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► **To cite this version:**

David Alan Grier. Founding IFIP as an International Computing Organization. Leon Strous; Roger Johnson; David Alan Grier; Doron Swade. Unimagined Futures – ICT Opportunities and Challenges :, AICT-555, Springer International Publishing, pp.177-187, 2020, IFIP Advances in Information and Communication Technology, 978-3-030-64245-7. 10.1007/978-3-030-64246-4\_14 . hal-03194542

**HAL Id: hal-03194542**

**<https://inria.hal.science/hal-03194542v1>**

Submitted on 9 Apr 2021

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# Founding IFIP as an International Computing Organization

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**Abstract.** IFIP was founded with the help of UNESCO and it captured some of the scientific idealism that marked the early days of UNESCO. Identifying the presence of this idealism helps explain why the organization could be successful at some kinds of activities and challenged by others.

**Keywords:** International Organizations, Professional Societies, Computing Milieu, Computing History

## 1 Introduction

The 1950s were marked two phenomena that foreshadowed the founding of IFIP in 1960. It was a decade in which internationalism flourished. After the cataclysm of the second world war, national governments were interested in rebuilding their countries, establishing their place in the global economy and developing institutions that would limit the widespread conflict. The decade saw the rise of the computer industry. The first commercial machines appeared in 1951 and 1952. By the end of the decade, more than 3,000 machines were operating in government offices, corporate organizations, and university computer centers.

To some, it might seem obvious that these two phenomena might combine in an international organization that would promote computing. However, it was far from obvious to the members of the computing community how this organization might be formed and what it might do. At the time, computing was still an engineering discipline and hence tightly connected to national security and the fate of the nation state. Hence the most likely form of an international computing organization might have been a multi-national organization that shared information and promoted the peaceful uses of computing.

IFIP, however, did not follow this model. It became an organization that represented professional societies and looked for ways to support computing developments across nations. This approach was the result of nearly 8 years of careful work, study and negotiations. IFIP achieved its current form because its early leaders, leaders that included people such as Isaac Auerbach and Alwin Walther, had a clear vision sense of computing's universality. They also felt that the universal nature of computing should be captured by an international organization that transcended national borders and provided

benefits to all. In the early years of IFIP, they spend much of their efforts trying to build such an organization, and to learn what that kind of organization could and couldn't do to promote computing and computer science.

## 2 The Founding Generation

Isaac Auerbach (1921- 1991) helped to organize IFIP in the late 1950s. Yet in many ways, he was more a creature of the 1940s, an era that rejoiced at the end of the second world war and hoped that nations could cooperate to maintain the peace. In scientists, these hopes were seen in a form of scientific idealism, an idealism that believed that scientific knowledge was the property of all human-kind, that it could be a force for good and that scientists could collaborate across national boundaries in a way that would establish a model for all collaboration. This idealism was not unique to scientists, but the scientist community embraced it fervently. "Part of this optimism stems from central tenets of classical liberalism," explain two scholars of international organizations, which viewed International Organizations "as a peaceful way to manage rapid technological change and globalization, far preferable to the obvious alternative - war" [7].

Auerbach was member of that post-war generation of scientists. He came of age during the last years of the war and might be described as being "almost a member" of the founding cohort of computer designers. He first came in contact with computers at Harvard, where he was an undergraduate. Harvard professor Howard Aiken (1900-1973) built a mechanical computer in 1943, a machine that presaged developments in electronic computation less five years later [4]. Auerbach did not work on this machine but he did take one undergraduate course from Aiken, a course in numerical analysis [10]. His relations to the undergraduate Auerbach, seems to be friendly but not close. He helped to spark Auerbach's interest in computation but was a little upset when Auerbach decided to join the Eckert and Mauchly Computer Corporation rather than pursue graduate study at Harvard.

The Eckert and Mauchly Computer Corporation was first company that came out of the ENIAC Project at the University of Pennsylvania. The ENIAC has been described as the most important result of second world war research that was never used in the second world war. It was not quite an electronic computer when it first began operating in the fall of 1946 but it led directly to the ideas of the modern stored program computer architecture and the construction of many electronic computers in the late 1940s and 1950s.

Auerbach described himself as perhaps "the number three man in the company". He worked as an electrical engineering in the company and claimed that he was ultimately responsible for "all of the manufacturing of the product" as well as doing research and developing all the electronics for the memory. He eventually grew disenchanted with the way the founders were managing the organization and moved to the laboratory of the Burroughs Adding Machine Company. Burroughs had created this laboratory in downtown Philadelphia in order to build its expertise in electronics and move into the market for electronic calculators and computers. To lead the laboratory, they had been

able to recruit Irven Travis (1904-1986), who had worked with Eckert and Mauchly on the ENIAC project during the war [4]. For his first job at Burroughs, Auerbach had the opportunity to return to the ENIAC and study its design as Burroughs had been given a contract to build new memory units for the machine that would extend its capacity and lengthen its life [2].

While working for Burroughs, Auerbach began to look beyond his employer and think about the bigger computing community. In 1949, he was one of the founding members of the Computer Interest Group of the Institute of Radio Electronic Engineers, the organization that would eventually become the IEEE Computer Society. He also served as a member of the organizing committee of the Joint Computer Conferences [4].

In the 1950s and 1960s, to be on the organizing committee of the Joint Computer Conferences was to be at the center of the American computing community. These conferences assembled most of the serious researchers in computing. Their proceedings contained most of the important computing papers of the era, certainly far more than the journals of the three professional societies that sponsored the conference, the Institute of Radio Engineers, the American Institute for Electrical Engineers and the Association for Computing Machinery. At the time, most of the interesting computing development was being done by private corporations such as Eckert and Mauchly Corporation, ERA (both later to merge as UNIVAC), IBM, Burroughs, Honeywell, RCA and General Electric [1].

Auerbach had a restless mind that kept pushing him into bigger and bigger communities. At the Fall Joint Computer Conference of 1955, he posed an innocent question about the work that was being done outside of the United States that led him to the founding of IFIP. As he later recalled it, he was “sitting in the bar with three or four other guys” when he observed that they came “back to these meetings every year” and in the process met “the same people and kind of talk about the same kinds of things. Does anybody have any idea what's going on overseas?”. The Joint Computing Conferences had few attendees from outside the United States and most of that group came from the United Kingdom [4].

At this point, most industrialized countries were supporting some kind of computing development but the connections between these projects were haphazard. Sometimes a laboratory would publish a book or article that was well circulated. In 1951, for example, the first major book on programming, which was written by Maurice Wilkes (1913-2010) of Cambridge University. More often than not, the connections were made by the movement of computing personnel. Harry Huskey (1916-2017), the assistant to the late Alan Turing (1912-1954), had brought his experience to the University of California and to Bendix Corporation. The Computing laboratory at the University of Sydney also relied on connections to Turing's laboratory as well as connections to the University of Illinois. Some of the pioneering computing work was done in isolation. In Kyiv, Serge Lebedev (1902-1974) worked behind the barriers of the Soviet Union and in Germany, Konrad Zuse (1910-1995) labored with little contact to British or American projects.

Auerbach wanted to build a more systematic way of connecting computer projects and immediately rallied the support of the Joint Computer Conference board. As a

member of the board, he argued that the group should develop an international meeting or congress for computer developers and users. He seems to have gotten their approval relatively easily but instead of arranging for the Joint Computer Conferences board to manage the conference, Auerbach turned to the United Nations Educational Scientific and Cultural Organization (UNESCO) [4]. He knew no one in the organization and had only an outsider's understanding of how it worked. Yet, Auerbach did not seem particularly concerned by his lack of knowledge or connections. He drafted a proposal that the UN group sponsor an international conference in computing. With the help of two friends, "mailed out 40 or 50 copies of this proposal to UNESCO representatives from various countries" and asked those representatives to support this idea. "Much to everybody's pleasant surprise they agreed," he recalled [4].

### 3 The Two Sides to UNESCO

It is possible to argue that Auerbach did not need UNESCO to create his conference. He could have planned a conference in one of the European capitals, raised money through his connections at the Joint Computer Conferences, and managed the conference himself. That argument probably underestimates the difficulty of running an international conference in 1955. International borders hindered the movement of both assets and people. Furthermore, it was often difficult to hold a meeting in Europe without a local organization to take responsibility for the event. Seven years later, the new IFIP board was a little surprised to discover that it needed a legal presence in Germany if it was to hold a conference in that country [14].

However, it seems that Auerbach was interested in building connections with UNESCO from the time that he first conceived of an international meeting on computation. In his notes, he never discusses any alternatives to a connection with UNESCO and never considers running the conference as an independent entity. From his subsequent actions and writings, he clearly wanted to have a connection between his envisioned computer conference and UNESCO [5].

At this point in its history, UNESCO was at the zenith of its reputation. It was viewed as pristine organization that was promoting scientific cooperation throughout the world and through that cooperation, peace. "UNESCO's early science programs were designed to serve science and scientists rather than states," explained one student of the institution. "They aimed to increase the world sum of scientific knowledge and access to that knowledge without regard to national boundaries" [4]. If Auerbach was working to raise the profile of computing and connect it to the major international institutions of his time, he would do well to connect it to the UNESCO of the early 1950s.

Yet, UNESCO was already starting to show the first signs of moving away from the international scientific idealism that it had espoused in the early part of the decade. Scholars have called this a shift from "Kantian Transnationalism" and a slow movement towards a "Cold War Hobbesian Nationalism" [7]. Expressed more bluntly, the leadership of UNESCO realized that national governments were supporting it and hence these governments needed to have a bigger voice in the leadership of the organization. This shift was most clearly seen in a re-organization of UNESCO's governing board. Initially,

that board had consisted of individual scientists, educators and cultural voices. After 1954, the board was dominated by 22 national representatives [12].

If UNESCO was starting to serve governments more than scientists, it is perhaps a bit of an anomaly that IFIP became an organization that was supported by professional societies rather than those governments. Initially, neither UNESCO nor the IFIP founders may have pondered that distinction but they quickly began to discuss the ramifications of that issue. In 1957, Auerbach started holding meetings to plan the International Conference on Information Processing, which was eventually held on June 15-20, 1959 in Paris. In all, 1,800 people attended [6].

During these initial meetings, Auerbach raised the question of how the conference might establish a permanent existence. "I broached the issue about how to continue the cooperation and relationships that we had established with each other on an ongoing basis," he recalled. At this point, "UNESCO made it very clear that they wanted no part of that. If we wanted to do it, we could either do it as an inter-governmental activity or a professional activity." After a certain amount of discussion, Auerbach agreed to delay any further discussion until the end of that first conference [4].

From the descriptions of the 1959 conference, it seems to have been based on a combination of ideas drawn from the Joint Computer Conferences and the organizational goals of UNESCO. As he had at the joint conferences, Auerbach viewed computing as being strongly based by the businesses and the business community. "We felt that IFIP was an opportunity for us to enlarge the market by reaching out and teaching people something about computers and how they can be used," he recalled. It "was not difficult" to convince American firms, such "IBM, or UNIVAC, or Burroughs, or NCR" to participate. He was also able to reach German companies such as Siemens [4]. The conference was far from being a trade show, as the group was able to secure Auerbach's one-time teacher, Howard Aiken, as a keynote speaker [6].

Most observers agree that the first conference was a success, though all could identify shortcomings that they wished to rectify in any future conference. Many felt that the U. S. dominated the conference. Auerbach felt that this judgement was not surprising as the meeting had been initiated by a group of Americans who had wanted to "find out what's going on over there" [4]. Too "many of the papers were out of date and lacked the originality that should have prevailed," noted Auerbach. He argued that the "program was controlled by UNESCO's obsession with protocol and International politics, and thus was flawed by excessive concern for national distribution of the participants rather than the absolute quality of the papers" [6].

During the conference, Auerbach and the other organizers reconvened to discuss how they might hold a second meeting and how they might build an organization to support it. "All of us agreed that dealing with the bureaucracies of government was not something with which any of us were enamored," he said, "and so if we're going to do it why don't we do it as professional societies". With this discussion, IFIP embarked on the path that would lead it to its present organizational structure. At the same time, they did not abandon UNESCO nor did UNESCO entirely abandon them. It is clear from their early actions, that they appreciated their connections with UNESCO and were grateful for some of the things that the agency had done for them [4]. They regularly praised their early contact at UNESCO, Jean Mussard, and followed his advice [13].

Most notably, Mussard helped IFIP build connections with the International Council of Scientific Unions and to get consultative status within UNESCO [15]. In later years, UNESCO would provide funds, help organizations technical meetings, and support the work of the IFIP Technical Committee on Education, TC-3 [30].

In the work of strengthening its organization, the IFIP board was closely assisted by Mussard and other UNESCO personnel. In particular, UNESCO encouraged many a country to organize a professional society for computing [12]. He also helped IFIP win a financial support from UNESCO and build cooperative relations with other international groups, notably, the International Council Of Scientific Unions or the Union Of International Engineering Organizations, (a precursor to the UN Federation of Engineering Organizations). Mussard urged the IFIP Board “to one of these two large non-governmental organizations, as this would facilitate formal relations with UNESCO and ensure a link with other international scientific organizations” [13].

In its early days, IFIP underscored its commitment to that scientific idealism. At its first meeting, the group selected Alwin Walther (1918-1967) as its vice president. During the second world war, Walther had stood in mirror image to Auerbach and the ENIAC team. He had led computing at the Technische Hochschule in Darmstadt, Germany. This was the major computer organization at the time. He had led both teams of human computers and the development of new automatic computing machinery. Among other things, this group had done the ballistics and targeting calculations for the V-2 rocket. He was declared to be a person of interest in the waning days of the war and was captured (in what appears to have been a fairly friendly manner) by the British mathematician John Todd. Todd had run the computing operation for the British Navy during the war and, in May 1945, had been given the assignment of seizing the Third Reich’s computing assets [11][29].

#### **4 First Steps as an International Organization**

Beginning in 1960, IFIP took the first steps that any organization has to make. They had to establish their legal existence and legitimacy, secure themselves, and determine what they were going to do. All of these activities were shaped by the form of governance that they chose. As a professional organization, they decided that they would be a membership organization. The members would be professional societies and that they would accept no more than one member from each country. (As the organization evolved, they would make an exception for the United States, which had multiple professional organizations for computing.)

The initial organizational structure of IFIP challenged the plans of the board. They had decided to incorporate their organization in Belgium, which had become a center for international and trans-European scientific work that was symbolized by the Atomium, the iconic structure that represented the 1958 Brussels World’s Fair. The Belgian government seemed to be pleased to provide a home to IFIP but felt the organization did not meet the requirements set forth in the Belgian incorporation law. In particular, Belgian law required all members of a federation, such as IFIP, would be “duly incorporated” entities. It was far from clear that all the founding organizations would meet

this requirement, much less those that they might wish to admit in the future. This issue would be eventually resolved, but it would suggest some of the challenges that IFIP would have in the future [13].

To plan for the future, the IFIP board would have to secure the future of the organization. Securing the future of IFIP meant expanding the number of organizations. The first meeting of its board, in 1960, was attended by the representatives of ten societies. Not all of these groups were professional computing organizations. The Spanish representative, for example, came from the government Higher Council of Scientific Research. (Consejo Superior de Investigaciones Científicas.) To build its membership, IFIP would have to identify real and potential professional societies, help them meet the organizational requirements and encourage them to apply. Through 1970, this remained an important task for the board. The board received regular reports about organizations that might be ready to apply, those that actually applied and those that were accepted to membership.

Auerbach, who served as the first president of IFIP, was concerned with both the position of IFIP in the computing community and its relationships to other organizations. He told the board that “many external bodies come into existence in our vast field and that they impinge into our domain of interest”. He added that IFIP “must develop suitable policies to take care of this situation, otherwise the status and the influence of IFIP will gradually diminish” [18].

## 5 Strategy and the Structure to Support It

Beyond the task of securing the future IFIP, the board had to plan what the organization would actually do. In the classic theories of administrative behavior, structure follows strategy, an organization decides what it needs to do and then creates a structure that will accomplish that goal [9]. IFIP seems to have followed that pattern to a certain extent. As it identified new tasks, it created technical committees to undertake those tasks and constantly modified the structure of those committees in order to make them effective.

At the same time, the IFIP leadership was trying to identify the things that the group could do and could do well. It did not have a lot of models to follow [28]. Perhaps the best antecedent of the group could be found in the International Statistical Congresses of the 19<sup>th</sup> and early 20<sup>th</sup> centuries. These congresses met to standardize statistical practice and to develop common definitions of data and statistics. However, it seems unlikely that the IFIP founders were aware of these congresses. Furthermore, these meetings had a strong governmental component. The true successor to these congresses, the Organization for Economic Cooperation and Development, was founded at roughly the same time as IFIP and was a true intergovernmental organization.

From the start, the IFIP leadership had one clear goal, to sponsor a regular conference on the subject of computing [3]. It had begun planning of these conferences (following the 1959 Paris conference) as part of the work to build the IFIP organization. Beyond that goal, the board felt that IFIP should be involved in other activities but was unsure about what those activities should be. At its second meeting, the board decided



that the organization would publish a bulletin containing articles “of information on meetings, professional societies, etc., but no scientific articles”. It also created a technical committee “on the Standardization of Terminology and Symbols”. This committee would soon produce a glossary of computing terms, a glossary that dealt with the not insignificant problem of the differences between British and American terms. However, it would take 18 months for the committee to find its place in the organization [14].

IFIP first had to deal with how this committee would fit into the international standards regime. For the most part, the International Organization for Standardization (ISO) takes standards that have been developed by a national standards organization and helps them get international support. However, IFIP was not a national organization and needed a plan to get its work before the ISO. Furthermore, it needed a broader base from which to develop its ideas. To make progress towards both goals, the committee developed a partnership with the International Computing Center (ICC).

The ICC was a UN sanctioned agency that offered computing time to organizations from countries that lacked adequate computing facilities. Conceived in 1952, it had created a facility in Rome and begun operations in 1960. At a time when universities did not have computer science departments, computer centers were often a site of technical research and development. The MIT Computation Center, for example, had developed a pioneering timesharing operating system in the late 1950s and early 1960s. It was expected that the ICC would play a similar role [21, 22, 23].

The collaboration between IFIP and the ICC was genuine and, perhaps, effectual but it was not long lasting [19]. After changing the name of its technical committee to be “Joint IFIP-ICC Terminology Committee” in 1961, it reverted the name of the committee to “Committee on Terminology and Symbols” with the added designation of TC-1 in 1962 [16]. The group finished its work in 1964 but as it did so, it revealed some of the structural challenges faced by IFIP. Auerbach noted that the committee had undergone substantial changes and that “little work is getting done at the present time”. He said that the “chairman and other members have moved to other countries, and regrettably some have not replied to correspondence or even to telephone communication” [20].

IFIP would face this problem regularly in its history. It would set goals and then struggle to keep a committee working to achieve those goals. In part, this problem also came from the fact IFIP was not really a representative body. Though it was clearly influenced by its members, it set its agenda independently, as most international organizations do. International Organizations “can become autonomous sites of authority, independent from the state ‘principals’ who may have created them,” note scholars of these organizations [7]. Rather than doing the things that their members have decided that the organization should do, these groups tend to identify activities that their members are not doing or cannot do. They then attempt to complete their activities utilizing individuals that come from their member organizations. This challenge was most clearly seen when IFIP decided to support the development of the ALGOL.

ALGOL was an important project in the early years of computer science and established a pattern of work that would be repeated throughout the history of computing. It was one of the first computing languages, along with languages such as Fortran and

Cobol. Unlike those two languages, which were developed by a private corporation and the US Department of Defense respectively, ALGOL was created by a volunteer international committee. It grew out of a 1958 conference that had been jointly sponsored by the Association for Computing Machinery and the German Gesellschaft für Angewandte Mathematik und Mechanik, two groups that would be represented on the IFIP board.

From its founding, the ALGOL project was coordinated by the ALGOL Bulletin, a newsletter that was supported by the Danish Government and edited by Peter Naur, a Danish computer scientist. The aim of the Algol Bulletin, Naur wrote, “will be to act partly as a correspondence column for the active members of the [ALGOL Development Group], and partly as an instrument for making agreements” [24]. In 1962, IFIP agreed to take responsibility for ALGOL and created a new technical committee to support it. “The Working Group has been mainly set up to establish an authoritative body which can serve as a home for ALGOL,” reported Naur. “The incentive for this was derived from a request of ACM to IFIP” [25].

From our current perspective, ALGOL was an early example of a collaborative or open source project. Like IFIP, it had no real example or model to follow. IFIP treated it like a standardization project and was generally successful in completing the first task it undertook, creating a portable subset of the language [17]. This subset represented an admission by those involved with the project that the language had overly ambitious goals. The “generality of some of the features of ALGOL 60 and the disagreement concerning the exact meaning of others have proved a considerable discouragement to some of the groups who have contemplated implementing the language,” reported Naur, “and have caused most of the existing implementations to be based on subsets defined locally” [26].

The ALGOL subset proved to be reasonably successful but subsequent efforts revealed the challenges that IFIP faced as a language development organization in the early 1960s. Again, from our current standpoint, we know that such development is best done with rapid feedback, when a group is able to posit questions, suggest answers to those questions, and assess those potential answers within a short period of time. Naur identified it as “the principle of feedback in well-adjusted systems.” At this period, IFIP was simply not able to maintain that kind of process [27].

Auerbach, as President, seemed to grasp that IFIP faced some special challenges as an organization. It was, after all, a tertiary organization. The volunteer workers, the people who served on technical committees, were not employees of IFIP they were not employees of the organizations represented in the IFIP leadership but were volunteers to those organizations. At one meeting, Auerbach recognized this challenge and “pleaded that IFIP can only perform its several duties if all committee members who have accepted assignments will carry these out promptly and carefully” [14].

In 1964, after the group had completed three full years of operation and had five years of experience, the leadership realized that it needed to think clearly and carefully about the kind of organization it could be and the kinds of things that it could do. It created a “Futures Plans Committee” to consider how IFIP should work with other organizations and “with the important question of how IFIP should be organized in the future”. It even raised the question of whether the organization should run a single large

conference. “It may be possible,” Auerbach explained to the group, “that the Congress 65 is the last congress of its kind, and that we will have to hold meetings on a smaller scale” [18].

## **6 The Organization You Have and the Organization You Desire**

Auerbach and the other founders created IFIP over roughly a ten-year period that started at a 1955 Joint Computer Conference in the United States and ended with Auerbach stepped down from the presidency in 1965. If we take his reminiscences at face value, we would conclude that IFIP proved to be the kind of organization that Auerbach hoped to create. It is an international body. It cooperates closely with UNESCO. It actively disseminates information about international computing activities. Finally, it bases its legitimacy on professional societies and not nation-states, an activity that was hard to accomplish given the direction that UNESCO was moving in the mid 1950s.

Yet, these descriptions only illustrate the structure of the organization and do not describe what it does or how it operates. While such issues need a fuller and more detailed analysis, we can get at least a first hint about those operations from its annual reports and its celebratory books. It is certainly an independent organization that sets its own agenda. It certainly takes advice from its members but it largely deals with questions that are international in scope, questions that may or may not directly affect national organizations. It has learned that there are some things that it can do well and some things that are more challenging [8, 31, 32].

At almost every point in its history, IFIP has had to confront the same questions that Auerbach and the founders faced in late 1960s. “Is its current organization structure the correct structure for our time?” and “What are the activities that it can do best?” These questions are all the more urgent because IFIP itself is being affected by the forces of globalization that it helped unleash. At least three of its members and one of its former members operate globally. They hold conferences outside their national borders, they publish globally, and they build international standards. Only IFIP can determine if its organizational structure is still relevant, if these other organizations are going to become the dominant international organizations or if there is yet a new organization that we do not yet understand that will be an improvement on what we have seen to date.

Three years into his term as president, Auerbach recognized some of the basic questions that IFIP was facing at the time and would face in the future. Addressing the leadership he needed that there might be “external bodies that come into existence in our vast field” and “impinge into our domain of interest,” he told the IFIP leadership. “We must develop suitable policies to take care of this situation, otherwise the status and the influence of IFIP will gradually diminish (Report on Second Council Meeting 1961). Auerbach and the others built a successful professional organization at a time when UNESCO was discouraging that model. As with all organizational leaders, the next generation of leadership will face questions equally vexing as they move IFIP into the future.

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