*Automatica*, Vol. 5, pp. 697–703. Pergamon Press, 1969. Printed in Great Britain.

# IFAC, from idea to birth*

R. OLDENBURGER†

*Formation of an international, scientific organization is not an easy undertaking, but with hard work, cooperation, and understanding of a few dedicated individuals, international harmony can be obtained in spite of political differences.*

AT THE invitation of the large German mechanical and electrical engineering societies Verein Deutscher Ingenieure (VDI) and the Verband Deutscher Electrotechniker (VDE) and the Germany government, I gave the official opening address at the Regelungstechnik (Automatic Control) Congress held in Heidelberg, Germany, September 25–29, 1956. The meeting was organized by the joint automatic control committee of the VDI and VDE, called the VDI/VDE Fachgruppe Regelungstechnik. Dr. G. Ruppel was secretary of this joint committee, actually executive secretary, and was thus directly responsible for the Heidelberg meetings. After I arrived at Heidelberg I learned from him that there were eight such overlapping meetings organized by European countries scheduled to be held that same year, 1956. Although foreign participants were invited these were actually national rather than international meetings. I considered the idea of holding eight such meetings in Europe in the same year ridiculous. If a control expert really wants to keep up on the newest information he should attend all such meetings. This is so time consuming how can he get his work done back home? This is also very expensive. If he stays home and misses a meeting he may fail to obtain information that may be of immediate and utmost concern to him. I mentioned these thoughts to Dr. Ruppel, September 26, when I met him in one of the halls of the University of Heidelberg. I told him that I felt that there should be an international body or society responsible for organizing international congresses on a regular basis which would make many of these national meetings superfluous, thus hopefully drastically cutting down the number of meetings a control expert would need to attend to keep up on his field. Dr. Ruppel told me that Professor Victor Broïda of France had indicated to him an interest in holding international as well as national meetings.

Dr. Ruppel suggested that we have a meeting the next day, of representatives from as many countries as were present at Heidelberg and that I should explain my ideas at this meeting. To keep the meeting efficient, we decided that the attendance should be kept down to one man from each country. We assumed that there might be a great deal of discussion and that this could best be managed by a small group. Dr. Ruppel immediately proceeded to arrange the meeting for the next day, September 27, while I went to my hotel to write up a proposal so that I could present the attendees with a definite concrete program and a resolution that I thought they would be willing to approve. Until then I had given the matter no serious thought and had only some vague rough ideas on the subject.

The meeting was held September 27, as planned and was attended by the following:

| | |
|---|---|
| Otto Grebe, Germany | J. M. L. Jansen, Netherlands |
| G. Ruppel, Germany | J. G. Balchen, Norway |
| G. Müller, Germany | J. R. Jensen, Denmark |
| H. Kindler, Germany | P. J. Nowacki, Poland |
| W. Pohlenz, Germany | G. Evangelisti, Italy |
| Rufus Oldenburger, U.S.A. | J. Boas Popper, Israel |
| A. Tustin, Gt. Britain | Ph. Passau, Belgium |
| J. F. Coales, Gt. Britain | V. Broïda, France |
| J. H. Westcott, Gt. Britain | M. Ajnbinder, Belgium |
| A. M. Letov, U.S.S.R. | L. V. Hamos, Sweden |
| H. Marzendorfer, Austria | S. Vladimir, CSR (Czechoslovakia) |
| H. Mesarovic, Yugoslavia | B. Hanus, CSR |
| | K. Izawa, Japan |

Dr. Ruppel introduced me and I proposed the following points:

1. That we organize an international organization to be called something like the "International Federation of Automatic Control", to be abbreviated, IFAC.

2. That this federation be modeled along the lines of the United Nations with nations as members rather than individuals.

* Received 19 August, 1969. This paper was written at the request of H. Chestnut, chairman of the Automatica Editorial Board.

† Director, Automatic Control Center School of Mechanical Engineering, Purdue University, Lafayette, Indiana.

3. With countries as members rather than individuals, financial support for the activities of the federation should be much easier to obtain. Also, publicity regarding federation activities should reach more people in a country if the country is responsible for its dissemination.

4. Each country would be represented by a national committee which would be the actual member of IFAC.

5. IFAC would restrict its activities to two tasks only. Firstly, would be the organization of an international congress at regular intervals. I urged that we follow the custom of the International Mathematical Congresses and those of Applied Mechanics by meeting once every four years. This would give ample time to organize sessions and raise money before each congress. Every four years there would likely be some really worthwhile new developments to report, making the holding of a congress for a great many attendees desirable.

Secondly, IFAC could serve as a clearing medium through which information about activities in one country or more than one country could be transmitted to the others.

6. By initially severely restricting the scope of IFAC activities we should be able to keep costs down, making it possible for poor countries to participate, and we should be able to do a much better job than if we spread ourselves over several functions.

After some discussion I recommended the following resolution which was unanimously adopted by the meeting participants and signed by all present:

"The undersigned favor the founding of an international federation of automatic control and declare themselves prepared to work in their respective countries for the organization of such a union. This federation is to have the following objectives:

1. To facilitate the interchange of information in automatic control and to promote progress in this field.

2. To organize international congresses in automatic control."

Those present at the meeting promised to go back to their countries and promote the idea of an international federation which would organize automatic control congresses.

When I found that some countries were represented at the meeting by more than one representative, contrary to our original plan, and bearing in mind the dominant role played by the United States in automatic control and the vast size of the United States compared with most of the other countries, I was somewhat embarrassed by the fact that I was the only attendee from the U.S.A. The next day I suggested to Dr. Ruppel that we treat Harold Chestnut as if he had attended the meeting and have him sign the resolution, which he did. He was one of several Americans at Heidelberg. I had previously been much impressed by Dr. Chestnut's administrative ability, stature as an engineering scientist and dynamic personality, and felt that he could play a very important role that I visualized for him later in the organization of IFAC, a role that fortunately for IFAC he did accept when it was finally proposed to him. I shall cover this role later.

The next day, September 28, at the suggestion of Dr. Harold Chestnut a provisional committee was formed to promote the organization of the federation. This committee was composed of:

| | |
|---|---|
| Broïda (France) | Nowacki (Poland) |
| Grebe (Germany) | Oldenburger (U.S.A.) |
| Letov (U.S.S.R.) | Welbourn (United Kingdom) |

Ruppel (Germany), Secretary

The provisional committee met September 29. At the time I had a fair reading knowledge of seven modern languages so that I could read letters in these languages without the need of a dictionary when they arrived, a facility which was most helpful in treating the voluminous correspondence regarding IFAC that came in during the early days while it was being organized. However, my speaking knowledge of these languages left much to be desired, my grammar being generally atrocious. The other committee members and I were amazed at the marvellous facility Professor Broïda displayed in speaking English, French, German and Russian, which were clearly going to be the main languages of communication between the organizers of IFAC. The provisional committee immediately elected Victor Broïda chairman as the obvious choice. We were extremely fortunate to have a chairman who could communicate clearly and instantly in whatever language was indicated at the moment. He was a hard worker who did his task with the utmost efficiency and diplomacy.

The French already had the equivalent of a national automatic control committee in l'Association Francaise de Régulation et d'Automatisme, abbreviated AFRA. Professor Broïda came to Heidelberg as an individual and not an official delegate from AFRA, and I believe that this and the fact that he would not be officially representing AFRA at forthcoming sessions of the IFAC committees made him take a strong position in favor of a federation with individuals as members rather than societies or national committees. His point was well taken in that the individual should be important above all and that maximum freedom

and independence of the individual is desirable. This system had worked well in the case of the mathematicians, so that there was a precedent. As scientists we should be citizens of the world and be able to act at meetings according to our own consciences and convictions and should not be bound or restricted in behaviour by prior commitments to governments or other organizations. I agreed very strongly with Professor Broïda's philosophy, but was convinced that it would be vastly easier to raise money for IFAC if we could go directly to member countries rather than individuals. In my past experience in the United States I had found it much simpler to raise large sums from companies than from individuals. Thus practical considerations made me urge the membership of nations or national committees rather than individuals. This point of view was adopted by the provisional committee. However, the members hoped that wherever possible the national committee would not be a government committee, but completely independent from the government in no way subject to the dictates of this government. We wanted IFAC to be a completely non-political organization, although we did hope that governments would contribute financially to these committees and IFAC, but with no strings attached.

We all resolved to go back to our respective countries and try to get the societies active in automatic control in each country to cooperate to form a national committee for that country. Due to the special situation in the Americas I was supposed to try to form a committee for all of North and South America, a sort of a local international rather than national committee, but this would be on a par with the national committees which would be members of IFAC. In the meantime Professor Broïda, others, and myself were to contact leaders in all other countries not represented on the provisional committee, where these countries were really active in automatic control, to urge them to form national committees which would become members of IFAC when IFAC was formed. Professor Broïda did almost all of this work and very ably, much helped by his fabulous knowledge of foreign languages.

Our federation was to encompass both open and closed loop systems. The word "system" was not yet a fad, but when I proposed IFAC I was really thinking of a federation devoted to the science and engineering of systems. I felt that the expression "automatic control" covered all systems, because all systems involve variables, and one is concerned with keeping these variables at constant or given varying values. This amounts to concern about control of these variables even though no actual automatic control devices may be intentionally or otherwise incorporated in these systems. I was thinking of biological, economic, political as well as engineering systems so that I pictured the scope of IFAC as a very broad one. I further pictured a federation heavily weighted in the direction of the practical and fervently hoped that automatic control would not go the way of applied mechanics, which is no longer applied, but has become a mathematical discipline.

At the time I felt that every automatic control paper published in an engineering journal, if it contained new mathematical theory, should give experimental or other examples to show that hardware would be improved by its application over the known state of the art, so that society would profit financially and otherwise. Thus I felt that the author was on the spot and that it was always up to him to establish the practical value of his work. I spent the first part of my professional career as a professor of pure mathematics, specializing in modern algebra, and was a very active mathematical researcher for several years before I switched to engineering in 1941. When I entered industry I had to completely transform my value system. I had to judge new developments in industry on the basis of their immediate or potential practical value not on mathematical elegance. Thus, for example, in 1942 during World War II I tried to find out whether or not our aircraft propeller governors were optimal in the sense of minimizing the maximum engine speed error and other quantities in response to a sudden disturbance such as a wind gust. Actually, these governors were used on fighter airplanes and the U.S. government wanted them to be as manœuverable as possible to save the lives of a maximum number of fighter pilots in combat.

From the system differential equations I was able to obtain the optimal transients and found that the governors in actual use were almost optimal, i.e. suboptimal, and the improvement that could be obtained by making them better was not worthwhile. At this point the mathematician in me wanted me to drop everything and see if the general mathematical optimal control problem was capable of solution. However, I could not justify the time such a study would take, and did not return to the subject until 1949 when a technique for solving the problem, at least in its simplest form, occurred to me. The optimal control theory I published in my 1966 Holt, Rinehart and Winston book entitled "Optimal Control" I actually completed in 1949 and 1950. At that time I could justify essentially devoting a whole year to this theory because I could demonstrate that substantial improvement of control performance could be obtained in certain situations and mankind could benefit accordingly.

I expected that the papers that would be presented at IFAC Congresses would be theoretical but combined with the application variety described above with heavy emphasis on engineering examples. I also hoped that the author would be given a field day in presenting his paper, in that most of the meetings would be devoted to such presentations with very little time spent on discussion, as is the case at meetings of mathematicians. I pictured fifteen or twenty minute papers with two or three minutes for discussion.

At that time I hoped that IFAC would sponsor no other meetings except a congress once every four years. I did not believe that IFAC committees, other than those needed for the congresses, would be very effective. I did not see how committees, such as theory, could get much done by mail and that getting such committees together frequently to get some real work done would be very expensive and unjustified. Therefore, I hoped that such committees would not be created.

After my return to the United States I asked Thomas Marshall, Jr. of the American Society of Mechanical Engineers (ASME) to call a meeting of representatives of major USA engineering societies involved in automatic control at which I could explain what transpired at Heidelberg. This he was willing to do and he arranged a meeting in New York City for November 29, 1956 to discuss the formation of what I arbitrarily called "The North American Control Committee". The participants were invited officially to the meeting by J. W. Barker, 1956 president of the ASME. The meeting was attended by Marshall, W. E. Vannah who served as secretary, and myself in the capacity of chairman, representing the ASME, W. R. Clark of the American Institute of Electrical Engineers (AIEE), J. T. Vollbrecht and W. H. Kushnick of the Instrument Society of America (ISA), G. D. Evans and R. L. Denning of the Society of Automotive Engineers (SAE), and J. C. Lozier of the Institute of Radio Engineers (IRE). I reported to this group that I had obtained U.S. State Department approval for our cooperation with the proposed federation and that the ASME was already on record as favoring the principle. To date Japanese, French, Norwegian, Swiss and Polish technical groups had pledged support. Belgium and British technical societies requested an invitation from a North American technical group to participate. J. W. Barker, ASME president, was willing to extend this invitation if he had the support of delegates from the AIEE, IRE, ISA, SAE, IAS (Institute of Aeronautical Sciences) and the Engineering Institute of Canada. The reason for not including South America in the American committee was that at that time there was no known, real activity in automatic control in South America. All present voted to recommend to their respective societies the appointment of a delegate and alternate to the North American Control Committee by February 1.

On March 21, 1957 the North American Control Committee met in Chicago, Illinois. At this time the committee membership was composed of the AIEE, ASME, IRE, ISA, and the AIChE, the American Institute of Chemical Engineers. The meeting was attended by Harold Chestnut, John Lozier, Joel Hougen and Rufus Oldenburger as AIEE, IRE, AIChE and ASME delegates respectively, and Gerhart Heuman, Gene D. Grabbe, Norman H. Ceaglske and W. E. Vannah as AIEE, IRE, AIChE and ASME alternates respectively. Prior to the March 21st meeting I had written a constitution for IFAC, at the request of the IFAC Provisional Committee, worked out in what I felt was sufficiently complete detail. At this meeting the North American Control Committee approved the presentation of this constitution to the IFAC Provisional Committee as a committee proposal. The committee made a major change in my write-up, as well as adding a great many new clauses, namely the abbreviation of IFAC to IFC (International Federation of Control), a change that did not make me happy but one that I was willing to live with. The committee decided that it would be willing to pay annual dues to IFAC.

The Instrument Society of America joined the North American Control Committee with Robert Jeffries as delegate and John Johnston, Jr. as alternate. The name of the committee was soon changed to the American Automatic Control Council (AACC). I was elected president and served in this capacity until the end of the first congress of IFAC held in Moscow in 1960.

J. W. Barker did send his invitation to the leading British engineering societies and they decided to support the new federation.

While I was promoting IFAC in the United States the Europeans were also active. December 18 and 19, 1956, Professor Broïda met with French, Belgium, Italian, Dutch, Swiss and German representatives. By this time he had worked out a very broad program of activities to be undertaken by the new federation. Dr. Ruppel proposed that the objectives be severely limited as I had suggested, and as reported to me this appeared to be the concensus of the majority present. It was felt that the complicated organization envisioned by Dr. Broïda would be vastly too expensive. The thought of several attendees was that each congress should be financed and arranged by the host country, and that there should be a permanent secretariat, which might be unpaid, situated in one fixed city to which all inquires about IFAC could

be referred. Much of the Paris meeting was devoted to terminology.

It was decided to hold meetings of the Provisional Committee in Düsseldorf, Germany at the offices of the VDI/VDE Fachgruppe. These finally took place April 25–27, 1957 with the following members present:

1. Professor V. Broïda (France), as chairman
2. Dr. O. Grebe (Germany) until the night of April 26
3. Professor A. M. Letov (USSR) accompanied by B. N. Naumov and by Ing. V. A. Račejev, from April 26 a.m.
4. Professor P. Nowacki (Poland)
5. Professor R. Oldenburger (USA) until 2 p.m., April 27
6. Mr. W. Bamford (UK) substituting for D. B. Welbourn, until the night of April 26.

Also present were Dr. G. Ruppel (Germany) as secretary assisted by Mr. G. Müller.

The sessions were held in English with Russian translation after the Russians arrived. Professor Broïda announced that I had come with a constitution I had prepared, for a federation with very limited objectives, and that he had a constitution he had written up for an organization with many more objectives. He announced that his constitution had the support of Czechoslovakia, France, Poland, the Soviet Union and Sweden and that he had received some favorable comments from Belgian and Italian delegates to the December 18, 1956 meeting in Paris. He announced that preference for my version had been given by Austria, Denmark, Germany, Holland, Japan, Norway, Switzerland, United States and Yugoslavia. After some discussion the provisional committee voted to use my constitution as the basis of discussion, and that an official provisional committee version would be compiled during the meetings by modifying my version where necessary. Thus it was agreed to have a federation with limited objectives which was relatively inexpensive to operate. It was decided to call the organization the "International Federation of Automatic Control", abbreviated IFAC. It was felt that the word control alone might mean military or political control or something else undesirable. It also was decided to have a secretariat located preferably in Switzerland, probably Geneva, or Paris. Actually, it turned out in the end that it was most convenient to let the secretariat stay in Düsseldorf with Dr. G. Ruppel as General Secretary of IFAC.

When the committee took up the constitution I was astonished at the big difference between English English and American English, at least in the precise legal meanings of words. Mr. Bamford was most helpful in rewriting parts of the constitution to meet the requirements of the English English. The Provisional Committee decided that the official organizational meeting of IFAC would take place September 11 and 12 in Paris, France, where all participating countries would be represented, a "final" constitution would be adopted, and officers of IFAC elected. As is well known this meeting took place as planned.

I was personally most anxious to help break down the barriers of the Cold War, which was very chilly at that time, although I knew that as a single individual I could probably contribute very litte. I was pleased to find that the Russians involved in IFAC were equally anxious to open up communications between East and West. I resolved that I would obtain agreement with the Russians, notably Professor Letov, on all important points before I brought them up at IFAC meetings, and significant matters that I thought others might bring up, so that the two largest countries, the Soviet Union and the United States, could present a united front to the delegates from other countries and avoid bickering before them. I always followed this policy and it worked, at least as long as I was active in IFAC, which was until 1960. As soon as Dr. Letov arrived at Düsseldorf we went for a walk and I proposed the following points:

1. That the first president of IFAC be an American. He agreed to this and said that I should then be the first president. I told him that IFAC had taken almost all of my time since the Heidelberg meetings and that I could not afford to take the presidency. I felt that the first presidency would be a full time job. I told him that I had someone else in mind. He asked me whom and I told him Harold Chestnut.

2. That the first congress be held in Moscow, say in about 1960.

3. That the official (principal) language of IFAC be English. More people in the world spoke English than any other language and it had sort of become the international language.

4. That the second president be a Russian, namely Letov.

Professor Letov agreed to this package and all of these points were eventually approved by IFAC and carried out. I proposed Dr. Chestnut for the first president to other members of the Provisional Committee and later to several control experts whom I knew would vote for the first IFAC officers. All of these people accepted this recommendation immediately. There was not a single objection.

Just before the September 1957 Paris meetings the British proposed a constitution with heavy emphasis on computation, but when the Provisional Committee met in Paris, September 9 and 10 it was

too late to make changes in the constitution the committee had printed to present to the IFAC organizing delegation.

Before the nomination of IFAC officers, I had a conference with Professor Broïda. I told him that since I had been a prime mover behind the scenes (there is always such a person when a new organization is being formed) and several people knew about my activity. I would not permit my name to be put in nomination for any IFAC office. Otherwise some people would accuse me of having started the whole thing for personal reasons, such as power, publicity or self-aggrandizement. Since Dr. Broïda had played a similarly key role as chairman of the Provisional Committee, I told him that the statesmanlike thing to do would be for both of us to withdraw our names from consideration for the posts of IFAC officers. We could continue working for IFAC but in humbler positions, and let others now take over the leadership. Fortunately, Professor Broïda did not go along with my idea. As Chairman of the Provisional Committee he had essentially been acting president of IFAC and he had many projects which he was interested in pursuing. Several delegates wanted to reward him for his past work by electing him second vice-president of IFAC at the Paris meetings. This was done. He is now finally president, a post he has earned by his faithful and continuous service to IFAC since its inception. IFAC is fortunate to have this devoted and faithful worker as its president.

Has IFAC lived up to my expectations? It has and more so. The Congresses, held every three years have been completely successful. IFAC sponsors other meetings each year, but these are in specialized areas and in no way dilute interest in the Congresses or overburden the control expert by having to attend too many meetings. The committees have been able to be much more active than I had hoped for and they have played an important role in selecting and sponsoring papers for IFAC Congresses.

While I was president of AACC I asked Dr. Nathaniel B. Nichols to form a committee and try to combine the automatic control meetings of the various American societies into one annual meeting. He did accomplish this task and there is now one annual joint meeting of the American societies active in automatic control, called the Joint Automatic Control Conference. As in the case of IFAC, this did not reduce the total number of meetings as much as expected, but it did help.

Contrary to what I anticipated, IFAC has become steadily more devoted to control theory. Papers tend now to be judged on the basis of mathematical elegance rather than industrial or other practical need. I have been forced to accept the fact that automatic control has become a mathematical discipline, and that theoretical papers are likely to be judged on the basis of how they relate to the rest of control theory. There is no question of whether or not the paper has the possibility of immediate or future application. It is simply hoped that it will add to the vast body of control theory and that from time to time parts of this body will prove to be of practical use and benefit to mankind.

Recently, I was able to prove a mathematical theorem about networks of lines (fluidic, etc.) and lumped elements that I hope will be of considerable use to the practising engineer. I would not have thought of developing this theory without the experience gained by treating hundreds of many kinds of such physical networks over a period of thirty years. I found that system damping was generally due to the presence of the lumped elements and that at least in first approximation studies line resistance could be neglected, which fact made the theory manageable. I would hope that more IFAC papers on theory will be related to actual real experience, so that the assumptions on which the theory is based are properly justified.

I do believe that eventually there will be less discussion of papers and more time given to the author. The assumption advanced by some influential IFAC leaders that one can assume that the audience has already read the paper under presentation is false. Many of us attend sessions so that we do not have to read some papers. Our time is very limited and we expect the author in a few words to make clear to us exactly what he has accomplished, making even a glance at his paper unnecessary unless the author convinces us that it is worth our while to read all or part of it.

When we formed IFAC, many of us, and this was certainly true in my case, thought that the world political situation could be kept out of the IFAC picture. In this we were wrong. Every major world problem, such as the schism between East and West Germany, were reflected in IFAC. However, the participants of IFAC from all countries showed great skill and diplomacy in circumventing and mitigating these problems. It appears to me that with all of the experience already gained in the past this wonderful cooperation will continue in the future, and IFAC will remain a completely technical and non-political organization.

IFAC Congresses are held every three years instead of the four I originally had in mind. It appears now that meeting every three years is not too often, and that the choice of three years was a good one. It does not appear to me that this will cause any difficulty in the future.

Over the years many people have asked me just exactly how IFAC (and AACC) were started, and suggested that I write up the history while it was still reasonably fresh in my mind and my earlier notes

were still in my files. The story up to the formation of IFAC in September of 1957 is now told. The rest is history, well known and well documented. I am grateful to the editors of Automatica for giving me the opportunity to write up the events up to the day of IFAC's birth precisely as they happened. I am comforted by the knowledge that IFAC is here to stay and is bound to have a brilliant future.