Total Reporting for Scientific Work

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Summary. The project grant system, which has been so effective in the support of scientific research in the United States, has included support of the indirect costs of that research. The desire to clearly justify these costs and to trace abuses has led the Office of Management and Budget to issue new rules. One such rule requires reporting for 100 percent of the work of scientists. The character of this rule raises fundamental questions about the possible control of universities by the government. This article is intended to describe the background of these questions and to examine their consequences.

Rules for direct and indirect cost calculations by universities are set out in the new (1979) Office of Management and Budget (OMB) circular A-21, entitled "Cost Principles for Educational Institutions" (*1*). The section in this circular on "Compensation for personal services" calls for a complete reporting of the work or activity of faculty members and other professionals, to be rendered on one of two plans: (i) monitored workload or (ii) personnel activity reports. Each of these plans proposes a single system to meet the very different problems presented by direct costs and by indirect costs.

The monitored workload plan is based on budgeted or (pre-) assigned workloads, updated to reflect all significant changes in workload distribution. The description of this system [under item J6c(2)] specifies that "The system will reasonably reflect workload of employees, accounting for 100 percent of the work for which the employee is compensated and which is required in fulfillment of the employee's obligations to the institution."

The personnel activity reports, on the other hand [items J6d(2) and (3)], "will reflect an after-the-fact reporting of the percentage of activity of each employee. . . . Each report will account for 100 percent of the activity for which the employee is compensated and which is required in fulfillment of the employee's obligations to the institution."

In other respects these two plans differ. The monitored workload plan is based on preassigned workload, and the preassigned figures must be adjusted to record changes in workload; it applies to salaries and wages of professional and professorial staff, but not to nonprofessional employees. The personnel activity plan can apply to all employees whose salaries and wages are charged to direct or indirect costs under government grants.

In both cases it is specified that the system will reasonably reflect "the percentage of activity applicable to each sponsored agreement, each indirect cost category, and each major function of the institution." The indirect cost categories involved include "departmental administration," "sponsored project administration," and "student administration and services." The major functions of the institution are "instruction" (including "departmental research"), "organized research" (that is, research sponsored by federal agencies and nonfederal organizations), "other sponsored activities," and "other institutional activities." The percentage reporting required thus potentially involves a considerable number of different categories for each faculty member or professional employee.

Appropriate accountability for the use of government funds to support science is necessary and proper. However, it is not clear that either plan for personnel is appropriate. The National Academy of Sciences, in its business meeting on 22 April 1980, passed a resolution as follows.

> While supporting the principle of accountability for usage of public funds, the National Academy of Sciences views with concern the proposed implementation of OMB revised circular A-21, effective July 1, 1980. Application of these new regulations to institutions of higher learning would further constrain the already limited flexibility in research thrust, increase the administrative burden, reduce morale among teaching and research personnel, and provide a cumbersome, meaningless documentation in terms of percent-of-effort for a continuum of scholarly activities. Moreover, because these regulations would monitor nonfederally supported academic functions as well, inappropriate controls might be exercised. We therefore urge reconsideration of regulations embodied in A-21 and we recommend that the Council of the Academy examine this situation so as to propose appropriate ways of achieving accountability.

My own examination of this situation is reported below. Observe first that circular A-21 covers many different topics in the assessment of costs. Most of these are handled effectively and are not in question here. The difficulty at issue arises only in the new requirement that university faculty report on 100 percent of their activity. This requirement was introduced to provide perspective on the accounting, but in my judgment such "total" activity reporting is a mistake. It requires reports of percentages which are fictitious because of the overlap between teaching and research; such fictions can lead to future conflict. By covering all activity, in teaching and independent research, this rule intrudes government recording on university activity which is not federally funded. Finally, such total reporting is not in keeping with the character of the university; the university does not consist of a set of faculty employees whose time is bought by the administration, but is rather a group of scientists and scholars engaged in free and independent inquiry.

The Grant System

The project grant system for the support of science in the United States was developed after the work of the National Defense Research Council in World War II had shown the national importance of scientific research. Vannevar Bush, in his influential book *Science: The Endless Frontier* (*2*), proposed a National Science Foundation (NSF). When the establishment of such a foundation was delayed, the Office of Naval Research started the system of supporting scientific research by way of grants to institutions on behalf of individual scientists. This system was continued by the NSF on its establishment in 1950. The grants did not support institutions as a whole,

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but supported the research by individual scientists ("principal investigators") and from 1947 included (portions of) the indirect cost to the institution of that research. In this system, grants were based on peer review. Such peer review, at the time of grant renewal, is a form of scientific accountability.

With the development of the system, and with the subsequent constraints on funding, there came to be scientists who needed support from more than one agency, either because any one agency might not have had sufficient funds in the appropriate program, or because the agency program did not have the same range of interests as the principal investigator. Such multiple support of science has strong merits—in particular, the merit of not making the support of novel scientific ideas dependent on the judgment of any one agency. In recent years, with more scientists and further constraints in real government support of science, the tendency for multiple grants to individual investigators has increased. The pressure of such constraints has been confirmed by Philip Handler, president of the National Academy of Sciences. In a recent speech (29 January 1980) he said, "The real resources available to an average American scientist have diminished by a factor of 2 in the last decade."

At the same time, the financial problems of universities have made it necessary for fiscal officers of universities to be more diligent in recovering all costs allowable under government policies, especially by indirect cost recovery and by support of portions of faculty salaries. This has tended to increase the pressure on principal investigators to obtain multiple salary support, such as would be verified under 100 percent reporting.

Indirect costs under the government grants have tended to increase in recent years. In the early days of NSF and the National Institutes of Health (NIH), indirect costs on all grants were computed as a standard figure—15 or 20 percent of salaries and wages. Now these percentages are much higher—50 to 70 percent of salaries and wages. They are based on explicit cost records and vary from university to university. Moreover, cost sharing is now required, on "more than a token basis"—more than 1 percent of total project costs.

This sharp increase in indirect costs has several causes: the effects of inflation on endowments, the drastically increased costs of heating, the increased administration required by a large array of government regulations, and the inevitable tendency of the administrative apparatus to become more elaborate. Thus a combination of circumstances has led to the situation which required that the previous Federal Management Circular (FMC 73-8, dated 19 December 1973) be replaced by the more explicit policy provisions of the new circular A-21. We next examine the background situation to see if there was a need in this revision for the new requirement of 100 percent reporting of professional activity.

Mistakes and Abuses

The project grant system, now very large, has involved a variety of accounting mistakes and actual abuses. Here are some types of these troubles:

1) Inadequate records of transfer of funds.

2) Unauthorized transfer of funds between projects.

3) Charges of equipment to the wrong project.

4) Charges of salaries to the wrong project.

5) Misuse of travel funds.

6) Salary charges for an investigator not actually working.

7) Charges of portions of an investigator's salary to several projects, to a total of more than 100 percent of his or her salary.

Following are some comments on the character (but not on the extent) of these abuses.

Transfer of funds. When unexpended funds remain in a grant about to expire, one may wish to use these funds for related purposes, say for work on a different, but related, project. In some cases, the necessary formal government approval for such transfers can be obtained. However, transfer may sometimes be made before approval is in hand, without adequate record of that approval. Scientists, who tend to think in terms of the common scientific objective of the various projects involved, are not always likely to understand the need for complete accounts of such matters. Auditors are certain, in such cases, to ask for "a complete accounting trail"—often years after the transfer has taken place. Such cases of transfer may thus range from simple "lack of documentation" to severe abuse. The largest accounting difficulties with government grants to universities are said to be with problems of transfer.

Charges to a different project. Many grants are to individuals or to small groups of principal investigators. However, in most cases the financial details of a number of different grants are administered together by a department. Such a common administration has evident advantages in efficiency. It also presents a temptation to "even things up" between grants or to make various small charges to that grant most conveniently available. Sometimes it appears that money from grants in hand may have been used to support a young investigator who does not yet have a grant, or to continue the support of an older investigator whose grant has not been renewed. A principal investigator, part of whose grant is so used, may protest at this misuse of funds intended for his purposes. At one congressional hearing (*3*), two such principal investigators reported such cases and how they had suffered. Other scientists may feel that their projects have lost out because of such incorrect charges to their grants.

Clearly, this type of abuse arises from the use of the individual project system in an environment where scientists work in large departments. This does not excuse such abuse. Since the project grant system gives greater freedom and importance to the individual scientist, it suggests that such scientists should be more careful in checking that the funds granted are used as intended. It also indicates the need for accounting trails.

Multiple salary charges. Since many scientists have laboratories requiring multiple agency support, portions of one investigator's salary may well be charged to several different grants. In one extreme case, 90 percent of an investigator's academic year salary was charged, in amounts varying from month to month, to five different grants. In other cases, the whole of an investigator's salary may be charged to a grant, but the investigator still teaches some courses for the university. Such peculiarities illustrate the real need for accounting records of salary charges on grants. At present, many universities keep a monthly record of percentage of activity of investigators on sponsored projects. In addition, these investigators make a yearly estimate of the percentage distribution of all their activities. Often the resulting comparison of annual to the sum of monthly effort seems to give a total of more than 100 percent.

This comparison has been cited to me as a major reason for 100 percent reporting of professorial activity. It seems to be rather an indication of the fictional character of percentage records of activity.

Consulting arrangements. Many university scientists engage in industrial consultation, often to the mutual benefit of the university and of industrial in-

novation. If the consultation takes place with some other institution also supported by government grants, an individual scientist might be drawing salary from several government sources, which might involve more than 100 percent of his salary. At a number of institutions, the teaching and consulting interests of faculty are balanced by a rule that consulting up to one day a week is appropriate. However, this familiar rule is not free from ambiguity. It is usually taken to mean that one day in seven is available for consultation, but there is another interpretation of "one day in five, plus Saturdays and possibly Sundays." In one case, government auditors complained about the use of the latter interpretation, and the institution returned the funds at issue. Such cases are sometimes publicized as examples of major transgressions requiring more regulation; they seem more like illustrations of the inherent ambiguity of rules, especially rules prohibiting moonlighting.

The problems with consultation clearly indicate the inherent ambiguity in the requirements in circular A-21 about "the employee's obligations to the institution." Consulting rules do not readily cover faculty members who sell real estate on the side or those who write textbooks; it would be hard to distinguish the innovative textbooks from those written just for the royalties. The federal government currently hopes to promote more industrial innovation; should consulting rules be used to constrain the contributions of scientific entrepreneurs to innovative high technology firms? What does one do about consulting done without compensation—such as peer review of projects done for the federal government? The ambiguities about consultation are manifold.

To summarize: with large sums of money involved in government grants, there can be abuses, mistakes, and lack of documentation. Scientists cannot simply take refuge in the assertion that a university is an honest place, or that all the money transferred is used somehow for science. Accounting is necessary for cost transfers, and careful records are needed for salaries charged to government-sponsored projects.

However, none of these various troubles indicate any need for 100 percent reporting of work, and no such reporting by itself will catch any real fraud.

The Central Difficulty

The new OMB circular A-21 was evidently prepared with the good intention of controlling indirect costs and avoiding fraud and abuse—thus providing accountability for the proper use of government funds. However, the part requiring 100 percent reporting is mistaken because it has several grave defects: it is meaningless, invasive, inappropriate, counterproductive, and ineffective.

It is meaningless, because scientific activity in a university involves complex and unpredictable interactions between research, teaching, and other university activities. Teaching an advanced course may suggest ideas for a sponsored research project. That sponsored research project may, in turn, overlap nonsponsored research (departmental research, in the language of the circular). Either research project may suggest better content for future teaching. When a student, who is also on a sponsored project, talks with his professor in the laboratory, that professor's response is both teaching and work on a sponsored project. There is no way of disentangling these and other activities so as to give a meaningful percentage (*4*) for each category of work. Moreover, there is no way of verifying after the fact that such percentages are appropriate.

The total of 100 percent is also not meaningful. Faculty do not have a fixed set of obligations to the institution; instead, there is a general expectation of scholarly effort, not covering any total number of hours per week.

An interpretation (*5*) of OMB circular A-21 by the Department of Health, Education, and Welfare (HEW) stated that reporting of "activity" is synonymous with reporting of "time and effort." It is well established that time or effort reporting for academic staff is meaningless. The requirement of meaningless reports results in numerical fictions likely to lead to future troubles.

The proposal of 100 percent reporting is invasive, in the sense that it suggests and stimulates federal control over those portions of university activity not supported by federal funds. Although the interest of the authors of A-21 is the provision of accurate accounting trails for government funding, their expression of this intent by 100 percent reporting requirements has already led to statements suggesting an improper invasion of university prerogatives. For example, the report of the HEW workshop on A-21, in discussing the monitored workload system, lists six "events" which must be documented; the first of these is a "change in the number or level of courses taught" (*6*, p. 23). The attention here to level of courses taught suggests an invasion of university prerogative, especially since the teaching load assessment of level of courses differs widely between universities. The HEW interpretations of A-21 specifies for monitored workload that the "assignment document shall also describe the assignments in sufficient detail (e.g. specific course, specific administrative assignment, etc.) to support the initial distribution" (*5*, p. 33).

Several government officials have carefully explained to me that these specifications by HEW in (*5*) and (*6*) were not intended to control teaching activities in universities, but were designed only to get careful accounting. Despite the intention, this requirement is out of order. There should be *no* reporting to the government on which courses are taught by whom.

The proposal of 100 percent reporting is inappropriate because it expresses a procurement approach (procurement of research, like that of industrial products) rather than an assistance approach—to provide government assistance to research, as an activity of general benefit to the nation. Recall that the Cooperative Agreements Act (the Chiles Bill), passed 2 years ago, suggested that all federal granting mechanisms be better labeled as either procurement grants or assistance. Recall also that the requirement of cost sharing on grants is intended as an expression of the idea that those grants are to support research desired by the faculty.

Requiring 100 percent activity reporting would be counterproductive, both because it would divert resources to elaborate accounting (a result which is not likely to be effective, in cost-benefit terms) and because it would serve to discourage those independent minds who are attracted to scientific work in universities because that work is free of reporting restraints. Up to the present, there has been no explicit requirement of 100 percent personnel reporting from educational institutions. There are several examples of individuals who have taken other employment or early retirement in order to avoid excessive reporting requirements. Similar effects in the future could discourage the entry into science of independent-minded able people, who would thus not contribute to the national needs for scientific research.

Finally, 100 percent reporting would be ineffective. Study of A-21 reveals that it is organized primarily to provide perspective and an explicit written record (an accounting trail) of all workload assignments. The fictitious character of the resulting percentages may be a possible cause of future conflict. Moreover, giving these explicit percentages does not seem to really address the (unstated) intentions of the circular. Estimated per-

centages of work will not catch abuses. They are most likely to abuse the time of those innocent of real abuse.

It is also not clear that detailed requirements will hold down the growth of indirect cost. They may equally well lead to more detailed reports justifying the same indirect cost, which will increase in subsequent years by the additional costs of these detailed reports.

To summarize: The requirement of 100 percent reporting produces percentages which are not approximations to real cost, but are fictions. Moreover, these fictions intrude on the university's own responsibilities.

The Agency Role

Time and effort reporting, in this sense, first came into prominence some years ago. In March 1965, the Bureau of the Budget issued a circular A-21 which set forth the "Criteria for Allowability of Costs for Research at Non-profit Institutions." This circular stated that salary costs are allowable only if supported by current reports of time and effort, and specified that these were to be descriptions of the individual's time and effort in three categories of duties: (i) instruction, (ii) administration, and (iii) sponsored research.

These regulations called forth a considerable reaction from the academic community. For example, the Council of the American Mathematical Society, on 29 August 1967, passed the following resolution:

> The Council of the American Mathematical Society urges responsible university officers to take immediate action to have Time and Effort Reports and similar documents pertaining to faculty members' time eliminated, because it considers that such documents are incompatible with academic life and work. The Council reiterates the traditional view that teaching and research are inseparable, and that accounting procedures in universities must take account of their unitary character.

As a result of many such observations, the government established an interagency task force, chaired by Cecil E. Goode, which reported, inter alia, that "Time and effort reports now required of faculty members are meaningless and a waste of time." As a result, the Bureau of the Budget issued, on 1 June 1968, an amendment of this circular A-21:

> The principal purpose of this amendment is to eliminate the time or effort reporting requirements set forth in that circular. In substitution therefor, charges to federally sponsored research projects for personal services will be supported by the institution's normal time and attendance and payroll distribution systems, and by stipulated salary support amounts as specifically stated in research agreements.

In the event, this method of "stipulated salary support" has been little used—perhaps by one-half of one university. Other universities had tried to use it, but the accounting agencies raised so many difficulties about stipulations made long ahead of time that the universities gave up trying, and instead used the alternative method called "certification of payroll distribution." The circumstances have been described in some detail (*7*). This experience indicates that difficulties can be caused not just by the text of the regulations, but also by the way they are administered.

No 100 percent report had been mandatory under previous versions of circular A-21, although some universities, under pressure from accounting agencies, have already used 100 percent reporting for professional time—and some state universities require accounting for time spent on teaching.

The new version of circular A-21 was published in the *Federal Register* in preliminary form in March 1978 (*8*) and in final form on 6 March 1979 (*1*). As originally proposed, it caused considerable concern among universities, so there were meetings with university groups, individual university officials, and other interested parties. Unfortunately, none of these meetings involved any real representation from the working scientists.

The negotiations about circular A-21 were unsatisfactory in other respects. The monitored workload plan had originally been proposed to OMB by the Committee on Government Relations (COGR) of the National Association of College and University Business Officers (NACUBO). This original version did provide for percentage reporting of activity, but apparently did not involve 100 percent reporting of time of professionals. This version was changed by OMB in at least six regards. Two important changes are these: the original monitored workload was to apply to both professional and nonprofessional staff and the original allowed for after-the-fact computaton of indirect cost items like departmental administration.

The new circular A-21 deals with many other problems. In addition to activity reporting there are a number of new features. Professionals report activity once each academic period, not once each month, and indirect cost is computed not as a percentage of salaries and wages, but as a percentage of modified total direct costs.

These discussions (1976 to 1979) of the proposed new circular A-21 apparently never raised the fundamental question about the use of the new requirement of 100 percent reporting of faculty activity. This is a strange omission, in view of the previous emphatic expressions of difficulty with the earlier, but comparable, idea of time and effort reporting.

To my regret, the university officials involved in these discussions did not catch this omission; moreover, as noted above, working scientists were apparently not involved. The presence of this 100 percent requirement was first noticed late in 1979 by Professor Serge Lang at Yale; since that time concern has mounted. In this way an unfortunate requirement has been placed on university faculty without adequate consultation with that faculty. The rules of the new circular A-21 are applicable now (more exactly, are applicable for each university at its first fiscal year beginning after 1 October 1979). Despite this plan, it is to be hoped that the previous regulations can be used for the time being to allow for adequate consultation and adjustment before the new regulations are actually implemented.

Indirect Costs

Accounting carefully for professional work (or activity) charged directly to government grants and contracts is appropriate and straightforward, but not always simple. All the complications and injustices of total reporting derive from the desire to account for professional work charged at various points to cost sharing and to indirect costs. Hence, to understand the situation and the alternatives which might be possible, one should understand how indirect costs are handled.

Congress has expressed concern about indirect costs. A 1976 conference report on an appropriation bill states (*9*):

> The conferees reaffirm the language of the House report calling on the Department to bring the spiraling indirect cost rates under control. The conferees are concerned over the substantial sums ostensibly appropriated for activities authorized by law, but which are in actuality being diverted to pay overhead costs of universities and other recipients of federal grants. It is thus imperative that the Department work closely with the Office of Management and Budget and other Federal agencies, to undertake revisions in the indirect cost mechanism which will result in a significant reduction in funds being diverted into indirect costs.

This report apparently did not call for 100 percent reporting for personnel, and other congressmen are said to have less drastic opinions about controlling indirect costs. However, these problems were a major motivation for the new A-21.

Circular A-21 contains an essentially

complete description of how to calculate indirect costs of federal grants to educational institutions. The description, however, is couched in heavy bureaucratic language and distributed over many different pages of the document, with no clear summary. To help the reader to penetrate this morass of official prose, I offer here my own summary.

Major functions of an institution. The costs of running educational institutions are ultimately allocated to five major functions, as follows:

1) Instruction: all teaching and training activities.

2) Departmental research: all R & D activities not separately budgeted or accounted for (this is subsequently combined with item 1).

3) Organized research: all R & D activities separately budgeted or accounted for—both those sponsored by federal agencies and those sponsored by nonfederal organizations.

4) Other sponsored activities: all work other than instruction or research financed by federal agencies or by other outside organizations.

5) Other institutional activities: residence halls, dining hall, and so on.

The circular then goes on to describe costs, first direct costs and then indirect costs. An indirect cost is one that cannot be specifically related to a particular sponsored project, instructional activity, or the like. There are defined eight categories of indirect costs: depreciation and use allowances; operation and maintenance expenses; general administration and general expenses; departmental administration expenses; sponsored projects administration; library expenses; student administration and services; and offset for indirect expenses otherwise provided for by the government. Each initial cost to an institution is assigned either as a direct cost to a major function or as an indirect cost to one of these eight categories. Within each indirect cost category there may be cost groupings, with like costs grouped together, to provide for selective distribution of costs to the different major functions.

After such groupings may have been made, the indirect costs are allocated or distributed to the major functions. There are rules for this distribution. An indirect cost which is allocated uniformly to all major functions is distributed between them in proportion to the "modified total direct costs" of these functions. This modified total, as defined in the circular (*1*, p. 17), consists of all direct costs, omitting that part of subgrants and subcontracts over $25,000, therefore presumably omitting that part of equipment expenses individually larger than $25,000. Some other indirect costs are distributed selectively according to appropriate rules. Thus indirect costs for departmental administration are distributed between the functions "instruction" and "sponsored projects" in proportion to the ratio of sponsored project costs to total departmental cost. Indirect costs are distributed seriatim: for example, the general administration costs are first apportioned to the individual departments, and are then distributed as above.

After the indirect costs have been distributed to each function, one is said to have a "cost pool" of indirect costs for that function. The indirect cost rate for that function is then determined as the following percentage: indirect cost pool over the modified total direct cost of that function. This, subject to the inevitable adjustments, gives the final indirect cost rate, say the rate for sponsored projects of a specified type. This is the indirect cost rate applied to each sponsored project, or to each sponsored project of a specified type.

In these indirect cost computations, the charges for professional or professorial time appear in section F, "Identification and assignment of indirect cost," under the following headings:

> 4.a. Departmental Administration Expenses. Salaries of professorial or professional staff, whose appointment . . . requires administrative work that benefits sponsored projects.
>
> 5.a. Sponsored Project Administration. The salaries of professorial or professional staff whose appointments . . . involve the performance of such administrative work.
>
> 7.a. Student Administration and Services. The salaries of members of academic staff whose academic appointments . . . involve the performance of such administrative or service work.

This concludes our summary of the computation of indirect costs.

On this analysis, what is really required for proper accountability for government funds is a report on those portions of the salaries of professorial or professional staff to be charged either directly, or indirectly, under one of these three rubrics. This could be accomplished in many other ways.

This analysis also indicates some of the inherent uncertainties and ambiguities in any calculations of such indirect costs. As circular A-21 states, these are costs which "cannot be identified readily and specifically with a particular sponsored project, an instructional activity, or any other institutional activity." The individual scientist may not recognize that these costs are there; in some cases they may not affect his project much. They are average costs, not marginal costs. A university might well undertake *one* additional scientific project without any visible addition to its indirect costs (that is, zero marginal cost), but on the average these costs are surely present.

They are also ambiguous. In the indirect cost computation, it is important to have the correct "base"—the direct cost of each sponsored project. Hence, officials intend that these costs include all professorial time devoted to the project—not just the percent of salary charged directly to the project, but the percent of salary which corresponds to all the actual work on the project. However, for most scientists, sponsored projects overlap other sponsored projects and other unsponsored work (so-called departmental research), so there simply is no clear percentage of work devoted to each project—and no way in which this regulation, or any regulation, can identify the work or effort of scientists on each and every project. They overlap; they are indefinite; they involve new ideas which are not classified by projects.

To summarize, the 100 percent reporting requirements have been included to cover indirect costs (and also items of "cost sharing"), but indirect costs are intrinsically just estimates. A recent General Accounting Office report (*10*) reads:

> Indirect cost rates at educational institutions are based on arbitrary methods and judgemental factors which make the evaluation of such rates very difficult. As a result, it is difficult for the Federal Government to "assure itself that charges for such costs are reasonable." . . . There is probably no feasible way for determining indirect costs that is both simple and reasonably accurate.

Nevertheless, effective figures for indirect costs are and will be essential. This depends on real agreement and careful execution by administrators on both sides.

Alternatives

The National Commission on Research was set up several years ago as an independent but temporary organization. The first of its five reports (*11*) deals with the problem of accountability; a summary of this report has appeared (*12*). Two recommendations of this report read:

> 4. The Commission recommends a simpler and less costly method of effort reporting based on responsible self-regulation: the explicit certification by individual investigators

that direct salary charges to their research agreements are reasonable and fair, coupled with the federal programs officer's review of the reasonableness of these expenditures for the work undertaken.

5. The Commission recommends that government agencies and universities construct an option, analogous to the 'standard deduction' in income tax calculation, to charge activity which is treated as indirect costs under sponsored agreements. The fixed percentage would be negotiated. It might either be uniform or vary from institution to institution. Some universities would not receive full credit for their allowable indirect costs. However, accountability would be fully served and both government and universities would reduce the burden of detailed accounting and audit.

These recommendations clearly recognize the important point of separating the accounting for direct costs—which do require the attention of the scientists involved—from the accounting for indirect costs. There can be other specific proposals for such separate consideration. Here is one:

Direct fixed cost plus sampling on indirect costs. On government grants and contracts, arrange that the salaries of principal investigators charged to direct costs be treated as fixed-cost grants. This would replace audit by scientific oversight, which would normally be accomplished when proposals are submitted for renewal of the grant through the judgment by program officers in agencies as to the effectiveness of the direct-cost work of the investigators.

Under indirect costs, arrange a negotiated rate for each university for each of the indirect cost categories involving personnel services, such as the category "departmental administration" (*13*). Data presently available in most universities should yield estimates of these indirect cost rates. They could then be renegotiated from time to time; this renegotiation could be based on suitable samples of such costs.

There are many other possible arrangements. For example, as the Association of American Universities has proposed, indirect cost rates involving personnel services could be based on careful samples of actual time spent in different categories of indirect cost. Such explicit samples should yield much more exact information than overall percentage reporting. Another proposal, from the National Commission on Research, suggests experimentation with a different funding mechanism: grants-in-aid, using an award made in response to a normal proposal including a detailed budget, with federal responsibility limited to scientific reporting and the fiscal management delegated to the institution (*14*).

Since the analysis and detailed specification of these and other alternatives require careful thought, more time is needed for this analysis. All the parties involved should be consulted: Congress, government officials, university officials, and university faculty.

We urge that initially the OMB announce that, for a period of 2 years, universities and other educational institutions are authorized to employ alternative plans, both plans to be specified by OMB and plans proposed by universities and other institutions. Experimentation with these alternatives would then allow for formulation of such alternatives in a modified circular A-21. Such a modified circular could provide a greater variety of methods of accounting to suit the variety of universities.

Concluding Remarks

Long ago, the government chose to support research in science and technology at universities in order to further new discoveries which would help both our own country and the whole of mankind. This support goes to members of the academic community. This community can and must apply high standards of accountability for direct expenses of travel, equipment, and the like. However, for this community, time spent on research in its manifold forms is not accurately accountable, so that any system of percentage reports is sure to involve artificiality and therefore ultimately to lead to additional abuses. Our examination in this article has shown that 100 percent reporting of activity is not a requisite or effective means to control abuses, or to meet the needs of the granting agencies, or to control indirect costs, or to meet requests of Congress. This total reporting is simply a mistake. It makes for constraints counter to the spirit and intent of those who struggle to discover new results. These constraints will diminish and divert the very scientific progress for which the monies are expended.

Scientific research in universities is firmly based on the independent initiatives of professors and scientists. Unfettered search for the truth has benefited and will benefit the nation, and has deserved and will deserve strong government support from public funds. The central tradition to be supported is the independence which attracts original minds and which cannot be subdivided into individual projects. Hence, with the 1968 interagency task force, we can say, "Time or effort reports now required of faculty members are meaningless and a waste of time."

References and Notes

1. Office of Management and Budget circular A-21, "Cost principles for educational institutions," *Fed. Regist.* **44** (No. 45), 12368 (6 March 1979).
2. V. Bush, *Science—The Endless Frontier, A Report to the President on a Program for Postwar Scientific Research* (Government Printing Office, Washington, D.C., 1945; reprinted, National Science Foundation, Washington, D.C., 1980).
3. U.S. House of Representatives, subcommittee of the Committee on Government Operations, *Hearings on Accountability of Educational Institutions for Federal Funds and the Effectiveness of Federal Auditors* (96th Congress, 1st Session, 17, 18, and 19 July 1979; Government Printing Office, Washington, D.C., 1979).
4. Here it might be objected that lawyers and others (for example, plumbers) do record time spent on tasks. The comparison is not relevant, because their tasks are of uniform character (always advising a client) and because the record is made as the basis of a charge—an explicit charge for profit.
5. "HEW interpretations on OMB circular A-21, revised March 6, 1979. Cost principles for educational institutions" (mimeographed, Office of Grant and Contract Financial Management, Office of the Assistant Secretary for Management and Budget, Department of Health, Education, and Welfare, Washington, D.C., 11 December 1979).
6. "A workshop on OMB circular A-21, revised March 6, 1979, Cost principles for educational institutions" (mimeographed, Office of Grant and Contract Financial Management, Office of the Assistant Secretary for Management and Budget, Department of Health, Education, and Welfare, Washington, D.C., revised 2 January 1980).
7. *A Report of the Commission on Federal Paper Work (Education)* (Government Printing Office, ed. 8, Washington, D.C., 1977), vol. 3, p. 19:2.
8. Office of Management and Budget Circular A-21, *Fed. Regist.* **43** (No. 48), 9896 (1978).
9. *Congressional Record*, 3 August 1976, p. H8269.
10. "Federally sponsored research at educational institutions—A need for improved accountability" (report PSAD 78-135, General Accounting Office, Washington, D.C., 18 August 1978).
11. "Accountability: Restoring the quality of the partnership" (National Commission on Research, Washington, D.C., 1980).
12. National Commission on Research, *Science* **207**, 1177 (1980).
13. It has been observed that related ideas for the consolidation of overhead functions have been encouraged by the Administration, and experiments of such sorts by NIH and NSF have been expressly mentioned in the President's Science and Technology Message and in many statements from the Office of Science and Technology Policy.
14. *Funding Mechanisms: Balancing Objectives and Resources in University Research* (National Commission on Research, Washington, D.C., 1980).

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