in Brussels. The General Meeting represented all the membership and was vested with broad powers to make decisions on all aspects of the organisation. An Executive Committee, made up of twelve members, served as the administrative arm of the General Meeting and was assisted by an Advisory Committee. A News Bulletin was published, and several standing committees were organised: A Congress Committee, a Standardisation Committee and an Education Committee. By the end of November, 1959, the organisation had 32 Corporate Founder Members and 418 Individual Founder Members from 24 countries.

4. FORMATION OF THE INTERNATIONAL UNION FOR VACUUM SCIENCE, TECHNIQUE AND APPLICATIONS (IUVSTA)

It would appear that the IOVST was off to an excellent start. However, this proved not to be the case because of problems concerning the composition of its membership. In some countries, because of government restrictions, it was impossible for technical societies, and in some cases even individuals, to join a foreign organisation composed of private individuals and corporate bodies. For this reason, some vacuists and national vacuum societies were excluded from participation in the activities of the IOVST.

Had the IOVST been organised as a federation of only national vacuum organisations and had it not permitted private membership, it would have been difficult to obtain broad international participation since only three or four such national organisations existed in 1959. It appears that the Executive Committee was aware of this dilemma and elected initially to allow individual and corporate memberships, but had as its final goal to organise a federation of national vacuum societies once a sufficient number of these had formed. In the meantime the Executive Committee was making every effort to encourage the creation of national vacuum societies in countries where they did not yet exist.

This campaign was quite successful. On 27 January 1961 in Cologne a meeting was held between members of several national vacuum organisations and IOVST representatives to consider what could be done to form an international federation of national vacuum societies. The meeting was called by K. Diels (D) and those in attendance were A. S. D. Barrett (GB), M. Berthaud (F), C. Biguenet (F), D. Degras (F), R. Jaeckel (D), E. Thomas (B), and L. Wegmann (CH). This committee was known as the Cologne Committee, and later as the Statutes Committee of the IOVST. The task of drafting a constitution and bylaws for a new federation was given to M. Berthaud and E. Thomas. This work continued for nearly two years with many reviews by various national bodies. Four drafts were made before final completion and acceptance by the Cologne Committee at its meeting in Dijon on 5 November 1962.

There had obviously been the possibility of the IOVST coexisting with the new federation, but it was the desire of the IOVST Executive Committee to terminate the IOVST when the new federation was created. They believed that there needed to be only one international vacuum organisation. This was without question a wise decision because the coexistence of two international organisations would certainly have led to difficulties. At the General Meeting of the IOVST, which was held in Washington, DC, in October 1961 during the Second International Congress on Vacuum Science and Technology, more time was granted to convert the IOVST into a federation. A motion put by B. B. Dayton (USA) was unanimously approved. The motion was that the present Officers and Executive Committee of the IOVST continue in office until an Extraordinary General Meeting could be held to dissolve the IOVST and until Officers of the new federation could be elected to serve under the provisions of its statutes. By this time, the total IOVST membership had grown to over 600 members representing 28 countries.

At the Extraordinary General Meeting which was held in Brussels on 8 December 1962, the IOVST was dissolved in accordance with a letter ballot vote of 16 July 1962. A new constitution was adopted with the formation of the International Union for Vacuum Science, Technique and Applications (IUVSTA). The assets (approximately US$ 15,000) and records

of the IOVST were transferred to the new organisation. On the same day, the IUVSTA held its first General Meeting. The following ten countries were represented and their national vacuum organisations became Founder Members of IUVSTA:

Belgium	Spain
Federal Republic of Germany	Sweden
France	Switzerland
Great Britain	United States of America
The Netherlands	Yugoslavia

The General Meeting adopted the proposed bylaws drafted by M. Berthaud and E. Thomas and elected the following Officers and Councillors for IUVSTA's first triennium period 1962-65:

President:	M. W. Welch (USA)	
1st Vice-President:	J. Debiesse (F) (President Elect)	
2nd Vice-President:	E. Thomas (B)	
Councillors:	A. S. D. Barrett (GB)	R. Mercier (CH)
	M. Berthaud (F)	E. Thomas (B)
	G. Brogren (S)	A. Venema (NL)
	K. Diels (D)	L. Villena (E)
	H. Gruber (D)	J. Yarwood (GB)
	E. Kansky (YU)	

The General Meeting fixed the number of contributory shares for each Founder Member, established a budget, and set the amount of a unit contributory share at US$ 20. It also determined the objectives of its Scientific and Technical Directorate (STD). The IUVSTA maintained the legal status which had been granted to the IOVST in compliance with Belgian laws on international associations having scientific aims.

The Executive Council, which also met for the first time on 8 December 1962, appointed E. Thomas as Secretary General and as Secretary of the STD, R. Mercier as Treasurer, K. Diels as Scientific Director of the STD and J. Yarwood as Recording Secretary, a post he held for many years. The Council also set the Union's program of activities for the triennium. This included the following main points: to continue to encourage the establishment of national vacuum societies and committees where they did not yet exist, to coordinate meetings of the national societies in order to avoid conflict of dates, to prepare a manual on the purpose and policies of the Union, to organise the Third International Vacuum Congress, to publish a News Bulletin on the activities of the Union, and to develop working groups within the STD on education, bibliography and literature, measurements and standards. In response to these objectives, K. Diels set up the following four Working Groups within the framework of the STD:

Working Group	Chairman
Education	D. A. Degras (F)
Documentation	J. H. Makkink (NL)
Development of Measuring Methods	W. Steckelmacher (GB)
Standardisation	W. Hänlein (D)

The statutes of the Union proved to endure time remarkably well. They have served the Union for nearly forty years with only minor modifications. The constitution and bylaws were derived mainly from the study and research of M. Berthaud with the help of E. Thomas.

The objectives of the Union are to promote, encourage and develop vacuum science, techniques and the applications of vacuum in all countries. The Union encourages the establishment of national vacuum societies and committees in countries where they do not yet exist and may coordinate the activities of those national organisations in countries where they do exist. The Union promotes and coordinates international meetings and develops educational material for international use. It publishes notices of national and international meetings related to vacuum and other vacuum activities of international interest. The interests of the IUVSTA encompass not only vacuum per se, but those disciplines which use vacuum as an important tool. It established Divisions in 1977 to promote these disciplines on an international scale. The growth in membership of IUVSTA from 1962 to 2001 is shown in Table I and is discussed later in detail in Section 10.

The official languages of the Union are French, English and German. Official recommendations are published in all three languages with the original text indicated. General communications presented in one language must, if required, be repeated in either or both of the other two. Currently, most of the papers presented at its meetings are delivered in English. Earlier all three languages were used with instant translations provided, but this has now become prohibitively expensive.

5. ORGANISATIONAL STRUCTURE OF THE IUVSTA

The organisational structure of the IUVSTA is shown in Fig. 1. The Union currently has 30 National Vacuum Society, or National Vacuum Committee, members. These, together with the anticipated 31st member (Pakistan Vacuum Society) are listed in Table I. It should be explained that some countries do not have a National Vacuum Society, but may have a National Vacuum Committee. Such Committees are usually a group within a larger National Professional Society or the National Academy of Sciences of the country. For the sake of brevity, the term National Society will be used here to mean either a National Vacuum Society or a National Vacuum Committee.

The Union is composed of four organs:

The General Meeting (GM)
The Executive Council (EC)
The Scientific and Technical Directorate (STD)
The Divisions

The GM is composed of delegates nominated by the National Societies they represent. The delegation from each Society consists of not more than three people and is led by a Head of Delegation who casts all votes assigned to his Society. The GM has traditionally met every three years at the time of an International Vacuum Congress. It is the highest authority of the Union and has the sole power to elect Union officers and members of the EC, to admit new members, to amend the statutes and determine the bylaws, to approve the Union's budget and

set the value of the unit contributory shares paid by its members, and to confer the title of Honorary President of the Union. Since 1971 each National Society member proposes a single candidate for Councillor to represent it on the EC, subject to ratification by the GM. Prior to 1971 some National Societies had more than one Councillor while others had none. Since 1983 each National Society also proposes an alternate Councillor candidate to the GM. Whilst it is intended that this alternate can act as an authorised replacement should the Councillor become unable to continue to serve, it is also accepted that the alternate can stand in, with full voting rights, for the Councillor at any individual Executive Council meeting which the Councillor is unable to attend. The Secretary General, Treasurer, Scientific Director and Scientific Secretary are elected by the GM from candidates proposed by the new President. The EC proposes a candidate to the GM for the President-Elect. Terms of office for the officers and councillors of the EC are for the triennial period between the General Meetings.

The EC consists of one Councillor from each of the National Society members and the President, President-Elect, immediate Past-President, Secretary General, Treasurer, and the Scientific Director and Scientific Secretary of the STD. The Union's Presidents and Scientific Directors are listed separately in Table II, whilst all of the IUVSTA Officers and Councillors for the period 1962-2001 are listed in Table III. All members of the EC are entitled to speak and vote. The Chairmen of the Divisions and other members of the STD may also attend EC meetings with the right to speak but not to vote. Observers are also frequently admitted to EC meetings by permission of the President. The EC is responsible for the management of the Union. Traditionally, the EC meets twice per year, and three times during the year of an International Vacuum Congress. The meetings of the EC are usually hosted by one of the Union's national society members just before or immediately following a scientific meeting of interest to the Union. The dates and locations of past EC meetings are listed in Table IV. This table also gives the names of the Presidents for the triennial periods between the General Meetings although these are also shown in full in Tables II and III.

The President, with the concurrence of the EC, may appoint Standing Committees, see Fig. 1, to assist the EC in performing its duties. The Chairs and members of the Standing Committees are predominately members of the EC but it is not uncommon to have experts who are members of the Union's National Societies serve as well. The Standing Committees usually hold their meetings immediately prior to the EC meetings. The Chairs then present recommendations of the Standing Committees to the EC for approval. The Standing Committees may change from time to time depending upon the business at hand. Traditionally, there are standing committees on statutes, finance, education, publications, and congress planning. Other committees that have existed for various periods include: Previous Decisions, Latin American Activities, Co-ordinated Activities, Liaison, and Developing Countries. Since 1982 there has been a Long Range Planning Committee, chaired by the President-elect. The STD, Welch Foundation and Prize Committee (described in later Sections) also hold meetings prior to the EC meetings. The latter committee has recently been renamed the Awards and Scholarships Committee and reports also on the activities of the Welch Foundation.

The financial resources of the Union have always been very modest. Traditionally, profits made from exhibits at the International Vacuum Congresses have been given to the Union by the host National Society. This income has varied from one meeting to the next, and could not be accurately estimated in advance. In recent times, to help facilitate financial planning, host nations have generally built a specific donation (about SFr 40,000 in 1986, rising approximately SFr 5,000 per triennium, where SFr designates Swiss Francs) into their

congress budgets but the original principle continues to hold, namely that this is a voluntary donation and it is expected that this money will come predominantly from the exhibition. The Union receives additional income from membership dues. Each member pays a subscription which is a multiple of a fixed amount called a "unit contributory share". This is designated in Swiss Francs, the budgeting currency used by the Union. The GM determines the value of the unit contributory share based on the estimated financial requirements of the Union for the ensuing triennium. The number of contributory shares assigned to each member is determined by the size of the country and the extent to which vacuum science and technology is practised in that country. It is fixed by the EC subject to ratification by the GM after negotiations between the Secretary General and the Union members. Although this method of assessing the Union members is not very precise, it has been difficult to find a more equitable method because of large differences in the structure of National Societies and National Committees which make up the Union membership.

Recognition of the IUVSTA's status within the international scientific community was enhanced when the IUVSTA was accepted as a Scientific Associate of the International Council of Scientific Unions (ICSU) in November 1992. The formalities of this application had extended over the full period of the preceding triennium and had involved gaining documented support from at least six national scientific societies and a minimum of four international unions already accepted by ICSU. Since 1999, ICSU has changed its name to the International Council for Science but has maintained the acronym ICSU.

6. THE SCIENTIFIC AND TECHNICAL DIRECTORATE (STD)

An important organ of the IUVSTA, the STD is concerned with accomplishing the scientific and technical objectives of the Union. It did this originally through international Working Groups assigned to study specific scientific and technical problems. These Working Groups frequently made recommendations and were involved in coordinating various international vacuum activities and in preparing and publishing educational and bibliographical material. Since 1977, the activities of Working Groups have been taken over by the appropriate new Divisions or by Standing Committees. For example, the Education Committee now manages the Visual Aids Project. Currently the STD is primarily concerned with guiding the scientific activities of the Union through coordinating the activities of the Divisions. On advice from the Divisions, the STD recommends to the EC on the sponsorship/endorsement of conferences. It also receives requests from the Divisions for financial support from its discretionary funds for IUVSTA Scientific Workshops and Schools. The STD also coordinates other activities of the Union in that the Education Committee and the Awards and Scholarships Committee (formerly the Welch Foundation and Prize Committee) each reports to it.

The location of the STD within the organisational structure of IUVSTA is shown in Fig. 1. The STD is managed by the Scientific Director and Scientific Secretary who are members of the EC. The Division Chairs and other Scientific Experts are members of the STD but not members of the EC. Originally the Chairs of the Working Groups and Steering Committees were also members of the STD but, since the demise of the Working Groups, only the Chair of the Education Committee remains a member of the STD.

The four Working Groups set up by the STD's first Director, K. Diels (D), are listed in Section 4. The Committee on Education made a survey of vacuum courses available at different levels in various countries in the 1960's. It was also involved in establishing the protocol and basic concepts for the Welch Foundation and administering the Welch Scholarships. In 1968, the Committee started a Graphical Encyclopaedia on Vacuum which was later called the Visual Aids Program. It was very successful and is described in detail in Section 14. The Committee on Bibliography and Literature (within the Documentation Working Group) undertook the formidable task of preparing a bibliographical index on vacuum. Through the efforts of J. Debiesse (F), and with the help of D. Degras (F), this work was undertaken by the French Nuclear Energy Centre at Saclay in order to take advantage of the computer facilities there. The Index Bibliographique du Vide, with references from several hundred journals, patents and books, was first published in French in 1966. At the beginning of 1968, a bilingual form was introduced with the hope that it would increase international subscriptions. However this failed to materialise, and after 24 issues had been published the Index was discontinued in 1969. Another index on surface and vacuum physics (Index zur Oberflächen- und Vakuumphysik), compiled at the Max Planck Institute for Plasma Physics at Garching through the efforts of K. Diels (D), was published in cooperation with the IUVSTA for 17 years (1966-1982) but eventually met with similar financial difficulties because of insufficient subscriptions.

Another activity of the Documentation Committee related to the preparation of a subject classification for vacuum in close collaboration with Technical Committee 112 of the International Standards Organisation (ISO). The working groups on measurements and standardisation also worked closely with the ISO and eventually all of these activities were taken over by the ISO.

Other initiatives were made possible through liaison with UNESCO. In 1983, at the start of his period as President, J. Antal (H) recognised that the educational objectives of UNESCO closely resembled one component of the Union's educational aspirations. Accordingly he set up a UNESCO Liaison Committee with M. Croset as chairman and by the following year a Protocol for Cooperation with UNESCO had been drawn up and accepted by the EC. The first achievement of this committee, resulting from personal contacts established by Croset with people within the UNESCO headquarters in Paris, notably S. Raither, was the granting of US$ 3000 support for scientists from developing countries (Brazil, China and India) to travel to a Joint Vacuum Conference (JVC-3) in Debrecen in Hungary in 1985.

The committee was later renamed the Liaison Committee, in 1986, to acknowledge its broadened scope but it has continued to be chaired by Croset, supported strongly and actively by S. Choumoff (F). Over the early years, grants totalling about US$ 10,000 per triennium continued to be received from UNESCO, principally to help scientists and students from developing countries and eastern Europe to attend and participate in international conferences and schools.

In 1987 it was recognised that the International Centre for Theoretical Physics (ICTP) in Trieste was partly supported by UNESCO and that UNESCO was encouraging ICTP to develop an emphasis on Applied Physics topics. Accordingly, IUVSTA approached ICTP with the suggestion that a joint Educational Workshop should be organised on the Science and Technology of Thin Films. This was so successful that continued collaboration with ICTP has led to a series of these workshop/schools, as reported in Section 13.

Two other major projects were prepared for collaboration with UNESCO. In one, representatives from the Union, principally B. S. Halliday (GB), developed a course module on Vacuum Technology to be used within a University Undergraduate Physics Course being developed by UNESCO for developing countries. In the other, the Union prepared the content, and identified presenters, for a technical course on Vacuum Technology to be presented to teachers from a number of African universities, based on our Visual Aids material. The idea was to train these people in English and then allow them to return to their own countries to re-teach the course in their own language, using our Visual Aids modules. Unfortunately, although our Union completed its contribution for each of these activities, both had to be abandoned when UNESCO became unable to finance the projects.

By 1992, some of our interactions with UNESCO had become less satisfactory and less successful. This was related to a change of UNESCO policy which required grant-seeking bodies to deal directly with regional UNESCO National Commissions rather than with the Paris headquarters where the initial strong ties had been established and maintained. The onus now lies with individual societies to approach the regional commissions independently.

The administrative structure within UNESCO has also changed in relation to how it deals with non-government agencies. Initially we had been classified as Category C but by 1996 such categories had been abolished and our Union was given the status of "relations opérationelles". In addition, by 1998 UNESCO had created a council of Non-Government Organisations (NGOs) with 47 members, including IUVSTA. Three working groups were set up. IUVSTA belongs to the third group which covers Education and Peace, Social Structures, and Information and Communication. IUVSTA is more closely involved in the third subject which includes modern communication techniques for education, science and culture; implementation of electronic media for dissemination of information; and teaching pedagogy.

A number of other new activities were initiated by the STD during the 1986-89 triennium, whilst A. Van Oostrom (NL) was the Scientific Director. These included the Highlight Seminars and Short Courses, which are described below, and the IUVSTA Workshops and Schools, which are discussed in Section 13.

The Highlight Seminars were introduced to showcase developments in fields covered by the scientific Divisions of IUVSTA. The format is that once every three years, the Chair or another expert from within each Division presents a report on new discoveries or significant developments which have occurred within their field during the preceding three years. Where possible, these seminars are scheduled to be presented as a half-day meeting near the middle of the triennium and in conjunction with an Executive Council Meeting (ECM) and a significant conference. When available, edited texts of these reports were published in the IUVSTA News Bulletin and in future will appear on the IUVSTA webpage.

The first Highlight Seminars were presented in Salford, UK, on 15 April 1988 at the end of the 1st European Vacuum Conference (EVC-1) and immediately preceding ECM-57. Subsequent presentations have been in: Vienna, Austria, 27 September 1991 in conjunction with ECM-65 and EVC-3; Stockholm, Sweden, 17 June 1994 in conjunction with ECM-71 and EVC-4; Debrecen, Hungary, 26 May 1997, in conjunction with ECM-78 and JVC-7 (the 7th Joint Vacuum Conference of Hungary, Austria, Croatia and Slovenia); Namur, Belgium, 31 March 2000, preceding ECM-85 which immediately followed TATF-2000 (the 7th International Symposium on Trends and Applications in Thin Films - Nancy, France).

Short Courses on vacuum technology and related topics have been organised by the IUVSTA since 1994. However, the tradition for some national vacuum societies to offer such short courses within their own country dates back well before this. Indeed, the French Vacuum Society (SFV) has been offering courses since 1968. They have also established a dedicated and well equipped Vacuum Laboratory for Teaching, in Orsay near Paris, which is used to include a practical component in many of the 30 courses they offer each year. The American Vacuum Society has also developed an extensive range of courses (50 courses will be presented in conjunction with the AVS Symposium in 2001) on a very wide range of topics. Other societies have their own national programs, varying from one to a few courses, with some presented regularly and some offered on special occasions.

A decision was taken within the Education Committee to support the presentation of Short Courses in various countries in association with major international conferences. Thereupon, the IUVSTA prepared a list of teachers from all over of the world who were prepared to present specialist courses. The sponsorship is now arranged between any grouping of the conference organisers, the IUVSTA and the local or other national vacuum society, with these bodies sharing the financial gain or loss as arranged. However, the prime purpose is to make available courses on topics that would not normally be available at the chosen location. In particular, care is exercised not to usurp the opportunity for the local society to run these courses independently, where the society relies upon such courses for part of its annual income.

Under the guidance of J. E. Greene (USA), Education Committee Chair 1992-2001, such courses have now been organised as follows.

1994: Uppsala, Sweden,	3 courses in conjunction with EVC-4.
1995: Yokohama, Japan,	2 courses in conjunction with IVC-13/ICSS-9.
1996: Salamanca, Spain,	5 courses in conjunction with EVC-5.
1998: Birmingham, UK,	4 courses in conjunction with IVC-13/ICSS-10.
1999: Cancun, Mexico,	4 courses in conjunction with ICTF-11.
1999: Lyon, France,	4 courses in conjunction with EVC-6.

7. IUVSTA DIVISIONS

The Union's divisional structure arose from the interests of its members in applications of vacuum. Vacuum, first used as a research tool, made possible scientific discoveries which led to commercial products requiring the use of vacuum on a large scale. This justified large expenditures in vacuum science to develop the technology and techniques required by industry and research to accomplish their objectives. After a flurry of activity in fundamental studies of vacuum technique following World War II, the vacuists, within two decades, succeeded in advancing the state of their art to a level where it was adequate for practically all industrial applications and most scientific requirements. At that point there was little motivation to pursue additional research in vacuum. This resulted in a drastic decrease in papers on the subject and could well have led to the demise of many of the Union's national vacuum societies. But instead, the vacuum scientists and technologists did something unique in their field of science and engineering. Rather than being content to let the rest of the world find applications for their science and technology as best it could, they helped spawn and nurture new disciplines that could benefit specifically from improved vacuum technology. The national vacuum societies accomplished this by encouraging specialised topical sessions

and conferences within the framework of their own organisations and by publishing papers resulting from these meetings.

Starting in 1961, the American Vacuum Society (AVS) was the first to do this in an organised way by establishing Divisions in Vacuum Metallurgy, Thin Films, Surface Science, Electronic Materials and Processing, and Fusion Technology. As a result, the AVS has now become a large multidisciplinary society. However, there is a synergistic interaction between the divisions that extends beyond the fact that they all use vacuum as an important tool in practising their trade. It is doubtful whether there exists today enough activity in vacuum science and technology alone to justify the existence of national vacuum societies or an international union.

The first large impact of the multidisciplinary aspect of vacuum technology on the IUVSTA occurred in 1971, at Boston, when the First International Conference on Solid Surfaces was initiated by the AVS Surface Science Division and was held in conjunction with the IUVSTA's Fifth International Vacuum Congress. It was becoming evident that the Working Group or Steering Committee structure of the STD was having difficulty in encouraging and developing those disciplines in the national societies of the Union that depend on vacuum. This fact was recognised by the President, A. Venema (NL), and with his encouragement these matters were addressed at the 31st Executive Council meeting held in London, UK, on 1 April 1977. At this meeting, one of the Councillors, A. van Oostrom (NL), presented a report, ECM 31.3, proposing a divisional structure for the IUVSTA. The better part of the day was spent discussing the details of what form the structure should take. While all details were not finalised at this meeting, it was agreed that the Union should proceed with the formation of divisions within the Union. A. van Oostrom, C. J. Todd (GB) and L. Holland (GB) were asked to write recommendations that the EC could present to the 1977 General Meeting in Vienna. The proposal presented to that General Meeting was worded in general terms suggesting the formation of scientific divisions within IUVSTA. It required no change in the Union statutes and was of a provisional form valid only until the next General Meeting. In particular, it recommended the establishment of a Surface Science Division with the Chairman reporting to the Executive Council on its activities. The Division would retain autonomy with respect to its scientific activities but was subject to the EC in matters of finance and general policies. The proposal also presented a set of internal statutes regarding the election of a Division Committee that was to serve as a guide for the formation of other divisions and, in principle although not in detail, for major changes that were to be made later in the IUVSTA statutes. The proposal was unanimously approved, thus permitting the formation of a number of divisions during the next triennium.

In 1977, President L. Holland (GB) directed that the STD Scientific Director and Secretary should assume responsibility for supervising the formation of these new divisions. During his administration (1977-1980) several divisions were created in the form of Divisional Steering Committees under the tutelage of the STD Officers, L. E. Preuss (USA) and H. Ottosson (S). These were constituted into fully-fledged Divisions at the General Meeting in Cannes in 1980. A current list of IUVSTA Divisions is given in Table V, complete with the original Chair(s) and the year in which the Division was ratified at a General Meeting.

The Thin Film Division had its roots in the former International Thin Film Committee (ITFC) founded by the late Klaus Behrndt (USA) at Boston in 1968, on the occasion of the International Conference on Thin Films. Chairmen after Behrndt were C. A. Neugebauer (USA), M. Auwärter (A) and F. Abeles (F). It was at the International Conference on Thin

Films at Loughborough in 1978 that Auwärter resigned and the ITFC elected Abeles as the new Chairman who subsequently became Chairman of the new Thin Film Division of the IUVSTA. At the time of its formation, the Division Committee co-opted the former members of the ITFC as a result of negotiations between Auwärter and Preuss.

Under the Union's present statutes, the Divisions are one of the four organs of the Union responsible for prescribed areas within the Union's general field of scientific and technical interest. Initially each Division developed its own statutes. However, in the lead-up to the General Meeting in Birmingham in 1998, the STD supervised the drafting of a common set of statutes for the Divisions, although special clauses could be included for policy which was specific to any one Division.

The statutes of the Divisions define a procedure for the election of the Divisional Chair and Committee. As shown in Fig. 1, each Division has an electoral college composed of delegates nominated by the Union's national societies. A national society can nominate only one delegate who is an expert in the field relevant to the Division. If the college exceeds 10 in number, it elects from itself a fixed number of members (usually seven) for the Division Committee. In addition the Division Committee may co-opt a fixed number of experts (not to exceed one third of the initial Division Committee) in the field relevant to the Division. The Division Committee elects its own Chair, Vice-Chair and Secretary from those committee members who are not co-optees. These officers serve both the Division Committee and college. The Division officers and members serve for the three year period between General Meetings. The Chairs of the Divisions are members of the STD. Originally, either the Vice-Chair or Secretary served as Treasurer for the Division and was responsible for the preparation of a draft budget for the Division which was submitted to the Union's Treasurer through the Scientific Director. In current practice, there is no role for a Division Treasurer. Divisions propose their activities to the STD which then approves the allocation of a fixed amount of its own budget for use on that activity. This money is paid by the IUVSTA Treasurer to the body (perhaps a national society) which is running the activity (such as a scientific workshop). Unused funds are returned to the Treasurer and remain in the STD budget.

Currently the Divisions have a number of roles. One of these is to take a major part in coordinating and organising the technical program of the triennial International Vacuum Congress (IVC). The technical sessions of this Congress are arranged on the basis of the Union’s Divisional structure. The International Program Committee (IPC) for each of these sessions is composed of local members of the host nation together with members of the appropriate IUVSTA Division. Accordingly, each Division plays an important part in the selection of scientific papers, invited speakers, and session moderators.

Some Divisions are also responsible for organising, together with a host nation, the technical programs of those conferences which are part of an IUVSTA conference series. Currently the Surface Science Division is responsible for the International Conference on Solid Surfaces (ICSS), which is held concurrently with the triennial IVC. This Division is also responsible, together with the European Physical Society, for the European Conference on Surface Science (ECOSS) series. The Thin Film Division is responsible for the International Conference on Thin Films (ICTF) series. The Vacuum Science Division is responsible for the European Vacuum Conference (EVC) series. The origins of these conference series are as follows.

As discussed above, the ICSS had its origin at the 5th International Vacuum Congress (IVC) in Boston in 1971 when it was organised by the Surface Science Division of the AVS. This conference was so successful that it has been continued as a series. The IUVSTA's Surface Science Division now has the responsibility, together with the host nation, for organising the conference every three years in conjunction with the IVC. In fact the ICSS represents the Surface Science component of the IVC and is comprised of the Surface Science papers presented at the combined IVC and ICSS meetings. The number of these papers typically exceeds 40% of the total number of papers presented at the combined meeting, thus justifying the decision to continue to acknowledge the ICSS as an independent conference.

The ECOSS conference series was established in Brest in 1975 by D. Degras (F), G. Ertl (D), C. Todd (GB) and A. van Oostrom (NL). The first four conferences were held in their four countries in: Amsterdam (1978), Cambridge (1979), Cannes (1980) and Münster (1981) with the third being held in conjunction with IVC-8 and ICSS-4. Since ECOSS-2 this conference series has been organised by the Surface Science Division of IUVSTA and the Surface and Interface Section of the European Physical Society. The conferences are held annually, except (apart from 1980) in years in when the triennial IVC/ICSS is held in Europe. Twenty of these conferences have now been held with ECOSS-20 taking place in Krakow, Poland, in 2001.

Concerning the ICTF conference series, there is reference (in the Opening Address in the Proceedings of the 1972 meeting) to a Thin Film Conference being held in Clausthal and Göttingen in 1966. Three years later the ICTF was held in Boston, and at that time an International Thin Film Committee was set up to organise future conferences. The next was in 1972 in Venice but a numbering system was not yet in use. In 1975 the conference was titled the 3rd International Conference on Thin Films (ICTF-3) and the numbering has continued since then. Since 1980, when the International Thin Film Committee was amalgamated into the IUVSTA to become the first Thin Film Division committee (see above), this conference series has become the responsibility of the Thin Film Division and it is organised by that Division in conjunction with a host nation. The conferences are held triennially and ICTF-11 was held in Cancun, Mexico, in 1999.

The first European Vacuum Conference (EVC) was held under the joint sponsorship of the IUVSTA and the British Vacuum Council (BVC). It was held on 11-15 April 1988 at the University of Salford, Manchester, UK. It was organised by the Vacuum Science Division of IUVSTA, of which N. R. Whetten (USA) was the Chair. The Conference Chairman was J. S. Colligon (GB). There were 210 delegates from 25 countries and 110 papers were presented. The conference was supported by an Exhibition of equipment and a two-day Training Course in vacuum technology coordinated by A. Chambers (GB) for the BVC. The success of this conference ensured that it became the first of a series. These conferences are organised biennially (triennially if the IVC is in Europe) by one of the European vacuum societies and IUVSTA. Seven have now been held.

As can be seen, many of the STD functions are now carried out through the Divisions. Under this arrangement the Divisions have the directive to advise the Union on scientific matters. They report to the Union's Executive Council and require council approval for their major activities. The right to vote at the EC meetings remains with the national society Councillors, as established by the constitution of the Union, since the Union is a body made up of national societies and not technical experts.

Through divisional structuring, the IUVSTA has become a stronger organisation better able to serve its more than 15,000 individual researchers and technicians who are affiliated with the Union through their national societies. The Divisions have given the Union the tools to better coordinate and improve the quality of the many conferences and workshops it sponsors or supports for the benefit of all scientific specialists. The IUVSTA serves as a "clearing house" for the organisation of international congresses and conferences on vacuum and related fields by granting sponsorship for these meetings. At the STD meeting during ECM-84 in September 1999, it was agreed to replace the word sponsorship by "endorsement", in order to make it clear that the IUVSTA was not offering financial support for these meetings. The formalities of the endorsement requests are handled by the Secretary General, but divisional approval is also required. The purpose of the endorsement is to avoid timing conflicts and coordinate international meetings in fields of interest to the Union. It is also intended that potential participants can feel assured that an endorsed conference will be well organised, be of a high scientific quality and, if international, will have wide international representation on its organising and program committees.

8. THE SECRETARIAT

As shown in Fig. 1, the organisational structure of the IUVSTA provides for a Secretariat. When the IOVST was transformed into the IUVSTA, it maintained the legal status which had been granted to the IOVST in compliance with Belgian laws on international associations having scientific objectives. Belgian law requires the IUVSTA to maintain its registered office in Brussels or one of its boroughs. To satisfy this requirement the IUVSTA simply retained the offices of the Secretariat (located at 30, Avenue de la Renaissance, B-1000, Brussels) which had served the IOVST. E. Thomas, Past President of IOVST, was now Vice President and Secretary General of IUVSTA and Scientific Secretary of the STD and lived in Brussels. The offices in Brussels became the international headquarters for the Union. All of the daily business and correspondence were handled there with the help of an Administrative Secretary, A. De Henau, and an assistant. Each national society member of the Union appointed a secretary (IUVSTA Correspondent) to take charge of correspondence between the society and the Secretariat. News Bulletins, edited by E. Thomas, were also published and mailed by the Secretariat.

According to the Union's statutes, as amended in 1971, the President has the right to determine the location of the Secretariat. President L. E. Preuss (USA) proposed to the 4th General Meeting that it be transferred from Brussels to the offices of The (British) Institute of Physics at Belgrave Square, London and that N. A. Walter assume the post of Executive Secretary. This proposal was accepted, because of an attractive financial offer made by The Institute of Physics, and the office was transferred in early January 1972. A. De Henau continued working in Brussels until July 1972 for the STD and a registered office is still retained there for legal purposes.

In London, the Secretariat took on a more prominent role in the activities of the IUVSTA. N. A. Walter, who had been Secretary to the British Vacuum Council and associated to some extent with the Union since the organisation of the 4th International Vacuum Congress in Manchester in 1968, was familiar with the activities of the Union. With the help of A. R. Bellion, at first his assistant and later Administrative Secretary, and with other secretarial assistance from The Institute of Physics, Walter was able to take on essentially all of the administrative chores of the Union. These included: the billing and collection of membership

subscriptions and the keeping of financial records; preparation of the agenda and the recording and publishing of minutes for all meetings of the GM, EC, STD, Standing Committees, and Welch Foundation; administration of the Welch Scholarships; editing, publishing and mailing of an expanded bimonthly News Bulletin; coordination of local arrangements with the host national vacuum societies for International Congresses, GM and EC meetings; the production and marketing of the Visual Aids; and general correspondence and correspondence with the National Vacuum Society Correspondents. Assumption of these responsibilities was of great help to the Officers and Committee Chairmen of the Union. However, as time went on, the cost of maintaining the full-time Executive Secretariat in London continued to rise. The increased cost was due in part to general inflation and in part to expanded administrative services and development of the Visual Aids Project. These costs were not easily separated. In the late 1970's, it became clear that even with increased membership subscriptions the Union could no longer afford the luxury of a full-time Executive Secretariat to provide the excellent services that it had enjoyed in the past. Consequently, the London Secretariat was closed at the end of 1980. However, the Union kept the 47 Belgrave Square address to give the Union a permanent mailing address which was listed in various publications and where general inquiries could be made. Mail received there was forwarded to the appropriate Union Officer or Committee Chairman.

Since 1983, the address of the Secretariat has continued to be determined each triennium by the President and has been set as the address of the Secretary General. From 1983 to 1986 the address was Institut für Experimentalphysik, Universität Wien, Boltzmanngasse 5, A-1090, Wien, Austria. From 1986 to 1989 it was Surface Science Division, National Bureau of Standards, Gaithersburg, MD, 20899, USA. From 1989 to 1998 it was The University of Salford, Department of Electrical Engineering, Salford, M5 4WT, England, UK. Currently from 1998 to 2001 it is 7 Mohawk Crescent, Nepean, Ontario, K2G 0N9, Canada.

When J. M. Lafferty (USA) became the Union's President in 1980 he devised a decentralised structure for the Secretariat which allowed the Union to operate within a budget based on its membership subscriptions. Under these arrangements, the agenda and the recording and distribution of minutes of the EC and GM meetings became the responsibility of the President and Secretary General. Lafferty delegated to J. L. Robins, Councillor from Australia, the responsibility of recording and distributing, with partial subsidy, the EC and GM minutes. Each Chairman, with the help of a Secretary, became responsible for setting the agenda and for recording and distributing the minutes of the Standing Committees. The Treasurer of the Union, with the help of a Finance Committee, became fully responsible for the administration of all the Union's finances. The Chairman of the Education Committee, L. C. Beavis (USA), assumed responsibility for the Visual Aids Project. The administrative work of the Welch Scholarship reverted to the American Vacuum Society and J. P. Hobson became the Scholarship Administrator. Starting in 1984, the News Bulletin was published quarterly at cost, and edited, printed and distributed by its editor J. L. Provo (USA) from his home office in St. Petersburg, FL, USA. To reduce mailing costs, during the 1983-1986 triennium all copies destined for Europe were sent by air freight to the office of the Secretary General, M. J. Higatsberger (A) in Vienna, for distribution by surface mail. Similar mailing strategies continued for the remaining life of the hard-copy Bulletin through the generous cooperation of R. Dobrozemsky (A), also in Vienna.

The decentralised system of administration significantly reduced the Union's administrative costs to the point where they became less than the subscriptions paid by the member national vacuum societies. While this dismantling of the centralised Executive Secretariat has created

more work for the Executive Council, it has also afforded it on-going financial freedom and a renewed vitality and interest in determining its own destiny. With recent advances in computers and information technology, most of the clerical and mailing tasks are now carried out personally by the Officers and the Chairs and Secretaries of the Committees and Divisions.

This reorganisation of the Union's administrative structure saw the re-introduction of the position of Recording Secretary. It is recorded that J. Yarwood (GB) undertook such a role for many years commencing in 1962 but it was not until 1980 that this position became a permanent part of the Union's administrative structure. During the 1980-83 triennium the position of Recording Secretary was filled by J. L. Robins (AUS). At that time the EC and associated committee meetings occupied three days, including a weekend preceding or following a scientific conference. The time was divided as follows. One day was occupied by the committee meetings with perhaps two or more being held concurrently. They were only attended by the members of the committee. Usually another half day was devoted to accepting the host society's invitation to a tour of local attractions and a dinner. This event, although not a requirement on the host nation, served an important role in giving councillors an opportunity to mingle and talk to each other, not only about Union matters but also about common and separate issues of importance to their national societies. The EC meeting itself occupied one and one half days and this was where most of the issues were debated broadly.

By 2001, the pattern of these meeting has changed. The committee meetings have developed to become the main venues of discussion and one and one half to two days are devoted to these meetings. An attempt is made not to hold meetings concurrently and all councillors, not just the committee members, are encouraged to attend. As a consequence, most discussion takes place in these meetings, especially the STD meeting. The EC meeting itself has been shortened to less than one half day, with the committees merely reporting and very little discussion ensuing. The half day tour and dinner, with its opportunity for Councillors to mix and talk, is still continued.

With the introduction of the Recording Secretary position the minutes of the EC meetings became a very comprehensive record of all of the activities of the Union. This was achieved by including the minutes or reports of each committee, including the STD, and each Division, as appendices to the EC minutes. This procedure continues today. Each set of minutes is now very voluminous but this is currently offset by the facility of collecting, preparing and distributing the material electronically.

During the 1983-86 triennium, following the term of office of J. L. Robins, the private secretary of the Secretary General (M. J. Higatsberger) prepared the minutes. Subsequent to this, the position of Recording Secretary has been held by J. S. Colligon (GB) 1986-89, J. H. Leck (GB) 1989-98, and R. J. Reid (GB) 1998-2001.

At the end of his period as President, H. Jahrreiss (D) advised the Union that he had been storing a large quantity of archival material relating to the IUVSTA in his office in Cologne but as he was about to retire the Union should find a permanent site for its Archives. J. Dupont (B) undertook to find appropriate storage space within Belgium, which he did in 1994.

As a consequence, the IUVSTA Archives are now at "Ecole Royale Militaire", 30, Avenue de la Renaissance, 1000-Brussels, Belgium. Currently (2001), the contact person there is Mrs de Barsy. The IUVSTA contacts for this archival material are J. Dupont (B) and J-J Pireaux (B).

The initial entries were compiled by H. Jahrreiss (D), who was Secretary General (1974-1983) and President (1986-1989). These covered the activities of the Union from its inception until 1995, with special emphasis on his periods of office (1974-1989). Historical documents on the former IOVST and its conversion to IUVSTA were provided by H. Adam (D). In addition, J-J Pireaux has a very comprehensive personal collection of duplicate archival material.

Previously, N. Walter had produced three rolls of microfilm containing replicas of early documents of the Union from material generated, received and held during the period whilst the IUVSTA Secretariat was at The Institute of Physics in London (1972-1980). He delivered these to the then Secretary General during a meeting held in East Germany, but because of the prevailing political situation, microfilm could not be safely taken from that country to the West. The microfilm was stored at the Physikalische Gesellschaft der Deutschen Demokratischen Republik for many years. After the reunification of Germany, these three rolls of microfilm were added to the Archives in Brussels.

Subsequently, additional material has been added to the Archives by: J. S. Colligon (GB), who served as Recording Secretary (1986-1989) and Secretary General (1989-1998); J. L. Robins (AUS) who was Recording Secretary (1980-1983) and President (1995-1998); and W. D. Westwood (USA) who is the current Secretary General (1999-2001).

9. INTERNATIONAL VACUUM CONGRESSES

One of the most important functions of the IUVSTA has been to organise an International Vacuum Congress every three years. A list of these, showing the year, location and any accompanying conference(s), is given in Table VI. The First International Vacuum Congress on Vacuum Technology in 1958 at Namur, Belgium has been described in Section 2.

At the closing session of the Namur Congress, R. Champeix, Past President of the French Vacuum Society, proposed that the next Congress be held in France in 1961. In January 1959 the French Vacuum Society, assuming that this would be the case, set up an Organising Committee for the Second International Vacuum Congress. However, in April 1960 the IOVST announced that it had decided to hold its second triennial vacuum congress jointly with the American Vacuum Society's Eighth Annual Symposium in Washington, D.C. on 16-19 October 1961. By this time the French Vacuum Society, under the presidency of M. Berthaud, having advanced so far in organising an international vacuum congress decided to have its own "Congrès International des Techniques et Applications du Vide" (CITAV) without IOVST sponsorship. A successful meeting with an equipment exhibit was held in Paris in June 1961 with 900 participants, 600 of whom came from 22 foreign countries.

In October 1961, the IOVST-sponsored Second International Congress on Vacuum Science and Technology held at the Sheraton-Park Hotel in Washington was also a success making 1961 a banner year for vacuists. Approximately 1800 persons representing 15 countries attended the meetings in Washington. Over 200 papers were presented in 22 sessions. They covered a wide field of vacuum science and techniques: Ultrahigh Vacuum, Forepumps, Adsorption and Gettering, Space Simulation, Vacuum Metallurgy, Thin Films, Pumps (Diffusion, Cryo- and Getter Ion), Systems, Gauges, Leak Detection and Gas Flow, Evaporation and Sputtering, Mass Spectrometry and Freeze Drying. An exhibition of vacuum

equipment by over 80 firms also added to the interest of the Congress. L. E. Preuss was Program Chairman for the Congress and R. Denton was Chairman of the Local Arrangements Committee. Profits from the exhibition were given to the IOVST and later transferred to the IUVSTA when the new statutes were adopted.

The Third International Vacuum Congress under IUVSTA sponsorship was scheduled to be held in Stuttgart, with the German Vacuum Society in charge of the local arrangements. Since it was the intent that an International Vacuum Congress be held every three years, the Stuttgart Congress should have been scheduled for the latter part of 1964. At this time, however, considerable interest had developed in space research in Europe, and P. S. Choumoff, Chief Engineer of the French vacuum company SOGEV, proposed an International Congress on Vacuum Technique in Space Research (Congrès International des Techniques du Vide en Recherche Spatiale (CIVRES)) with the support of the French Vacuum Society and the French space organisation CNES. This meeting was scheduled for about the same time as the 3rd IUVSTA International Vacuum Congress. To avoid a conflict in timing, Choumoff, M. W. Welch, IUVSTA President, and K. Diels, German Vacuum Society President agreed to advance the date of the CIVRES meeting six months and delay the IUVSTA Congress six months. The CIVRES meeting was then held in Paris on 29 June-4 July 1964 and the 3rd International Vacuum Congress in Stuttgart on 28 June-2 July 1965.

This Stuttgart Congress was organised on behalf of the IUVSTA by the German Vacuum Society (DAGV) and the meetings were held in the "Liederhalle". K. Diels was chairman of the Organising Committee and was assisted by an International Scientific Committee chaired by H. Adam and a Local Organising Committee. The Congress was sponsored by IUVSTA, by prominent German vacuum firms and by Messrs. Bosch in Stuttgart. The Congress was attended by more than 700 persons, coming from 28 countries. Several USSR participants presented papers during the Congress. The scientific program included about 130 papers twelve of which were invited. Four papers were presented the day after the official closing of the Congress in an educational session with experiments on vacuum physics and technology. This session was attended mainly by persons from the teaching profession. The morning sessions of the Congress were devoted to invited papers with simultaneous translations in the three official languages of the IUVSTA. This was done visually in a rather unique manner. On two screens, in addition to the screen for showing the slides, the text of the speaker's manuscript was shown in the two other languages. The texts were kept in phase with the speaker's oral presentation. This method of translation was very much appreciated by the audience at the time, but was never adopted afterwards, perhaps because of the amount of preparatory work involved. Gas flow, low pressure measurements, sorption, thin films, particle accelerators, space simulation and vacuum metallurgy were quite evenly covered by the invited papers. Short contributions were presented in 13 afternoon sessions. Thin films produced in vacuum and surface phenomena had already begun to play an important part in the program. All the papers were published by Pergamon Press in two volumes available about one year after the Congress. The Congress included an exhibition with 28 booths showing vacuum equipment from continental Europe and from overseas.

The Fourth International Vacuum Congress was held in Manchester at the Renold Building of the Manchester University Institute of Science and Technology on 17-20 April 1968. The Congress was organised by the Joint British Committee for Vacuum Science and Technology. L. Holland was Chairman of the Organising Committee. The Congress was attended by 578 previously registered persons from 27 different countries. There were also a number of day registrants. This number fell somewhat short of the 800 people anticipated. The Congress fee

was 27 GBP (Pounds Stirling). The Congress program included 161 papers, of which 25 were invited, covering all aspects of Vacuum Science and Technology. The greatest number of contributions were on vacuum deposition of thin films, measurement of total and partial pressure, and the sorption and desorption of charged and uncharged particles.

The Fifth International Vacuum Congress was held in Boston on 11-15 October 1971. L. E. Preuss was General Chairman of the Organising Committee, J. H. Singleton was Chairman of the Program Committee and M. H. Hablanian was Chairman of the Local Arrangements Committee. The American Vacuum Society's newly-formed Surface Science Division initiated the First International Conference on Solid Surfaces (ICSS) in conjunction with this Congress. The ICSS was co-sponsored by the International Union of Pure and Applied Physics (IUPAP) and C. B. Duke was Conference Program Chairman, with T. E Madey as the Conference Secretary and B. Park the Proceedings Editor. The introduction of this separate conference was to highlight the fact that a very large component of the papers at this "vacuum" congress were associated with the study of surfaces. In addition, the organisers recruited world leaders in surface science to participate, thus establishing the AVS and the IUVSTA as active organisations within this new field. Subsequently, the two meetings, IVC and ICSS, have always been held jointly. Proceedings of both meetings were published in The Journal of Vacuum Science and Technology in 1972.

The Sixth International Vacuum Congress and Second International Conference on Solid Surfaces was held in the International Conference Hall in Kyoto on 25-29 March 1974. H. Kumagai was the General Chairman of this event. He was assisted by G. Tominaga, General Secretary, and two Program Chairmen, Y. Tuzi, for the Vacuum Congress, and T. Toya, for the Solid Surfaces Conference. The Congress was attended by approximately 900 scientists and engineers from 32 countries. More than 350 of the participants were from overseas. A total of 508 scientific papers were presented in 57 sessions. The papers were almost equally divided between vacuum and surface science but more than half of the 62 invited papers were on solid surfaces. Proceedings of the meetings were published in two volumes, with a total of nearly 1800 pages, in a supplement of the Japanese Journal of Applied Physics in 1974.

The Austrian Vacuum Society together with the Austrian Research Centre Seibersdorf GmbH and the Technical University of Vienna were responsible for the organisation of the Seventh International Vacuum Congress and Third International Conference on Solid Surfaces held in Vienna. The meetings were held in the Hofburg Congress Centre on 12-16 September 1977. Dr. Kirchschläger, Federal President of the Republic of Austria, opened the Congress. Over 1,300 participants from 38 countries attended the meetings. R. Dobrozemsky, as Secretary General of the Congress, was responsible for the coordination of the work of the Local Organising Committee, the two International Advisory Committees and the group of Corresponding Members. It was the first of the triennial congresses to include Poster Sessions and to have the complete printed copies of the proceedings available at registration. The registration fee, including three proceedings volumes, was US$ 120. Twenty-four thousand dollars in revenue from the 750 square meters of exhibition space was transferred to the IUVSTA.

The Eighth International Vacuum Congress, including the Fourth International Conference on Solid Surfaces and the Third International European Conference on Surface Science, was held at Cannes on 22-26 September 1980. The Congress was organised by the French Vacuum Society (SFV) on behalf of IUVSTA. Reservations were made by the SFV with the city of Cannes in July 1977 for the Palais des Festivals. A few days before the opening of the

Congress, the Mayor of Cannes claimed that he had discovered a tight overlap of the Vacuum Congress with a show-business conference (International Market for Video-Communication) starting on 27 September. He refused to put the Palais des Festivals at the disposal of the SFV. Instead, marquees were erected in a free park area located in the suburbs of Cannes for the Congress sessions and exhibition. In spite of contractual rights and government support it was not possible for the SFV to initiate legal action that would have led to an immediate rescission of the Mayor's action. While the alternate meeting facilities were not completely appropriate, a successful Congress was held with nearly 1500 attendees from 38 countries. A total of 870 papers were presented, including about 40 invited papers and 500 poster papers. Proceedings of the Congress were published in a special issue of "Le Vide, Les couches Minces" consisting of 3,570 pages in four volumes available at registration. On 2 October 1980 the SFV started legal action against the City of Cannes asking for financial compensation for being deprived of the use of the Palais des Festivals. Five years later the SFV won its suit against the City of Cannes and presented IUVSTA with an additional 60,000 French Francs, plus and a gift of 120,000 French Francs to establish a special fund to support the attendance of students or participants from developing countries at future Vacuum Congresses.

Until 1983, the organisation of the International Vacuum Congresses had been almost entirely the responsibility of the host National Society. The EC's only role was to select the host country and monitor progress of the Local Organising Committee. In 1980, J. M. Lafferty (USA), President of the Union, asked J. L. de Segovia (E) to chair a Congress Planning Committee (CPC) for the purpose of developing a model organisational structure for the planning, programming and execution of future International Vacuum Congresses and Conferences involving the Union, its new Divisions and the host country. De Segovia and his Committee devised such a plan which involves two pillars on which the organisational structure of the Congress is supported: the Organising Committee (OC), and the International Program Committees (IPCs) through which IUVSTA Divisions work together with the host National Society.

The OC is appointed by the host National Society and is composed of its own scientists. It has full responsibility for the Congress and is responsible to its National Society. The National Society Councillor is the link between the National Society and the IUVSTA, keeping the EC and the CPC fully informed on the progress of the OC. Each IPC is composed of scientists, at least one half being proposed by the relevant Division and the remainder being selected by the OC. The chairmen of the IPCs are chosen by the OC from two or more nominees proposed by the Divisions. It is the important task of the IPCs to organise the scientific program of the Congress including the selection of topics, joint (interdivisional) session topics, plenary lecturers, invited speakers, moderators, review procedures, etc.

This procedure, involving active participation by the IUVSTA Divisions, was first used for the Ninth International Vacuum Congress and Fifth International Conference on Solid Surfaces organised by the Spanish Vacuum Society and held in the Madrid Conference Centre on 26-30 September 1983. The OC was under the Chairmanship of J. L. de Segovia. The congress was divided into five main sections each with its own corresponding IPC. These IPCs and Chairmen were: Surface Science, D. A. King (GB); Vacuum Science, J. Hengevoss (CH); Thin Films, F. Abeles (F); Electronic Materials and Processing, M. Croset (F); and Fusion Technology, M. Kaminsky (USA). About 900 participants from 30 countries attended the Congress. There were five plenary lectures, 80 invited talks and 750 short papers. The interlink between overlapping areas was provided through common sessions. Two volumes were published containing the contributions to the Congress. One volume contained extended

abstracts of papers presented at the Congress and the other volume contained papers presented by the invited speakers. These were edited by the Spanish Vacuum Society. The authors were allowed to publish their contributions in an archival journal of their choice. Most of them appeared in the Journal of Vacuum Science and Technology, Surface Science, Vacuum, Thin Solid Films and Fusion Technology. The Congress fee was US$ 210. The exhibition occupied 1000 square meters with 60 booths. Twenty-three manufacturers were represented. The Spanish Government, through several departments, gave financial support to the Congress. This was done mainly through the Consejo Superior de Investigaciones Cientificas which provided funds and headquarters for the congress organisation and through the Surface and Vacuum Physics group of the Instituto de Física de Materiales.

In 1986 the Congress returned again to the USA and was hosted by the American Vacuum Society in conjunction with their own national meeting. Thus the 10th International Vacuum Congress, the 6th International Conference on Solid Surfaces and the 33rd National Vacuum Symposium of the American Vacuum Society were held jointly on 26-31 October 1986 at the Baltimore Convention Center, in Baltimore, USA. The sponsorship of IUPAP was obtained for these meetings. The Chairs of the Organising Committee and the Program Committee were L. C. Beavis and T. E. Madey respectively. This congress was marked by a number of special features. It was the first at which sessions were devoted to Applied Surface Science, which had been organised through the Steering Committee of the newly formed IUVSTA Division. It was the first at which joint sessions were held to highlight the fact that much research spanned the fields of more that one Division. It was also the first IUVSTA congress for which a computer-based system was used for indexing, sorting and filing the abstracts. Various categories of registration were offered and the attendance included 1414 full registrations, 150 one-day registrations, 246 students and 40 companions. In all, 34 countries were represented. There were 99 plenary and invited papers, 506 contributed papers and 245 poster presentations. The breakdown of these by Divisions (see Table V for Division identification) was: 102 ASS, 112 EMP, 40 FT, 262 SS, 165 TF, 35 VM, 128 VS and 16 New Products (not an IUVSTA Division). The Proceedings were published in the AVS's own journal, the Journal of Vacuum Science and Technology (JVST). These were free to AVS members, who receive the journal. To others the cost was US$ 40 for soft cover and US$ 75 for hard cover binding. Full fee registration cost US$ 240 and one-day registration US$ 120. Students were encouraged with a low registration fee of US$ 10 and companions paid US$ 30. An excellent exhibition by equipment manufacturers was held during the congress. At the conclusion of the congress, the AVS made a donation of US$ 25,000 (SFr 43,245 at the then-current conversion rate to Swiss Francs) to the IUVSTA as forecast in their original offer to host the meetings but they then made a further donation of SFr 123,124 to the Union. This had arisen from an overestimation of the number of pages to be published in the Proceedings and the AVS Board voted to share this unexpected windfall with the IUVSTA This very generous additional donation produced a significant increase in the Reserve Funds of the IUVSTA with on-going benefit in terms of interest and investment potential.

The combined 11th International Vacuum Congress and 7th International Conference on Solid Surfaces were hosted by the German Vacuum Society (Deutsche Arbeitsgemeinschaft Vakuum, DAGV). These meetings were held from 25 to 29 September 1989 in the Cologne Convention Centre (Köln Messe) in Cologne in the Federal Republic of Germany. The Chairs of the Organising and Program Committees were A. Benninghoven and H. Bonzel, respectively. The concept of offering limited-period registration was continued at this congress. The attendance included 1092 full registrations, 52 two-day and 144 one-day registrations, 319 students and 125 companions, with 39 countries being represented. There

were 91 plenary and invited papers plus 917 contributed papers, including 300 from students. The breakdown of papers by Divisions was 114 ASS, 134 EMP, 26 FT, 378 SS, 177 TF, 24 VM and 155 VS. The Proceedings were all published in the archival journal Vacuum (Volume 41, 1990) by Pergamon Press. The hard-cover copies of the Proceedings were grouped in three volumes: SS; EMP + TF + FT; ASS + VS + VM. A very successful exhibition of scientific equipment was held with 64 exhibitors occupying 1929 square metres of space. The registration fees were: DM 600 for full registration, including the Proceedings, DM 120 for students, and DM 220 and DM 440 for 1- and 2-day registrations respectively. After the congress the German Vacuum Society made a donation of DM 50,000 (SFr 44,525) to the IUVSTA.

The Congress in 1992 was to have been hosted by the Brazilian Vacuum Society in Rio de Janeiro. This had been agreed by the Executive Council in 1986 and N. G. Dhere was to have been the Conference Chairman. However, at the 59th Executive Council meeting in April 1989, the Secretary General announced that he had received a fax message from the President of the Brazilian Vacuum Society to say that, regrettably, they must withdraw their offer to host the 1992 Congress. The CPC proposed that the society that had polled second in the vote to choose the host for this congress be approached. Thus it was that, with a lead-time of only about 3 years, the Netherlands Vacuum Society (NEVAC) agreed to take on the duties of host nation.

The 12th International Vacuum Congress and the 8th International Conference on Solid Surfaces were held at the Netherlands Congress Centre in The Hague on 12-16 October 1992, hosted by the Netherlands Vacuum Society (NEVAC). By this time, congress organisation was recognised as being a very time consuming activity for committed scientists, and it was clear that considerable advantage was to be gained by contracting professional conference organisers to manage the non-scientific aspects of a conference. A company, Van Namen & Westerlaken Congress Organisation Services, was so employed for the congress in The Hague. The Chair of the Organising Committee was J. F. van der Veen and the co-chairs of the Program Committee were F. H. Habraken and W. F. van der Weg. Attendances for the various categories were: 98 invited participants, 748 full registrations, 76 one-day registrations, 33 two- or three-day registrations with 193 students and 105 companions. These attendees came from a total of 45 countries. There were 78 plenary and invited papers, 542 contributed papers, and 555 poster presentations. The breakdown in terms of papers from Divisions was: 188 from ASS, 131 from EMP, 44 from FT, 464 from SS, 175 from TF, 19 from VM, and 54 from VS. A continuation of the large Surface Science contribution could be seen. These papers represented an increase of about 17% above the number presented at the previous congress in Cologne, due mainly to an increase in the number of papers from Eastern Europe, which no doubt resulted from the dramatic political changes which occurred in Europe in 1991. The Proceedings of these meetings were published in four separate Volumes. Two of these, at the registrant's choice, were presented free with each full registration. The papers were published in appropriate journals and grouped as follows for the four Volumes: SS papers in the journal Surface Science; ASS and EMP papers in Applied Surface Science; TF in Thin Solid Films; and FT in the Journal of Nuclear Materials with VM in Materials Science and Engineering and VS in Vacuum. The three journals included in Volume 4 could easily be combined as they were published in the same format by the same publisher. The Exhibition accompanying this congress covered 1,360 square metres with 76 stands occupied by exhibitors. As a special feature of this congress, the exhibition catalogue was published as a detailed glossy booklet by The Institute of Physics (London) and distributed widely in advance of the congress. The full registration fee was Dfl 750, which

included two volumes of the Proceedings, lunches, public transport and some other features. One-day registration was Dfl 200 and Accompanying Persons paid Dfl 200. At the conclusion of the conference, the Netherlands Vacuum Society made a donation to the IUVSTA of Dfl 50,000 (SFr 38,887).

In 1995 the congress was held in Yokohama, Japan. This remains the only occasion the congress has been held outside Europe or North America apart from the congress in Kyoto, Japan in 1974. The combined 13th International Vacuum Congress and 9th International Conference on Solid Surfaces were hosted by the Vacuum Society of Japan and were held at the Pacifico Yokohama (International Conference Centre) on 25-29 September 1995 in Yokohama, Japan. The non-scientific aspects of the congress were handled by a conference organising company, the International Communication Specialists, Inc. The Chair of the Organising Committee was Professor G. Horikoshi. The Chair of the Program Committee was Professor A. Yoshimori. Approximately 1,300 people attended including 931 full registrations, 190 one-day registrations and 188 students. There were a total of 989 presentations including 3 plenary, 76 invited, 496 poster and 414 oral presentations. A special feature of this congress was the introduction of sessions devoted to Nanometer Structures which was organised by the new IUVSTA Steering Committee of Nanometer Science and Technology. The breakdown of the presentations by Division was: 175 ASS, 88 EMP, 26 NS, 49 PST, 397 SS, 210 TF, 38 VM and 130 VS. There were 73 Joint Sessions showing the increasing acknowledgement of the multi-field nature of the research being presented at these congresses. The Proceedings of the congress were again published in 4 volumes, using regular archival journals as follows: SS in Surface Science; ASS and EMP in Applied Surface Science; TF and NS in Thin Solid Films; and VS, VM and PST in Vacuum. Full registration included two volumes of the Proceedings of the registrant's choice and cost 55,000 yen (or 44,000 yen for early registration). Student and one-day registrations were 24,000 and 15,000 yen, respectively and did not include any volumes of the Proceedings. This congress was held in conjunction with the International Exhibition of Vacuum Equipment which is a very well established exhibition held annually in Japan and organised by the Japan Vacuum Industry Association. This was a very large and comprehensive exhibition which attracted many regular attendees in addition to the congress delegates. With generous support from the exhibition organisers, the Vacuum Society of Japan was able to make a donation of 5,000,000 yen (SFr 54,823) to the IUVSTA. A very significant outcome from this congress was that it brought the IVC/ICSS triennial meeting to the attention of a wide range of Japanese researchers and resulted in over 300 Japanese attending the following IUVSTA congress in Birmingham in 1998.

The 14th International Vacuum Congress and 10th International Conference on Solid Surfaces were held in Birmingham, UK, during the period from 31 August to 4 September 1998. A feature of this congress was that two further, well established, meetings were incorporated into the congress by combining them with the programs being developed by two of the IUVSTA Divisions. These were the 5th International Conference on Nanometer Science and Technology (NANO-5) and the 10th International Conference on Quantitative Surface Analysis (QSA-10). NANO-5 was combined with the component of the meeting run by the Nanometer Structures Division and QSA-10 was combined with the activities of the Applied Surface Science Division. As usual, ICSS-10 was the Surface Science Division's component of the meeting. The Congress was held at the International Convention Centre in Birmingham. It was hosted by the British Vacuum Council (BVC) and co-organised by the BVC and The Institute of Physics (IoP). The latter also acted as the professional congress management company. The Chair of the Organising Committee was Professor D. P. Woodruff and the

Chair of the Program Committee was Professor R. H. Williams. There was a total of 1219 registrations, including 826 full registrations, 107 one-day registrations and 286 students. There were 47 countries represented among the participants. The largest number came from Japan (321), then from the UK (236), Germany (115), USA (60), France (52), Netherlands (44), Italy (43), and Sweden (39), with the number from each of the other 39 countries being less than 30 each. The total number of presentations was 1383 including 3 plenary and 69 invited papers. Of the presentations 629 were oral presentations and 754 were posters. In the following breakdown of presentations by Divisions the many joint sessions have been apportioned to individual Divisions, leading to apparent fractional numbers of papers: 184 ASS, 162.5 EMP, 175.5 NS, 45.5 PST, 527 SS, 163 TF, 33 VM and 92.5 VS. The Proceedings were published in 4 volumes, using regular archival journals as follows: SS (ICSS-10) in Surface Science; ASS (QSA-10) and NS (NANO-5) in Applied Surface Science; TF and EMP in Thin Solid Films; and PST, VM and VS in Vacuum. There were 81 exhibitors at the Equipment Exhibition which occupied about 1800 square metres. Full registration, which included one volume (registrant's choice) of the Proceedings, cost GBP 330 (Pounds Sterling). Other registration costs were: GBP 130 for one-day registration, GBP 190 for students and GBP 80 for accompanying persons. At the conclusion of the congress the organisers made a donation of GBP 25,000 (SFr 65,738) to the IUVSTA.

It is clear that this triennial congress is recognised as an important international gathering of scientists and technologists working in the relevant fields. The attendance continues to increase. It was boosted in 1992 when political events made it much easier for scientists in eastern Europe to travel to the west, and in 1998 when the Japanese contingent increased following their exposure to this meeting three years before in Yokohama. The contingent from the USA is always proportionately low compared to the relevant number of scientists in that country. This is possibly due to the fact that the AVS organises a similar large Symposium covering the same, and more, topics. This Symposium is held every year, usually in October, and attracts a very large number of American and international attendees. In 2001 the IVC/ICSS will be hosted by the AVS in conjunction with this annual AVS Symposium. It is planned that in 2004 the congress will be hosted by the Italian Vacuum Society in Venice at a time (June/July) which is further removed from that of the AVS Symposium.

The 15th International Vacuum Congress and 11th International Conference on Solid Surfaces will be hosted by the AVS in San Francisco between 28 October and 2 November 2001, in conjunction with their own 48th AVS International Symposium. A feature of this congress will be the method of presentation of the Proceedings. The hosts intend to prepare a fully electronic Virtual Proceedings which will be posted on the AVS website. This Virtual Proceedings will contain the technical program which will consist of every abstract submitted prior to the meeting, the corresponding author's contact information, and an archival journal citation to the published paper associated with the presentation. As the citation will most likely not be known until after the Congress, the Proceedings will remain available on the website and be continually updated as the authors submit their citations. For papers accepted for publication in the AVS journals JVST A and B, the full manuscript will be accessible via "hot links" from the Proceedings. It is expected that hot links will also be available for articles published in Elsevier journals. Another feature of the Virtual Proceedings is a search engine that will allow the reader, by entering subjects or keywords, to quickly find those papers of interest, regardless of location in the program. This is a significant feature as it is expected that over 1200 papers will be presented in 16 parallel sessions during the congress.

10. NATIONAL MEMBERSHIP OF IUVSTA

The nations represented by National Vacuum Societies (or Committees) within IUVSTA are shown in Table I. Each society is formally accepted into IUVSTA at a General Meeting (GM) although provisional membership may have been granted by the Executive Council (EC) at any time during the preceding three years.

There were 10 Founder Member societies of IUVSTA (see Section 4) who joined in 1962. These included the two oldest societies: the French Vacuum Society (SFV) founded in 1945 and the American Vacuum Society (AVS) founded in 1953. In Sweden in 1962, all scientific activities had to be represented through their national academy. Thus although the Swedes were active participants in IUVSTA from the beginning (G. Brogren (S) was one of the original councillors) an independent Swedish Vacuum Society was not formed until 1973.

At the 1965 GM, four more nations joined (Czechoslovakia, Hungary, Italy and Poland). Table I shows Czechoslovakia as terminating its membership later in 1995. This came about because in 1989 political changes led to the division of that country into the two independent Czech and Slovak Republics. These two nations subsequently formed their own vacuum societies and were admitted to IUVSTA membership at the 1995 GM, as the combined Czechoslovakian society's membership was terminated.

At the GM in 1968, Japan and Bulgaria joined the Union. In fact, the Vacuum Society of Japan is the third oldest vacuum society, having been founded in 1958. Bulgaria was originally an active member of IUVSTA but by the mid 1980's the economy of the country was in an extremely depressed state and local scientists were unable to participate in international activities. After six years without effective representation on the EC, the Bulgarian membership was regrettably terminated in 1995. This action cancelled their debts for unpaid dues which, hopefully, will allow them to rejoin without financial encumbrances in the future.

In 1971, the GM admitted four more members nations (Australia, Austria, India and Israel). Finland joined in 1974.

Following World War II, the countries of Europe were divided on political grounds into two groups, commonly referred to as the East and West, and travel across the border was severely restricted. This political boundary passed through Germany dividing that country into the Federal Republic of Germany (West) and the German Democratic Republic (East). Thus the German Vacuum Society (DAGV), which had been a Founder Member of IUVSTA, was not able to represent scientists and technologists in East Germany. As a consequence, the German Democratic Republic National Committee on Vacuum was formed and, as shown in Table I, it was a member of IUVSTA between 1977 and 1992. It was disbanded after the reunification of Germany in 1991.

At the following four GMs, one new national society was admitted at each meeting: Brazil (1980), the Peoples Republic of China (1983), Mexico (1986) and Portugal (1989).

The GM in 1992 saw the admission of five new societies (from Slovenia, Croatia, Korea, Romania and the Russian Federation) and the termination of two memberships (Yugoslavia and GDR Germany). In 1991 changes in the political situation had resulted in the dissolution of Yugoslavia into five independent states. Two of these, Slovenia and Croatia, subsequently

formed their own vacuum societies and joined IUVSTA whilst, with these separated off, the former Yugoslavian Vacuum Society was disbanded. Also, following the break-up of the Union of the Soviet Socialist Republics (USSR), Romania had proceeded to form its own vacuum society and joined IUVSTA. As far back as 1981, scientists in the USSR had been negotiating within their own country for permission and support to join IUVSTA. However, it was not until 1992 that it became possible for a society within the newly constituted Russian Federation to make a formal application to join the Union.

At the GM in 1998, three societies were admitted (from the Czech Republic, Slovakia and the Ukraine) and the membership of the Czechoslovakian Vacuum Society was terminated. The splitting of Czechoslovakia into two separate states has been discussed above. The Ukraine had previously been a member of the USSR.

In February 1999, the Pakistan Vacuum Society was granted provisional membership by the EC and it is expected that the GM will confer full membership in November 2001. This will bring the membership of IUVSTA to 31 national vacuum societies, which is a very healthy start to the twenty-first century.

11. THE IUVSTA NEWS BULLETIN

The Union has published a News Bulletin since January 1965. Its primary purpose is to inform its readers of the activities of the IUVSTA and to publicise meetings held throughout the world on vacuum and its applications. The Bulletin is in the form of a non-commercial newsletter. It contains reports of the Executive Council meetings and the General Meetings. It often contains news articles about the National Vacuum Societies that make up the Union membership. An article entitled the "President's Message" is frequently included in which the President keeps the membership informed about important Union matters and invites comments concerning critical decisions to be made by the EC. Traditionally, the Bulletin has been distributed to members of the EC and to key personnel in the national vacuum organisations. A limited quantity was sent to the National Vacuum Societies of IUVSTA for local distribution to their officers and members. Since 1997, it has been published in an electronic format and appears on the IUVSTA website.

The first 33 issues of the News Bulletin were published on a bimonthly basis, during a seven year period, by E. Thomas, Secretary General, from the Secretariat office in Brussels. In 1972, when the Secretariat was transferred to London, N. A. Walter assumed editorship of the Bulletin and it was published there. In 1974, it was proposed that advertising be introduced in the Bulletin to provide a source of income that could be used to improve its appearance and content, and that it be distributed to all members of the national societies. This suggestion never came to fruition.

K. L. Poulter (GB) became Senior Associate Editor of the Bulletin in 1976, and Editor in 1978. In early 1981, with the demise of the Secretariat in London, Poulter took sole responsibility for editing, printing and distributing the Bulletin. Though conditions proved to be trying at times, Poulter nonetheless prevailed.

Starting with the 89th issue in February 1985, the News Bulletin was published in a new format with financial support from the American Vacuum Society. The new editor, J. L. Provo (USA), was also editor of the AVS Newsletter. Provo continued as the News Bulletin

Editor until 1996 when he handed it over to L. Westerberg (S). This change coincided with the change to electronic publishing of the Bulletin.

By the end of the 1992-95 triennium, the News Bulletin was by far the largest expense item in the IUVSTA budget, excluding the collected scientific activities. Of the SFr 35,000 per triennium budget item for publications, the quarterly mailing of the Bulletin was the largest component. However at that time electronic publishing and communication were developing rapidly and a decision was made to take advantage of this new technology. Accordingly, Issue No. 140 of the News Bulletin (Nov/Dec 1996) was the last published in the standard print format. The numbering sequence was maintained so that issue No. 141 of the IUVSTA News Bulletin (Jan. to Jun. 1997) became the first issue in electronic format. These Bulletins now appear on the IUVSTA webpage and are produced twice per year. The content and format has changed slightly and the facility of linking to other website documents is used. Old issues of the Bulletin are archived for future reference. The links to the Calendar, ECM and Workshop pages are however still directed to the current web pages, where archived information, as well as current information, is still present, in most cases. Issue No. 149 was the first issue available as a downloadable ".pdf" file. It has some links archived.

The News Bulletin is only one of many publications produced by the IUVSTA and these are all currently managed by the Publications Committee of the Executive Council. Some of these other publications are discussed in connection with our website in Section 12.

12. WEBSITE AND ELECTRONIC COMMUNICATION

In his President's Inaugural Address at the start of the 1995-1998 triennium, J. L. Robins (AUS) remarked on the rapid developments occurring in electronic communications and foretold that it would surely impact on the work of the Union. In fact, the impact was great and touched almost all of the Union's activities.

At that time (1995) the main publications of IUVSTA were as follows: the Statutes and By-Laws (including the initial statutes of the Divisions); the News Bulletin (see Section 11); an IUVSTA Information Booklet (giving a brief description of the IUVSTA, its history, its member societies, its activities, and its current officers); the IUVSTA Directory (listing names and contact information for the officers, councillors and alternates, and members of IUVSTA Committees and Divisions - first issued Sept. 1990); the Administrative Procedures Booklet (covering the tasks and responsibilities of all officers and most chairs and secretaries, and the protocols and documentation for the Union's activities - first issued Feb. 1991); and a one-page Flyer (for distribution to advertise IUVSTA and its activities). Many people over many years have contributed to the development of these documents but special mention of the contribution of J. L. Provo (USA) is appropriate for his sustained editorial contributions.

In 1996 the AVS generously invited IUVSTA to set up a World Wide Web site on the AVS internet servers. They offered to host the site and provide the services of Mrs Mary Weaver free of charge for the first year and at a nominal rate thereafter. As Webmaster from 1996 to 1998, Mary Weaver was a great asset because of both her competence and her intimate knowledge of the Union's structure and activities through her husband J. H. Weaver (USA). As Chair of the Publications Committee, L. A. Westerberg (S) undertook the task of planning what material would be put onto the website in close collaboration with John and Mary Weaver. Westerberg has served as Web Editor 1996 to 2000, and as Assistant Web Editor

since 2000 when John Grant (USA) took over as Web Editor. Keith Mitchell, Webmaster of the AVS site, has served as the IUVSTA Webmaster since 1998.

Thus, on 24 May 1996, the IUVSTA's World Wide Web site was launched at <http:// www.vacuum.org/iuvsta>. In 2000 this was changed to <http://www.iuvsta.org>. Initially, all of the information contained in the above-mentioned publications was transferred to the web. Thereafter, this information was added to and expanded. The difficulty with all websites is that, despite the best efforts of the web-editor and webmaster, there is a vital need for a large number of individuals to conscientiously supply information on a continuing basis to keep the website current.

Currently (2001) the site contains the following information: IUVSTA (including a description, short history, its administrative structure and officers); Directory (although the names of the approximately 360 persons associated with all activities of the union are presented, full contact details are restricted by password to councillors and other people listed in the Directory); Member National Societies (listings, contact details and links to their own websites where these exist); Administrative Procedures (as described above for the former publication); Divisions and Committees (objectives and activities); IUVSTA Prizes (inaugurated in 1998); Scholarships (Welch Scholarship and student awards); Executive Council and General Meetings (historical information of dates and locations, but not minutes, plus information of dates, times, agenda, accommodation, and travel arrangements, for forthcoming meetings); Scientific Workshops and Schools (historical listings of these events run by IUVSTA with links where further detailed information is available); IUVSTA Conferences (listings of the conferences organised and controlled by IUVSTA including the IVC, ICSS, ICTF, ECOSS and EVC); Calendar of Events (a list of IUVSTA meetings and international conferences relevant to the fields of IUVSTA, with links to the Calendars of other related societies); Education (including the Visual Aids Program, and links to the Short Course Program, Summer Schools, and the Welch Scholarship); News Items (current items of interest to members); News Bulletin (see Section 11).

By the early 1990's, facsimile (FAX) transmission had become the most common procedure for transmitting documents among councillors, although airmail was still used when all councillors had to be contacted. In the November 1994 edition of the 1992-1995 IUVSTA Directory, 28 of the 29 councillors listed fax addresses but only 6 showed e-mail addresses. By the first edition of the 1995-1998 Directory all of the 30 new councillors showed fax addresses and 22 showed email addresses. This allowed e-mail communication, speeded the interchange of ideas, and encouraged and facilitated consultation amongst the Officers and amongst the members of Divisions and Committees. It is now common for notices, agenda and minutes of all meetings to be distributed by e-mail.

Revisions to the statutes and by-laws are currently being considered in order to permit the use of e-mail and fax in some instances where postal ballots are required, although for the more important issues the requirement for original signatures will be retained.

As described elsewhere, the ECM minutes have now become the primary archival document for the Union. For each meeting, a full set of the reports of the Officers, Committees and Divisions are attached to the ECM minutes as appendices. Printed out, even in small font, these minutes may amount to over 80 pages and, as upward of 75 copies need to be distributed, electronic distribution is efficient and offers considerable savings in mailing costs. Following the September 1998 meetings, the GM-13 and ECM-82 minutes were the first

distributed by e-mail. The minutes of ECM-83 and subsequent meetings have been placed on a local closed-access web site with the web address being circulated only to those who are entitled to access them. These changes were introduced as standard procedure by R. J. Reid (GB), as Recording Secretary for the 1998-2001 triennium, although U. Valbusa (I), as Scientific Director, had begun making use of a local server for STD agenda and notices in the lead-up to this same meeting, ECM-83.

13. IUVSTA WORKSHOPS AND SCHOOLS

After the financial restructuring of the Union during J. M. Lafferty's presidency (1980-83) it became possible for the regular administrative expenses of the Union to be fully financed from the share subscriptions. This left the financial donations made by triennial congress (IVC) organisers, together with interest generated from the Union's reserve funds, available for scientific and educational activities. While some of this was set aside each triennium to build up the reserves, a major part was designated as the STD Discretionary Fund. The Union had been very fortunate in that its reserves had benefited unexpectedly from two major donations, one from the French Vacuum Society and another from the American Vacuum Society, following the 8th and 10th International Vacuum Congresses respectively. (See Section 9.)

During the 1986-89 triennium, under the guidance of the Scientific Director, A. Van Oostrom (NL), the STD debated possible initiatives for utilising these Discretionary Funds. Possibilities considered included Summer Schools, "seed money" for conferences, IUVSTA guest lecturers, support for scientists to attend conferences, and interaction with UNESCO through the International Centre for Theoretical Physics (ICTP) in Trieste, Italy.

As a result of these deliberations, activities were undertaken which eventually developed into the current IUVSTA Workshop series and the IUVSTA School series. The Short Course program was also an outcome of these discussions. The fact that the Highlight Seminars also were initiated in this triennium testifies to the vitality of the STD, which was under the leadership of A. Van Oostrom (NL) as Scientific Director, during the 1986-92 period.

The first IUVSTA Scientific Workshop arose from the STD's decision to sponsor a high level scientific workshop in 1989. The idea was to provide a forum for intense scientific debate and discussion between a small number of experts in a focused scientific field which fell within the area of activity of the Divisions of IUVSTA. The purpose of the workshop was to be scientific rather than educational.

The topic of this first workshop was "The Structure and Reactivity of Small Molecules on Surfaces". It was organised by D. P. Woodruff (GB), Chair of the Surface Science Division, and A. Bradshaw (GB). It was held at Ofir, Portugal, on 17-22 September 1989. There were 58 participants (20 from the FRG, 10 from the USA, 10 from GB, 6 from Japan and 12 from nine other European countries) including 17 invited speakers. This workshop was judged to be a complete success and the format was retained for future workshops, two of which were organised for the following year, 1990.

These first few workshops were so successful that they were numbered and continue as a series. It is intended that they remain informal and that they involve all delegates being "in residence", typically at a relatively remote site (i.e. not in a large city). It is also intended that the workshop be kept small enough and long enough to ensure active debate (i.e. less than 100 delegates and about 5 days duration). There are no printed proceedings of these workshops,

thus allowing new and untried ideas to be raised and discussed. Proposals for workshops can be initiated by Divisions, or by individuals through Divisions.

The STD Discretionary Fund support for these meeting is intended to guarantee financial stability. Initially this support was SFr 15,000 but experience showed that SFr 10,000 was sufficient and this latter figure has been taken as the normal maximum since the 16th Workshop. Any surplus funds generated are returned to the STD.

The number of IUVSTA Workshops presented each year has increased dramatically and the program currently constitutes the largest item of expenditure in the STD budget. A total of 31 Workshops have now been held.

In general, it is more expensive to run a Summer School, particularly for students from developing countries, than to run conferences or scientific workshops. Thus it was recognised that, for Schools, a partner organisation was required. Such a partner was first found in the International Centre for Theoretical Physics (ICTP) in Trieste, Italy, which is now called the Adbus Salam International Centre for Theoretical Physics. After extended negotiations, in which M. Croset (F) and A. Zalar (SLO) were heavily involved, it was agreed to run a jointly sponsored Educational Workshop on the Science and Technology of Thin Films. The IUVSTA contributed SFr 10,000 and organised the program and instructors, whilst the ICTP contributed more that five times this amount and supplied their facilities which included accommodation areas, lecture rooms, laboratory space, a library and computing facilities. P. Barna (H) took a leading organisational role on behalf of the IUVSTA.

Thus the 1st IUVSTA/ ICTP Educational Workshop on the Science and Technology of Thin Films was held at ICTP in Trieste, Italy, from 7-25 March 1994. The course directors were P. Barna, J. Geerk, F. C. Matacotta (local organiser), and G. Ottaviani. There were 52 attendees, coming from 37 different countries, chosen from over 400 applicants. The course activities included lectures, participant contributions, and practical exercises. There were 18 lectures by IUVSTA presenters, occupying 52 hours. All participants had an opportunity to present and discuss their on-going research during seminars and poster sessions. The practical sessions were carried out in the ICTP laboratories, in which some of the specialised equipment for film deposition and analysis had been supplied by equipment manufacturers and local industrial companies. This first workshop set the format for two further educational workshops sponsored jointly by the IUVSTA and the ICTP.

The 2nd IUVSTA School was also held at ICTP Trieste, from 11-29 March 1996. It was titled the Second IUVSTA/ICTP Workshop on the Science and Technology of Thin Films, with the topic Thin Films for Micro- and Opto-electronics. The course directors were P. Barna and F. C. Matacotta (local organiser). There were 42 attendees (selected from over 300 applicants) from 28 countries of which only a few were from western Europe. IUVSTA instructors presented 57 hours of lectures. An additional feature was that the practical component was enhanced by including working visits to two laboratories of the Area di Ricerca di Bologna where the participants were encouraged to gain hands-on experience.

The 3rd IUVSTA School was the Abdus Salam ICTP/IUVSTA Workshop on Thin Film Physics and Technology. It was held at ICTP in Trieste, from 8-26 March 1999. The joint sponsors were the ICTP which supplied the venue, the educational infrastructure and US$ 50,000 and the IUVSTA which supplied the instructors and US$ 8,500. The directors were P. Barna and M. Sancrotti. There were 97 attendees (selected from 250 applicants) and 49

fellowships were awarded. This educational workshop included, during the final three days, a Topical Conference on Microstructure and Surface Morphology Evolution in Thin Films. This was also the general topic of the workshop.

At this stage it was decided to number these schools for identification within the Union's activities. However it must be recognised that, by their nature, and the fact that significant collaboration and co-sponsorship is required, these schools will usually have their own identifying name and may be part of an independent series. The above three Educational Workshops have now been designated as the 1st, 2nd and 3rd IUVSTA Schools.

The 4th IUVSTA School was on Quantum Devices and Nanostructures. It was held from 18-26 July 1999 at Cortona, Italy, utilising the Palazzone which is the Summer School facility of the Scuola Normale Superiore of Pisa. This school was co-sponsored by the IUVSTA, the Scuola Normale Superiore di Pisa, and the Gruppo Nazionale di Struttura della Materia. G. E. McGuire, F. Beltram and M. Sancrotti comprised the Organising Committee. There were 12 lecturers at this school and 39 attendees, of whom 23 were students. The students came from Japan, North America and Europe. Two fellowships were awarded.

14. THE VISUAL AIDS PROGRAM

After a meeting of the STD's Working Group on Education in Manchester in 1968, A. Blaha (CS), a professor at the Technical University of Bratislava, suggested an educational project called the Graphic Encyclopaedia of Vacuum. It was envisioned that it would consist of a series of 35 mm slides covering, in principle, the whole field of vacuum physics and technique, and a number of vacuum applications. Accompanying the slides would be a text that explained the content of each slide. The slides and text were intended to be used as supplementary material for instructors giving courses in vacuum technology and its various applications.

It was recognised that considerable financial support would be needed to realise such a project, and that preparation of the illustrations would be the main item of expense. UNESCO was approached for funding by D. Degras (F) but these initial contacts were not successful. It quickly became evident that in order to get financial support and international cooperation for the project it would be necessary to produce demonstration material to illustrate what was intended. This was done and the first showing was made at the 5th International Vacuum Congress in Boston in 1971.

As work on the slides progressed, it became known as the IUVSTA Visual Aids Project. Several of the Union's National Societies contributed to the preparation of the illustrations and text and the Union provided financial support. In 1977, a new series of 35 mm slides providing the necessary visual material for a complete five part course in vacuum science and technology was completed. The series was then comprised of the following parts.

	Title	Prepared by
Part 1.	Fundamentals of Vacuum	The Netherlands Vacuum Society
Part 2.	Vacuum Measurements and Gauges	French Vacuum Society
Part 3.	Conventional Vacuum Pumps	German Vacuum Society (DAGV)
Part 4.	Sputtering, Capture Pumps, and Mass Spectrometry	American Vacuum Society
Part 5.	Vacuum Deposition	British Vacuum Council

These were all shown in Vienna at the 7th International Vacuum Congress. In addition to the efforts of the individual National Vacuum Societies in preparing the slides and text, the Secretariat in London did a considerable amount of work producing, advertising and distributing the Visual Aids. When the London Secretariat was closed at the end of 1980, the responsibility of promoting, selling and maintaining a stock of Visual Aids Project material was assumed by the Chairman of the EC's Education Committee, L. C. Beavis (USA).

In 1982 and 1983 the Visual Aids material was revised. The German Vacuum Society was responsible for the technical content of the revision, and L. C. Beavis (USA) was responsible for the production of the new illustrations and text. Part 4, revised by the AVS, was divided into two new sections: a new Part 4 on Partial Pressure Analysis and a Part 8 on Capture Pumps. The new edition was also to have a Part 6 on Leak Detection and a Part 7 on the History of Vacuum Science, with these being produced under the direction of the Vacuum Science Division of IUVSTA.

During the 1989-1992 triennium, under the direction of the Education Committee Chair, Konrad M. Eisele (D), the series of educational material was updated and expanded into eleven Parts and the format was changed from 35 mm slides to more practical overhead transparencies. The new Parts were: Part 9 on Vacuum Systems, Part 10 on Vacuum Materials, and Part 11 on Electron Spectroscopies. These eleven modules were prominently displayed in 1992 at the 12th International Vacuum Congress in The Hague, which led to a significant increase in sales (approximately 40 within the following year).

From 1993 through to the present (2001), Visual Aids material has been distributed in Europe by the Executive Secretary of the French Vacuum Society, D. Célier (F). Distribution to the rest of the world was from the Secretary of the IUVSTA Education Committee, J. L. Provo (USA), from his home office in St. Petersburg, FL, USA from 1993 to 1996 and since then from the New York Office of the American Vacuum Society.

By 1995, it was clear that another major revision and updating of all Parts (variously called units or modules) was required and that an Editor-in-Chief should be appointed for this Visual Aids project. In 1996, J. H. Leck (GB) was appointed to this position and set about instituting a continuing process of revision for the material. It was also decided that individuals, rather than vacuum societies, would be assigned to undertake the revisions, with these people being recommended by the appropriate Division which would also referee the revised version before it was put into production. Currently, five of the modules are being revised and modernised, with the responsible persons being as follows: Part 3 (Gas Transfer Pumps) J. Leclerc, Part 4 (Residual Gas Analysis) L. Beavis, Part 5 (Vacuum Deposition) A. Rockett, Part 6 (Leak Detection) S. Hoath, and Part 10 (Vacuum Materials) N. Peacock and R. Reid.

The Visual Aids Program is an important IUVSTA contribution to international education. The next stage will be to redevelop these modules in electronic format and make them available on CD ROM. This has already been achieved for Part 5 (Thin Film Deposition) which is available both on CD ROM and with standard transparencies. At present (2001) these modules retail at between SFr 120 and 140 although a substantially reduced rate is offered to developing countries. A list of the currently available Visual Aids modules is presented in Table VII.

15. THE MEDARD W. WELCH INTERNATIONAL SCHOLARSHIP

The Welch Scholarship had its origin at an EC meeting in Stuttgart during the 3rd International Vacuum Congress in 1965. Even though it was a lean financial period for the Union, President Debiesse (F) expressed the desire for an IUVSTA scholarship. Later, through M. Berthaud (F), M. W. Welch (USA) informed Debiesse that he would like to be the first to contribute to such a scholarship. He then made a proposal to the American Vacuum Society (AVS) Board of Directors for the establishment of a US$ 5000 international scholarship to be used for postgraduate study in vacuum science and technology. Under the terms of his proposal, the AVS would be custodian for the funds, advancing US$ 5000 each year to the IUVSTA, after acceptance of a satisfactory protocol describing how it would select the scholars. A protocol, drawn up by M. Berthaud (F), D. Degras (F) and A. Venema (NL), was accepted in 1966, and the first scholar was chosen in 1968. The administrative details of the scholarships were handled in the STD by M. Berthaud, Scientific Secretary. A scholar has been selected each year since 1968. Since the death of Mr. Welch, his daughter and her husband, Mr. and Mrs. Bro, have generously continued to advance money annually to support the scholarships. The amount of the scholarship was increased to US$ 7000 in 1974 and subsequent increases have raised this to the present value of US$ 15,000 for the year 2001 scholar.

After the establishment of an Executive Secretariat by the IUVSTA in London in 1971, all administrative duties associated with the Welch Scholarship were transferred to that office. When that Secretariat was dissolved in 1980, the administrative work was returned to the AVS and is now managed by a Scholarship Administrator: the first being J. P. Hobson, followed by W. D. Westwood in 1987 and F. R. Shepherd in 1999. Under the present protocol, revised in 1980, the Scholarship Administrator is responsible to the Welch Foundation which is the responsibility of the Scientific Director of the STD. The Scientific Director is assisted by a committee named the Welch Scholarship Trustees, which is comprised of himself, as ex officio chairman, the Treasurer of the IUVSTA and four Welch scholarship trustees, elected by the Executive Council. One trustee is elected each year for a term of four years. A list of the Welch Scholars is shown in Table VII, together with their country of origin and the country in which they took up their scholarship.

16. THE IUVSTA PRIZES

In 1995, at the end of his period as President, T. E. Madey (USA) proposed the idea of creating an IUVSTA Prize. It was suggested that it should be designed and promoted as a Prize with sufficient prestige that it would encourage and acknowledge scientific research and/or technological achievement of the highest possible standard whilst also bringing recognition and kudos to the IUVSTA. His proposal was that national and international companies associated with the fields of interest of the Union would be invited to make a once-only donation and that the prize be financed by the income from an endowment fund created from these donations. It was estimated that if eight donors contributed SFr 5,000 each, and the fund was invested at about 5% per annum, then the money available for the Prize at the end of each triennium would be about SFr 6,000.

The EC gave strong endorsement to this proposal and an IUVSTA Prize Protocol, drawn up by Madey, was formally accepted at the ECM-78 meeting at Debrecen, Hungary, in May 1997. The Prize was presented for the first time at the IVC in Birmingham in 1998.

Subsequently, the number of donors increased, so that at ECM-85 at Namur, Belgium, in April 2000, the EC agreed that henceforth the IUVSTA would award two prizes of equal value, one in the area of science and one in the area of instrumentation and technology, on the occasion of each International Vacuum Congress.

Thus, the purpose of the two Prizes is to recognise and encourage outstanding internationally-acclaimed research, and internationally-acclaimed achievements in technology and instrumentation, in the fields of interest to the IUVSTA. Each Prize consists of a cash award, a struck medal and a certificate setting forth the reasons for the award.

Currently, the endowment for the Prizes has been provided by generous donations from: ANELVA; Balzers and Leybold Holding AG; Intevac; OMICRON Vakuumphysik GmbH; Osaka Vacuum; Physical Electronics; ULVAC; SAES Getters; TAV; Varian Associates; and VAT.

In 1998, the inaugural IUVSTA Prize was presented to Professor Johannes Friso van der Veen of the University of Amsterdam. In 2001, the IUVSTA Prize in Science is being awarded to Professor Kunio Takayanagi of the Tokyo Institute of Technology, and the IUVSTA Prize in Technology is being awarded to Professor Wolf-Dieter Münz of the Material Research Institute of Sheffield Hallam University.

17. PERSONS HONOURED BY THE IUVSTA

At various times throughout its history the Union has recognised and honoured those who have made significant contributions to vacuum science and/or have been of outstanding service to the Union.

The title of Honorary President has been awarded by the IUVSTA General Meetings to the following individuals:

Prof. Louis Dunoyer† (F)	1962
Prof. M. Pirani† (GB)	1962
Mr. Medard W. Welch† (USA)	1977
Prof. Max Auwärter† (A)	1983
Prof. Emile Thomas† (B)	1989

This is the highest honour the Union can bestow. Professors Dunoyer and Pirani were honoured for their pioneering research in vacuum science. They were also Honorary Members of IOVST. Mr. Welch played a prominent roll in establishing and shaping the Union and served as its first President. The Welch Foundation for international scholarships was proposed by him and supported by his financial generosity. Professor Auwärter founded the Balzers Company in Liechtenstein and was Chairman of the "Thin Film Committee" before this organisation was incorporated as a Division into the IUVSTA. Professor Thomas, by convening and organising the first international meeting on Vacuum in Namur in 1958, had been one of the first persons to stimulate the formation of the Union. He had been President of the IOVST, a Founder Member of IUVSTA and later served as both President and Secretary General of IUVSTA. (The † symbol indicates "deceased".)

In 1968, at the Third General Meeting of the Union in Manchester, the following persons were made Honorary Members of the Union:

Mr. A. S. D. Barrett† (GB)
Mlle. M. Berthaud† (F)
Prof. D. Degras† (F)
Prof. K. Diels† (D)
Prof. E. Thomas† (B)
Dr. A. Venema† (NL)
Mr. M. W. Welch† (USA)

At the Fourth General Meeting in Boston in 1971 the same persons were designated as Founder Members of the Union, with non-voting rights to attend and speak at all Executive Council Meetings. The Founder Members of the Union are those people who had participated in the Executive Committee meetings of the IOVST and/or meetings for the formation of the IUVSTA at Cologne, Brussels and Dijon and who continued to play an active role in the Executive Council and/or the Scientific and Technical Directorate of the Union.

18. CONCLUSION

The 84th Executive Council meeting of IUVSTA was held in Namur, Belgium, in April 2000. This city had been the site of the first International Conference on Vacuum Technology in 1958, which had led to the formation of IOVST (1959) and IUVSTA (1962). It thus seemed appropriate to consider this as a 40th anniversary of the start of the Union and the Belgium Vacuum Society (BELVAC) arranged a commemorative session to follow the ECM, complete with historical presentations and a display of old equipment and documents relating to the 1st IVC and the formation of IOVST and IUVSTA.

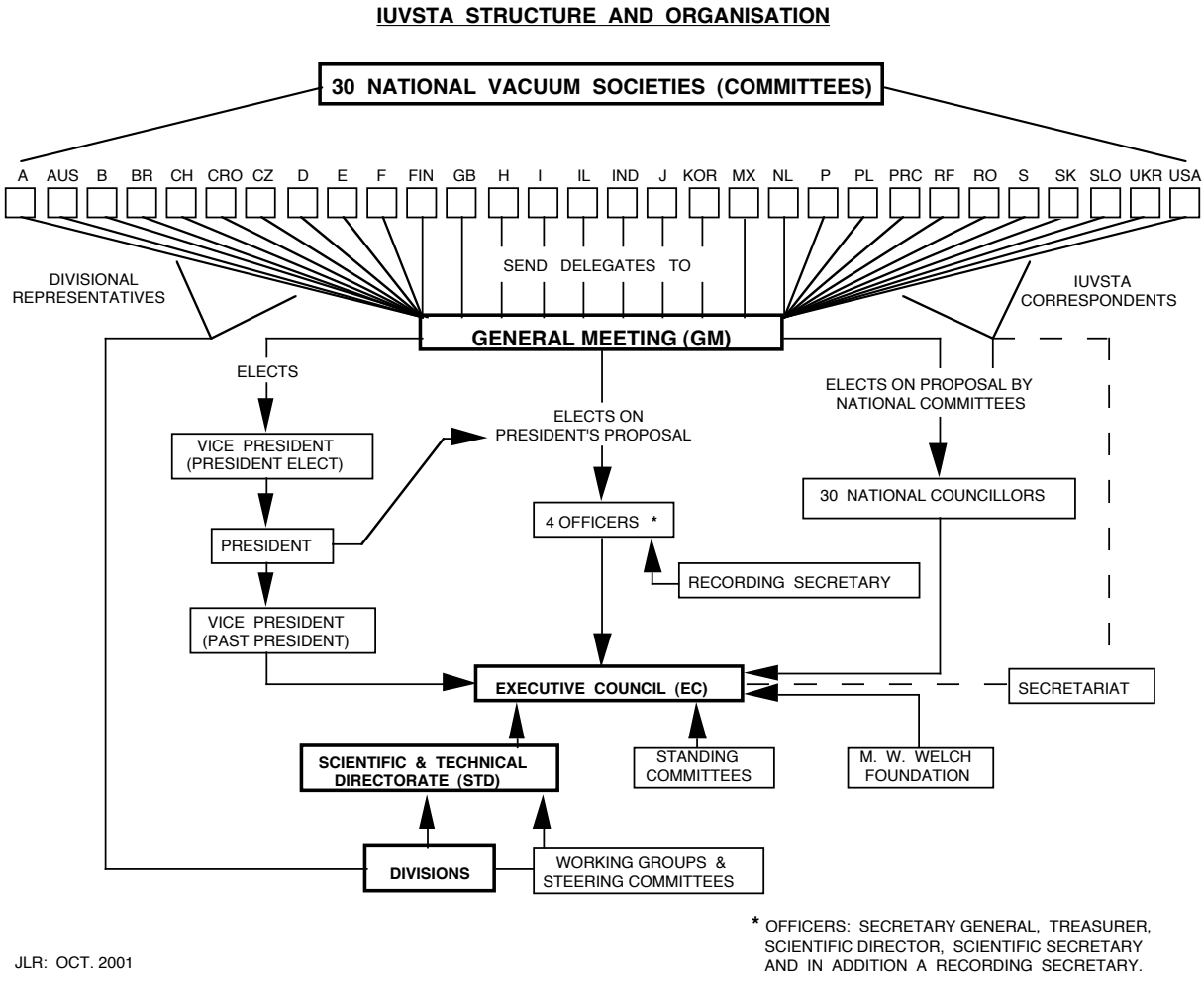
As one looked at the display of very early vacuum equipment (supplied by J. Dupont (B) from his own collection) it was incredible to see how rapidly this field has advanced in just 40 years. This rapid growth is indicative of how strongly the recent developments in the field of high technology have required, or been enabled by, vacuum environments. The commercial and strategic incentives of this industry have ensured good funding for research and there has been unprecedented collaboration between industry, scientists and technologists to rapidly develop new ideas into practical applications.

For the first half of the 20th century the largest applications for vacuum science and technology were for the development and manufacture of light bulbs and vacuum tubes for X-rays, radio, television and radar. Then, during World War II, heavy demands were placed on vacuum equipment manufacturers to supply large quantities of high-speed vacuum systems for numerous applications related to atomic fission. Space research, starting in the early 1960's, placed even more stringent requirements on the equipment manufacturers for fast-pumping vacuum systems for use in large space simulators. Today, devices used for atomic fusion experiments and particle accelerators continue to create a demand for large ultrahigh vacuum systems. Even though production of vacuum tubes has decreased drastically, the solid-state devices, integrated circuits and micro-chips that have replaced them require more sophisticated vacuum equipment in their processing and manufacture than did the vacuum tubes. Examples of modern electronic processing that require vacuum are plasma etching, evaporation, sputtering, ion implantation, vacuum baking, and low-pressure chemical

decomposition by pyrolysis. The list of devices and equipment that use vacuum technology in their manufacture seems endless. It includes coated lenses and plastics, high-power vacuum circuit interrupters and triggered vacuum gaps, gas discharge light sources and solid-state displays. Vacuum is also used to increase the evaporation rate of various substances without destructive heating as in the case of dehydration of frozen fruit juices, penicillin and blood plasma. The field of nanostructures has seen the move towards microminiaturisation carried to the extreme. All the evidence indicates that science and industry will continue to have a growing need for vacuum science and technology tailored to their specific requirements.

As the requirements of society become more and more reliant on electronics and microminiaturisation of devices, there will continue to be a demand for vacuum and its applications. Nature may abhor a vacuum but society relies upon it. The IUVSTA is now capable not only of encouraging the generation of new knowledge in this field but also of helping to spread this knowledge across all nations.

Figure 1. Organisational Structure of the IUVSTA



Note: The Pakistan Vacuum Society is to be admitted as the 31st member society in November 2001.

Table I. IUVSTA Member Societies

Country	Code	Year Founded	Joined IUVSTA	Left IUVSTA	Name of National Society or Committee
Australia	AUS	1966	1971		Vacuum Society of Australia
Austria	A	1969	1971		Österreichische Gesellschaft für Vakuumtechnik
Belgium*	B	1962	1962		Société Belge de Vacuologie et de Vacuotechnique Belgische Vereniging voor Vacuologie en Vacuumtechniek
Brazil	BR	1978	1980		Sociedade Brasileira de Vácuo
Bulgaria	BG	1967	1968	1995	Bulgarska Akademiya na Naukite - Natsionalen Komitet za Vakumka Fizika e Technika
Croatia	CRO	1979	1992		Hrvatsko Vakuumsko Drusto
Czechoslovakia	CS	-	1965	1995	Ceskoslovensky Narodni Komitet pro Vakuovou Fyziky, Techniku a Aplikace
Czech Republic	CZ	1993	1995		Ceská Vakuová Spolecnost
Finland	FIN	1973	1974		Suomen Tyhjiöseura
France*	F	1945	1962		Société Française du Vide
Germany* (Fed Rep Germ)	D (FRG)	1962	1962		Deutsche Vakuum-Gesellschaft (Deutsche Arbeitsgemeinschaft Vakuum)
German Democratic Republic	DDR	1977	1977	1992	Nationale Kommission Vakuum/ Grenzflachen/Dunne Schichten der DDR
Great Britain*	GB	1959	1962		British Vacuum Council
Hungary	H	1962	1965		Nemzetközi Vákuumtechnikai Unio - Magyar Nemzeti Bizottsága
India	IND	1970	1971		Indian Vacuum Society
Israel	IL	1968	1971		Israeli Society for Vacuum Technology
Italy	I	1963	1965		Associazione Italiana del Vuoto
Japan	J	1958	1968		Nihon Shinku Kyokai
Korea	KOR	1991	1992		Hankook Jinkong Hoakhoe
Mexico	MX	1982	1986		Sociedad Mexicana de Ciencia de Superficies y Vacío
Netherlands*	NL	1962	1962		Nederlandse Vacuumvereniging
Pakistan	PAK	1998	2001		Pakistan Vacuum Society
People's Republic of China	PRC	1979	1983		Chinese Vacuum Society
Poland	PL	1964	1965		Polskie Towarzystwo Pròzniowe
Portugal	P	1986	1989		Sociedade Portuguesa de Vácuo
Romania	RO	1990	1992		Societatea Romana de Vid
Russian Federation	RF	1992	1992		Russian Scientific and Technical Vacuum Society
Slovakia	SK	1993	1995		Slovenská Vákuová Spolocnost
Slovenia	SLO	1959	1992		Drustvo za vakuumsko Tehniko Slovenije
Spain*	E	1962	1962		Associación Espanola del Vacio y sus Aplicaciones
Sweden*	S	1973	1962		Svenska Vakuum Sällskapet
Switzerland*	CH	1959	1962		Schweizerische Gesellschaft für Vakuum-Physik und -Technik Societé Suisse pour la Science et la Technique du Vide
Ukraine	UKR	1993	1995		Ukrainske Vacuumne Tovaristvo
United States of America*	USA	1953	1962		American Vacuum Society
Yugoslavia*	YU	1962	1962	1992	Zveza Drustev za Vakuumsko Tehniko Jugoslavije

* Founder Member of IUVSTA.

Table II. IUVSTA Presidents and Scientific Directors

Period	President	Scientific Director
1962 – 1965	M. W. Welch (USA)	K. Diels (D)
1965 – 1968	J. Debiesse (F)	A. Venema (NL)
1968 – 1971	K. Diels (D)	A. Venema (NL)
1971 – 1974	L. E. Preuss (USA)	D. Degras (F)
1974 – 1977	A. Venema (NL)	D. Degras (F)
1977 – 1980	L. Holland (GB)	L. E. Preuss (USA)
1980 – 1983	J. M. Lafferty (USA)	L. E. Preuss (USA)
1983 – 1986	J. Antal (H)	L. E. Preuss (USA)
1986 – 1989	H. Jahrreiss (D)	A. Van Oostrom (NL)
1989 – 1992	J. L. de Segovia (E)	A. Van Oostrom (NL)
1992 – 1995	T. E. Madey (USA)	D. P. Woodruff (GB)
1995 – 1998	J. L. Robins (AUS)	U. Valbusa (I)
1998 – 2001	D. P. Woodruff (GB)	U. Valbusa (I)

Table III. IUVSTA Officers and Councillors, 1962-2001

Table III. (Part 1) Officers and Councillors (1962-1974)

Country	Office	1962-1965	1965-1968	1968-1971	1971-1974
	President	M. W. Welch (USA)	J. Debiesse (F)	K. Diels (D)	L. E. Preuss (USA)
	President-Elect	J. Debiesse (F)	K. Diels (D)	L. E. Preuss (USA)	A. Venema (NL)
	Past President	E. Thomas (B)	M. W. Welch (USA)	J. Debiesse (F)	K. Diels (D)
	Sec. General	E. Thomas (B)	E. Thomas (B)	E. Thomas (B)	E. Thomas (B)
	Treasurer	R. Mercier (CH)	R. Mercier (CH)	R. Mercier (CH)	A. Roth (IL)
	Sci. Director	K. Diels (D)	A. Venema (NL)	A. Venema (NL)	D. Degras (F)
	Sci. Secretary	E. Thomas (B)	M. Berthaud (F)	M. Berthaud (F)	M. Berthaud (F)
	Rec. Secretary	J. Yarwood (GB)			
Australia	Councillor				J. Ward
	Alt. Councillor				
Austria	Councillor				R. Dobrozemsky
	Alt. Councillor				
Belgium	Councillor	E. Thomas			R. Verheugen
	Alt. Councillor				
Brazil	Councillor				
	Alt. Councillor				
Bulgaria	Councillor			E. Djakov	E. Djakov
	Alt. Councillor				
Croatia	Councillor				
	Alt. Councillor				
Czechoslovakia	Councillor			J. Vana	R. Harman
	Alt. Councillor				
Czech Republic	Councillor				
	Alt. Councillor				
Finland	Councillor				
	Alt. Councillor				
France	Councillor	M. Berthaud	M. Berthaud	M. Berthaud	M. S. Choumoff
	Alt. Councillor			M. S. Choumoff	
Germany	Councillor	K. Diels	H. Gruber	H. Adam	M. S. Choumoff
(Fed. Rep. Germ.)	Alt. Councillor	H. Gruber		R. Ruhle	
German Democratic	Councillor				
Republic	Alt. Councillor				
Great Britain	Councillor	A. S. D. Barrett	A. S. D. Barrett	L. Holland	L. Holland
	Alt. Councillor	J. Yarwood	J. Yarwood	J. Yarwood	
Hungary	Councillor		G. Szigeti	G. Szigeti	I. P. Valko
	Alt. Councillor				
India	Councillor				P. Vijendram
	Alt. Councillor				
Israel	Councillor				M. Steiner
	Alt. Councillor				
Italy	Councillor		P. della Porta	P. della Porta	P. della Porta
	Alt. Councillor				
Japan	Councillor			H. Kumagai	H. Kumagai
	Alt. Councillor				
Korea	Councillor				
	Alt. Councillor				
Mexico	Councillor				
	Alt. Councillor				
Netherlands	Councillor				J. Los
	Alt. Councillor				
P R China	Councillor				
	Alt. Councillor				
Poland	Councillor		-	J. Groszkowski	J. Groszkowski
	Alt. Councillor				
Portugal	Councillor				
	Alt. Councillor				
Romania	Councillor				
	Alt. Councillor				
Russian Federation	Councillor				
	Alt. Councillor				
Slovakia	Councillor				
	Alt. Councillor				
Slovenia	Councillor				
	Alt. Councillor				
Spain	Councillor	L. Villena	C. S. Martin	C. S. Martin	C. S. Martin
	Alt. Councillor				
Sweden	Councillor	G. Brogren			
	Alt. Councillor				
Switzerland	Councillor	R. Mercier	R. Mercier	R. Mercier	E. B. Bas
	Alt. Councillor				
Ukraine	Councillor				
	Alt. Councillor				
USA	Councillor	-	L. E. Preuss	H. W. Schleuning	J. M. Lafferty
	Alt. Councillor				
Yugoslavia	Councillor	E. Kansky	E. Kansky	E. Kansky	E. Kansky
	Alt. Councillor				

Table III. (Part 2) Officers and Councillors (1974-1986)

Country	Office	1974-1977	1977-1980	1980-1983	1983-1986
	President	A. Venema (NL)	L. Holland (GB)	J. M. Lafferty (USA)	J. Antal (H)
	President-Elect	L. Holland (GB)	J. M. Lafferty (USA)	J. Antal (H)	H. Jahrreiss (D)
	Past President	L. E. Preuss (USA)	A. Venema (NL)	L. Holland (GB)	J. M. Lafferty (USA)
	Sec. General	H. Jahrreiss (D)	H. Jahrreiss (D)	H. Jahrreiss (DF)	M. J. Higatsberger (A)
	Treasurer	A. Roth (IL)	P. S. Choumoff (F)	J. Imachi (J)	J. P. Hengevoss (CH)
	Sci. Director	D. Degras (F)	L. E. Preuss (USA)	L. E. Preuss (USA)	L. E. Preuss (USA)
	Sci. Secretary	J. Bonnerot (F)	H. Ottosson (S)	H. Ottosson (S)	S-E. Karlsson (S)
	Rec. Secretary			J. L. Robins (AUS)	-
Australia	Councillor	M. T. Elford	D. L. Swingler	J. L. Robins	A. Simpson
	Alt. Councillor				
Austria	Councillor	R. Dobrozemsky	M. Auwarter	W. J. Chernoch	W. J. Chernoch
	Alt. Councillor				
Belgium	Councillor	J. Dupont	J. Dupont	J. Dupont	J. Dupont
	Alt. Councillor				
Brazil	Councillor			N. G. Dhere	N. G. Dhere
	Alt. Councillor				
Bulgaria	Councillor	E. Djakov	-	-	G. J. Grigorov
	Alt. Councillor				
Croatia	Councillor				
	Alt. Councillor				
Czechoslovakia	Councillor	R. Harman	L. Zobac	L. Zobac	-
	Alt. Councillor				
Czech Republic	Councillor				
	Alt. Councillor				
Finland	Councillor	P. Viitamen	P. Viitamen	M. Pessa	M. Pessa
	Alt. Councillor				
France	Councillor	M. S. Choumoff	M. Croset	M. Croset	J-P. Langeron
	Alt. Councillor				
Germany (Fed. Rep. Germ.)	Councillor	H. Adam	A. Benninghoven	A. Benninghoven	W. Bachler
	Alt. Councillor				
German Democratic Republic	Councillor		C. R. Weissmantel	C. R. Weissmantel	C. R. Weissmantel
	Alt. Councillor				
Great Britain	Councillor	J. Yarwood	C. J. Todd	D. A. King	D. A. King
	Alt. Councillor				
Hungary	Councillor	I. P. Valko	J. Antal	P. B. Barna	P. B. Barna
	Alt. Councillor				
India	Councillor	P. Vijendram	G. K. Bhide	G. K. Bhide	C. K. Shah
	Alt. Councillor				
Israel	Councillor	B. Raz	M. Steiner	Y. Shapira	Y. Shapira
	Alt. Councillor				
Italy	Councillor	T. A. Giorgi	T. A. Giorgi	A. Calcatelli	A. Calcatelli
	Alt. Councillor				
Japan	Councillor	H. Kumagai	J. Imachi	G. Tominaga	Y. Tuzi
	Alt. Councillor				
Korea	Councillor				
	Alt. Councillor				
Mexico	Councillor				
	Alt. Councillor				
Netherlands	Councillor	A. van Oostrom	A. van Oostrom	M. J. van der Wiel	W. F. Van der Weg
	Alt. Councillor				
P R China	Councillor				Z-Y. Hua
	Alt. Councillor				
Poland	Councillor	-	-	-	-
	Alt. Councillor				
Portugal	Councillor				
	Alt. Councillor				
Romania	Councillor				
	Alt. Councillor				
Russian Federation	Councillor				
	Alt. Councillor				
Slovakia	Councillor				
	Alt. Councillor				
Slovenia	Councillor				
	Alt. Councillor				
Spain	Councillor	C. S. Martin	J. L. de Segovia	J. L. de Segovia	M. Duart
	Alt. Councillor				
Sweden	Councillor	H. Ottosson	S-E. Karlsson	S-E. Karlsson	R. Jacobsson
	Alt. Councillor				
Switzerland	Councillor	E. B. Bas	J. P. Hengevoss	J. P. Hengevoss	W. Groebler
	Alt. Councillor				
Ukraine	Councillor				
	Alt. Councillor				
USA	Councillor	J. M. Lafferty	M. H. Francombe	M. H. Francombe	L. C. Beavis
	Alt. Councillor				
Yugoslavia	Councillor	F. Lah	F. Lah	J. Gasperic	J. Gasperic
	Alt. Councillor				

Table III. (Part 3) Officers and Councillors (1986-2001)

Country	Office	1986-1989	1989-1992	1992-1995	1995-1998	1998-2001
	President	H. Jahrreiss (D)	J. L. de Segovia (E)	T. E. Madey (USA)	J. L. Robins (AUS)	D. P. Woodruff (GB)
	President-Elect	J. L. de Segovia (E)	T. E. Madey (USA)	J. L. Robins (AUS)	D. P. Woodruff (GB)	M-G Barthes-Labrousse(F)
	Past President	J. Antal (H)	H. Jahrreiss (D)	J. L. de Segovia (E)	T. E. Madey (USA)	J. L. Robins (AUS)
	Sec. General	T. E. Madey (USA)	J. S. Colligon (GB)	J. S. Colligon (GB)	J. S. Colligon (GB)	W. D. Westwood (USA)
	Treasurer	J. Hengevoss (CH)	J. Hengevoss (CH)	R. Dobrozemsky (A)	R. Dobrozemsky (A)	H. Wahl (CH)
	Sci. Director	A. Van Oostrom (NL)	A. Van Oostrom (NL)	D. P. Woodruff (GB)	U. Valbusa (I)	U. Valbusa (I)
	Sci. Secretary	S-E. Karlsson (S)	D. P. Woodruff (GB)	U. Valbusa (I)	M-G Barthes-Labrousse(F)	M. Sancrotti (I)
	Rec. Secretary	J. S. Colligon (GB)	J. H. Leck (GB)	J. H. Leck (GB)	J. H. Leck (GB)	R. J. Reid (GB)
Australia	Councillor	A. Simpson	D. L. Swingler	D. L. Swingler	D. J. O'Connor	D. J. O'Connor
	Alt. Councillor		J. L. Robins	D. J. O'Connor	A. Morton	A. Morton
Austria	Councillor	W. Husinsky	W. Husinsky	M. Leisch	M. Leisch	P. Varga
	Alt. Councillor	R. Dobrozemsky	R. Dobrozemsky	W. Husinsky	W. Husinsky	M. Leisch
Belgium	Councillor	R. Caudano	J. Vennik	J. Vennik	J-J. Pireaux	J-J. Pireaux
	Alt. Councillor	J. Dupont	J. Dupont	J. Dupont	J. Dupont	R. de Gryse
Brazil	Councillor	R. A. Douglas	G. de Matos Gualberto	R. A. Douglas	R. A. Douglas	D. Pereira
	Alt. Councillor	N. G. Dhere	R. A. Douglas	C. de Mouro Neto	C. de Mouro Neto	R. A. Douglas
Bulgaria	Councillor		G. Grigorov			
	Alt. Councillor		I. Martev			
Croatia	Councillor			H. Zorc	M. Milun	N. Radic
	Alt. Councillor			M. Milun	H. Zorc	P. Pervan
Czechoslovakia	Councillor	R. Harman	Z. Hulek	Z. Hulek		
	Alt. Councillor			P. Lukac		
Czech Republic	Councillor				Z. Hulek	P. Hedbavny
	Alt. Councillor				F. Tesar	P. Repa
Finland	Councillor		E. Ristolainen	E. Ristolainen	E. Ristolainen	E. Ristolainen
	Alt. Councillor		R. Nieminen	J. Molarius	J. Koskinen	J. Koskinen
France	Councillor	J-P. Langeron	M. Baudron	M. Croset	M. Croset	J-P. Duraud
	Alt. Councillor	S. Choumoff	M. S. Choumoff	J-P. Langeron	J. Leclerc	G. Damamme
Germany	Councillor	W. Bachler	A. Benninghoven	H. Oechsner	H. Hoffmann	H. Hoffmann
(Fed. Rep. Germ.)	Alt. Councillor	H. Adam	W. Bachler	W. Bachler	W. Bachler	O. Ganschow
German Democratic	Councillor	C. R. Weissmantel	G. Leonhardt			
Republic	Alt. Councillor	G. Leonhardt	M. Krohn			
Great Britain	Councillor	D. P. Woodruff	R. W. Joyner	R. W. Joyner	G. J. Davies	R. J. Reid
	Alt. Councillor	J. H. Leck	J. H. Leck	G. J. Davies	M. A. Chesters	M. A. Chesters
Hungary	Councillor	I. Berecz	L. Guczi	L. Guczi	G. Radnoczi	G. Radnoczi
	Alt. Councillor	J. Gyulai	J. Gyulai	G. Radnoczi	L. Kover	L. Kover
India	Councillor	P. Vijendran	K. L. Chopra	A. K. Gupta	A. S. Raja Rao	A. S. Raja Rao
	Alt. Councillor	J. K. N. Sharma	A. K. Gupte	R. Vijayraghavan	A. V. Sapre	A. V. Sapre
Israel	Councillor	E. Grunbaum	E. Grunbaum	R. Tenne	Y. Siderer	G. Golan
	Alt. Councillor	Y. Shapira	Y. Shapira	Y. Shapira	R. Tenne	E. Grunbaum
Italy	Councillor	U. Valbusa	U. Valbusa	B. Ferrario	M. Sancrotti	M. Anderle
	Alt. Councillor	M. G. Cattania	C. Misiano	P. Picozzi	M. Anderle	M. Grazia Betti
Japan	Councillor	Y. Tuzi	G. Horokoshi	G. Horokoshi	G. Horokoshi	K. Nakayama
	Alt. Councillor	G. Horokoshi	Y. Tuzi	K. Nakayama	K. Nakayama	A. Yoshimori
Korea	Councillor			T. S. Park	T. S. Park	T. S. Park
	Alt. Councillor			J. C. Kim	C. J. Kim	C. J. Kim
Mexico	Councillor	J. L. Pena	J. Rickards	C. Falcony	C. Falcony	O. Zelaya-Angel
	Alt. Councillor	J. Rickards	I. Hernandez-Calderon	J. M. Dominguez	O. Zelaya-Angel	M. Lopez
Netherlands	Councillor	J. F. Van der Veen	J. F. Van der Veen	A. W. Kleyn	A. W. Kleyn	J-W. Niemantsverdriet
	Alt. Councillor	W. F. Van der Weg	M. P. A. Viegers	F. H. M. P. Habraken	F. H. M. P. Habraken	A. W. Kleyn
P R China	Councillor	Z-Y. Hua	Z-Y. Hua	Z-Y. Hua	Z-Y. Hua	Z-Y. Hua
	Alt. Councillor		S-J. Pang	S-J. Pang	S-J. Pang	S-J. Pang
Poland	Councillor		J. Sobanski	M. Szymonski	M. Szymonski	M. Herman
	Alt. Councillor		A. Halas	M. Herman	M. Herman	A. Ciszewski
Portugal	Councillor		M. I. Calado Ferreira	M. I. Calado Ferreira	A. M. C. Mouthino	A. M. C. Mouthino
	Alt. Councillor		M. Aurea Cunha	A. M. C. Mouthino	M. I. Calado Ferreira	M. I. Calado Ferreira
Romania	Councillor			G. Marin	G. Marin	
	Alt. Councillor			M. Vlad	G. Olaru	
Russian Federation	Councillor			V. A. Grazhulis	V. A. Grazhulis	P. K. Kashkarov
	Alt. Councillor			V. F. Kuleshov	V. G. Stepaniants	D. V. Bykov
Slovakia	Councillor				M. Vesely	M. Vesely
	Alt. Councillor				P. Lukac	P. Lukac
Slovenia	Councillor			M. Jenko	M. Jenko	A. Pregelj
	Alt. Councillor			A. Zalar	A. Zalar	M. Jenko
Spain	Councillor	J. Soria	J. Soria	J. Soria	J. L. de Segovia	J. L. de Segovia
	Alt. Councillor	J. Pajares	J. Pajares	C. Ocal	J. M. Albella	J. Soria
Sweden	Councillor	R. Jacobsson	A. Flodström	A. Flodström	L. Westerberg	L. Westerberg
	Alt. Councillor	A. Flodström	J-E. Sundgren	J-E. Sundgren	J-E. Sundgren	L. Hultman
Switzerland	Councillor	J. P. Decosterd	J. P. Decosterd	H. Diletti	H. Wahl	U. Wälchli
	Alt. Councillor	W. Groebler	H. Diletti	H. Wahl	J. Ramm	A. Dommann
Ukraine	Councillor				V. T. Cherepin	V. T. Cherepin
	Alt. Councillor				A. G. Naumovets	A. G. Naumovets
USA	Councillor	L. C. Beavis	N. R. Whetten	N. R. Whetten	J. W. Rogers Jr	J. W. Rogers Jr
	Alt. Councillor	J. A. Thornton	J. E. Greene	J. E. Greene	G. E. McGuire	G. E. McGuire
Yugoslavia	Councillor	A. Zalar	A. Zalar			
	Alt. Councillor	M. Jenko	M. Jenko			

Table IV. IUVSTA Executive Council Meetings

Table IV. (Part 1) ECM (1962-1977)

ECM	President	Date	Place
		GM1 (1962)	Brussels, Belgium
1	Welch	8 December 1962	Brussels, Belgium
2		7 June 1963	Frankfurt am Main, Germany
3		29 June 1964	Saclay, France
3(cont.)	30 June - 2 July	1964 Paris, France	
4		3-4 December 1964	Brussels, Belgium
5		29 June 1965	Stuttgart, Germany
		GM2 (1965)	Stuttgart, Germany
6	Debiesse	1 July 1965	Stuttgart, Germany
7		4 November 1965	Saclay, France
8		28 September 1966	Zagreb, Yugoslavia
9		16 March 1967	Rome, Italy
10		5 November 1967	Strasbourg, France
11		16 April 1968	Manchester, UK
		GM3 (1968)	Manchester, UK
12	Diels	6 April 1968	Manchester, UK
13		19 October 1968	Dijon, France
*(No quorum)		31 March 1969	Cologne, Germany
14		21 September 1969	Berlin, Germany
15		5-6 March 1970	London, UK
16		8 October 1970	Cannes, France
17		13 May 1971	Portoroz, Yugoslavia
18		10 October 1971	Boston, USA
		GM4 (1971)	Boston, USA
19	Preuss	14 October 1971	Boston, USA
20		18 May 1972	Venice, Italy
*(No quorum)		16 October 1972	Scheveningen, Netherlands
21		26 January 1973	London, UK
22		29 September 1973	Madrid, Spain
23		30 January 1974	London, UK
24		25 March 1974	Kyoto, Japan
		GM5 (1974)	Kyoto, Japan
25	Venema	29 March 1974	Kyoto, Japan
26		2-3 October 1974	Sofia, Bulgaria
27		21-22 March 1975	Münster, Germany
28		28-29 October 1975	Philadelphia, USA
29		9 April 1976	Amsterdam, Netherlands
30		4 September 1976	Uppsala, Sweden
31		1 April 1977	London, UK
32		13 September 1977	Vienna, Austria

Table IV. (Part 2) ECM (1977-1992)

ECM	President	Date	Place
		GM6 (1977)	Vienna, Austria
33	Holland	16 September 1977	Vienna, Austria
34		30 March 1978	Amsterdam, Netherlands
35		15 September 1978	Loughborough, UK
36		20-22 March 1979	Budapest, Hungary
37		9-11 September 1979	Nice, France
38		13 April 1980	Bath, UK
39		24 September 1980	Cannes, France
		GM7 (1980)	Cannes, France
40	Lafferty	26 September 1980	Cannes, France
41		27-28 February 1981	Dresden, Germany
42		13-14 September 1981	Münster, Germany
43		7-8 April 1982	Florence, Italy
44		16 August 1982	Tampere, Finland
45		21-22 May 1983	Vaduz, Liechtenstein
46		28 September 1983	Madrid, Spain
		GM8 (1983)	Madrid, Spain
47	Antal	30 September 1983	Madrid, Spain
48		1 February 1984	Clearwater Beach, USA
49		12 August 1984	Täby, Sweden
50		22-23 April 1985	Princton, USA
51		5-6 October 1985	Debrecen, Hungary
52		31 May - 1 June 1986	Spitz, Austria
53		26 October 1986	Baltimore, MD, USA
		GM9 (1986)	Baltimore, MD, USA
54	Jahrreiss	31 October 1986	Baltimore, MD, USA
55		14-16 March 1987	Strasbourg, France
56		4-6 December 1987	New Delhi, India
57		16-18 April 1988	Hale, Cheshire UK
58		23-25 September 1988	Portoroz, Yugoslavia
59		14-16 April 1989	San Diego, Calif., USA
60		23-24 September 1989	Cologne, Germany
		GM10 (1989)	Cologne, Germany
61	de Segovia	29 September 1989	Cologne, Germany
62		17-18 March 1990	Dresden, Germany
63		29-30 September 1990	Avila, Spain
64		9-10 February 1991	Clearwater Beach, USA
65		29-30 September 1991	Vienna, Austria
66		8-10 May 1992	Antibes, France
67		10-11 October 1992	The Hague, Netherlands

Table IV. (Part 3) ECM (1992-2001)

ECM	President	Date	Place
		GM11 (1992)	The Hague, Netherlands
68	Madey	16 October 1992	The Hague, Netherlands
69		26-28 March 1993	Bolzano, Italy
70		19-21 November 1993	Orlando, Florida, USA
71		17-19 June 1994	Saltsjöbaden, Sweden
72		23-25 September 1994	Krakow, Poland
73		7-9 April 1995	Brdo, Slovenia
74		24 September 1995	Yokohama, Japan
		GM12 (1995)	Yokohama, Japan
75	Robins	29 September 1995	Yokohama, Japan
76		26-28 April 1996	San Diego, Calif., USA
77		20-22 September 1996	Segovia, Spain
78		23-25 May 1997	Debrecen, Hungary
79		21-23 November 1997	Port Stephens, Australia
80		21-23 March 1998	Bratislava, Slovakia
81		28-30 August 1998	Stratford-upon-Avon, UK
		GM13 (1998)	Birmingham, UK
82	Woodruff	4 September 1998	Birmingham, UK
83		9-21 February 1999	Saillon, Switzerland
84		3-5 September 1999	Cancun, Mexico
85		31 March-2 April 2000	Namur, Belgium
86		7-9 October 2000	Portoroz, Slovenia
87		14-16 March 2001	Brighton, UK
88		26-28 October 2001	San Francisco, USA
		GM14 (2001)	San Francisco, USA
89	Barthés-Labrousse	2 November 2001	San Francisco, USA

Table V. IUVSTA Divisions

Division	Initials	Year Founded	Original Chairman
Surface Science	SS	1980	A. van Oostrom (NL)
Thin Film	TF	1980	F. Abeles (F)
Vacuum Science	VS	1980	K. Poulter (GB) W. Bächler (D)
Electronic Materials and Processing	EMP	1980	M. Francombe (USA) M. Croset (F)
Plasma Science and Technique (originally Fusion)	PST	1983	M. Kaminsky (USA)
Vacuum Metallurgy	VM	1986	R. Bunshah (USA)
Applied Surface Science	ASS	1989	C. J. Powell (USA)
Nanometer Structures	NS	1995	J. S. Murday (USA)

Table VI. IOVST and IUVSTA International Congresses and Conferences

Year	Location	Meeting
1958	Namur	1st International Congress on Vacuum Technology
1961	Washington	2nd International Congress on Vacuum Science and Technology 8th National Vacuum Symposium (AVS)
1965	Stuttgart	3rd International Vacuum Congress
1968	Manchester	4th International Vacuum Congress
1971	Boston	5th International Vacuum Congress 1st International Conference on Solid Surfaces 18th National Vacuum Symposium (AVS)
1974	Kyoto	6th International Vacuum Congress 2nd International Conference on Solid Surfaces
1977	Vienna	7th International Vacuum Congress 3rd International Conference on Solid Surfaces
1980	Cannes	8th International Vacuum Congress 4th International Conference on Solid Surfaces 3rd European Conference on Surface Science
1983	Madrid	9th International Vacuum Congress 5th International Conference on Solid Surfaces
1986	Baltimore	10th International Vacuum Congress 6th International Conference on Solid Surfaces 33rd AVS National Symposium
1989	Cologne	11th International Vacuum Congress 7th International Conference on Solid Surfaces
1992	The Hague	12th International Vacuum Congress 8th International Conference on Solid Surfaces
1995	Yokohama	13th International Vacuum Congress 9th International Conference on Solid Surfaces
1998	Birmingham	14th International Vacuum Congress 10th International Conference on Solid Surfaces 5th International Conference on Nanometre Science and Technology 10th International Conference on Quantitative Surface Analysis
2001	San Francisco	15th International Vacuum Congress 11th International Conference on Solid Surfaces 48th AVS International Symposium

Table VII. IUVSTA Visual Aids Modules

Part 1.	Fundamentals of Vacuum	41 transparencies, 84 pages of text.
Part 2.	Vacuum Measurements & Gauges	48 transparencies, 53 pages of text.
Part 3.	Gas Transfer Pumps	68 transparencies, 132 pages of text.
Part 4.	Residual Gas Analysers	47 transparencies, 68 pages of text.
Part 5.	Thin Film Deposition*	36 transparencies, 79 pages of text.
Part 6.	Leak Detection	39 transparencies, 58 pages of text.
Part 7.	History of Vacuum Science	56 transparencies, 59 pages of text.
Part 8.	Capture Pumps	77 transparencies, 43 pages of text.
Part 9.	Vacuum Systems	39 transparencies, 40 pages of text.
Part 10.	Vacuum Materials	38 transparencies, 40 pages of text.
Part 11.	Electron Spectroscopies	33 transparencies, 41 pages of text.

* Part 5 is also available in electronic format on CD ROM with 128 PowerPoint© slides.

Table VIII. Welch Scholars

Year	Name	Country of Origin	Country of Study
1969	J. Lopez-Sancho	Spain	USA
1970	M. Vesely	Czechoslovakia	USA
1971	S. Tabata	Japan	France
1972	E. Rieger	Hungary	Netherlands
1973	J. Czyzewski	Poland	USA
1974	O. Christensen	Denmark	France
1975	S. M. Ojha	India	USA
1976	H. Urbankova	Czechoslovakia	USA
1977	H. Kezuka	Japan	Germany
1978	L. Verheij	Netherlands	United Kingdom
1979	P. I. Cohen	USA	Not Used
1980	J. A. Kolaczkiewicz	Poland	Germany
1981	C. V. Dharmadhikari	India	USA
1982	P. A. Dowben	USA	Germany
1983	Antoni Ciszewski	Poland	USA
1984	Catherine Foley	Australia	USA
1985	Jan Paul	Sweden	United Kingdom
1986	Yumin Gao	China	France
1987	S. N. Sahu	India	Australia
1988	G. M. Sundaram	USA	United Kingdom
1989	Suda Uthanna	India	Germany
1990	Lars G. Hultman	Sweden	USA
1991	M.-A. Hassan	Iraq/Sweden	USA
1992	Jose del Barco	Argentina	France
1993	Wu Hong	China	USA
1994	Marlin Foltin	Slovakia	USA
1995	Wei Yang	China	USA
1996	Helmut Öfner	Austria	USA
1997	Sasha Gorer	Israel	USA
1998	M. Keidar	Israel	USA
1999	She Guan Wang	China/Israel	USA
2000	Erik Svedberg	Sweden	USA
2001	Christine A. Nicoll	Canada	United Kingdom