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STUDIES IN CERN HISTORY

**The relationship between CERN and its visitors in
the 1970s**

John Krige

**GENEVA
1990**

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The Relationship Between CERN and its Visitors in the 1970s¹

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"....The physicists of the European High Energy Physics Community, which are the users of CERN, [...] [look] at CERN as their laboratory, and not as an ivory tower for a select body of physicists on site. [...] I feel that, in spite of the budget difficulties of CERN, we have discussed today, the even greater difficulties of the home laboratories render the ideal of CERN as the laboratory of us all even more essential."

From the farewell address by the Chairman of ECFA, Guy von Dardel, to CERN Director General W. Jentschke (emphasis in the original).²

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1. This chapter extends the study made by Dominique Pestre on the organization of the experimental work at CERN in the late 1950s and early 1960s which was published in the volume II of the *History of CERN* (chapter 8). It is based primarily on papers prepared for the Working Group set up by ECFA in 1972 to look into the relationship between CERN and its outside users. It has been supplemented by a number of formal interviews and informal discussions with CERN staff and visitors. Many of the interviews were made within the framework of a project to study multi-institutional collaborations launched by the Center for History of Physics of the American Institute of Physics in New York. My contribution to this project has been supported financially by The Andrew W. Mellon Foundation, and I wish to record my thanks to them here.

The main files used for the study were two in the Director General series, DG 21220 and DG 21221, and one in Yves Goldschmidt-Clermont's papers, YGC23572, all in the CERN archives.

2. Document on ECFA notepaper entitled "Farewell address to professor W. Jentschke pronounced at the CERN Council Session on December 17 1975 by the Chairman of ECFA". undated, unsigned (DGR21311).

From its very inception it was understood that CERN would have to open its doors to outside visitors who wanted to make use of its unique facilities for doing high-energy physics. Funded by a "conglomerate" of nations, the bulk of which could not afford to build anything comparable on their own, it was assumed that the laboratory would serve a community whose size far exceeded the number of physicists employed by CERN itself. In terms of access CERN was supposed to be quite different to, say, a university laboratory whose equipment "belonged" to those who had acquired it. It was meant to be a European laboratory, and as such the entire European high-energy physics community was seen to have a right to exploit the potential of its machines.

In the late 1950s and early 1960s the CERN staff and management negotiated a number of arrangements with the outside users aimed at protecting the visitors' right to work around the machines. A committee structure was set up for deciding on the experimental programme on which visitors were well-represented. A suitable scheme for using beams and distributing photographs was worked out by bubble-chamber physicists once the big equipment built by groups in France and at CERN had been installed and was running. Finally, an equilibrated mix of CERN teams and outside groups using electronic modes of detection had been established by 1964/65. In 1961 five out of six groups doing electronic experiments at the CERN PS were composed of CERN staff only, plus the odd individual visitor. By 1965 only three out of twelve teams were built like this. There were eight mixed teams of CERN staff and outsiders working at the machine, and one team composed of visitors only.³

Little was to perturb the *modus vivendi* established between the CERN staff and the outside users for the next five years. The experiments committee structure remained intact, to the extent that both Gregory in 1965 and Jentschke in 1970 left its basic core unchanged, coping with new developments (like the ISR experimental programme) by accretion to the existing system rather than by transformation. Bubble chamber physicists continued to decide among themselves how to organize their work. And the swing in favour of electronic experimentation by outside teams at the PS continued. In mid-1969 there were only three "pure CERN" groups working at the machine out of a total of 22 teams, the balance being made up of ten mixed teams and nine visitors-only teams.⁴

This relatively harmonious situation was not to persist for long, however. By the early 1970s rumblings of discontent among the visitors were once again being heard. No longer satisfied to be treated as "customers" of a facility which was "owned" and controlled by others, they wanted CERN to belong to them in the same (restricted) sense that it

³. See Pestre, *op. cit.*, note 1, for this paragraph, in which the struggles which led to these various arrangements are described in detail. The figures for mixed teams are from CERN/SPC/272, 25/2/69.

⁴. The changes to the committee structure made between 1966 and 1976, and the organization of bubble chamber and electronic experiments will be the subjects of separate CHS reports. The figures quoted at the end of the paragraph are from CERN/SPC/272, 25/2/69.

belonged to the physicists based in Geneva. The point came up again and again, we are told, in an informal meeting held with visitors in January 1973. They stressed, the author wrote, "that they should not be considered as visitors at CERN but they thought they had a right to be fully integrated into the CERN machinery".⁵ In other words, experimentalists in the Member States wanted to abolish any distinction between "in-house staff" and "outside user", between "host" and "visitor" and, correlatively, they felt that any arrangement which embodied such distinctions between physicists was discriminatory and degrading.

In this chapter we shall describe in more detail some of the grievances expressed by visitors to CERN in the 1970s and their causes. The problem will be studied primarily through the deliberations of a working group set up by ECFA (the European Committee for Future Accelerators) in 1973 to look into, *inter alia*, the visitors question. Having briefly identified the factors precipitating ECFA's enquiry in the first place, we go on to study five specific points of friction between outside users and the host laboratory which were widely debated in this period. We then briefly survey the situation about a decade later. It emerges that many of the complaints made by visitors in the mid-1970s were still being made in the mid-1980s. In conclusion we discuss some of the reasons for the persistence of these difficulties.

1. THE UNDERLYING CAUSES OF VISITOR'S DISCONTENT IN THE EARLY 1970'S

ECFA's idea of setting up a working group to study the relationship between CERN and institutes in the member states was sparked off by the decision, taken officially in February 1971, to build a 300 GeV "Super Proton Synchrotron" in Geneva. The negotiations over the design, funding, and siting of this machine had dominated CERN Council meetings throughout the late 1960s. At this time it had been assumed that the new machine would not be built in Geneva. However, early in 1970 John Adams, the recently-elected 300 GeV Project Director, and his team, showed that this was in fact technically, geologically, and financially feasible, not to say advantageous. With that, the CERN Council rapidly agreed to pay for an SPS built on an extension of the existing CERN site.⁶ The European high-energy physics community was delighted, of course: now, at last, they were guaranteed the machine that would enable them to compete with the facilities under construction at Fermilab near Chicago. But they were also concerned: for the Council's decision inevitably signalled an even greater *concentration* of the European high-energy physics effort at CERN. The writing was already on the wall. At the end of 1966 about 52% of the European high energy physics community not paid by CERN was "dependent" on the Geneva laboratory in the sense that they

⁵. The quotation is from the undated memorandum by H. Schopper entitled *Summary of the Discussions with Visitors on 29 and 30 January, 1973*. (DG20589). See also the statement by von Dardel, note 2.

⁶. The decision-making process for the 300 GeV machine is described in detail by Dominique Pestre in *History of CERN*, Volume III (in preparation).

were working exclusively on taking data at CERN, or on analysing data obtained there. By 1970 the percentage of physicists depending on CERN had risen to 58%.⁷ During the 1960's outside users in at least the four big CERN member states could do useful physics at their "own" national laboratories. With the commissioning of the ISR and, above all, the SPS, these would soon be obsolete. Hence the demand by visitors that they be better integrated into CERN, that CERN become the common property of the entire European high-energy physics community.

Coupled with this – and this is the second factor explaining the new "militancy" among the users in the early 1970s –, was the increase in the number of outside users at CERN caused by the growing importance of electronic methods of detection. In the early 1960s the bubble chamber had been the dominant detector in the field. However, it gradually lost ground to electronic detectors – spark chambers, counters, and later wire chambers, drift chambers, etc. ECFA figures indicated that in October 1966 there were 607 European experimentalists doing bubble chamber physics and about the same number, 594, using counters and spark chambers. Four years later the balance had swung distinctly in favour of electronic detectors. Provisional figures for 1970 gave 986 counter and spark chamber physicists in Europe, and 708 bubble chamber physicists, a ratio of almost 3:2.⁸ This trend was coupled with a growth in the user population actually present on the CERN site. For technical reasons physicists using electronic devices were obliged to spend far more time at the host laboratory than were those using conventional track chambers:⁹

- a bubble chamber was basically a piece of heavy engineering; physicists had little to do with its construction and installation. An electronic detector, by contrast, was basically a combination of separate components, some of which required heavy engineering, others of which could be made in a local workshop or bought off the shelf; physicists took part in the construction of the detector and their presence was essential during the assembly on the experimental floor;

- the experimental parameters did not change during a bubble chamber run; physicists, in so far as their presence was needed at all during the data-taking phase, played a supervisory role. With an electronic device, on the other hand, the experimental parameters were continually modified during a run; the physicists' relationship to their detector was interactive, and it was imperative that they be present while taking data.

⁷. The first figure, and the definition of dependence, is taken from CERN/ECFA/67/13/Rev. 2, 15/5/67 (DADM20099). The second figure is from Harting's report presented at the ECFA information on 30/11/72, document CERN/ECFA/73/3, undated (DG21220). The figures for 1966 differ very slightly between these two documents.

⁸. The data for 1966 are from CERN/ECFA/67/13/Rev.2, cited above. The data for 1970 are from Dick Harting's report to the 13th plenary meeting of ECFA on 25/26 May, 1972, CERN/ECFA/72/5, undated (DG21220).

⁹. For more extensive discussions of the differences between the two techniques see Pestre in volume II of the *History of CERN* (chapter 8), and Galison. See also Gambaro, in *History of CERN*, Volume III (in preparation) for the development of electronic detection techniques at CERN.

•finally, the results of a bubble chamber experiment were recorded on film, and were extracted after a run, and away from the experimental area. Some of the results of electronic experiments, and often the most important and exciting ones, were acquired during a run (though much analysis could also be done after the data was taken and away from the experimental floor).

In short, whereas bubble chamber physicists would generally expect to have rather weak links with the technical staff of the host laboratory, and to spend most of their time at their home institutes (if they had adequate scanning and measuring instruments and computers), the converse was true for electronic experimentalists. They had to work closely with the laboratory staff – as Goldschmidt-Clermont put it, “The symbiosis CERN–outside group(s) has to be rather close for electronic experiments, where much work occurs on the spot at the time of the exposure, and where apparatus has to be built and assembled [...]” – and they could count on spending many days, even months at the host laboratory during the course of an experiment.¹⁰ In consequence as this form of experiment grew more important in the late 1960s and early 1970s so the pressure mounted on CERN to meet the day-to-day needs of a fast-growing, insistently present, population of outside users.

Figure 1 illustrates both the concentration of resources at CERN in the 1970s, and the growth in the number of outside users on the site.¹¹ The curves are indicative only: it is difficult, if not impossible, to get strictly comparable data across such a wide time scale. Yet the trends are clear: a marked increase during the 1970s in the proportion of the European high-energy physics community using CERN, and a rapid, even exponential growth in the users on site, with particularly sharp increases in about 1969 (preparation for the ISR, commissioned early 1971) and in 1975 (preparation for the SPS, commissioned early 1977). These technico-demographic transformations triggered the events we shall now describe.

¹⁰. See his report prepared for ECFA, *Structure of CERN Research Groups and Support Provided*, ECFA/WG3/RLP4/73, 7/9/73 (DG21221).

¹¹. The lower set of points for the NP, TC, and EP divisions are taken from the CERN Annual Reports. From 1962 to 1965 these figures include visitors from the non-member states. They are counted by adding categories labelled “visitors” and “national teams”. From 1965 to 1979 the data do distinguish between visitors (called associates from 1973 onwards) from member and from non-member states. From 1976 onwards all experimental physicists were grouped in one division, Experimental Physics (EP) Division.

Two of the upper set of three points (for 1966 and 1970) are taken from Harting’s report to the ECFA information meeting on 30/11/72, CERN/ECFA/73/3, undated (DG21220) (for 1966 see also Table VII in CERN/ECFA/67/13/Rev. 2, in DG20099). The data for 1978 are from ECFA/RC/79/47, 10/10/79, a report of Working Group V under John Mulvey which was set up to study hep activities in the MS. To make them roughly comparable with the other two points on the curve we have taken the figure for the total hep community exclusive of CERN and DESY from Mulvey’s Table II (1728) plus the number of “non-particle physics users” in the members states from Mulvey’s Table IX (230).

Figure 1. Visitors to CERN from the member states in the NP (electronic detectors) and TC (track chambers) divisions (until 1975) and in the EP division (from 1976 onwards). The curve marked "all users" gives the size of the European outside user community (regardless of technique) exclusive of those paid by CERN and (in 1978) of those using DESY. Data from different periods, and for different divisions, is not always strictly comparable. For more details, see note 11.

2. THE SETTING UP OF ECFA WORKING GROUP 3. A BRIEF CHRONOLOGY

On the 30 November 1972 the ECFA held an information meeting intended to keep the European particle physicists in touch with important developments at CERN and elsewhere.¹² The fifth item on the agenda concerned the relationship between the 300 GeV accelerator and the national laboratories and universities. It was introduced by ECFA Secretary Dick Harting, who for several years had been responsible for compiling statistics on the European high-energy physics community.

Harting began his address by pointing out that the increasing tendency to concentrate the high-energy research effort in Europe at CERN "had already given rise to a considerable amount of discussion". He then went on to give some data illustrating this situation. For example, in 1966 CERN had accounted for 30% of the total European high-energy physics budget. This had climbed to 39% in 1970, and to 46% in 1972. The proportion granted to the national laboratories had decreased accordingly. And the situation in universities seemed to be even worse. "Of the total

¹². The minutes of the meeting are CERN/ECFA/73/3 (undated), a copy of which is in file (DG21220).

budget of 374 MSF for the CERN-independent laboratories in 1970", said Harting, "311 MSF had been granted to the national laboratories employing 321 physicists and only 63 MSF to the universities employing 408 physicists".¹³ "Although the decision to build the 300 GeV accelerator was to be welcomed by the whole European physics community", said the Secretary, "the structural problems of co-operation in the field of high-energy physics should be closely examined both by CERN and by ECFA".

Acting Chairman Giorgio Salvini took a step in this direction the following day, when ECFA held its fourteenth plenary meeting.¹⁴ An item dealing with the issues raised by Harting's report was added to the agenda at the last minute. Salvini opened the debate on it by mentioning some of the concerns that he felt – the need for every European high-energy physicist to spend some of his time at CERN, the need for a "proper balance" between a visitor's duties at CERN and his obligations at his home institute, "action to increase the impact of physics research activities on European culture", etc. Other items were added in the subsequent discussion. To conclude, Salvini proposed that a summary of the discussion together with the terms of reference of a future working group be sent to ECFA members for their comments.

Three weeks later Salvini and Harting circulated a letter to all members of the Plenary ECFA presenting the argument for "a careful study of the relations CERN-National Laboratories-Universities", and calling for suggestions for the members of a working group. They then went on to explain why they thought this study was needed. The Geneva laboratory, they said, was "an absolutely necessary institution", but it "could not exist alone" – "for we could not justify its solitary existence to our governments, and it [was] difficult to imagine three hundred millions of Europeans ready to finance a huge splendid enterprise for the enjoyment of a selected class of persons, with thousands of technicians working for them". National laboratories and universities, "the transmission belt of the scientific culture from one generation to the other", were needed too: the image was that "of a triangle, with currents circulating through the vertices". The authors then listed some of the problems faced at home by visitors to CERN from the universities, concluding that "it [would] be the task of ECFA and its Working Groups to discuss all these topics in detail".¹⁵

The Salvini-Harting letter elicited some dozen replies from the members of the Plenary ECFA. About half of them simply proposed

¹³. Several speakers pointed out that these figures did not give a true reflection of the distribution of resources for experiments between the national laboratories and the universities. Allaby, for example, remarked that some money spent by university teams was included in the 311 MSF national laboratory expenditure. Schopper pointed out that the hep budget for a university included only expenditure on materials for an experiment, whereas the budget for a national facility also included the cost of overheads. CERN/ECFA/73/3, p. 12, (previous note).

¹⁴. The minutes of this meeting, held on 1 December 1972, are CERN/ECFA/73/4, (undated). They can be found on file (DG21220).

¹⁵. The letter from Harting and Salvini, CERN/ECFA/72/10, dated 21/12/72, is attached as Appendix II to the *Report of Working Group 3 of the European Committee for Future Accelerators*, dated 1 August 1974 (DG21222).

candidates for the envisaged Working Group. A few went further, suggesting issues that needed looking into, sometimes using strong language. Two respondents complained that at CERN "Visitors [were] treated as second-rate physicists [...]". One letter even questioned the validity of the enterprise as a whole: "HEP [was] a patriarchal ivory tower", its author said. "We should think about integrating in society rather than make [sic] HEP still more exclusive".¹⁶

At its fifteenth plenary meeting on 4 May 1973 ECFA established a working group whose task it was to explore these issues in greater depth (Working Group 3). Professor J.C. Gunn of the Department of Physics at Glasgow University was appointed Chairman. There were 16 other members drawn from the spectrum of the CERN member states, and five CERN representatives. Harting and Salvini were *ex officio* members of the panel and its Secretariat was provided by J. M. Valentine and D. J. Baugh. The Group's terms of reference invited it to look into the relationships between the "constituent parts" of the particle physics community, and between that community and the physics community as whole.¹⁷

The Working Group held its first meeting in the CERN Council Chamber on 15 June 1973. The Chairman, who had prepared a tentative list of topics, called for a wide-ranging discussion on the aims of the study. Salvini broke the ice. "At a certain moment", he said, "a community [felt] something and [...] it was important to check this and establish its real content. It was important to bring to the level of careful analysis what [was] whispered or discussed in a disorderly way in a community". This was followed by what Hine afterwards described as "a well conducted exchange of views and a general consensus that h.e.p. in Europe was at another turning point [...]". It was also agreed, Hine went on, that "there could be no useful discussion until the factual background to questions was established [...]". In line with this idea, all delegates were asked to consult widely (25 written statements were ultimately submitted to the Group) and to provide information for the next meeting on a select number of topics.¹⁸

The Working Group set up four sub-committees to deal with these several topics when it met for the second time on 17 September 1973. Sub-committee 1, chairman H. Faissner, was to report on demographic problems. Sub-committee 2, chairman A. Donnachie, had responsibility

16. For a summary of their contents see *Replies Received to the Letter of Salvini and Harting of 21 December 1972 to Plenary ECFA Members*, CERN/ECFA/RC/73/4, 29/3/73 (DG21221).

17. For the composition of the Group and its terms of reference see the minutes of the ECFA meeting on 4/5/73, CERN/ECFA/73/5, and its final report (cf. note 15).

18. The official minutes of the first meeting of Working Group 3 are paper ECFA/WG3/RLM1/73, signed by David Baugh and dated 11/7/73 (DADM20099). Mervyn's Hine record of the meeting, sent to Jentschke and Adams, and dated 28.6.1973, can be found on the same file. For more information on the factual material that was sought, see the *Note by the Chairman*, undated, summarizing the activities of WG3, and prepared as an interim report for the ECFA meeting on 22 February 1974 (DG21221). The number of written statements received by WG3 was reported by Gunn to ECFA in January 1975 (CERN/ECFA/75/4, 16/5/75).

for the problems faced by visiting groups from the CERN Member States. The third sub-committee, chaired by Gunn himself, dealt with the relationship between CERN and the national laboratories. Finally, sub-committee 4, chairman J. Géhéniau, was asked to make recommendations on how to improve the links between high energy physics and European science or, more generally, "the community".¹⁹

The provisional findings of the subcommittees were outlined by Gunn in a progress report to the sixteenth plenary meeting of ECFA held on 22 February 1974.²⁰ The final report of Working Group 3, dated 1 August 1974, was laid before ECFA when it next met in January 1975. It solicited a lively debate in which quite a few people, including some non-CERN scientists who had served on the Working Group itself, again criticized various practices and attitudes at CERN, and indicated that they felt that the Report's recommendations were not strong enough. The Report was accepted "subject to the inclusion of the remarks made during the present meeting", and the new ECFA Chairman, Guy von Dardel, closed the debate by suggesting that its findings "be constantly kept before ECFA so that it could see where action remained to be taken".²¹

The central theme throughout these discussions was that the resources and facilities for European high-energy physics were becoming concentrated at CERN, at the expense of activities in the members states' laboratories. "I feel strongly" wrote one user "that we [i.e. national groups] must resist forces that completely centralise all life and initiative in the subject" at CERN.²² To that was coupled a concern, a resentment even, among the outside users of the laboratory that this concentration of resources was going along with a concentration of privileges for the in-house staff, that CERN was becoming an "oasis" cut off from its base in the national laboratories and the universities. These twin concerns were translated into a number of specific complaints in the early 1970s. Some of these complaints were to recur again and again in later years. Some of them have been raised by physicists using facilities in the United States. In short, taken as a whole, they may be regarded as exposing problems which are intrinsic to the practice of high-energy physics today, a practice in which accelerators have necessarily become national, or international facilities, a scarce resource serving a large and demanding community, and in which friction between "in-house staff" and "outside users" is commonplace.

19. For the information in this paragraph see Gunn's *Note* referred to in the previous note, and Appendix III of the final report of the Working Group (cf. note 15).

20. The minutes of the meeting are document CERN/ECFA/74/4, 10/10/74 (DG21220).

21. The final report of Gunn's Working Group was entitled *Report of Working Group 3 of the European Committee for Future Accelerators*, dated 1 August 1974 (DG21222). For the minutes of the ECFA meeting see document CERN/ECFA/75/4, 16/5/75 (DG21220).

22. Letter Lipman to Gunn, 4/5/73 (YGC23572).

3. FIRST POINT OF FRICTION: THE CONSTRUCTION OF BIG EQUIPMENT

One of the major concerns of the Member States' physicists in the early 1970s was that their national laboratories should be given every opportunity and encouragement to build big equipment for use at the SPS. Electronics experiments were not only growing in popularity, but also in complexity and in scale. Consider, for example, the increase in the size of the teams. Table 1, presented by Jentschke at a 300 GeV Study Week in September 1972, illustrates the situation as it evolved from 1966 to 1970,

Table 1. The increase over time in the size of teams doing electronics experiments at CERN

	1966	1968	1970	1976 estimate
Number of physicists in electronics experiments	271	460	630	900
Number of groups doing electronics experiments	17	20	27	30-36
Physicists per group	16	23	23	25-30

with the Director General's estimates for 1976 (the year the SPS was expected to start).²³ We see a 50% growth in size from 1966 to 1970, and an expected doubling over the decade 1966 - 1976. The equipment used became correspondingly "heavy". In 1961 spark chambers were presented as extremely easy to construct - "anyone can build one in the basement and make it work" - and cheap and versatile - "[...] you can build a device for a particular experiment and give it away, store it in the basement, or forget it and build another one for the next experiment"..²⁴ By contrast one of the first experiments being installed at the SPS in 1976 was a six-team, 26 physicist affair, and its proposed apparatus, which extended over 25 m on the experimental floor, consisted of "a beam telescope of proportional wire chambers, a liquid-hydrogen target surrounded by a 4π solid angle anticoincidence counter arrangement [...], and a forward spectrometer equipped with two magnets giving a total bending power of 3Tm, wire spark chambers with a resolution better than 0.3 mm, two large aperture Cerenkov hodoscopes, a trigger system and anticoincidence counters for the detection of charged particles and neutral pions".²⁵ These

²³ See Jentschke's "Introduction" to Volume II, 300 GeV Working Group, Proceedings of the Second Tirrenia Study Week, Tirrenia, Italy, 20-29 September 1972, at p. 13 (CERN/ECFA/72/4 Vol. II, January 1973).

²⁴ These remarks were made by Bruce Cork at the Spark Chamber Symposium chaired by Arthus Roberts and held on 7/2/61 at the Argonne National Laboratory. The proceedings were published in the *Rev. Sci. Inst.*, 32 (1961), 479-531.

was clearly a good deal of work in the field of detector-construction for applied physicists and engineers. But who would do it?

The general feeling among outside users was that CERN wanted to "hoard" important, big-equipment projects for itself.²⁶ As one visitor put it in a written statement to WG3 in 1973, he had been struck by some "rather startling comments" made by CERN senior staff at a meeting of the SPS Experiments Committee. "The question asked by a senior CERN physicist", the correspondent went on was "whether all major experimental projects at the SPS should come under the control of CERN paid project leaders". Two arguments were put forward by CERN for this policy. Firstly, the laboratory had the requisite technical and engineering capacity for building big, complex equipment. Secondly, it was claimed that such projects should come under the "neutral" control of CERN, rather than be built by any national group. This was because, by virtue of their size and complexity, they were not just one-off experiments but general long term facilities which should be available to the whole physics community.²⁷ In line with these ideas DG Jentschke told ECFA in December 1972 that "big experimental equipment projects were usually financed by CERN", and that it was planned "to spend about 50 MSF on major equipment for SPS physics in the West Area [...]".²⁸

Against this, visitors from the member states felt that, whenever possible, big experimental equipment should be built in the national laboratories. For one thing, they had the infrastructural resources, employing together about 4500 people and dispensing funds of about 500M Swiss Francs per annum. This compared favourably with the manpower and expenditure figures for the more capital-intensive CERN programme of some 3500 people and a budget of 570M Swiss Francs in 1973.²⁹ For another they had the technical capability and skills deriving essentially from the fact that they had built accelerators of their own. To give some examples. Saclay in France had constructed and installed a 7 m³ hydrogen bubble chamber, Mirabelle, for use at the 70 GeV machine in Serpukhov, and had also built a variety of scanning and measuring set-ups. As for

25. The experiment was labelled WA3, "Exclusive πp and $K p$ interactions", it was an Amsterdam-CERN-Cracow-Munich-Oxford-Rutherford Laboratory collaboration, and the spokesman in 1976 was P. Weilhammer. See *Experiments at CERN in 1976* (Geneva: CERN, 1/9/76).

26. The phrase is Mulvey's in his memo *Comments on ECFA III (3)* addressed to "Director-General, CERN Laboratory I", and dated 13/11/73 (DADM20099). CERN's construction of superconducting elements for low-beta-sections in the ISR was cited by Mulvey as one example of what visitors called CERN's "insularity". Why do this at CERN, they argued, when national laboratories had groups who were just as capable of doing so?

27. For these quotations see letter Lipman to Gunn, 4/5/73 (YGC23572). Lipman had spent the previous ten months at CERN working as the leader of an experiment at the Omega spectrometer, and personally felt himself "rather well involved in CERN". This, and the generally objective tone of his letter, has led us to place considerable weight on the document. The type of projects the senior staff had in mind which he mentioned were muon scattering experiments, counter neutrino experiments and a large spectrometer system.

28. See the minutes of the ECFA meeting on 1 December 1972, CERN/ECFA/73/4 (undated) (DG21220)

29. WG3 Final Report, p. 14 (see note 21).

counter experiments, to quote Berthelot in May 1972, "physicists [were] assisted by engineers and technicians who [had] acquired a large amount of experience both in very fast electronics, on-line computers, and construction of all kind of equipment involved such as spark chambers, wire chambers, scintillators, Cerenkov counters, etc..."³⁰. At Frascati in Italy there were groups specialized in magnets, in cryogenics, in ultra-high vacuum techniques, and in electronics. There was also a workshop in which about ten people built detectors for electronics experiments – counters, light pipes, spark chambers, etc.³¹ Finally (and unfortunately we have no comparable information for Germany) the Rutherford Laboratory in England had "a strong applied physics support programme", covering the development of superconducting magnets and RF separators, polarized and track sensitive bubble chamber targets, and fast cycling vertex detectors. They had also built a special camera system (the so-called Plumbicon) for the Omega project.³² In brief, national laboratories were well equipped to build major equipment for use at the SPS and, in one visitor's view, "it would be a madness to ignore this capacity [...] and to go instead to a further reliance on CERN engineering and technical facilities".³³

Three other arguments were advanced by "outsiders" to bolster this line of thinking. Firstly, it was recognized that detector development required and extended strategically important skills and knowledges in those involved in "technically advanced projects". Member states had "a legitimate desire" to see those skills fostered in their technicians and engineers.³⁴ Secondly, there were the advantages to be gained by the universities in those countries that had national laboratories. On the one hand the latter had the resources and the know-how to turn good ideas into useful devices – and the most oft-quoted example here was the Plumbicon, which had been built at the Rutherford Laboratory though the "initial thinking" had been at Westfield College, London.³⁵ On the other hand, they could simplify the working arrangements of electronics experimenters based in physics departments. They provided "a local, easily accessible, centre for the preparation of apparatus and for subsequent data analysis". As such they could help reduce the time university physicists had to spend away from their families and their normal

³⁰. A. Berthelot, "Elementary Particle Physics in Saclay", paper presented at the ECFA Information Meeting, CERN, 26/5/72 (YGC23572).

³¹. "Frascati National Laboratories. A Report to ECFA. May 15, 1972", Servizio Documentazione dei Laboratori Nazionali di Frascati del CNEN (YGC23572). 46-54.

³². G.H. Stafford, "The Rutherford High Energy Laboratory", section 7 (YGC23572).

³³. Letter Lipman to Gunn, 4/5/73 (YGC23572).

³⁴. The point was made, for example, by Salmeron, at the ECFA meeting on 1/12/72, minutes CERN/ECFA/73/4, undated (DG21220).

³⁵. For a description of the Plumbicon see Stafford's report, note 32. In this report it is written that the proposal to build this kind of system was made in January 1971 "by a team from Birmingham University, Westfield College, London, and the Rutherford Laboratory" (p.15). Stafford attributed the original idea to Westfield at the ECFA meeting on 1/12/72, minutes CERN/ECFA/73/4, undated (DG21220).

teaching duties.³⁶ Finally, and perhaps most important of all, the construction of big equipment for high-energy physics provided something of a guarantee for the long-term survival of the national institutes.

During the late 1950s and early 1960s all the large member states built national accelerators which, though not comparable in energy to the biggest Europe could offer, the 28 GeV CERN PS, could still do useful high-energy physics work. However, the costs of financing the construction of, first the ISR and then, immediately afterwards, the 300 GeV SPS, coupled with the enormous increase in energy that these machines represented over other accelerators in Europe, inevitably entailed a refocussing of activities at the national level. Two lines of action were envisaged. Firstly, machines that could no longer compete in the high-energy field were to be decommissioned. At the end of 1973 France, for example, was planning to do all its high-energy physics at accelerators outside the country (CERN, Serpukhov, Fermilab), and to concentrate on nuclear structure physics – Saturne had in fact already been converted to a nuclear structure programme. In Britain, for its part, there were plans to close NINA, the 5 GeV electron synchrotron at Daresbury by 1977 or 1978, transferring some of the staff to a nuclear structure facility, and to turn-off the 7 GeV PS Nimrod around 1979 – in fact NINA was closed down in 1977 and Nimrod in 1978.³⁷ The second approach taken by national laboratories was to envisage building high-energy accelerators that were “complementary” to what CERN had, realizing that if they did not the money would flow out of high-energy physics into other fields. However, the strongest, and indeed the *only* serious candidate for this role from a physics point of view was a 10-20 GeV electron-positron colliding beam machine – and in 1973 three national laboratories had plans to build one (the 14 GeV per beam EPIC at Rutherford, the 15 GeV PETRA at DESY, and the 10 to 12 GeV Super ADONE at Frascati). The Working Party realized that “to attempt to build more than one would be quite unrealistic, political and financial suicide for the high-energy physics community” to quote Mulvey.³⁸ Put differently the ECFA-inspired image of a pyramid of European accelerators with CERN at the peak, resting on a base of high-energy machines in the member states, was now obsolete. And national laboratories needed to carve out a new niche for themselves to ensure their survival. The construction of heavy equipment for use at CERN was seen to be one important way of keeping them in business. In fact it was even suggested that they might do this on “some sort of contractual basis for CERN, providing equipment not only for their own user groups but in

³⁶. WG3 final *Report...*, p. 15 (see note 21). The problems faced by university physicists doing electronics experiments are discussed in greater depth below.

³⁷. For this information see the Appendix to Mulvey’s memo cited in note 26. See also the minutes of the second meeting of the Working Group, held on 17/9/73, document ECFA/WG3/RLM2/73 (DG21221), and the *Report of Sub-Committee 3*, dated 28/1/74 (YGC23572) for more information on the national situations.

³⁸. The quotation is from Mulvey’s memo cited in note 26.. In the more sober language of the Final Report of the Working Group (see note 21), we read that “any attempt at the unnecessary duplication of similar accelerators would be damaging to the credibility and, hence, to the future prospects of high energy physics” (at p.17).

a more general way".³⁹ To simplify, why not have CERN build accelerators and the national laboratories build the heavy equipment to exploit them (rather as was done for the two big bubble chambers, BEBC and Gargamelle)?⁴⁰

How sympathetic was CERN to these arguments? We have no direct evidence for answering this question but it is safe to say that no formal attempt would have been made by CERN to *coordinate* its detector-building activities with those in the Member States. More precisely, the kind of suggestion made by visitors to the effect that "CERN should rely more on specialist techniques developed in the National laboratories *rather than maintaining comparable specialist groups at CERN [...]*" (our emphasis) would undoubtedly have fallen on deaf ears.⁴¹ This was partly for the simple reason that CERN had a large number of applied physicists and engineers on its staff (550 not counting mathematicians and programmers in December 1974, 398 of them on indefinite contracts) and it was management's responsibility to secure interesting and challenging work for them.⁴² It was also because the CERN staff had every intention of building "their" laboratory into the best of its kind in the world, and wanted to have the all the equipment and expertise that was needed to achieve this goal at hand and under their control. There was no question then of CERN suppressing scientifically and technically important and challenging activities just because there were groups engaged in doing similar work in the Member States.

This does not mean, of course, that there was no technical collaboration between CERN groups and outside groups in detector construction for electronic experiments. What we suspect though is that, just as in the case of the organization of work with bubble chambers in the early 1960s, this happened informally rather than as a matter of deliberate policy, and in response to the concrete needs of the parties concerned. In fact, as detectors got bigger and more expensive, and were of modular construction, it became normal for visiting groups to develop and build their own piece of the apparatus using in-house facilities in national laboratories and universities. These are points we shall return to later.

³⁹. See Point 16 in the minutes of the first meeting of the Working Group, document ECFA/WG3/RLM1/73, dated 11/7/73, and signed D. Baugh. (DADM20099).

⁴⁰. The arrangements made for the construction of these two chambers are being discussed by Dominique Pestre in Volume III, *History of CERN* (in preparation).

⁴¹. The quotation is from the memo written by Mulvey (see note 26). As an example Mulvey added "(e.g. don't build SC elements for ISR low- β -sections at CERN if they can be built by a National laboratory)".

⁴². For these figures see the unsigned memo *Complementary Information on CERN Policy in Connection with the ECFA (WG3) Report*, 11/4/75 (DG21222). Reporting his 1970 census figures to ECFA Harting said that there were 583 applied physicists at CERN, 351 at the national laboratories, and that the number elsewhere was negligible – see CERN/ECFA/73/3, undated (DG21220).

4. SECOND POINT OF FRICTION: CERN'S INDEFINITE CONTRACT POLICY

In the late 1950s and early 1960s the CERN management successfully argued that certain categories of staff should be given indefinite contracts, a concept equivalent to tenure in a university. Initially seen as something of a privilege to be awarded to a few individuals whose services were highly prized, this practice gradually evolved into standard laboratory policy. By the end of 1971 about 60% of the CERN staff had indefinite contracts.⁴³ Table 2 shows how these contracts were distributed among scientific staff a few years later. We see that almost three-quarters of applied physicists and engineers and about half the experimentalists had indefinite contracts at this time.

Table 2. Number of CERN scientific staff with indefinite contracts (IC) around the end of 1974⁴⁴

Category	Total staff	Staff, IC	Percent
Experimental physicists ⁺	77	36	47%
Theoretical physicists ⁺	19	12	63%
Applied physicists [*]	197	147	75%
Mathematicians, programmers [*]	138	68	49%
Engineers [*]	353	251	71%

Notes.

+ = As on 1.1.75

* = As on 31.12.74

CERN's policy of granting physicists, in particular, a "job for life" after they had had been employed on a fixed-term contract for several years was strongly opposed by some of the outside users in the early 1970s. Indeed it was the one issue on which certain ECFA delegates felt that the Working Group's final recommendations were not firm enough with CERN. Its Report recommended that CERN "should be asked to examine critically the balance of its temporary and tenure appointments in both pure and applied physics [...]". In fact, as was pointed out by H. Faissner, who had chaired the subcommittee most directly concerned with this question, "there was a strong opinion in the Working Group that the number of tenure appointments in pure and applied physics at CERN should not be allowed to increase". This opinion, he said, had been "insufficiently stressed" in the final recommendation – apparently to

⁴³. The figures for 31.12.1971 are taken from the Report of a Working Group on Appointment Policy dated 31 August 1972, at p.4. (GU23800). This Report describes past CERN policy in this area, and makes recommendations about how to improve it.

⁴⁴. From an unsigned memo dated by hand 11.9.75, and entitled *DRAFT No. 2 (final version). Complementary information on CERN Policy in Connection with the ECFA (WG3) Report* (DG21222).

accommodate CERN's claim that the laboratory had already adopted a no-growth policy.⁴⁵

The main objection that the visitors had to this policy was that it seriously impeded mobility through CERN, so that the knowledge and experience to be gained by working in Europe's most important laboratory were becoming concentrated in the hands and minds of a privileged few who were based there. Indefinite contracts discouraged scientists from leaving CERN. "European physicists must spend at CERN a part of their life, but not all their life [...]", otherwise "a deadly stagnation develops". Indefinite contracts led CERN staff to be closed in on themselves, indifferent to building contacts with colleagues in national laboratories and universities, and reluctant to spend extended periods of time away from Geneva. "One reason why collaboration [with CERN] was easier in research than on the technical side was the fact that all applied physics staff held indefinite contracts and thus had no incentive to maintain outside contacts". Indefinite contracts impeded the flow of outsiders through the laboratory. "Anybody who scientifically deserves it [should have] an opportunity to spend a period at CERN. To improve the situation in this respect I see only one way: to shorten the admissible stay of visitors at CERN, and to stop the creation of new permanent positions".⁴⁶

Behind these objections, and increasing the strength of feeling in ECFA on this question, lay the prevailing situation in the universities, and the difficulties that high-energy physics was experiencing at the time, both of which were demoralising younger people in the field and turning potential recruits away from it. Firstly, and most concretely, it seemed that "in most countries the physicists' career prospects [had] recently changed dramatically [...]" in the universities.⁴⁷ There was a growing tendency to give tenure, not only to those in very senior positions, but also to relatively young, junior staff, so that in some countries it looked as if only one PhD graduate out of ten could hope for a permanent appointment in the foreseeable future. At the same time, there appeared to be a declining number of technical or computing jobs in high-energy

⁴⁵. The material in this paragraph is from the Working Group's Final Report (see note 21), Recommendation 7.4, and paragraph 3.8, and from the minutes of the seventeenth plenary meeting of ECFA, CERN/ECFA/75/4, 16/5/75 (DG21220). The quotation beginning "there was a strong opinion [...]" does not give Faissner's actual words. It is a statement made in the Report at paragraph 3.8 which was apparently paraphrased by Faissner at the ECFA meeting. It was Gunn himself who implied that the recommendation had been softened to 'appease' the CERN representatives on the Working Group – see minutes of the ECFA meeting at p.17.

⁴⁶. For these quotations see, respectively, the letter from Salvini and Harting to the members of the plenary ECFA, CERN/ECFA/72/10, 21/12/72, Appendix II to WG3's Final Report (see note 21), Salvini's intervention at the 17th plenary meeting of ECFA, minutes CERN/ECFA/75/4, 16/5/75 (DG21220), and letter Morpurgo to Faissner, 1/10/73 (YGC23572). The point about CERN staff being closed in on itself was also made by Mulvey. Visitors complained, he said, that "CERN staff never spend significant periods of time working with groups in National laboratories; the traffic is all in the other direction". See his memo cited in note 26.

⁴⁷. See Hine's memo to Jentschke and Adams on the *Second Meeting of ECFA Working Group III* dated 27/9/73 (DADM20099) and letter Goldschmidt-Clermont to Faissner, 15/11/73 (YGC23572).

physics. In short, all indications were that the boom of the 1960s was coming to an end in the universities, and that the field as a whole was reaching a "steady state", both in terms of money ("The expected financial future in different countries [was] typically one of constant budgets [...]")⁴⁸ and of manpower ("The number of positions in high energy physics [would] stay approximately constant")⁴⁹. Hence the need to improve the circulation of staff between CERN, the universities, and the national institutes, and "Not to increase the number of permanent positions at CERN and at the National Labs."⁵⁰

A second factor increasing anxiety about the long-term future of high-energy physics was "the current antiscientific tendencies among young people".⁵¹ This was associated with the general wave of student unrest which swept through many European and American universities in the late 1960s. A focal point of student protest was the involvement of scientists in the Vietnam war, a war in which the USA's role was vehemently opposed by many of the young, and which exposed, in their view, the shallowness of claims that scientific research was "objective" and "disinterested", it results "value-neutral". At a famous meeting of the AAAS in Chicago in December 1970 "Dr Teller, father of the American H-bomb, had to share his platform with placards proclaiming him a war criminal; Dr Glenn T. Seaborg, chairman of the Atomic Energy Commission [...] fled the room rather than hear himself indicted for the crime of 'science against the people'; the president of the National Academy of Sciences, Dr Philip Handler, escaped lightly in being called a lackey of the ruling class by a speaker who usurped his podium [...]". As one of those present explained, "Because science is used for war, we have lost the respect of the people and there is a revulsion against scientists [...]".⁵² Similar, though perhaps less spectacular, protests were also common in Europe, where they were coupled with a fundamental challenge from below to the prevailing power-relationships in many walks of life, including the universities, and the demand for more participation in decision-making procedures.⁵³ Some members of ECFA were alarmed to the point of despair: "In my country", wrote Morpurgo from Genoa, "the future itself of the Universities as a place where research of any kind can be done is, in my opinion, strongly in doubt. We have assisted", he went on, "in the past 6 years to a progressive unbelievable deterioration of the standards of our Universities, which has proceeded in

⁴⁸. See Hine's memo just referred to, and, for more details country by country, Baugh's minutes of the second meeting of WG3 held on 17 September 1973, document ECFA/WG3/RLM2/73, 9/11/73 (DG21221).

⁴⁹. From the *Report of Sub-Committee 1 to Working Group III of ECFA*, signed by H. Faissner and dated 21/12/73 (DG21221). see also the Final Report of WG3, section 3.

⁵⁰. From the *Report of Faissner's Subcommittee* referred to in the previous note.

⁵¹. From the minutes of the 16th Plenary ECFA meeting held on 22/2/74, document CERN/ECFA/74/4, 10/10/74 (DG21220).

⁵². All quotations from "Dissent Blooms at AAAS Circus", *Nature*, 229 (January 8 1971), 81-2. The AAAS is the American Association for the Advancement of Science.

⁵³. For a general account of the left-wing critique of science in this period, see for example H. and S. Rose (eds.), *The Radicalisation of Science* (London: Macmillan Press, 1976), chapter 1.

parallel with a demagogic [sic] set of laws aiming, partially, to hit the so called 'meritocracy';".⁵⁴ Even the sober-minded *Nature* felt it apposite to ask "Can and Should the Universities Survive?".⁵⁵ In this embattled atmosphere, with science under attack, and with poor career prospects in high-energy physics, the Working Group felt that every effort should be made to improve the public image of their discipline, and to provide young researchers with a taste of the excitement and the challenge of the field which only a place like CERN could offer.

CERN's position on these questions rested on two main planks. Firstly, it reiterated the scientific need for indefinite contracts. Many experimental projects, as Goldschmidt-Clermont pointed out, could take five years or more from conception to completion – and here he mentioned large experimental facilities like BEBC, Gargamelle, the Split Field Magnet and the Ω spectrometer by way of examples. Obviously "some long-time continuity" was required for a number of the people working on these projects, and this was not compatible with a rapid turn over of staff.

CERN's second main argument was that, unless its employment policies were compatible with those being applied in the Member States, it could not recruit and keep good people. "Many staff feel strongly that CERN policies and practices should parallel those found in the Member States [...]", noted The Working Group on Appointment Policy which reported in August 1972, and this meant that CERN too had to yield to the pressure to grant long-term job stability. "The idea of a guaranteed job in the same organization from the age of 25-30, with a pension to follow, is now a commonplace, and mobility between employers becomes more and more difficult after the age of about 30-35".⁵⁶ As Goldschmidt-Clermont explained to Faissner, if the laboratory's policy for awarding indefinite contracts did not reflect these realities, "some of the best candidates for work at CERN may be discouraged to join its staff".⁵⁷

This did not imply that CERN was against a greater deal of mobility among the three vertices of the triangle CERN-National Laboratories-Universities. On the contrary, it "favour[ed] sabbatical years in the member states and support[ed] extended leaves for its senior staff" with indefinite contracts. If these possibilities had not been used very much to date, it was not for any lack of goodwill on CERN's part. Indeed the laboratory's scientists and engineers would welcome the opportunity to teach some advanced courses at universities, but they found it difficult to do so "due to a lack of available positions in the member states".⁵⁸

⁵⁴. Letter Morpurgo to Faissner, 1/10/73 (YGC23572).

⁵⁵. *Nature*, 230 (March 26 1974), 1978.

⁵⁶. From the *Report of the Working Group* cited in note 43, at pp. 8, 7. See also the document *DRAFT No.2 (final version)* cited in note 44.

⁵⁷. See letter Goldschmidt-Clermont to Faissner, 15/11/73 (YGC23572).

⁵⁸. See *DRAFT No. 2 (final version)* cited in note 44. See also the *Memorandum* from Meyer to Jentschke dated 2/2/1973 (DADM20099). J. Meyer was the head of the CERN delegation to ECFA at the time.

In line with these considerations, and despite the protests from its users, CERN continued to apply an active policy of awarding indefinite contracts to its staff. The 1972 Working Group on Appointment Policy proposed that research physicists be given 2-3 ICs per year, that 50% of mathematicians and programmers, and 50% of applied physicists and engineers recruited for development work should be awarded indefinite appointments, and, finally, that 50-60 applied physicists and engineers on fixed-term contracts who were in non-developmental work should also be given the appropriate job security.⁵⁹ This was a far cry from the appeal to stop all such awards which was made by some people in ECFA's WG3. And by 1987, 91% of CERN's staff members had indefinite contracts, compared to some 60% among the scientific staff in 1972.⁶⁰

5. THIRD POINT OF FRICTION: VISITORS' PARTICIPATION IN DECISION-MAKING

One of the classic sites of conflict between a host laboratory and its outside users is the extent to which the latter are involved or, at least, feel involved in decisions which affect them, notably decisions concerning the experimental programme.⁶¹ In the early 1960s the CERN management set up structures which took account of this demand for consultation, a demand which was that much more insistent because the laboratory was supposed to serve the entire European high-energy physics community. The committees set up at that time, after some difficulty one should add, were still essentially intact in the early 1970s, with the addition of two new bodies to handle the experimental programmes on the ISR and the SPS. One of the tasks of Working Group 3 was to see if visitors were satisfied with the way such committees were functioning at CERN and in the national laboratories (though the latter were not, in fact, studied in any depth).

By way of introduction to the issue let us first survey the committees involved in laying down the experimental programme at CERN. The account will be brief, as this structure and its evolution will be the subject of a separate study in its own right.⁶²

In 1973 there were four experiments committees dealing with the machines then operating, the Track Chamber Experiments Committee, (TCC), the Electronic Experiments Committee (EEC), the Physics III Committee (Ph.IIIC, primarily concerned with work at the Synchro-cyclotron), and the Intersecting Storage Rings Committee (ISRC). A fifth

⁵⁹, From the Report of the Working group cited in note 43, Recommendation 8.

⁶⁰. See *Final Report of the CERN Review Committee*, CERN/1675, 3/12/87, at p. 51.

⁶¹. See for example, L. Kowarski, *An Observer's Account of User Relations in the U.S. Accelerator Laboratories* (Geneva: CERN 67-4, 1967) and D. Pestre in *History of CERN, Volume II*, chapter 8.

⁶². The account that follows is based on two papers prepared by Mervyn Hine for the Working Group, namely, *Planning and Decision Making Procedures at CERN. Working Paper* by M.G.N. Hine, document ECFA/WG3/RLP6/73, 27/8/73 (DG21221) and *Membership of CERN Committees*, document ECFA/WG3/RLP6 Add/73, 10/10/73 (YGC23572).

committee was preparing the experimental programme for the Super Proton Synchrotron, then under construction (the SPSC). Overall responsibility for the laboratory's research programme was vested in the Nuclear Physics Research Committee (NPRC), and ultimately in the hands of the Director General.

Broadly speaking the experiments committees functioned along similar lines, holding both open and restricted meetings (the exception was the PhIIC, where the community was sufficiently small (~140 people) that restricted meetings were not necessary). Open meetings were held roughly once a month, and could be attended by all physicists interested in the technique or machine concerned – as for numbers, as Hine put it, “the document circulation lists add[ed] up to several centimetres of computer print out”.⁶³ At these meetings those present would hear and discuss proposals for experiments, reports on the progress of the programme, information on problems to be expected in the future, and so on. At the more restricted meetings, attended basically by the official committee members (typically 10-20 people, see below), the proposals were analysed in more detail, their infrastructural needs were identified, and a consistent programme for the months ahead was laid down.

While all committees combined open and closed sessions, the relationship between the two forums for discussion, and the mechanism for transmitting recommendations to the NPRC differed between them. In the EEC and the ISRC the restricted meeting formulated its recommendations after hearing the discussions in the open session. In the TCC the proposals were first prepared in the restricted meeting (the TCC ‘bureau’), and then submitted to the open session for possible modification and formal approval, before being passed on to the NPRC. As for the SPSC, at the end of 1973, it was, in Hine's view, “following the EEC schema rather than the TCC”.⁶⁴

It was up to the NPRC to approve the proposals laid before it which came up from below. Generally speaking these were already compatible with one another technically, this having been settled previously with those responsible for the accelerators and the beams. Only exceptionally did the NPRC have to choose between various proposals. Its main task was to legitimate the decisions already taken by the ‘lower’ committees, and to fix “the future frame in which the other committees should plan their programmes (numbers of shifts available, times of shut downs, sharing between Experimental Areas or between kinds of beam and detector, use of new ejection facilities etc. etc.)”.⁶⁵

Table 3 illustrates the distribution of membership of the five main experiment committees towards the end of 1973. The chairmen of the experiment committees were always eminent outside physicists, and were formally appointed by the Director General, who was himself chairman of the overarching NPRC. The often large contingent of *ex officio* CERN staff included the secretaries of the committees, senior members of the division most directly concerned, technical people from the accelerators,

63. Hine, in *Membership...* (see note 62).

64. In *Planning...* (see note 62).

65. *ibid.*

etc. (whose membership lasted "as long as they [were] involved in the work"⁶⁶) and the physics 'coordinators' who were responsible for the day-to-day running of the programmes (and who were changed annually). The rest of the membership, including the chairman, were generally appointed for two years.

Table 3. The composition of the main experiment committees at CERN in October 1973. as distributed between CERN staff and visitors.⁶⁷

Committee	EEC	TCC	ISRC	SPSC	NPRC
Type of Membership					
Visitor	6	9	6	9	7
CERN staff	3	1	5	4 ⁺	1
CERN staff, ex officio	2	5	7	10	14
Chairman	Manelli (Pisa)	Cresti (Padova)	Schopper (DESY)	Lehmann (Orsay)	Jentschke (DG)

Note.

+: Rubbia (CERN, Harvard) has been counted as CERN staff here.

What did the visitors feel about these arrangements? After investigating the situation, the Working Group found that, by and large, outside users were satisfied with them. Their anxieties, it seems, had been based on a misunderstanding, a lack of information about the precise composition of the committees, how members were chosen, the rate of rotation of membership, and so on.⁶⁸ With these points clarified, as Hine put it, the tone of their remarks became "much more understanding and favourable than the initial attitudes had been".⁶⁹ At the same time the visitors did feel that there was room for improvement. What particularly disturbed them was the number of *ex officio* CERN members, which was extremely high in committees like the SPSC and the NPRC (see Table 3). To counteract this they would have liked to increase the external membership (accepting, for want of a better idea, that CERN should continue to appoint the outside members).. At the same time, they realized that there were, in fact, very few 'active' CERN physicists in these bodies. Seen from this point of view, it was the CERN physicist's representation which was unsatisfactory.⁷⁰ In the event the Working Group conceded that it was necessary to have CERN staff with knowledge and responsibility for running the experimental programme, as well as the appropriate division leaders, present at meetings and accepted that there were already enough external members on most committees. Their main

⁶⁶ Hine, *Membership...* (see note 62)

⁶⁷ *ibid.*

⁶⁸ See H. Schopper's *Summary of the Discussion with Visitors on 29 and 30 January, 1973*, (DG20589).

⁶⁹ Hine, *Memorandum to Jentschke and Adams*, dated 5/12/73, and reporting on the second meeting of ECFA WG3 (DG21221).

⁷⁰ For this material see the undated, unsigned memorandum *ECFA Working Group III, Sub-Committee 2* (DG21221).

recommendation was simply that the balance between external and internal membership be kept under review.⁷¹

The visitors' views on the committee system prompt a number of remarks. Firstly, it is important to realize that if they were basically satisfied with the structure, it was because they had, and almost always had had, an important role in it. The CERN management had been made aware very early on in the laboratory's life that they would have to include outsiders in decision-making at this level, – witness the policy of having non-CERN staff as chairmen for example – and this obviously reduced and redirected any tension that there might have been between the laboratory and its users in this area.⁷² Secondly, it must also be admitted that these committees had a very particular, and rather limited, kind of power. Most crucially, their main aim was not to settle priorities in the research programme, it was not to make important choices between proposals for experiments (although originally Weisskopf, for example, had thought that a committee like the NPRC would do this). Their task was essentially *to give the seal of approval for the carrying out of decisions already prepared before the committees met*. As Hine put it – and the Report of Working Group 3 uncritically repeated this phrase almost word for word – with the effective spreading of information and discussion prior to formal meetings, most decision making at CERN became “the necessary formality of giving authority to those responsible for execution for actions already agreed upon”.⁷³ As Wolfgang Paul explained to SPC on a different occasion, “Although relatively few proposals were rejected at the Committee stage, a substantial number were never put forward after discussions between the physicists concerned and Professor Cocconi, Professor Preiswerk or himself [the three senior physicists in the NP division]”.⁷⁴ The experiments committees were thus not the site of titanic battles with winners and losers in which it was important to have as many likeminded people on one's side as possible. They had power, but they did not use their power to decide but to confirm. They did not choose between experiment proposals, they legitimated ‘choices’ already made in the pre-committee stage.

This probably explains why the outside users were so concerned about the number of *ex officio* members on these committees. Here was the executive arm in person, the group which had earlier played a dominant role in eliminating certain proposals as unpractical, in persuading some groups to join up with others, in suggesting when

⁷¹. See the *Report* of the Working Group cited in note 21, sections 4.5 and 7.6. It was also suggested that more theorists should be included on the committees. It was difficult to take this recommendation seriously as, in presenting WG3's report to ECFA, its chairman, Gunn, remarked that this idea had perhaps been mooted because the chairman of the sub-committee which had dealt with this matter was himself a theorist – see the minutes of ECFA's 17th plenary meeting, CERN/ECFA/75/4, 16/5/75 (DG21220).

⁷². See Dominique Pestre, *History of CERN, Volume II*, chapter 8.

⁷³. Hine, *Planning...* (see note 62). This view was confirmed by scanning the minutes of these meetings, and was also confirmed in an interview with one of the secretaries of such a committee.

⁷⁴. Paul at the 52nd meeting of the SPC, 25. 26/2/69, minutes CERN/SPC/74, 27/4/69.

certain experiments might be scheduled and how much priority they should be given, and so on. What the committees were doing, in effect, was to 'rubber stamp' the decisions that the beam and accelerator people, the division leaders and the coordinators had worked out beforehand in consultation with the physicists who had made the proposals. What the visitors sought in reducing their weight in the meetings was a clearer line of demarcation between the 'legislative' and the executive, a greater freedom to discuss, among a core of 'active' physicists, the experimental proposals that were before them without having the debate dominated by the practicalities and pressures of implementation – and by the CERN staff responsible for doing so.

One other committee, apart from the experiments committees, was singled out for criticism by the visitors. This was the Data Handling Policy Group, chaired by Mervyn Hine, whose task it was to advise on major computer installations. Visitors objected strongly to the absence of an outside contingent of users and computer experts on this committee (it had 14 members in October 1973, the bulk of them being CERN staff),⁷⁵ and were determined to be properly represented on it, and any other similar body dealing with computer policy.

One reason was probably that the services given by the Data Handling Division at CERN were not particularly good around this time. As one person who was not an outsider reputedly put it, they were "much less convenient to the users than those at the Rutherford Laboratory and at the Max-Planck Institut in Munich". The main cause of the difficulty seems to have been the poor performance of the new central computer. In 1969-70, after user representatives had made two surveys of future needs, and a panel of experts had been invited to assess various possibilities, it was decided to acquire a CDC 7600 for CERN rather than an IBM.⁷⁶ This machine was delivered in 1972, when it was found that there were major deficiencies in the software, particularly for the processing of large volumes of data on magnetic tape. With more and more electronic experiments storing their information in this form (see below), this weakness – which was still not ironed out at the end of 1973 – was causing considerable irritation to the physics community.⁷⁷

A more fundamental reason why visitors wanted to be fully consulted on data-handling policy was the growing importance that big computers were playing in electronic experiments. Big facilities like the Split Field Magnet and the Ω spectrometer were recording their data on tapes in a similar way to bubble chamber film, a new generation of

⁷⁵ For the membership in October 1963 see Hine, *Membership...*, note 62. The Report of the Working Group recommended that "A balance of external membership, both of users and of computer experts, is considered desirable for the Data Handling Policy Group, or any other committee advising the Director General on computer policy", see *Report...*, note 21, recommendation 7.7.

⁷⁶ For material in this paragraph see Hine, *Planning...*, note 62, and an "informal write-up of some informal notes" taken at an informal *Physicists Meeting* of 27 November 1972 by A.J.H. (DG20589).

⁷⁷ For this information see CERN, *Annual Report*, 1972, 100-1, *Annual Report*, 1973, 98-9.

electronic detectors suitable for fast data capture, like 'Charpak' or wire chambers, was coming into use, and increasingly large and sophisticated experimental set-ups were being proposed for use at the ISR and the SPS. In 1972, Hine reported, about 87% of the used computer capacity in Europe was dedicated to data analysis, 52% for bubble chamber film, 35% for electronics experiments. Overall computer usage was expected to grow 2-3 times between 1972 and 1975, and the amount of data to be stored (mostly on tapes), was expected to grow by a factor of 3 to 5 over the same period. This could mean that in a few years a large centre like CERN would be holding 100,000 tapes or more.⁷⁸ CERN alone could not carry this load; indeed it was central to its policy that datahandling be shared Europe wide.⁷⁹ The need to be able to transfer data on tapes between computers at CERN, the national laboratories, and the universities, and the new possibilities being opened up for this by using telephone lines, made it essential for outside users to keep in touch with all major developments at the CERN computer centre.⁸⁰

These criticisms fell on fertile ground at CERN. Early in 1976 Leon Van Hove, newly-appointed DG for Research, reported to ECFA that 'improvements' were being made to the committee structure. "A strict rotation rule" was being imposed on the experiments committees. And the Data Handling Policy Group was being abolished. In its place there would be a Computing and Data Handling Policy Committee. It would be advisory to the CERN management, and its membership would be made up of two *ex officio* CERN staff, two ordinary CERN members, four external users (physicists using CERN and computer centre managers) and a secretary.⁸¹

So far we have concentrated on the need which outside users felt for adequate representation in formal, rather high-level committees. However many of them believed that this was not sufficient, that a participation in internal decision-making at the less formal and working level was just as crucial. As one outsider put it, what was "very poorly catered for [at CERN] [was] for visitors to get involved in the day-to-day dialogue on what physics to back and what projects to start. This is not my view alone", he went on, "but to my experience a frequent complaint of

⁷⁸, The figures are taken from Hine's 1972 *CERN-ECFA Survey of European Computing Facilities for High Energy Physics*, CERN/ECFA/74/3, 19/2/74, and an update dated 27/2/74, both in (DADM20099). As one would expect, more of CERN's used capacity was taken up with analysing data from electronic experiments than from bubble chamber experiments – 52% as opposed to 36%.

⁷⁹. See J. Krige in *History of CERN. Volume II*, chapter 9.6.

⁸⁰. Stafford described the links established between the Rutherford Laboratory and CERN and nine work stations at UK universities to the ECFA meeting in February 1974. At this time the system could not yet transmit bulk data due to limitations in the speed of telephone lines, and there was an air shuttle service carrying tapes between CERN and RHEL – see minutes, CERN/ECFA/74/4, 10/10/74.

⁸¹ From the draft minutes of ECFA's 19th plenary meeting held on 29/3/76, CERN/ECFA/76/12/Draft, 24/9/76 (DGR21311).

visitors".⁸² Of particular concern were laboratory decisions to invest in major facilities like the Split Field Magnet. These called for important investments in time and money which, while opening new horizons, also set important constraints on the physics that could be done by staff and by users. More generally, visitors wanted "a much better integration" into the routine life of the laboratory, being included, for example, in selection committees for staff appointments.⁸³ Participation at this level, plugging people into the CERN system "from a cultural or organizational point of view", finding ways of involving "even the quieter visitor into the discussion and even some of the decision-making that goes on here" was more difficult to arrange than having visitors represented on experiment committees.⁸⁴ It involved not simply a change of rules – rules for the selection of chairmen, for the rotation of membership, etc. – but a change of attitudes on the part of the CERN staff – the building of a relationship based not "only on the need of the outsiders to get better service but on a genuine co-operation [...]".⁸⁵

One remark by way of conclusion to this section. The debate between CERN and its outside users over the question of participation in decision-making, while raising an important point of principle, was also very much a child of its time, and followed the classic pattern of the day. On the one side, the visitors, those who felt excluded from the structures of power and influence, demanding to have a greater say in the running of affairs which affected them directly. On the other, the CERN management, tending to reduce the problem to one of a 'lack of information', and to treat the complaints as misguided and 'emotive'. Inevitably too the mechanism set up to deal with the conflict, a committee of enquiry, clarified misunderstandings, reduced tensions, proposed certain measures for improving relationships – and did not really come to grips with a number of deeply felt, vaguely articulated objections and misgivings which visitors had. Objections which had less to do with the inadequacy of formal mechanisms than with informal assumptions about the role of CERN and its responsibilities to its user community.

6. FOURTH POINT OF FRICTION: THE WORKING CONDITIONS OF VISITORS AT CERN

The relatively long periods of time that visitors using electronic detectors had to spend at CERN, and away from their home institutes, raised a number of new problems for outside users in the early 1970s. Two general kinds of complaint emerged in the debates stimulated by the enquiry of ECFA Working Group 3. Firstly, there was concern about access to CERN facilities which, said Chairman Gunn, people felt to be

⁸². See letter Lipman to Gunn, 4/5/73 (YGC23572).

⁸³ For this sentence and the one before see H. Schopper's *Summary of the Discussions with Visitors on 29 and 30 January, 1973*, undated (DG20589).

⁸⁴. See letter Lipman to Gunn, 4/5/73 (YGC23572).

⁸⁵. See Schopper, *Summary...*, note 83.

"prejudiced in favour of CERN-based groups rather than visitors".⁸⁶ These facilities ranged from office accommodation ("of low quality", according to one source), through secretarial and administrative support ("minimal" according to the same source⁸⁷), to technical support and workshop arrangements. The other area of concern was the social and personal problems of people coming to work temporarily in Geneva. We shall reserve our discussion of them to the next section.

To understand the complaints about the assistance being given to outside physicists doing experiments at CERN, we need first to describe the services and support available at the laboratory in the early 1970s. We shall focus on the arrangements made inside the NP division, as it was the needs of electronic experimentalists that particularly caught the Working Group's eye.⁸⁸

In 1973 there were nine "technical and service groups" in the NP division which helped experimentalists "at close range". Goldschmidt-Clermont regrouped them by task into six. Three of these dealt with the development, construction, assembly and, if need be, operation of heavy equipment: polarized targets (11 people), magnets and beams (26 people), and technical equipment of a mechanical nature (23 people). The other three dealt with electronic equipment. One group of 33 people was concerned with development (e.g. prototypes of fast electronics and readout systems for wire chambers, prototypes of CAMAC and general computer interfacing). Another, of 38 people, concentrated on the maintenance of electronic units built by CERN or by industry, on running the electronics pool for the experimental groups and projects, and on building prototypes and small series for the electronics development groups (the electronics workshop). Finally, there was a group of 16 people providing small on-line computers and programming assistance.

CERN groups and visiting groups did not have equal access to these resources, even when they were part of the same collaboration. Let us take the CERN groups first. Each contained typically one to three CERN staff physicists, and two CERN-paid fellows, research associates or visitors. In 1973 these groups were working in 18 mixed teams at the ISR, the PS, and the SC: there were no "pure" CERN teams active at the time.⁸⁹ The teams varied in number from about 12 to 27 people (excluding major facilities like the Ω spectrometer at the PS and the Isolde collaboration at the SC), and their mean size was about 16. The CERN group in each mixed team had its own budgetary code, a research budget of ~50,000 Swiss francs/physicist/year, and dedicated technical support of ~0.5

⁸⁶. In presenting WG3's report to the 17th plenary ECFA meeting on 27/1/75, minutes CERN/ECFA/75/4, 16/5/75.

⁸⁷. Letter M.A.R. Kemp to D. Baugh, 5/9/73 (YGC23572)

⁸⁸. The following description is based on a paper prepared for WG3 by Yves Goldschmidt-Clermont entitled *Structure of CERN Research Groups and Support Provided*, ECFA/WG3/RLP4/73, 7/9/73 (DG21221), an unsigned paper dated 21/3/73 entitled *Background information on the organization of the NP division* (YGC23572), and an unsigned *DRAFT No. 2 (final version) Complementary information on CERN policy in connection with the ECFA (WG3) report*, dated 11/9/75 (DG21222).

⁸⁹. According to Goldschmidt-Clermont, in the NP division "The CERN group is never strong enough to do an experiment on its own" (see his *Structure...*, previous note).

technicians/physicist. (Thus each CERN group had on average two 'attached technicians'). The CERN groups had free use of the electronics equipment pool and of computer time, but had to 'pay' for some workshop services and for material drawn from the CERN stores.

The outside groups worked either in mixed teams with CERN groups or in 'pure' teams of outside users. Goldschmidt listed 32 such teams, nine at the ISR, 14 at the PS, and nine at the SC, and they comprised about 300 physicists in all. CERN provided them with certain infrastructural services free of charge – things like beams, magnets, targets, small on-line computers and big experimental facilities, as well as engineering and technical assistance. At the same time "It was CERN policy and practice that [outside] experimenters generally [had] a basic support from their their home institutions which cover[ed] their detectors, electronics, their technicians, their computing, and their salaries".⁹⁰ In addition visitors were expected to pay for items drawn from the CERN stores, and for services in the mechanical, electronics, and special (plastic- and wire chamber-) workshops.

Outside users were dissatisfied with these arrangements for a number of reasons. Firstly, they felt that the technical interface between the visiting groups and the host laboratory could be improved. They wanted each experiment at the PS and later at the SPS to have its own 'project engineer' allocated to it. They wanted advice on the design and commissioning of technical work (including the supervision of work orders). And they felt that they were not being given enough support during the installation of their experiments.⁹¹

The electronics pool posed a different kind of problem. Here the visitors called for an increase in the number of standard items with which it was equipped, particularly fast electronics and datahandling units (CAMAC). This was the kind of material that visitors were supposed to provide for themselves, and so they only used the CERN electronics pool "to a limited extent to tide them over short-term needs of apparatus, or the waiting periods due to delivery times for ordered equipment". From one point of view the visitors did not mind this: they liked starting an experiment with brand new equipment, and were inclined to mistrust the reliability of the old. On the other hand, this attitude was "clearly a luxury" as far as standard units were concerned, and particularly when the group was not certain to reuse material once its experiment was over. In such circumstances it was far more logical to build up a large pool of common equipment which could be shared by all – even if that raised budgetary problems, "for which a solution should be found either within CERN or with the help of member States" as the Working Group put it.⁹²

⁹⁰. Taken from *DRAFT No. 2 (final version)...*, (see note 88). CERN did provide help in these areas in exceptional cases e.g., 250 KSF in 1974 to support members of visiting teams, 500 KSF for materials, extra computer time (38% of NP time in 1974), "and the use of the NP electronics pool without charge".

⁹¹. From *WG3 final Report...*, see note 21, pp10-11.

⁹². This paragraph is based on the *WG3's Report...*, note 21, 10, and a lengthy paper by Guy von Dardel entitled *Working paper for the meeting of Restricted ECFA, March 20th, 1975*, document CERN/ECFA/RC/75/4, 24/2/75, p.11 (DG21220). Von Dardel had just taken over

The fact that visitors had to pay for services in the mechanical, electronic, and special workshops like the scintillator workshop posed problems at two levels. They were spelt out by Guy von Dardel, who took over as ECFA Chairman in 1975, and who immediately addressed himself to the visitor question. Firstly, such payment involved an additional transfer of resources from the visiting groups/member states to CERN. As von Dardel put it, even though CERN teams were also charged for workshop facilities "[...] in their case it [was] not real money which [was] involved but only a question of internal bookkeeping at CERN. For the visiting teams it [was] real money and", the new ECFA chairman went on, "Swiss Francs at that, which have gone up considerably in value as we all know". von Dardel's second point was more fundamental. Should visiting teams from the member states pay for workshop services *at all*, he asked, considering that their governments had "already once paid the machines and the salaries of the mechanics by their CERN contribution"?⁹³

How did CERN react to these ideas? One of the first things that the new management did in 1976 was to abolish a 10% surcharge which had been imposed on items issued to visiting teams from the CERN stores. At the same time Van Hove drafted a set of *Procedures for Physicists Making Experiments at CERN*, reaffirming that CERN would provide, "on request, technical support for approved experiments, including experiments in which no CERN physicist [was] involved". This support would be available "within the limits of [CERN's] manpower and financial resources", and bearing in mind "the physics priorities of the overall CERN programme". A coordinator for technical support would be appointed – a person akin to the 'project engineer' called for by WG3, and who could handle the interface between the visitors the local services. A contactman would also be agreed between CERN and any collaboration, someone, preferably a physicist paid at least partially by CERN, who would be present on site throughout the preparation and running of an experiment. These improvements were to be made within the general framework of CERN's standing policy on visitors. They were "expected to have a reasonable level of technical support" from their home institution, to contribute a "fair share" of technical and financial support to any collaboration in which they worked, and to "share their time and activity" between Geneva and their home base, "also for data handling and computing". There was one important twist, though, which created some resentment among visitors because of the power it gave to the CERN management to 'interfere' (as they saw it), in the setting up of a collaboration and, in principle, to exclude a group on purely financial grounds. "The composition of the collaboration and the sharing of support", wrote Van Hove, "should be cleared with CERN before approval of the experiment".⁹⁴

as ECFA Chairman, and this was a wideranging discussion of the most important issues which he saw as lying before the Committee.

⁹³ *ibid.* p.9.

⁹⁴ For the information in this paragraph see the minutes of ECFA's 19th plenary meeting held on 29/3/76, CERN/ECFA/76/12/Draft, 24/9/76 (DGR21311). Van Hove's *Procedures*

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There is one rather different point that needs to be made regarding the strains imposed on some outside users by the need to spend relatively long periods of time at CERN. This was the problem raised for university staff of having to take their share of departmental duties, while doing research at a remote laboratory. If they made their research a top priority, asking for reduced teaching and administrative loads in their home institute, they risked alienating their colleagues and damaging their career prospects in the physics department. If they put their university life first, they were relegated to playing only a marginal role in the development of their experiment at CERN. And while these problems had always been present to some extent, they were exacerbated by the new importance of electronics experiments, their increasing size and complexity, and the concentration of resources at CERN. As one person who submitted written evidence to the Working Group explained, a counter physicist now had to envisage spending "roughly equal amounts of time at the University and distant laboratory, often on a day by day basis", adding that, as far as he, a married lecturer at Manchester University who used counter techniques, was concerned, "I see no way of continuing to make significant contributions in this branch of research after NINA closes. The personal problems", he went on, "[were] just too great under the present circumstances".⁹⁵

We have already mentioned two measures proposed by the visitors, and the Working Group, to improve this situation: encouraging national laboratories to build big equipment for experiments, and establishing computer networks between CERN and institutes in the member states. Both of these would reduce the time that physicists needed to spend away from their home centres. Yet these could only be palliatives. For the fact remained that outside users who maintained important links with their home institutions were fundamentally disadvantaged in that they were only temporarily at CERN. As one CERN staff member pointed out, if university staff had teaching and administrative duties to perform they "could not accept the responsibility for any part of an experiment that require[d] continuous attention, so their contributions were, of necessity, limited".⁹⁶ In short the working conditions of high-energy physics, particularly from the 1970s onwards, were intrinsically biased against the outside users of centralized facilities, and they had no choice but to accommodate themselves to that unpleasant reality, and to the loss of influence which it entailed.

for *Physicists Making Experiments at CERN*, 2nd Draft, dated 11/3/76, is Annex II to these minutes.

⁹⁵. Letter J. Allison to D. Baugh, 10/9/73 (YGC23572). These problems are also currently of great concern in the United States, in the light of the anticipated construction of the SSC – see the *Report of the HEPAP Subpanel on Future Modes of Experimental Research in High Energy Physics*, July 1988, US Department of Energy document DOE/ER-0380.

⁹⁶. See note 76, *Physicists Meeting*... See also letter T. Sloan to D. Baugh, 7/8/73 (YGC23572).

7. FIFTH POINT OF FRICTION: SALARY DIFFERENTIALS BETWEEN CERN STAFF AND OUTSIDE USERS

One of the problems which particularly concerned Salvini and Harting when they alerted ECFA to the visitors problem was that outside users should be able to "stay at Geneva without having a hard and convulsed life, and without having them feeling guilty towards their families and children".⁹⁷ This of course required that physicists came with their families to the host laboratory, and that while there they had adequate financial support, accommodation, schooling facilities etc, as well as the opportunities for spouses to work in the host state.⁹⁸ Gunn's Working Group found that these needs were either being conscientiously dealt with by CERN (housing, education, work permits for wives, etc.) or that they were the responsibility of the member states themselves, and so outside their brief.⁹⁹ One of these 'national' issues, simmering beneath the surface in 1972/3, and coming clearly into the open in 1975/6, was that of the financial situation of users vis-à-vis their CERN colleagues.

The salary question had two aspects: the differences in basic remuneration (plus Geneva allowances) between visitors from different member states, and the differences between visitors as a whole and the CERN staff. In a survey made for the Working Group in 1973 on the social problems of outside users it was the first aspect, the differences between the visitors themselves, that was reported as being "a continuous source of problems".¹⁰⁰ However, an important revision of the CERN salary scales in December 1974 shifted attention explicitly onto the second dimension of the problem, the difference between the salaries at CERN and in the member states. At the ECFA plenary meeting in January 1975 Høgaasen (Norway) spoke of the danger of CERN becoming "an artificial paradise with high salaries envied by everyone and losing touch with what happened on the base". Salvini warned that "similar criticisms were also being voiced in other countries where CERN was also regarded as an oasis, and it would help a lot if CERN showed some understanding of these criticisms".¹⁰¹ The storm of protest was one reason why the CERN management decided not to apply an 8.1% cost-of-living adjustment at the

⁹⁷. See their letter, Appendix II of the Working Group's *Report...*, note 21.

⁹⁸. In this connection see letters M.A.R. Kemp to D. Baugh, 5/9/73, letter P.J. Negus to D. Baugh, undated (YGC23572), *Memorandum* from G.H. Hampton to M.G.N. Hine, 31/8/72 (DADM20099), in which Hampton states that he thinks that "the real problem for the unpaid visitor is the financial one" and that he feels that wives cannot find work in Switzerland because they lack the necessary qualifications and linguistic fluency, rather than work permits, the report entitled *ECFA Working Group III, Sub-Committee 2*, unsigned and undated (DG21221), which gives very little attention to the problem, and M. Holder's paper *ECFA Working Group III, Some social problems of visitors in CERN*, ECFA/WG3/RLP5/73, undated (DG21221).

⁹⁹. See the Working Group's *Report...*, note 21, at p.12.

¹⁰⁰. See his paper cited in note 98. Holder found that in a sample of 249 (out of 900) visitors who replied to a questionnaire, 130 mentioned special problems. Of these 56 mentioned housing, 52 mentioned legal status in Switzerland, 19 mentioned schooling and 15 mentioned salaries as the notable social problems which they had at CERN.

¹⁰¹. Minutes of 17th ECFA plenary meeting, 27/1/75, CERN/ECFA/75/4, 16/5/75.

end of 1975, instead applying 2% differentially to the salaries in the various grades.¹⁰² ECFA, in its turn, set up a working group to look into the financial position of unpaid associates. The group's chairman, Michel Vivargent, presented its findings to the 20th plenary meeting of ECFA on 25 November 1976.¹⁰³

Vivargent's group produced two reports. The first gave data on the salaries, daily allowances, travel expenses, etc of unpaid visitors to CERN, broken down by country. The second attempted to compare the financial position of certain selected categories of unpaid associates with the CERN staff, and to assess the cost of living in the Geneva area. The matter was complicated by the lack of information for some countries, by the fact that individual circumstances varied widely, that social security systems and taxation had to be taken into account in each country, that there were constant and substantial variations in the exchange rates with some countries, and so on. All the same the working group did manage to produce useful estimates for the net disposable income of long-term visitors (and of physicists with PhDs or the equivalent, in particular). Their findings are partially summarized in Figure 2. It compares monthly incomes at CERN with the net incomes plus Geneva allowances for scientists in several categories of employment, and for five CERN member states.¹⁰⁴

Vivargent's group drew three major conclusions from their data:

- that the salaries paid to physicists in the CERN member states varied widely, and were below the salaries paid to professionally equivalent CERN staff by a factor of 2 to 4;
- that when the allowances paid by the member states to personnel on long-term visits to CERN were added to these salaries, their disposable income was still not high enough to allow them to have a 'reasonable' standard of living in Geneva (as defined by the Working Group);
- that visitors' disposable incomes (salaries + allowances) were still below the salaries paid to CERN staff with equivalent responsibilities (see Figure 2).¹⁰⁵

¹⁰². See the remarks of Van Hove at the 19th plenary ECFA meeting, 29/3/76, p.17, CERN/ECFA/76/12/Draft, 24/9/76 (DGR21311)

¹⁰³. For Vivargent's statement see Annex F to the minutes of ECFA's 20th plenary meeting, CERN/ECFA/77/17/Draft, 27/1/77 (DGR21312).

¹⁰⁴. The two *Report[s] on ECFA Working Group on Users' Conditions*, were subtitled *Report by the ECFA Working Group on the Support given to CERN Unpaid Associates by their Home Countries*, ECFA/76/3A, 15/3/76, and *Financial Position of Unpaid Associates* ECFA/76/3B, 19/3/76, and ECFA/76/3B/Rev, 31/8/76 (DGR21311). The figure is based on the summary table on page 10 of ECFA/76/3B.

¹⁰⁵ See the documents cited in the two previous notes.

Figure 2. A comparison of CERN salaries with the net incomes and allowances of visitors from five CERN member states. The numbers after each member state indicate the "level of confidence of accuracy and completeness of figures", those for the UK being the most reliable. Data for the other countries was incomplete.

If the outside users were disturbed by these "glaring inequalities", as Vivargent called them, it was not simply because they wanted to ensure that they had a reasonable standard of living while working in Geneva. It was primarily because the differentials existed between physicists who rubbed shoulders daily, who worked together in the same 'mixed' teams, who were equals in all respects save in the financial compensation for what they did. And although it was obviously up to the member states to remedy the situation as best they could, Vivargent felt that CERN should not wash its hands of the problem. Appealing to all those who wanted the laboratory "to be not only a citadel of science but also an example of human collaboration" he insisted that, "in its own long-term interests and in the spirit of generosity for which it [was] known", CERN ought to do all it could to alert the member states to the problem which, said Vivargent, posed a serious threat to the vitality of the community as a whole.¹⁰⁶

In fact, of course, there was little that CERN could do. The differentials between the salaries it paid to physicists and those paid to them in the member states were an inevitable consequence of the different frameworks used for calculating earnings. CERN's main references were the salary levels in other international organizations and in industry (one argument being that "as CERN was essentially a service organization, its salary scales had been largely aligned with those of engineers in the member states"¹⁰⁷). Physicists working at home were paid on the far

¹⁰⁶. See the statement cited in note 103.

¹⁰⁷See the informal notes on the informal meeting held on 27/11/72 cited in note 76.

lower salary scales devised for the civil service or for university staff. To align these in any way was impossible. The most that could be done was to compensate for the differences by paying additional allowances to visitors at CERN. These would inevitably vary from one country to another depending on local circumstances and custom. Thus there was nothing for it but for visitors to accept that they would be paid very different amounts of money at CERN, and that in any event they would not be as well off as their colleagues in the host laboratory – and to hope that the staff and management in Geneva would not be insensitive to the ‘injustice’ that that entailed.

8. THE VISITORS QUESTION: A QUICK SURVEY OF LATER DEVELOPMENTS

A number of initiatives concerning the needs of outside users were taken during the decade following the events we have described. For example, in 1978 an Advisory Committee of CERN Users (ACCU) was established, in 1979 the SPC sponsored an enquiry into the adequacy of decision-making procedures at CERN, and in the mid-1980s the CERN Review Committee chaired by Professor A. Abragam made an extensive survey of users’ attitudes to CERN. These activities attest to the ongoing concern in the laboratory and in the member states about the CERN-user relationship. And while it is not our intention to study them in any detail – in fact we shall do little more than list their findings here –, they are useful for the light they throw on the tenacity of some of the points of friction which first surfaced in the early 1970s.

The question of whether or not some sort of advisory committee for CERN users was desirable had already been discussed early in 1973. At that time it raised no great enthusiasm. Visitors apparently accepted that such matters could be handled by ECFA. “The people”, wrote Herwig Schopper, “were more interested in getting integrated in the existing CERN organization”.¹⁰⁸ However, in 1975 a so-called Commission of Associates (or visitors) was formed spontaneously in response to changes in the Swiss income tax laws affecting short-term residents in the country. This Commission was expanded in 1976 to represent unpaid associates from all countries, and to advise the CERN management on the status and working conditions of outside users.¹⁰⁹ ACCU was a logical extension of this body. Set up by CERN in 1978, its task was to advise the Directors General (there were two at the time) “on the practical measures and administrative internal arrangements to be taken by the CERN Management for the utilization of the CERN facilities for research”. In particular ACCU was to watch over the “working conditions and the arrangements for technical support of the CERN Users”.¹¹⁰ The chairman

¹⁰⁸ See H. Schopper, *Summary of the Discussions with Visitors on 29 and 30 January, 1973*, undated memo (DG20589).

¹⁰⁹ See Van Hove’s intervention at the 19th plenary meeting of ECFA, minutes CERN/ECFA/76/Draft, 24/12/76 (DGR21311).

¹¹⁰ These formulations are taken from the *1978/79 Report by the Chairman of the Advisory Committee of CERN Users ACCU*, undated (DG21313). The official terms of reference can

and members of the committee were appointed by the Director(s) General for a period of two years, with the possibility of extension. ACCU's first chairman was E. Lillestøl, its first secretary W. Blair.

ACCU achieved a good deal during the first two years of its life. It secured improvements in the accommodation for short-term visitors, it obtained satisfactory terms for medical and accident insurance of CERN users, it monitored the CERN workshop facilities and costs, it got CERN to provide support for a range of small computers used on-line in experiments, it arranged for the more efficient re-use of experimental equipment at CERN. Indeed reading through Lillestøl's first report, one has the impression that the only major problem encountered by the committee was that of securing permits for the spouses of physicists to enable them to work in the Geneva area.¹¹¹ In particular, the technical interface between CERN and its visitors seemed to be essentially trouble-free. That granted, the opinion of one dissenting voice who had served on the committee for its first two years should be recorded, a voice which did not deny the value of ACCU, but which felt that, "in spite of the good will of the CERN Staff, some of the main difficulties met by the visiting teams [could] not be solved" in its framework. These, the correspondent went on, lay "in the lack of balance between CERN and the small laboratories and in the fact that the interests of CERN members and those of visiting teams [were] not similar".¹¹² In short, while ACCU undoubtedly did useful work within its terms of reference, for at least one visitor those terms were too restrictive for the committee to really come to grips with the roots of the problems faced by outside users at CERN.

Let us now turn to the second initiative mentioned above: the decision taken by the SPC in 1979 to set up an ad hoc committee to investigate whether the procedure for selecting experiments at CERN was still adequate. W. Paul was the chairman of this committee, and V. Telegdi and M. Vivargent, then the chairman of ECFA, were its other two members. Reporting in 1980 this committee identified two specific areas where changes could be made. Firstly, it was suggested that the procedure for refusing proposals (which happened rather less frequently at CERN (20%) than at BNL (22%), DESY (25%) and SLAC (30%)) should be improved e.g., by allowing the spokesman to give additional information at a closed session of the experiments committee before they turned down a proposal. Secondly, the position of the *ex officio* members of committees was again questioned. While accepting that their counsel was essential, it was stressed that they "should restrict themselves to the role of advisers". These quibbles apart, the enquiry's overall finding was that there were "no serious complaints by the experimental physicists, but only uneasy feelings about some aspects of the present procedure". CERN, or rather Van Hove, had apparently expected heavier criticism than this.

be found, for example, in the *Final Report of the CERN Review Committee*. CERN/1675, 3/12/87, p.25

¹¹¹ See the 1978/79 Report cited in the previous note.

¹¹² Letter Crozon to Van Hove, 25/10/79 (DG21363).

The Director-General for Research admitted that he was “pleasantly surprised by the outcome [...]”.¹¹³

Finally, let us say a few words about the findings of the CERN Review Committee, set up at the instigation of the British CERN delegation in the mid-1980s.¹¹⁴ One of the tasks which it undertook was to consult the community of outside users to see if they were satisfied with the facilities at their disposal for doing particle physics at CERN. A large majority of the users responded to a questionnaire which was circulated with the help of coordinators in each member state. A survey of the results, and a selection of some specific replies to their enquiries, were published by the Committee in the report it laid before the CERN Council in December 1987.

The first point stressed by the Committee was that among the users “there was uniform praise for the excellence of the experimental facilities and the scientific environment at CERN”.¹¹⁵ At the same time, the scientists in the member states made a number of criticisms about CERN, many of them all-too-familiar by now. In fact the only major concern of the early 1970s which did not come up again in the mid-1980s was the need for national institutes to construct big equipment. This was doubtless because the growth in complexity, size and cost of the big ‘4 π ’ detectors being built for the CERN colliders demanded a major contribution from them and from the home universities. Apart from that, while the context was different, the complaints were the same. Taking our other four “points of friction” in turn we find:

- on the question of indefinite contracts, “it was almost universally felt that a decrease of indefinite appointments compensated by an increase of fixed-term contracts [was] desirable [...]” (emphasis in the original suppressed).¹¹⁶ Many reasons were given for this, including the enhanced mobility in the physics community, the increased opportunity for outsiders to benefit from the stimulating environment of CERN, the attenuation of the dominant position acquired by CERN staff inside the laboratory, and the improvement of bonds with home laboratories;

- on decision-making procedures, there was again general satisfaction with the experiments committees. At the same time the report made much of the now-familiar complaint that no mechanisms existed for outsiders to participate in decisions concerning long-term technical developments (detector developments, electronics, data acquisition and analysis software), and that CERN computing policy was not discussed widely enough by the user community;¹¹⁷

¹¹³ For the material in this paragraph see Paul’s paper *Methods of Selection of Experiments on CERN Accelerators*, CERN/SPC/458, 1/4/80, and the minutes of the 112th meeting of the SPC at which the report of the ad hoc group was discussed, CERN/SPC/460/Draft, 30/5/80.

¹¹⁴ The Committee comprised A. Abragam (Chairman), M. Boyer, C. De Benedetti, B.F.F. Fender, W. Paul, H. Sandvold, and J. Vodoz. Its *Final Report* ... was presented to the CERN Council at its meeting on 17 and 18 December 1987, and is document CERN/1675, 3/12/87. Material on the users’ attitudes is summarised in Chapter III and detailed in Annex II.1.

¹¹⁵ *Final Report*... (previous note), p.21.

¹¹⁶ *ibid.*, p.121. See also pp. 25-6.

¹¹⁷ *ibid.* pp.116-7

- on working conditions at CERN, there was again a complaint that office space was inadequate, that the plan to charge for loaning electronics items from the pool was unacceptable, that the technical back-up for a collaboration was not being adequately coordinated, and that, in general, the technical support offered by the laboratory had deteriorated from good or even superb before LEP was built to "poor/unacceptable now" (emphasis in the original suppressed);¹¹⁸

- finally, on the social and personal conditions of life at CERN the question of working permits for spouses came up strongly once more as did the matter of CERN salaries. Here outside users called variously for a reduction in the salaries of the top grades, a reduction in allowances and benefits for CERN staff, the use of post-tax salaries in universities and in industry as a frame of reference for the CERN salary scales, and so on. In fact the Abragam report tells us that "about half of the replies [to its questionnaire] contained adverse comments on the levels of salaries and allowances" at CERN.¹¹⁹

There are two points to be retained from this section. Firstly, there is the striking fact that many of the complaints raised by visitors to CERN have persisted for well over a decade. Secondly, and related to this, one has the clear impression that, despite all that has been done to harmonise the relationship between CERN and its outside users, there is a layer of feelings and attitudes which eludes the recommendations of the most well-intentioned and conscientious enquiry into visitor's complaints. It is a point we have remarked on before and it is worth stressing again here. Time and again the climate surrounding the setting up of an investigation into visitor's conditions – be it that made by ECFA in the early 1970s, or that made by the SPC in 1979/80 – was marked by tension and hostility between the users and the laboratory. And time and again the management was relieved, and many of the visitors reassured, to find that the complaints were, apparently, misguided, that matters were not as bad as they had seemed, and that they could be 'resolved' by tinkering with the existing arrangements. Yet an undercurrent of discontent remained among the users, the feeling that the nettle had not really been grasped, that somehow the point of their anger and frustration had been missed. This was the kind of objection made to the Report of Working Group 3. It was also the kind of misgiving which led one ACCU member to resign after serving his statutory two years. We shall try to expose some of its roots in the final section of this paper.

¹¹⁸ *ibid.*, pp.118, 119.

¹¹⁹ *ibid.*, pp 121, 122.

9. CONCLUDING REMARKS

There is no doubt that the early 1970s heralded another turning point in the history of European high-energy physics. As everyone realized the decision to build the 300 GeV machine in Geneva was to lead to an even greater concentration of resources for doing high-energy physics at CERN. CERN would no longer be the apex of a pyramid whose base comprised the national laboratories. Most of them were rendered obsolete at a stroke when the SPS was commissioned. CERN was now *the* locus around which European high-energy physics turned. Only DESY provided a counterweight to the forces drawing the community to Geneva. This tendency to concentration was heightened by the growing importance of electronic methods of detection and the work patterns that that entailed. As electronic detectors became bigger, more complex, and more costly, outside users played an increasingly important role in all phases of the experimental process, from building or assembling the detector, to taking the data during a run, and to analysing the tapes produced in the experiment. It was not simply that outside users had to spend more time at the host laboratory. They also became more intimately associated with its staff and locked into its infrastructure, more closely involved in its day-to-day affairs. In short they began to see it as *their* laboratory.

At the same time this community of the 1970s was far more experienced in the high-energy field than the pioneers who had launched CERN in the 1950s. Their predecessors had leapt from working on machines of a few MeV to working on the most powerful machine in the world and they were ill-prepared for the corresponding change in scale and sophistication in the experimental workplace. They had not yet learnt how to plan an experimental programme, they did not know what equipment to order, they could not coordinate the acquisition of the separate components required to exploit a big machine. And they were not sure what experiments to do: the appeal for proposals for work at the PS, launched by the CERN management in 1959, fell on the ears of a surprised user community which had few ideas and little or no equipment of its own.¹²⁰ This was to change dramatically during the decade of the 1960s. The staff at CERN began to learn how to run a big laboratory and to organize a competitive experimental programme. At the same time national facilities were expanded, and every major member state of CERN could boast its own 'high-energy' accelerator, and the infrastructural support needed to exploit it. The size of the member state community grew dramatically, encouraged by the rapid expansion of the universities, and a new generation was trained who did their PhD's on one of a number of powerful machines in Europe or even in the USA. Outside users, who previously may have felt (or been made to feel) that they were still 'wet behind the ears' compared to some of the CERN senior staff, began to be more confident about themselves, to regard themselves as every bit as

¹²⁰ For this section see J. Krige in *History of CERN, Volume II*, chapter 9

competent as their professional homologues in the Geneva laboratory. In short they began to insist that they be treated as *equals* by their colleagues at CERN, and not as apprentices.

These two seemingly abstract ideas – that CERN was their laboratory, and that they were every bit the professional equals of the people employed there – were twin ideals shaping the attitudes of users towards CERN. These ideals structured visitors' conception of the way things should be done, and informed the proposals they made for practical 'improvements'. The situation outside users wanted, the "utopia" dreamt of by a von Dardel, was one in which "the distinction between CERN and outside teams [was] abolished [...]", in which "the allocations of CERN resources [were] decided purely on the basis of the needs of the group and the resources it [could] mobilise at home institutes", in which "ultimately" a group "comes to CERN with bare hands and sets up their experiment by drawing instruments such as wire chambers, counters and electronic equipment from the instrument pool, being provided with magnets and separators by the experimental support team".¹²¹ It was a situation in which the outside users were fully *integrated* into life at CERN, and accorded the dignity appropriate to first-class citizens of the laboratory, their laboratory.

The CERN management and staff, for their part, saw matters rather differently. This laboratory essentially belonged to *them*. They were responsible for running and improving it, they were building their careers in it, they would take the blame for its failures, and the praise for its achievements, they would be the first to suffer if the member states withdrew support from it. Of course they had to provide a service to the European high-energy physics community.¹²² But this was a duty imposed on them by the international character of the funding for CERN. It was a duty they discharged without resentment, but a duty nevertheless. Once fulfilled, they felt themselves free to do as they thought best for Europe, for the laboratory, and for themselves.

In short, the 'conflicts' or disagreements between CERN and its user community are, at source, conflicts over ownership and control. The form taken by those conflicts will vary depending on the context. The substance will persist as long as the laboratory itself.

¹²¹. See the document cited in note 92, at pp. 9-11.

¹²². For the twin concepts of CERN as their laboratory which serves the European community, see Dominique Pestre, *History of CERN, Volume II*, chapter 8.

STUDIES IN CERN HISTORY

This report is the first of a number which will be incorporated into volume III of the History of CERN. Volume I was published in 1987, and covered the launching of the European Organization for Nuclear Research. Volume II, concerned with building the laboratory and running it until 1965, was published in 1990. They are available from

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