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CANADIAN COMMITTEE ON  
FINANCING UNIVERSITY RESEARCH

**REPORT OF THE PILOT STUDY  
ON THE  
COSTS OF UNIVERSITY RESEARCH**

DECEMBER 1979

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FOREWORD

As early as 1973, the provinces, through the Council of Ministers of Education, Canada, and the federal government studied the possibility of establishing a mechanism for consultation in matters relating to the financing of university research. In 1974, the Council recommended the creation of a federal-provincial task force which would act as a forum for exchange of information and mutual consultation between the two levels of government. The provinces' major concerns revolved around the form of this consultation and their desire to establish mechanisms which would provide information to universities, provinces and federal government agencies on the costs of university research. From the beginning, the ministers of education and the federal authorities recognized the importance of involving universities in the process.

Thus in 1974, federal and provincial representatives appointed a task force to prepare a preliminary report on the costs of university research. In 1976, the federal government, the Council and the universities, represented on the Canadian Committee on Financing University Research (CCFUR), asked the Canadian Association of University Business Officers (CAUBO) to undertake a study on the information available with regard to determining the costs of university research and on the procedures utilized by Canadian universities for identifying these costs. In June 1977, CCFUR requested CAUBO to coordinate the activities of a pilot project on the direct and indirect costs of research. The final version of this study, which follows, provides a costing methodology. The participation of universities, federal officials and of provincial officials in the CCFUR reveals their continuing interest in this matter and emphasizes the importance which must be given to cooperation in this field with due respect for each jurisdiction.

We hope that the consideration of the application of the methodology developed in the study will provide all concerned with a better knowledge and understanding of the costs of university research.

*Patrick L. McGeer*

Patrick L. McGeer  
Chairman, CMEC

*Heward Grafftey*

Heward Grafftey  
Minister of State for Science  
and Technology

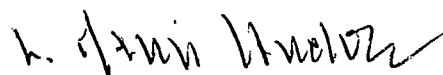


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## PREFACE

The present report constitutes another effort by universities, provincial governments, the federal government and professional associations to increase their knowledge of the real costs of university research. We are therefore indebted to the Council of Ministers of Education, Canada, and to the Ministry of State for Science and Technology for supporting the study and assigning responsibility to the Canadian Committee on Financing University Research (CCFUR) for its conduct.

CCFUR would like to commend the Canadian Association of University Business Officers (CAUBO) and the participating universities for their contribution. The results of the pilot study will provide, we hope, different levels of government, the universities and the university research community, with useful information relating to the funding of university research.



L. Denis Hudon  
Chairman, CCFUR

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11 June 1979

To: The Canadian Committee on Financing University Research

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We take pleasure in presenting the Report of the Pilot Study on the Costs of University Research.

The report is very much the result of a co-operative effort. In broad design, the Pilot Study was guided by a Steering Committee providing representation from various elements of the Canadian university community. In addition, the Council of Ministers of Education of Canada and the Ministry of State for Science and Technology appointed representatives to attend the meetings of the Steering Committee. The membership of the Steering Committee is shown as Appendix "A".

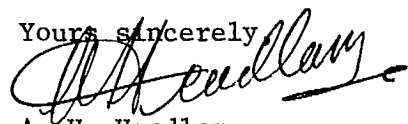
Appreciation is acknowledged for the professional assistance and advice, and the diligent work at the institutional level, of the members of the Technical Advisory Group, whose experience and background provided input to the project well beyond their initial role as representatives of the participating universities. The membership of the Technical Advisory Group is shown as Appendix "B".

In execution, note must be made of the work of Mr. William McMinn of Woods, Gordon & Co. and subsequently of Mrs. Bernadette Lynn of McMaster University who, along with the Project Resource Group, co-ordinated the collection and aggregation of the data. Finally and most importantly recognition must be given to the contribution of the participating universities -

University of New Brunswick  
Université Laval  
McMaster University  
University of Manitoba  
University of Calgary  
University of British Columbia

without whose generous co-operation this study would not have been possible.

It is our sincere hope that the report will be of assistance to you in developing recommendations for policies and priorities related to the funding of university research.

Yours sincerely  
  
A. H. Headlam,  
Chairman,  
Steering Committee.

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INTRODUCTION

At a meeting held on 9 June 1977, the Canadian Committee on Financing University Research (CCFUR) received a report from the Accounting Research Committee of the Canadian Association of University Business Officers (CAUBO) entitled "The Status of Research Costing Information and Procedures at Canadian Universities". A copy of the report is attached as Appendix "J". The document was an update of a 1974 "Report of the Study Group on the Costs of University Research" which had been commissioned by the Ad Hoc Federal-Provincial Task Force on Research.

While noting some significant developments in the application of programme costing at colleges and universities in Canada, the authors of the updated report concluded that the main emphasis of the activity had been directed toward determination of instructional and per-student operating costs and funding. There was very little information on the costs of the total research activity at Canadian universities.

Viewing such a conclusion against the catalogue of major studies in this area, extending back over the last decade or so, it is surprising that there appeared to be a lack of a full understanding of the financial implications of the research activity. Bernard S. Sheehan, Director of the Office of Institutional Research at the University of Calgary had prepared a chronology of the threads of the study of the costs of university research for this project, and his review is included as Appendix "C".

Substantial support for research development activity is almost now universally recognized as being vital to the social and economic advancement of the people of any complex industrial society. Unfortunately, there are no absolute standards which such a society can use in determining the adequacy of its provision for research and development. The tendency therefore is to seek proxies for such standards by relying on international comparisons.

Clearly, a fundamental starting point in this sort of exercise is the determination of the extent of the present commitment to research activity. As has been noted, however, at least with regard to university research, no data had been consolidated which would accurately reflect the full extent of expenditure in this area.



Accordingly at the 9 June 1977 meeting, CCFUR requested CAUBO to proceed to manage and co-ordinate a pilot study on the direct and indirect costs of university research. The general objectives of the pilot study were to be twofold:

- (1) to provide governments with information which will enable them to make policy decisions and set priorities relating to the funding of university research; and
- (2) to provide universities with information which will enable them to better identify the costs related to specifically funded research.

In addition two specific objectives of the pilot study were identified:

- (1) to assess the currently used methodologies on the costs of university research;
- (2) to refine and revise procedures for determining the direct and indirect costs of specifically funded university research.

The terms of reference of this Study restrict the examination and the results to an analysis of expenditures and patterns of cost structure at the participating universities. The fundamental and related financial questions of the appropriate level of support for the research activity at the universities and how the burden of this support is to be divided between the various funding jurisdictions have not been addressed; however, this report should provide additional input to the resolution of these and other related questions. A review of certain general issues on university research costs, activities and funding, prepared for use in connection with this Study is attached as Appendix "D".

One of the principal problems to be addressed in the costing of university research arises from the knowledge that the research activity supports and enhances the teaching capacity and, at the same time, basic research could not be carried out without the full support of a university infrastructure, the substantial portion of which has its origins in and sustains support arising from the teaching function. This may be said to be particularly, though not exclusively, so at the level of graduate instruction where the apprenticeship

system so characteristic of our graduate programmes clearly could not exist without a high level of research activity.

To overcome this problem a fundamental assumption is made that each component activity of the university must share jointly in supporting those elements that cannot be directly attributed to one of the basic missions of instruction, research and community service. This assumption underlines all of the analyses which follow and is basic to the methodology and the results derived from its implementation. Further reference to this point is made under the sub-heading "joint-product" in Terminology on Page 9.

SCOPE OF THE PILOT STUDY

The scope was initially outlined as follows:

"The Pilot Study will address two specific areas of costing, namely contract research and costing studies at universities.

1. Costing contract research

The Pilot Study will involve the establishment of a costing methodology for contract research only and aims at providing guidelines for the definition, calculation and inclusion of indirect costs and to arrive at procedures for the determination of direct and indirect costs of research contracts that would be acceptable to both the granting agencies and the institutions.

2. Pilot costing studies at universities

Concurrently, costing studies will be undertaken in a representative sample of universities: four institutions where similar work has been undertaken in the past, and two institutions where no such work has been carried out to date. Attention will be given to regional representation.

The purpose of this part of the Study is:

- to examine and compare the methodologies used currently;
  - to study research costs produced by existing studies;
  - to investigate whether patterns of cost structure and composition as found in the universities under study have applicability to other institutions; and
  - to examine whether or not proxy formulae could be elaborated which would be applicable to a wider range of institutions.
- (Such formulae, it is understood, will have the nature of guidelines only and will not attempt precise quantifications).

Additional output of this part of the Pilot Study might be the publication of a detailed description of the methodology, definitions and procedures followed at the selected institutions, which could be used by other universities interested in undertaking a full costing study. "

Following its preliminary review the Steering Committee advised CCFUR that: given the time and resource constraints imposed on the project the general objectives would be limited to:

- (i) the gross measures of the costs of university research;
- (ii) preliminary patterns of research cost components and their cost behaviour relative to other costs, and
- (iii) comments on opportunities and constraints for general applicability of the results for inter-institutional comparisons.

The foregoing was not intended in any way to reduce the obligation of the participants or to limit the scope of the project, but rather to identify the parameters within which the final report would be presented.

#### Selection of Participants

The selection of the participating universities was made on the basis that four of the institutions, Universite Laval, McMaster University, University of Manitoba and University of Calgary, had been involved in cost or expenditure studies and had developed the necessary data base and institutional research expertise. At the request of CCFUR the University of British Columbia and the University of New Brunswick were also requested to participate to provide representation and, at the same time, include a large and a smaller institution in the sample. The six pilot universities are therefore not a true statistical sample but do form a representative sample, in relative size and regional representation, of the universities of Canada, and in particular the 31 member institutions of CAUBO having sponsored research funding in excess of \$1,000,000 per annum.

(See Page 39 and Table 1).

#### Health Sciences

The preliminary report to CCFUR at 9 June 1977 made reference to the particular problems posed by the consideration of Health Sciences in university cost studies. The majority of cost studies have excluded the Faculty of Medicine (Health Sciences) from their analysis because of the complexity of the inter-relationship with teaching hospitals, the variety of funding sources and patterns, and the faculty involvement in patient care; supervision of interns and residents and the teaching hospital administration. An examination of

research funding statistics shows that in excess of 25% of the total research funding is directed to the Health Sciences, and at universities that have associated medical faculties the funding for health science research approaches 50% of the total sponsored research funding.

The exclusion from the Study recognizes that the total costs associated with research in the Health Sciences are not incurred in the university and a study of the costs of research of Health Sciences would have to incorporate the area of teaching hospitals, clinics and other areas of expenditure outside the universities. Table 2A on page 41 identifies the operating expenditure and sponsored research exclusions for Health Sciences. The operating expenditures include the relevant share of the support costs, having been retained as an identifiable group for the Study through the cost allocation process in the methodology. (See further reference, Page 33 ).

#### Capital Costs, Depreciation and Use Allowance

The Pilot Study excludes considerations of capital funds and capital expenditures on land, buildings and additions to equipment inventories. As described in the methodology on Page 27, expenditures for replacement of furnishings and equipment and for library acquisitions were included to the extent that they were reported as part of the operating expenditures or could be identified and transferred into the operating expenditures from the capital funds. Replacement costs of furnishings and equipment are considered as part of the ongoing annual cost of operations and therefore form part of any consideration of operating costs. Conversely capital expenditures to increase the size of the plant, i.e. additions to land, buildings and the basic equipment inventory are not considered as annual costs but will provide services for the institution over ensuing years.

On behalf of the Study, Mr. J. F. Houwing of AUCC conducted an extensive literature search and his findings support the exclusion on the basis that there has not been developed to this date a recognized method or formula to arrive at an acceptable method for cost measurement of the use of capital assets. The accounting treatment and valuation of capital assets in Canadian universities is not consistent and, although there is general agreement that the recognition of the full cost of university operations should include a factor for capital costs, further research is required before a formula or methodology for application of such costs can be recommended. In the Interim, where the inclusion of such costs is deemed appro-

priate, the amount could be negotiated on the basis of the identifiable proportion of the economic life and capacity of the asset, or as an alternative, a rental cost applied on the basis of current market rates for similar utilization.

#### Comparability

To provide comparability in the Study among the participating universities and to have a focus for expenditure reconciliation, it was agreed that the expenditure analysis would be applied to the 1976-77 fiscal year, as reported in the Financial Statistics of Universities and Colleges, 1976-77, prepared by Statistics Canada for the Canadian Association of University Business Officers. The Universite Laval was permitted to use the 1975-76 fiscal year because the disruption of activity at that institution in 1976-77 negated the comparability of the results for that year. The expenditures have been reconciled to the total of operating expenditures, including sponsored research and trust and endowment but excluding ancillary enterprises such as residences, bookstores and other revenue producing service areas as defined in the CAUBO financial reporting guidelines.

#### Contract Research

The Steering Committee decided that initially there should be a separate review of the indirect costs of contract research and Mr. Ken Clements, Executive Director of CAUBO agreed to supervise the separate study. The University of Guelph, the University of Toronto, Universite Laval and McGill University agreed to participate in the sub-project.

The selection of the four universities was made on the basis of their recent discussions with the Department of Supply and Services and their familiarity with the United States Federal Government guidelines entitled "Cost Principles for Educational Institutions" (Circular A-21).

The gross results obtained for each institution were similar to those gained from the initial results of the Pilot Study however, given the more detailed methodology being applied in the Pilot Study for the determination of the costs of all university research activity, it was decided that further development of specific guidelines for contract research should be deferred until the Pilot Study had been completed and the results analyzed.

It has now been determined that the methodology developed in the Pilot Study can be applied to derive the indirect to direct costs of all research activities. It is therefore not necessary to provide a separate methodology for contract research, however, a simplified version of the detailed methodology may be produced to assist institutions that do not wish to apply the full cost analysis.

## TERMINOLOGY

It is necessary to identify certain definitions that were used and determinations that were established for this cost Study.

### Joint Product

Current accounting terminology<sup>(1)</sup> describes joint product as -

"differing goods produced together in the course of the processing operations, the products being in such relationship that none can be designated as the major product".

Recognizing the intertwined relationship of instruction and research in the universities the research, instruction, and community services activities have been treated in this Study on a joint-product basis. This treatment provides that all three primary activities receive a proportionate allocation of the expenditures that cannot be specifically identified as belonging to one of the primary activities. The results of the Pilot Study, as shown on Table 3F, Page 48 show that 23% of the direct expenses and 12% of the indirect expenses have been directly allocated to the primary activities with the balance distributed on the joint-product basis.

If research had been treated as a "by-product", defined as a "marketable product of lesser importance produced incidentally with a major product"<sup>(1)</sup>, the marginal or additional cost method of allocating support expenditures to the research activity would have produced entirely different results.

### Primary Activities

Although the basic objectives of the Study are directed to the determination of the costs of research, it was felt necessary to the understanding of the results to follow the lead of previous cost studies in higher education and provide a breakdown of the three primary activities of instruction, research, and community service. The methodology should provide for a more useful application at institutions in the future and the results are more meaningful in relating the research expenditures to each of the other primary activities rather than to a combination of all other expenditures. The descriptions of the three primary activities are provided in the methodology on Page 30 .

### Direct Expenditures

The definition includes all expenditures identified under the function of "instruction and non-sponsored research" and "sponsored research", as these are defined for inclusion in the Financial Statistics of Universities and Colleges,

(1) Terminology for Accountants, The Canadian Institute of Chartered Accountants, 1976.



prepared by Statistics Canada for CAUBO.

- (a) "Instruction and non-sponsored research - this includes all direct costs of faculties, academic departments, graduate school, summer school, credit extension and other academic functions and expenses attributable to the area of instruction and non-sponsored research."
- (b) "Sponsored research - includes funds to support research from sources external to the university as well as funds transferred from trust and endowment for research purposes. Research sponsored directly by the university should be reported under general purpose funds."

The direct expenditures therefore normally include all faculty salaries and benefits, all technical and clerical staff support in the academic area, and the related travel, supplies and expenses, and equipment replacement expenditures.

As an exception to the foregoing, the office of the Dean and its related administrative expenditures are transferred out of the instruction and non-sponsored research and included as an indirect cost under Academic Administration. (See Methodology, Step 3, Page 28).

The methodology also provides (see Step 8, Page 33) that a proportion (10%) of faculty salaries and benefits is transferred to Academic Administration as an indirect cost. This transfer is to provide for the academic administration at the faculty and university level performed on the average by all faculty members, including department chairmen. (For further reference see Empirical Faculty Activity Analysis, Appendix "E").

#### Indirect Expenditures

All expenditures, other than direct expenditures. Includes all support costs for library, computer, administration and general, student services, and physical plant, as well as recognition of the academic administration costs evidenced through the decanal expenditures and the portion of faculty salaries and benefits.

#### Discipline Groups

The methodology provides for the collecting and reporting of expenditures by discipline groups. The groups follow the outline provided by Statistics Canada and the results have been summarized under four major headings as follows:

- 1) Education, including Physical Education
- 2) Humanities, Fine Arts and Social Sciences
- 3) Business, Administration and Law
- 4) Physical and Applied Sciences

The Study initially undertook to group expenditures under six major international standards classification of education disciplines (ISCED) headings however, following review of the initial results it was agreed that the number of major groups would be reduced to four and that the Statistics Canada groupings would be used as the basis for grouping. A listing of Statistics Canada groupings is shown as Appendix "F".

#### Empirical Faculty Activity Analysis (E.F.A.A.)

Central to the distribution of expenditures in programme costing at universities is the requirement to establish a faculty activity analysis upon which the distribution can be based. For purposes of this Study an empirical faculty activity analysis (E.F.A.A.) was established based on the results of detailed studies conducted at seven major Canadian universities over the past ten years. The combined results of the studies have been substantiated by reference to major studies conducted in the United Kingdom and in the United States, however, the E.F.A.A. distributions used in this Study have been determined solely on the experience at the seven Canadian universities. In line with the original decision to group the results according to ISCED, the E.F.A.A. analysis was developed by the six major ISCED groupings. The E.F.A.A. data was originally established by Mr. W. McMinn, in his capacity as Consultant to the Study, and the subject paper is included as Appendix "E". The decision to change to four major Groups necessitated an amendment to the original E.F.A.A. data and, at the same time, a decision was taken to provide for a common academic administrative function percentage (10%) across all groups rather than utilize a range as previously included. The modifications are also shown in Appendix "E".

## CONCLUSIONS

In setting out the summary comments and conclusions below, it is assumed that the reader is familiar with the terminology (see Page 9), the methodology, (a brief description of which is contained on Page 21), and the objectives of this Study (outlined on Page 2). It would be useful to have reviewed Appendix "E", the development of the empirical faculty activity analysis (E.F.A.A.) used in this Study.

## Objectives

In addressing the specific objectives the Pilot Study has -

- (i) assessed the currently used methodologies on the costs of university research,

and has determined that the main emphasis of programme costing at colleges and universities in Canada had been directed toward determination of instructional and per-student operating costs and funding. Existing methodologies have evolved from the NCHEMS<sup>(1)</sup> and WICHE<sup>(2)</sup> programme costing developments introduced in the early 1970s and it was found that previous cost studies carried out at three of the participating institutions made extensive use of these bases.

As an exception, Université Laval issued a report in 1975 entitled "Coûts indirects des activités d'enseignement et de recherche à l'Université Laval". This was an independently developed methodology for calculating direct and indirect costs to be applied to the variety of grants, contracts and professional services at Université Laval. In essence, the Laval methodology treats all the indirect costs of instruction and research as joint product items and, after certain non-pertinent costs have been eliminated, an overhead rate is developed based on a defined group of salaries. The Université Laval was in a unique position to compare its methodology with the methodology developed for this Study. After allowance for certain differences in definition it was found that the effective average overhead rate for research was slightly higher using the Laval methodology as compared with the methodology developed for this Study.

- (ii) selected and refined, and implemented at six participating institutions, a methodology for determining the direct and indirect costs of university research.

(1) National Center for Higher Education Management Systems, Washington, D.C., U.S.A.  
(2) Western Interstate Commission for Higher Education, Boulder, CO., U.S.A.

The methodology as implemented had the NCHEMS and WICHE programme costing as its basis, with certain modifications as described in this report in the section entitled "Methodology". The methodology can be applied at various levels of aggregation from budget unit to discipline group, but key to the direct expenditure distribution obtained at an individual university would be the application of an appropriate faculty activity analysis. For this Study an empirical faculty activity analysis was developed based on studies conducted at seven Canadian universities over the last decade and, according to its particular requirements an institution may not find the E.F.A.A. used in this Study to be appropriate for its direct expenditure distribution at a level of detail below that of the discipline groups.

The results achieved by the implementation provide the gross measures of the costs of university research, along with the gross costs of the other two primary activities, instruction and community service. The methodology assists in the identification of research cost components and, coupled with the results, provides a basis for satisfying the general objectives of the Pilot Study; to provide governments and universities with information which will enable them to better identify the costs related to research and to make policy decisions and set priorities relating to the funding of university research.

#### Applicability of Methodology

The Scope of the Study included reference to "investigate whether patterns of cost structure and composition as found in the universities under study have applicability to other institutions" and also indicated that -

"additional output of this part of the Pilot Study might be the publication of a detailed description of the methodology, definitions and procedures followed at the selected institutions, which could be used by other universities interested in undertaking a full costing study".

The analyses carried out following the initial implementation phase confirm that the patterns of cost structure and composition as found in each of the participating universities had applicability to the other institutions and, as the participants constitute a representative sample, it can be stated that the applicability will cover a significant number of the colleges and universities

of Canada. This will be particularly applicable to the 31 institutions that have sponsored research expenditures in excess of \$1 million annually and therefore will have developed patterns similar to the participating institutions.

The experience of the final implementation, following revision of the methodology after the initial implementation phase, allows the conclusion to be drawn that the methodology can be applied at a university that is presently reporting the annual financial statistics to CAUBO and has a reasonable data base to allow for reclassification of the accounts and to provide for the allocation process.

The methodology does not require a faculty activity analysis (F.A.A.) for calculation of the indirect to direct expenditure ratio, however, the distribution of the direct costs and the related indirect costs to the primary activities of instruction, research, and community service assumes the use of an F.A.A. The empirical faculty activity analysis (E.F.A.A.) used in this Study was developed from the data supplied by seven Canadian universities, substantiated by extensive studies conducted in the United Kingdom and in the United States. As noted previously, the application of the E.F.A.A. at a level of detail greater than the discipline groups may not be appropriate and the individual institution will have to determine whether or not there is benefit to be obtained from conducting its own internal activity analysis.

### Results

The results of this Study are provided in some detail in a separate section of the report and show, on Table 6, Page 52, that at the six participating institutions the ratio of indirect to direct expenditures in the research activity varies from a low of 47% to a high of 63%, with a median of 52% and a weighted average of 51%. Given the differences in organizational structure; the decentralized versus centralized philosophy and accounting; the budget allocation processes; the size and economies of scale; and the geographic location in different funding jurisdictions, the variance is found to be within acceptable limits. The standard deviation from the weighted average also indicates a relatively consistent pattern within the representative sample.

Table 7 on Pages 54 & 55 also shows a reasonable cluster for the Discipline Groups, particularly if one combines the first three groups of Education, Humanities and Social Sciences, and Business and Law.

Important to the usefulness of the results is the understanding that although the methodology uses the E.F.A.A. for distribution of the majority of the direct expenditures, the development of the indirect cost rate takes place before the distribution of expenditures to the primary activities and therefore changes in the E.F.A.A. do not affect the ratio of indirect to direct expenditures. This point is illustrated on Table 8, Page 57 .

In the accumulation of the indirect expenses, various bases and processes are used in the allocation of the support costs to the academic areas. Although some direct allocations have been made, the process used at the six participating institutions allocated the majority of the academic computer, library, space and equipment costs to the indirect expenses that were subsequently distributed to the primary activities on the basis of the indirect cost ratio. As further development of programme costing takes place at Canadian institutions there will be developed additional data that will allow such costs to be allocated directly to the appropriate primary activity and not as part of a joint-product ratio distribution. At this date the data was not available at a level of confidence or consistency for application in the Study.

The results do not imply a cost-benefit or a cost-research goals relationship but do show the result of the current level of external and internal funding support for the research activity. Evident from the results is the significant role that the internal operating funds play in support of the research activity and the recognition of the dependence of the research output both on the internal funding and the externally sponsored research funding. The patterns of cost structure and support have been established on the basis of past sponsored research funding and this may call into question the ability of the operating funds to provide the necessary support of a continuation of the research activity at the levels identified in the results of this Study.

#### Sponsored Research

The methodology and the empirical faculty activity analysis used in this Study have provided for determination of the direct and indirect costs of the total research activity. It was not possible, however, within the Study, to develop a proxy or formula to identify the costs associated with the allocation of faculty time to sponsored research grants.

The indirect to direct expenditures ratio as shown in the results of the Study can be applied to the direct costs of sponsored research to show the extent of the support for the direct cost "allowable" expenditures. The level of support as identified is only part of the support cost being provided by the operating expenditures because it does not include the support cost attributable to the direct cost of faculty time allocation.

In a separate section of the report, commencing on Page 59 , the development of a set of data which includes certain assumptions regarding the allocation of faculty time are shown. On Table 10, Page 62 the estimated faculty time allocation is applied to the overall results of the Study and two sets of percentages are derived. These percentages provide a proxy or formula that can be applied to the "allowable" sponsored research expenditures to identify the operating expenditure support of the direct expenditures plus the operating expenditure support for the faculty salary allocation not currently included.

On Table 10 and on the Graph on 10A it can be seen that the formula percentage is relatively insensitive to the different percentages of faculty time allocation in Group 4, the physical and applied sciences. In the humanities and social sciences the sensitivity is much greater because the base of sponsored research expenditures is lower in relation to the total expenditures.

Also on Table 10 there is identification of the total costs, including the factor for faculty time allocation, but it is inappropriate to calculate a percentage or ratio because the result is a mixture of direct and indirect expenditures or costs.

The development of these data, as shown on Page 59, was taken from the faculty activity analyses at three universities and applied to the results of the Study. Table 11 shows the application at the participating institutions but, as noted, these are included only to illustrate the range of results that may be obtained by applying the estimates.

The scope of the Study included reference to the determination of the costs of specifically funded research. Further testing and review of the above outlined allocations and formulae will have to be undertaken before the results are deemed acceptable.

Future Action

The implementation of the Study used the expenditures at the participating institutions for the 1976-77 fiscal year, except in the case of Universite Laval where the 1975-76 fiscal year was used. An analysis of university expenditures by fund, function and object of expense in the 1970s, as reported in the Financial Statistics of Universities and Colleges, prepared by Statistics Canada for CAUBO, indicates that the 1976-77 fiscal year can be taken as representative of the past decade. Changes in expenditure patterns at universities tend to be gradual and evolutionary rather than dynamic, however, if the results of this Study are to be more widely used it will be necessary for the implementation of the methodology at an additional number of Canadian universities. In the event that the additional studies do take place there will be a source of material for input to comparative studies that may be made in future years. The use and further refinement of the methodology will also serve to enhance the comparability of financial reporting among the colleges and universities of Canada, and to this end CAUBO intends to encourage the wider use of the methodology.

At the same time investigation has shown that the methodology will lend itself to the utilization of a computer model for simulation purposes. CAUBO would be interested in further discussions of this possibility, including input into the determination of assumptions and variables that may be programmed into the model.



## METHODOLOGY

Cost studies conducted at Canadian universities have generally been patterned on the NCHEMS<sup>1</sup> and WICHE<sup>2</sup> programme cost methodologies introduced in the early 1970s. As a result, previous studies conducted at McMaster University, the University of Manitoba and the University of Calgary contained similar bases and classifications, although the studies had been carried out with different objectives and, as previously noted, had not sufficiently identified the research activity for the purpose of obtaining results for this project.

To maximize consistency and to ensure reasonable comparability among the participating institutions, it was decided to select one methodology for the project implementation. McMaster University had been engaged in a joint study with the University of Guelph and the University of Waterloo and therefore had developed some experience in modifying a detailed methodology for use at different institutions. The McMaster methodology was selected as a basis for this pilot study, with modifications to provide for the research activity orientation.

It is important to note that two significant departures from previous cost studies were incorporated into the final methodology used in this project. The first was that all expenditures normally identified under the classification "Sponsored Research" were treated as direct expenditures, i.e. as an integral part of the academic activity, prior to the allocation of the support costs to the academic areas. This inclusion recognizes the impact and integration of the sponsored research activity in the total instruction and research activities of the academic areas.

The second major modification recognizes that although the direct expenditures attributable to faculty effort should be allocated to the primary activities of instruction, research, and community services on the basis of a representation of time allocation by the faculty, the same allocation would not necessarily be desirable for the support costs. Accordingly the methodology determines the allocation of support costs as a percentage of the direct expenditures prior to their distribution. As a result the ratio of indirect costs to direct costs for each of the primary activities is relatively insensitive to changes in the allocation of direct costs brought about by adjustments in the faculty activity

- (1) National Center for Higher Education Management Systems, Washington, D.C., USA
- (2) Western Interstate Commission for Higher Education, Boulder, CO., USA

analysis. The impact of this modification on the results is discussed on Page 56.

The user of this methodology has a number of options regarding the order in which the allocation process is applied, the level of aggregation which is analyzed and the type of faculty activity analysis to be used. Before describing the methodology in detail it is useful to outline these options.

The ten basic steps of the methodology are listed on Page 21 and following the classification and mapping of the first three steps, the allocation process takes place in Steps 4, 5 and 6. Steps 4 and 5, the allocation of institutional support and physical plant operations costs, may be interchanged without disrupting the results. A greater degree of accuracy may be obtained by applying a cross-over allocation between the institutional support and the physical plant costs before these costs are then distributed to the remaining support and academic areas. The remaining support costs, per Step 6, may be allocated in any convenient order and those that are distributed on similar bases can be grouped together for distribution. The order in which the methodology is applied is flexible and can be adapted to the user's requirements.

The level of aggregation to be used in the analysis is also left to the user's discretion. The ultimate object to which the costs are allocated may be the academic department or budget unit or a higher level of aggregation may be chosen. For an example, an institutions may decide that it is more interested in developing its costs at the level of the Faculty or School or it may wish to aggregate to the level of disciplines or discipline groups.

Using the higher level groupings reduces the amount of data manipulation required in the application of the methodology. Also, better allocation bases for usage may be available at the higher levels of aggregation, depending on the user's system of operation.

One major factor which may guide the level of aggregation is the faculty activity analysis (F.A.A.) data to be used in the analysis. Rather than using the historical F.A.A. data contained in Appendix "E", the user institution has the option of conducting its own faculty activity analysis. Because the historical data has been aggregated to the four Discipline Groups, if the user

opts to use the established data, his ultimate object becomes the four groups for which F.A.A. data has been provided. Likewise, the 10% allocation of faculty salaries and benefits included as Step 8, must be adhered to. If the user develops his own F.A.A., however, the allocation of direct costs to instruction, research, community service and faculty administration would be constrained by his own F.A.A. Since the F.A.A. presented as a supplement to this methodology is historical and applicable to discipline groups it may not be readily applicable to a user institution that wishes to obtain results at a lower level of aggregation. In that case, the user would be required to adjust the historical F.A.A. or to conduct his own analysis.

Common Methodology for the Study

As previously outlined, on Page 18 , a basic methodology was selected for the expenditure analysis required for the research cost pilot study. Refinements were made to the methodology following the initial implementation phase and the following ten steps summarize the method used in the final implementation phase. It is important to note that throughout the process a reconciliation of the total expenditures is maintained with the expenditures as reported for inclusion in the Financial Statistics of Universities and Colleges, prepared by Statistics Canada for the Canadian Association of University Business Officers (CAUBO).

- Step 1: Expenditures are summarized by source of fund.
- Step 2: Operating expenditures are classified by function.
- Step 3: University accounts are mapped to the Program Classification Structure (P.C.S.).
- Step 4: Institutional Support costs are distributed to all budget units.
- Step 5: Physical Plant Operations costs are distributed to all budget units.
- Step 6: All remaining support costs (computer, audio visual, library, student services, etc.) are distributed to academic departments.
- Step 7: Academic departments are mapped to the Discipline Groups, as selected for this Study.
- Step 8: The proportion of faculty salaries and benefits applicable to academic administration is calculated and transferred to indirect expenses.
- Step 9: The indirect cost rate is calculated.
- Step 10. The total direct and indirect costs of the primary activities are determined.

In general, costs are assigned to academic departments in the first phase of the analysis (Steps 1 through 6). In some cases, however, a higher level of aggregation, namely, the Faculty (Humanities, Social Sciences, etc.) was used as the initial cost object. All cost objects are standardized in Step 7 by combining costs into the Discipline Groups.

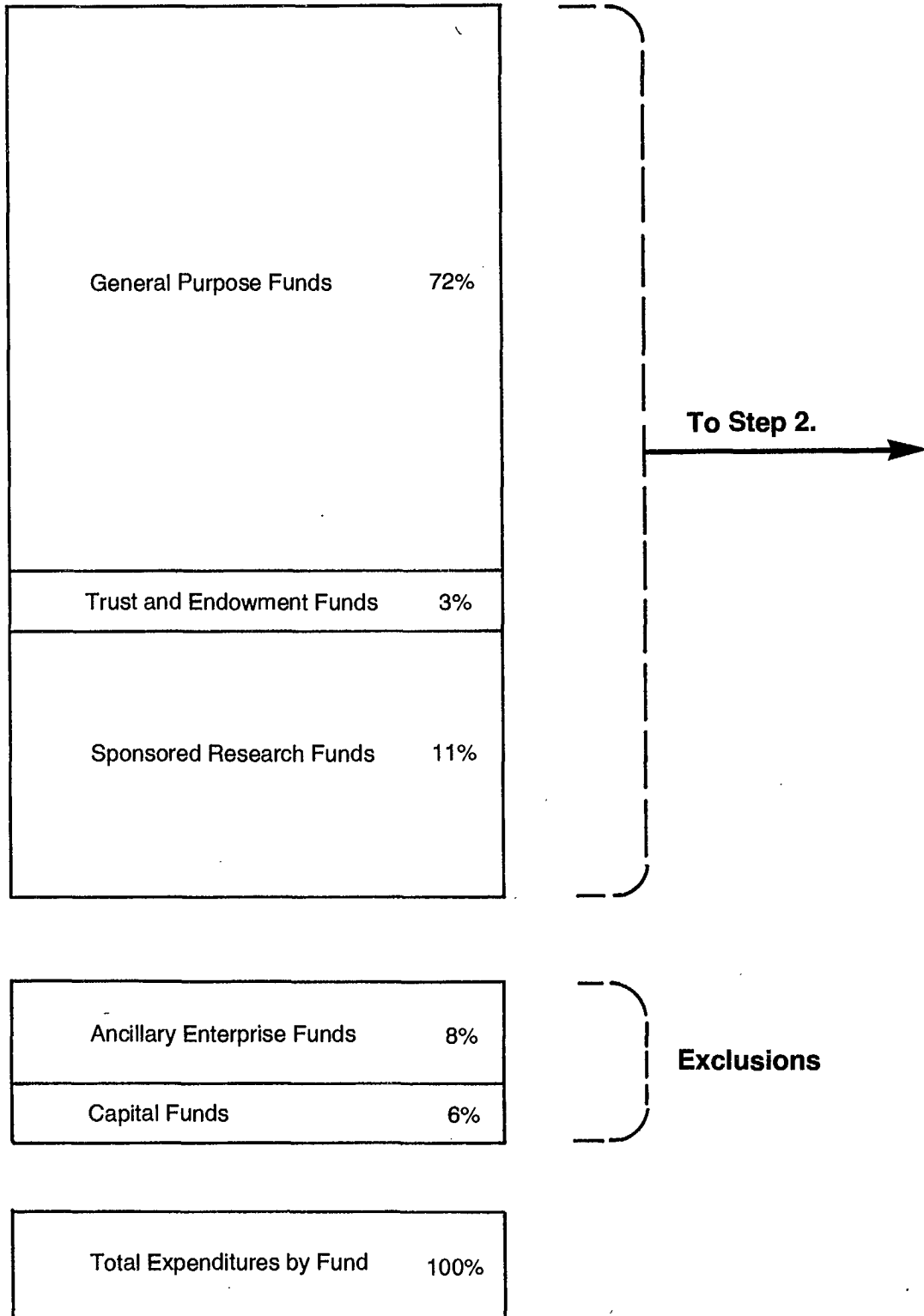
Figure 1 shows a schematic overview of the costing process. The methodology that follows outlines each step of the analysis.

### Methodology for the Pilot Study

#### Step 1 – Expenditures Summarized by Source of Fund.

As reported in Financial Statistics of Universities and Colleges, 1976-77; prepared by Statistics Canada for the Canadian Association of University Business Offices (CAUBO)

Percentages shown for total expenditures of six participating universities

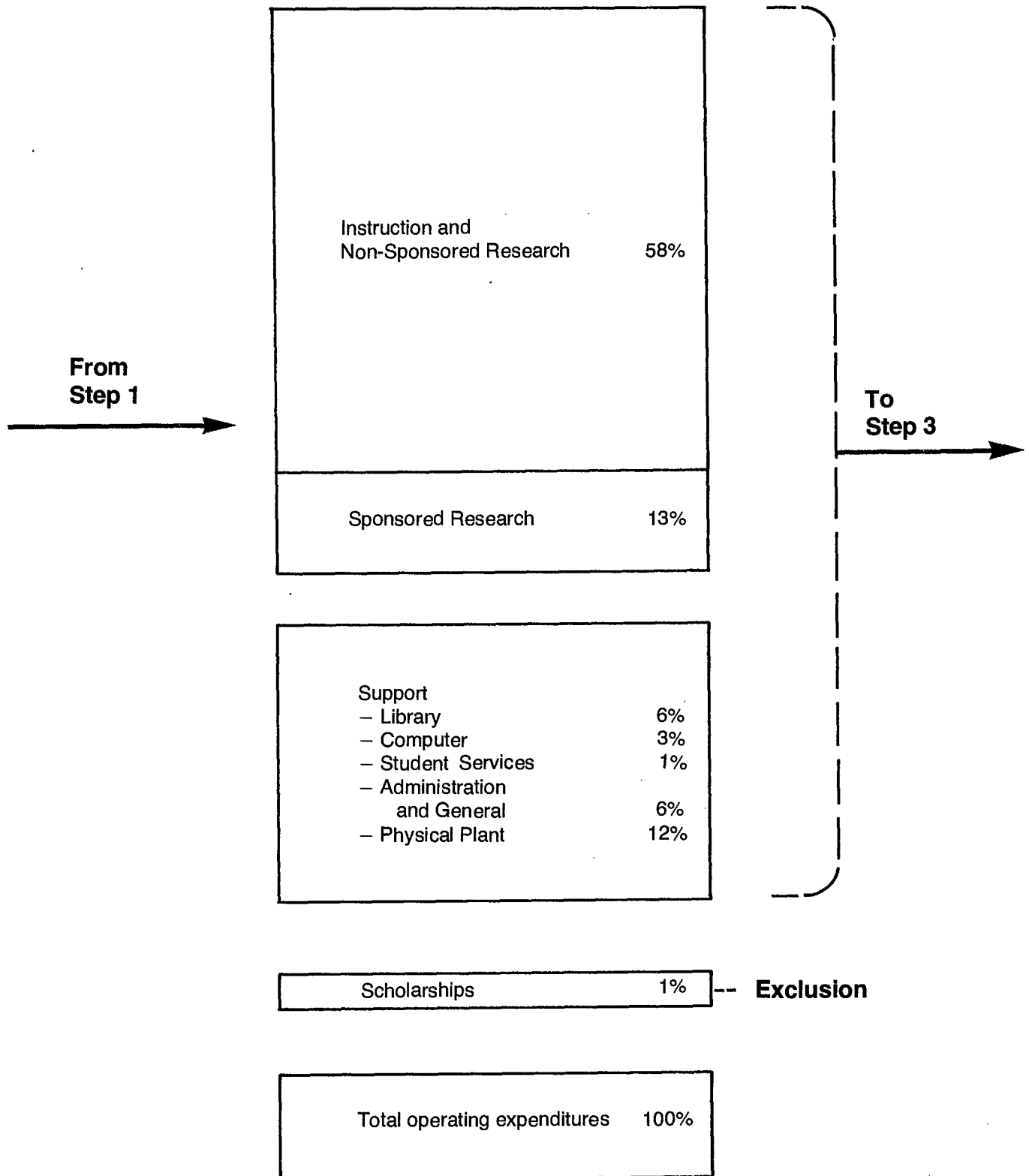


### Methodology for the Pilot Study

#### Step 2 – Operating Expenditures Classified by Function

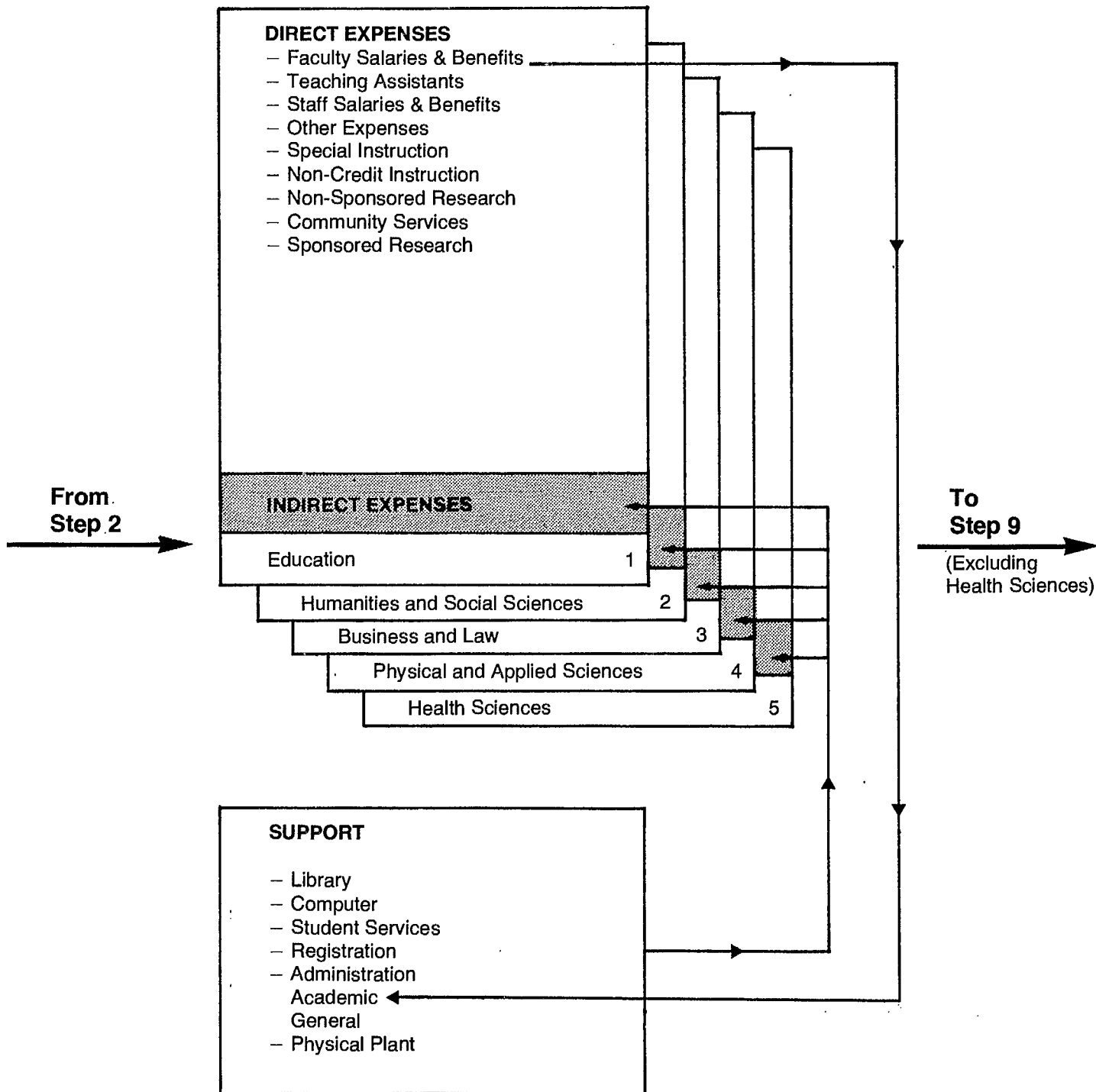
As reported in Financial Statistics of Universities and Colleges, 1976-77; prepared by Statistics Canada for the Canadian Association of University Business Offices (CAUBO)

Percentages shown for total expenditures of six participating universities.



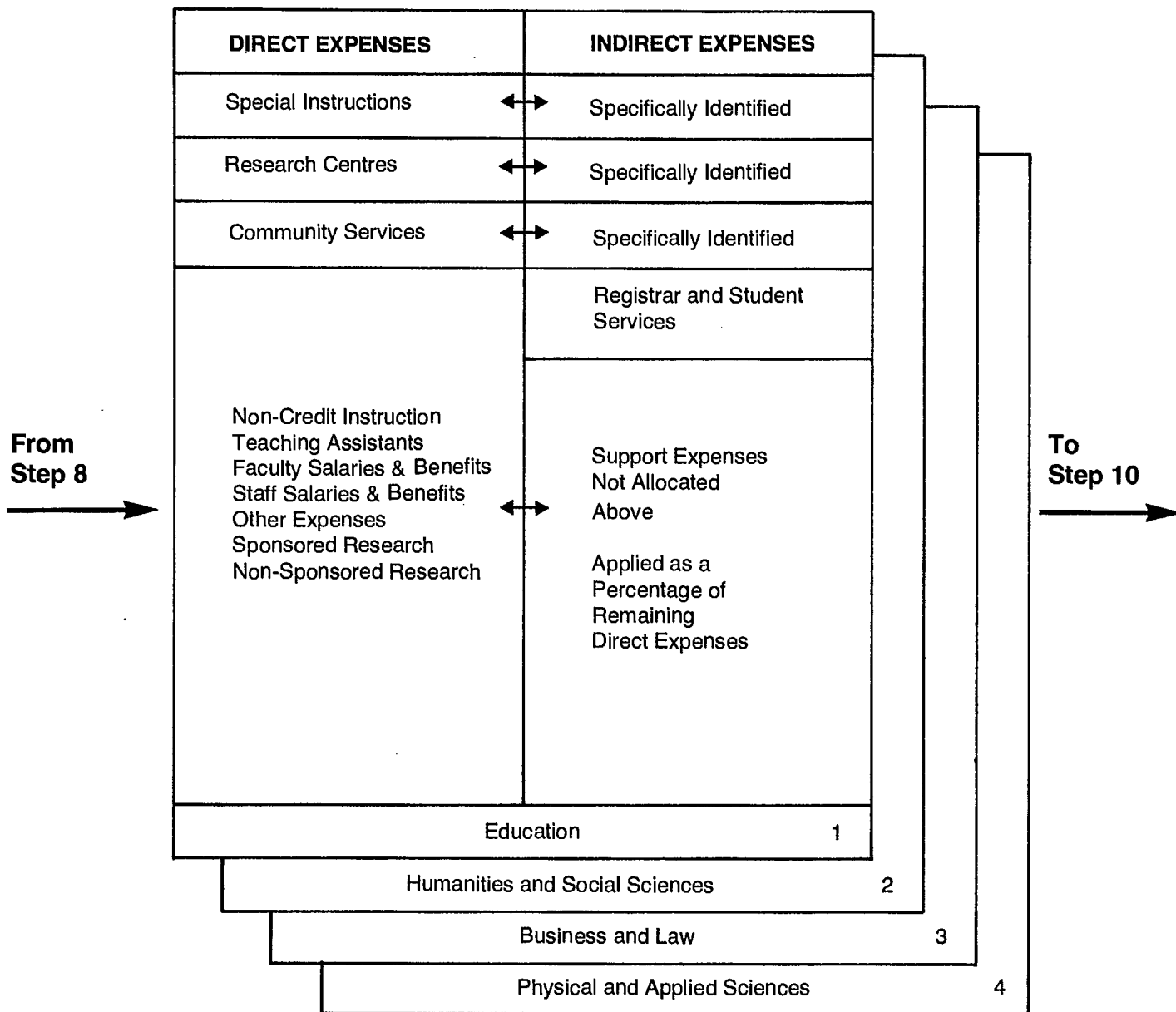
### Methodology for the Pilot Study

#### Step 3 Through Step 8 Mapping and Progressive Allocation to Discipline Groups



## Methodology for the Pilot Study

### Step 9 – Calculation of Indirect Cost Rate





### Methodology for the Pilot Study

#### Step 10 – Direct and Indirect Costs of the Primary Activities

##### Instruction

Direct
Special Instruction
Teaching Assistants Faculty Salaries and Benefits Staff Salaries and Benefits Other Expenses
<b>TOTAL</b>

Indirect
Special Instruction
Registrar and Student Services
Support (percentage per Step 9)
<b>TOTAL</b>

##### Research

Direct
Non-Sponsored Research
Sponsored Research Non-Sponsored Research Faculty Salaries and Benefits Staff Salaries and Benefits Other Expenses
<b>Total</b>

Indirect
Non-Sponsored Research
Support (percentage per Step 9)
<b>Total</b>

##### Community and Professional Services

Direct
Community Services
Faculty Salaries and Benefits Staff Salaries and Benefits Other Expenses
<b>Total</b>

Indirect
Community Services
Support (percentage per Step 9)
<b>Total</b>

Step 1: Expenditures are summarized by source of fund

University accounting systems are normally organized, and reported to CAUBO, on the basis of five types of funds:

- 1) General Purpose
- 2) Trust and Endowment
- 3) Sponsored Research
- 4) Ancillary Enterprises, and
- 5) Capital

Each of these funds contains budget units (departments) and objects of expenditure (salaries, benefits, supplies and services). For the purpose of the cost analysis, all expenditures by budget unit and cost object are required on the basis of funding source. All expenditures from operating, sponsored research and trust and endowment funds are included in the study, all capital funds and ancillary enterprises expenditures are excluded.

If the ancillary enterprises have not been allocated their full share of the support costs, the ancillary enterprise expenditures should be carried through Steps 4, 5 and 6 and then excluded at their full cost value.

Capital funds have been excluded on the assumption that the expenditures are increasing the inventory of plant assets for future use, i.e. are additions to the basic inventory levels, and these expenditures are therefore not part of the normal, annual operating expenditures of the university. It is assumed that expenditures for furnishings and equipment included in the general purpose or trust and endowment fund expenses are for replacement, i.e. maintaining the service levels of the basic inventory. To the extent that expenditures from the capital funds are for replacement of furnishings or equipment, these should be transferred into the operating expenditures. Library acquisitions have been treated as operating expenditures in the Study. (For additional comment on capital costs, depreciation and use allowance see Page 6 ).

As the first step in the procedure, all expenditures are summarized by funding source, budget unit and cost object. It is important to note that the summary can be made on the level of academic departments, of faculties or schools, or of discipline groups similar to the Groups used in the Study, depending on the needs of the institution, the availability of data and the constraints of time.

Step 2: Operating expenditures are classified by function

The university expenditure summary, prepared in Step 1, is reconciled with the institution's CAUBO Report 2 "Operating and Capital Expenditures by Fund ....". CAUBO Fund totals are used as a basis of comparison because they are a standardized, national set of financial data. If institutions abide by the CAUBO definitions, the resultant reports provide comparable financial statistics across the Canadian universities.

The university can reconcile its internal financial data and the external CAUBO reports either at the level of the CAUBO functional objects of expenditure (salaries, benefits, computer, etc.) or at the aggregate level of fund totals. Expenditures from general purpose, trust and endowment, and sponsored research (and any capital equipment component if applicable) are compared with the CAUBO fund totals. Differences between the two are identified by item and explained. The expenditure totals thus reconciled are mapped to the appropriate category in the Program Classification Structure (P.C.S.).

Step 3: University Accounts are Mapped to the Program Classification Structure (P.C.S.) - see Figure 2, Page 29

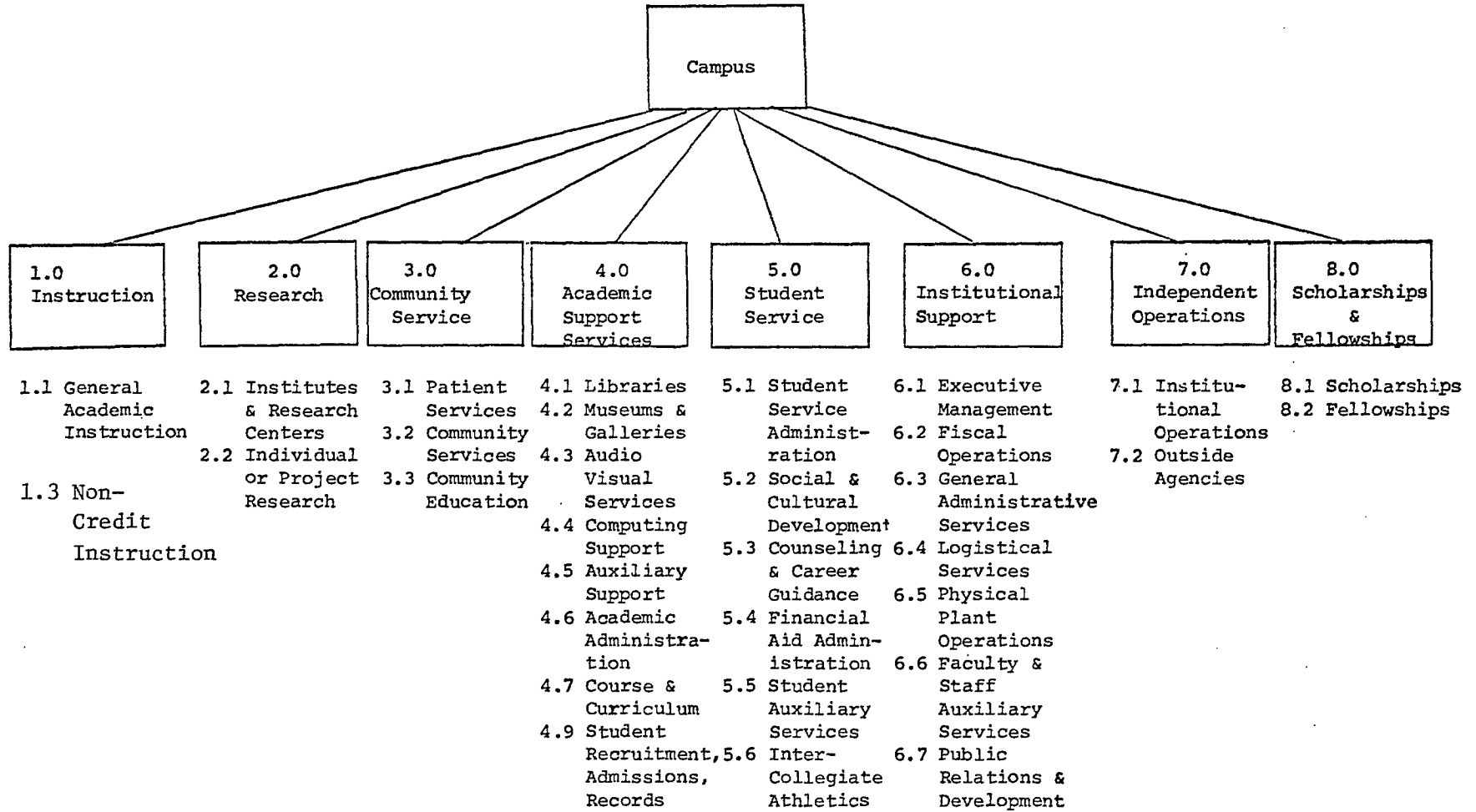
Developing costs on the basis of budget-line items identifies the spending source (the budget unit) but does not delineate the activity for which the expenditures were incurred. Some costs, such as a research grants office, are recognizably applicable to one of the university's activities, research. Many other expenditures, such as faculty salaries, apply partially to research and partially to instruction; therefore, some way must be devised to apportion costs among activities. This analysis utilizes activity-center costing to assign costs to activity centers.

The primary activity centers of the university, Instruction, Research and Community Service, are directly related to its primary objectives:

- 1) to instruct students in its disciplines;
- 2) to perform research to create new knowledge and to explore fields of existing knowledge; and
- 3) to act as a service unit to the community in fields of expertise.

Figure 2

PROGRAM CLASSIFICATION STRUCTURE



A budget unit is assigned to the three primary activities if its operations are intended to further one or more of the primary activities. If the budget unit is indirectly involved in forwarding the institution's objectives, it "supports" the primary activities. Certain items such as scholarships, taxes and interest on indebtedness are excluded from the analysis because they are considered to be "flow-through" expenditures, i.e. expenditures with offsetting revenues with the university being used to process the amounts.

A Program Classification Structure (P.C.S.) is used in the analysis to organize the accounts and to facilitate the assignment of the line-item account to appropriate activity centers. "Program" in the context of the P.C.S. represents an activity which serves as the basis of expenditure analysis. The eight major programs or activity centers are as follows:

Primary Activity Centers

- 1.0 Instruction: Includes instructional activities of a credit and non-credit nature, with the non-credit classified under a separate sub-heading. Also, for purposes of this Study, a separate sub-heading of "Special Instruction" was introduced to accumulate the direct and indirect costs attributable to instruction in the Summer session, correspondence programmes, and other non-regular credit programmes that were identified only with the primary activity of Instruction.
- 2.0 Research: Includes activities conducted within formal research organizations and those of an individual or project research nature conducted within departments including time spent by faculty members on scholarly activity, whether funded or not specifically funded.
- 3.0 Community Services: Includes all services to special groups and individuals outside the institution.

Support Activity Centers

- 4.0 Academic Support: Includes all activity centers such as libraries, museums and galleries, audio visual services, academic computing, faculty administration (deans and their support staff), admissions and registrarial function.
- 5.0 Student Services: Contains all activities established for the social, cultural, career and personal development of the student outside the formal degree curriculum.
- 6.0 Institutional Support: Includes all activities involved with the Executive Management of the Institution, Board of Trustees, Planning Office, Office of the President, Fiscal Management, Personnel, Logistical Services, Physical Plant Operations and Public Relations.
- 7.0 Independent Operations: Includes those activities which are only peripherally related to the primary activities. (Ancillary enterprises where assumed to be this type of expense and are excluded from the analysis).

- 8.0 Scholarships and Fellowships: Includes those funds awarded to graduate and undergraduate students for which they do not perform services. (This group of expenditures is excluded from the analysis).

Figure 2, Page 29 illustrates the subdivision of the P.C.S. categories.

Line-item costs are matched to the appropriate activity centers. Once all accounts to be included in the analysis have been mapped to the appropriate activity center, the support costs can be allocated to departments (or groups) within the primary activities.

Step 4: Institutional Support Costs are Distributed to All Budget Units

Institutional Support (P.C.S. 6.0, excluding 6.5) provides the general administrative function for the university. All expenditures within institutional support are assumed to belong to a single cost center which is distributed to all budget units on a single allocation base, basic departmental costs (salaries, fringe benefits, sponsored research and other expenses). Basic costs by department are obtained from the P.C.S. detail by budget unit and cost object prepared in Step 3.

Step 5: Physical Plant Operations Costs are Distributed to All Budget Units

The cost of Physical Plant Operations to a budget unit is assumed to vary proportionately with the amount of net assignable square feet (NASF) occupied. Thus, physical plant costs are distributed to all budget units, including institutional support on the basis of their relative usage of N.A.S.F. Physical plant operations and institutional support are the only two cost centers which are allocated to all budget units in the university. Other support activity centers are distributed directly to academic departments, the allocation procedure for the remaining support centers will be described next.

Step 6: All Remaining Support Costs (Computer, Audio Visual, Library, Student Services, etc.) are Distributed to Academic Departments

The expenditure analysis proposes to determine the total cost of research, instruction and community service; hence, full costs must be developed, allocating all relevant costs to academic departments on some logical basis. Because of institutional differences, prescribing a single allocation method is impossible. Rather, a standardized procedure is to be followed to the extent that the university's data base allows. It should be noted that certain support

activity centers are allocated directly to the primary activity centers without the use of the indirect cost base in Step 10. Three of these direct allocations (Student Service, Registrar and Admissions) are described next.

6A: Allocation of Student Services, Course and Curriculum and Student Recruitment and Admissions (4.7-5.0)

Student services costs are assumed to vary with changes in the full-time equivalent (F.T.E.) student population. Using a ratio of F.T.E. students, then, student services costs are allocated to the instruction activity within academic departments. The definition of F.T.E. students used should be appropriate for the expenditure allocation and not necessarily a definition that is used for funding or inter-institutional comparative purposes.

Course and Curriculum costs (4.7) and student recruitment and admissions costs are both handled in a manner similar to student services.

6B: Distribution of Academic Administration (4.6)

Academic administration costs include the salaries and benefits, supplies, travel, etc., expenditures of the Deans, their staff and other non-departmental administrative officers within a school, faculty or college. These costs are accounted for on a faculty-wide basis and are allocated to academic departments within a faculty based upon the relative number of F.T.E. students by department. The faculty salary component of 4.6 will be calculated and added to the allocated portion in Step 8.

6C: Distribution of Auxiliary Support Cost (4.5)

Auxiliary Support Costs (glassblowing, animal quarters, etc.) are distributed to academic departments on the basis of usage if this is available or on the basis of F.T.E. students or other appropriate method if no usage data exists.

6D: Distribution of Academic Computer Costs (4.4)

The portion of computer costs to be distributed at this point are those that pertain to academic services, that, those used in instruction and research. These costs are the residual amount, net of chargeouts, e.g. charges to research accounts, external agencies, etc. The computer costs for the non-academic departments will have been distributed at an earlier stage in the allocation process. Relative usage services as the allocation base for computer costs.

6E: Distribution of Audio Visual Costs (4.3)

Like academic computer expenditures, audio visual expenditures, net of recoveries or chargeouts, are distributed on the basis of usage.

6F: Distribution of Museums and Galleries (4.2)

Various allocation procedures may be followed for museums and galleries, such as F.T.E. students or usage. The appropriate method for an individual institution depends upon the nature of its museums and galleries.

6G: Distribution of Library Expenditures (4.1)

Library expenditures are allocated to academic departments on the basis of library usage (circulation statistics) and/or acquisitions. The costs of special purpose libraries (e.g. Health Sciences library) are allocated directly to the applicable department.

Step 7: Academic Departments are Mapped to the Discipline Groups

When all indirect costs have been allocated to academic departments by means of the appropriate distribution base, departments are grouped in this Study into the following broad discipline categories, based upon the revised Statistics Canada grouping of disciplines:

- 1) Education, including Physical Education
- 2) Humanities, Social Sciences, Fine and Applied Arts
- 3) Business and Law
- 4) Physical and Applied Sciences, including Agriculture

At this point in the analysis any direct or indirect costs associated with Health Sciences disciplines (nursing, pharmacy, dentistry, medicine, etc.) are summarized and excluded from further analysis.

Step 8: The Proportion of Faculty Salaries and Benefits applicable to Academic Administration is Calculated

Besides the decanal expenditures and other types of expense involved in academic administration, a portion of faculty time and, hence, faculty cost is applicable. To allocate the cost of the faculty member's time applicable to Academic Administration, 10% of faculty salaries and benefits is transferred from direct departmental costs to P.C.S. 4.6.



Step 9: The Indirect Cost Rate is Calculated

The costs accumulated in the Discipline Groups at this point in the analysis are of five types: (See Figure 1, Page 4 of 5 on Page 25).

- 1) Direct costs and their specifically identified indirect costs, which can be directly identified with one of the three primary activities, (e.g. special instruction, research centers).
- 2) Indirect costs which can be directly identified with one of the primary activities (e.g. registrar and student services).
- 3) Direct costs which can be identified with one of the primary activities but with which indirect costs have not been specifically identified, (e.g. teaching assistantships, sponsored research).
- 4) Direct costs which are not identified directly with one of the primary activities, i.e. joint-product costs (e.g. faculty salaries and benefits).
- 5) Indirect costs that have not been specifically identified with a direct cost or primary activity.

Cost types 1, 2 and 3 above will be allocated directly to the appropriate primary activity. Cost type 4 will be allocated on the basis of the E.F.A.A. The allocation of cost type 5 is made on the basis of its percentage to the total of the direct costs in types 3 and 4, i.e. direct costs that have not previously had indirect costs **specifically** assigned.

The indirect cost rate is calculated for each discipline group by means of the following formula:

$$\text{Indirect Cost Rate} = \frac{\text{Total Type 5 Costs}}{\text{Total Type 3 + Type 4 Costs}} \times 100\%$$

Step 10: The Total Direct and Indirect Costs of the Primary Activities are Determined

- (a) Allocate cost types 1, 2 and 3 (see Step 9) directly to the appropriate primary activities.
- (b) Distribute type 4 direct costs to the three primary activities by means of the E.F.A.A.
- (c) Distribute the type 5 indirect costs by applying the indirect cost rate percentage (as calculated in Step 9) to the total of the type 3 and type 4 direct costs of each primary activity.
- (d) Total the direct and indirect costs of each primary activity.

## Summary of Allocations\*

<u>P.C.S. Category</u>	<u>Activity Centre Name</u>	<u>Suggested Allocation Basis</u>	<u>Alternate Allocation Basis</u>	<u>Centres Receiving Allocations</u>
4.4	Academic Computing Services	Usage by Department	-	Academic Departments
	Optional Procedure		Usage by Function	Academic Departments by primary centres, Instruction and Research.
4.3	Audio Visual Services	Usage by Department	-	Academic Departments
	Optional Procedure		Usage by Function	Academic Departments by primary centres, Instruction and Research
4.2	Museums and Galleries	Usage	F.T.E. Students	Academic Departments
4.1	Libraries	Actual Acquisitions	Other Usage Statistics	Academic Departments
3.0	Community Services	F.T.E. Students	Basic Departmental Cost	Community Service in Academic Departments
2.0	Research	Research Grants	-	Research in Academic Departments

\*Where more refined procedures are possible, allowing allocations to be made directly to primary activity centres, these are shown as an optional procedure.

## Summary of Allocations\*

<u>P.C.S. Category</u>	<u>Activity Centre Name</u>	<u>Suggested Allocation Basis</u>	<u>Alternate Allocation Basis</u>	<u>Centres Receiving Allocation</u>
6.1-6.4, 6.6, 6.7	Institutional Support	Basic Departmental Costs	-	All university budget units
6.5	Physical Plant Costs	N.A.S.F. by Department	-	All university budget units
	Optional Procedure		N.A.S.F. by Function	All university budget units, ultimately within academic departments, research and instruction.
5.0	Student Services	F.T.E. Students	Student Credit Hours	Primary activity centre, Instruction in Academic Departments.
4.9	Registrar and Admissions	F.T.E. Students	Student Credit Hours	Primary activity centre, Instruction <sup>1</sup> in Academic Departments.
4.7	Course & Curriculum	F.T.E. Students	Student Credit Hours	Primary activity centre, Instruction <sup>1</sup> in Academic Departments
4.6	Academic Administration	F.T.E. Students	Basic Departmental Costs	Academic Departments within Faculties
4.5	Auxiliary Services	Usage.	Basic Departmental Costs	Academic Departments

\*Where more refined procedures are possible, allowing allocations to be made directly to primary activity centres, these are shown as an optional procedure.

IMPLEMENTATION

The methodology was applied in a reasonably consistent manner at the detail level of departmental expenditures at five of the six participating universities. Some flexibility was allowed in the various allocation schemes to distribute support costs but, based on previous sensitivity studies at the University of Calgary and McMaster University the overall results of the study are not significantly affected by the variations. The participation of the University of British Columbia in July of 1978, at the latter stages of the initial implementation phase of the project, necessitated the agreement to a modified methodology. Having had the opportunity for review and discussion of "first run" implementations at the other participating universities, it was agreed that the U.B.C. data could be formulated on the basis of the discipline groupings, avoiding the necessity for detailed departmental breakdowns. Based on the analysis of the results to this date it would appear that the modified methodology did not materially affect the cost results and relationships and the exercise proved to be useful to show that the methodology can be applied at the aggregated level if more detailed results are not required.

As stated in the Introduction, the six participating universities do not represent a statistical sample of the Canadian universities and therefore the data is presented in this report in absolute terms with no attempt to identify the totals or variances as being indicative of results that may be obtained from the total university system. A review of the Financial Statistics of Universities and Colleges for 1976-77 shows that of the 70 member institutions of CAUBO, 31 member institutions reported sponsored research expenditures in excess of \$1 million. These 31 members represented 88% of the total operating expenditures and 97.6% of the sponsored research expenditures of the 70 member institutions.

These statistics are shown on Table 1, Page 39 and if the 31 member institutions are used as the population then the six participating institutions represent 19% of the number of members, 25% of the total operating expenditures and 26% of the sponsored research expenditures at the 31 universities.

For further information, Appendix "G" shows the breakdown of total operating expenditures and the sponsored research expenditure components of the 31 universities by region, and shows that the sponsored research percentage of total operating expenditures is 13.1% for the six participating universities and 12.6%

for the 31 universities. Appendix "H" shows a breakdown of sponsored research income by agency, as reported to CAUBO by the universities for the 1976-77 fiscal year.

Table 2, Page 40 , displays the total operating expenditures of the six participating universities, along with the sponsored research component, and identifies the total of the operating expenditures and the sponsored research component included in the Study. Table 2A, Page 41 shows the total of the operating expenditures of the six participating institutions and identifies the major components of the \$137,000,000 excluded from the Study. As noted in the Methodology, the values of the excluded items were determined after the support cost allocation process and therefore include both the direct and the indirect expenditures for the particular activity.

The empirical faculty activity analysis (E.F.A.A.) developed for this Study, and described in Appendix "E", was applied at the discipline group level on a consistent basis at each of the participating universities. As indicated in Appendix "E", at least three of the participating universities had previously developed faculty activity analyses that could have been applied to their results at a more detailed level; however, in the development of the methodology it was found necessary to use the E.F.A.A. for consistency of application and comparability of the results. The development of any faculty activity analysis contains considerable elements of subjectivity. If this methodology is to be applied on a wider basis there may have to be further studies of the faculty activity analysis and general agreements on the applicability to individual universities.

OPERATING EXPENDITURES<sup>(1)</sup>, SHOWING SPONSORED RESEARCH COMPONENT

TABLE 1

(expressed in thousands of dollars)

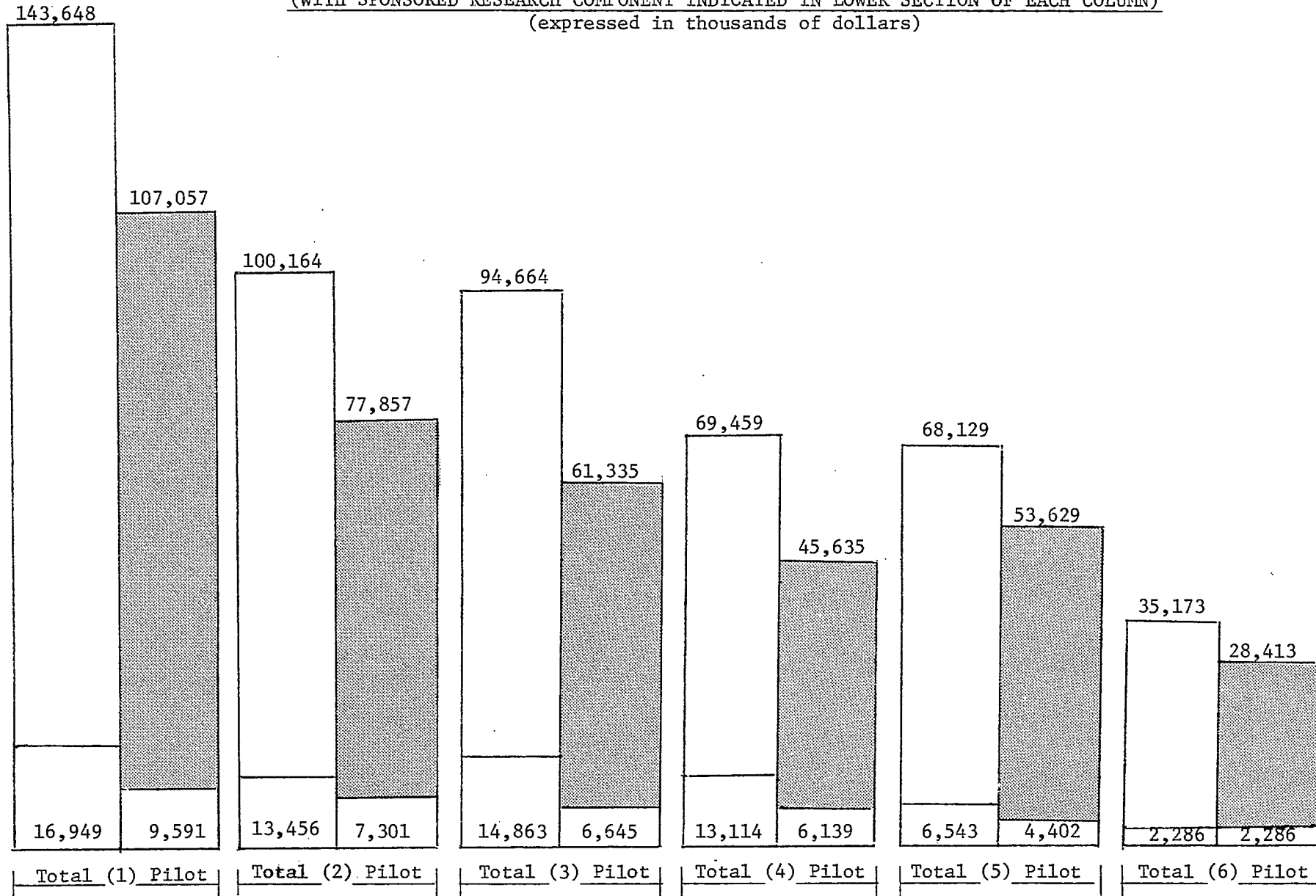
2,342,143		
Operating Expenditures <sup>(1)</sup> of the 70 member institutions of CAUBO.	2,068,601	
		Operating Expenditures <sup>(1)</sup> of the 31 member institutions having sponsored research in excess of \$1 million.
		511,237
Sponsored Research 266,347 (11.4%)	Sponsored Research 259,937 (12.6%)	Operating Expenditures <sup>(1)</sup> of the 6 participating institutions of the Pilot Study
		S.R. 67,211 (13.1%)

(1) Total operating expenditures, including sponsored research and excluding ancillary enterprises. Financial Statistics of Universities and Colleges, 1976-77; prepared by Statistics Canada for the Canadian Association of University Business Officers (CAUBO).

TOTAL OPERATING EXPENDITURES AND PILOT STUDY OPERATING  
EXPENDITURES (1) FOR EACH OF THE SIX PARTICIPATING INSTITUTIONS

TABLE 2

(WITH SPONSORED RESEARCH COMPONENT INDICATED IN LOWER SECTION OF EACH COLUMN)  
(expressed in thousands of dollars)



(1) Health Sciences and certain non-conforming expenditures excluded (See Table 2A).

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TOTAL OPERATING EXPENDITURES AND PILOT STUDY OPERATING  
EXPENDITURES OF THE SIX PARTICIPATING INSTITUTIONS, WITH  
SPONSORED RESEARCH COMPONENT INDICATED  
(expressed in thousands of dollars)

TABLE 2A

<u>Total</u> 511,237		
Operating Expenditures	<u>Pilot</u> 373,926	<u>EXCLUSIONS</u>
Operating Expenditures	Operating Expenditures	Health Sciences - Operating 72,924 - Sponsored Research 28,600 Total 101,524  Scholarships 8,278 Community Education 8,926 Research - General 3,890 Taxes and Special Grants 7,534 Other 7,159 Total Exclusions <u>137,311</u>
Sponsored Research 67,211 (13.1%)	Sponsored Research 36,372 (9.7%)	Operating Expenditures Total for Six Participating Institutions 511,237 Included in Cost Study <u>373,926</u>  Total Exclusions <u>137,311</u>



## RESULTS

In the following display of the results of this Study the four discipline groups and their total have been shown separately. In addition, in recognition of the similarity of research activity and funding sources for sponsored research among the first three groups, the Combined total of the discipline groups for education, humanities and social sciences, and business, administration and law has also been displayed.

To protect their individual identity, the participating institutions have been designated alphabetically, A through F. The designation was initially applied on a random basis but is used consistently throughout the display tables.

### Expenditures by Discipline Groups

Tables 3A through 3F show the total Pilot Study operating expenditures of the six participating universities (expressed in thousands of dollars), by Direct and by Indirect classifications, and by Primary Activity within discipline groups. The detail shown in the tables is in the same order as that used in the description of the Methodology, on Page 26 , and should enable the reader to cross-reference the results to the description.

The inclusion of these data affords an opportunity for a review of the components of the direct costs, a comparison of the dollar amounts allocated to each of the primary activities and to each of the discipline groups, and the opportunity for the development of ratios and relationships not illustrated in the balance of this report.

### Percentage of Total Expenditures by Primary Activities

Table 4 shows the percentage of total Pilot Study operating expenditures, both direct and indirect, allocated to each of the three primary activities of instruction, research and community and professional services, at each of the participating institutions. Also shown is the weighted average developed from the total of the expenditures at the participating institutions. There is a similarity among the participating institutions and this is occasioned in large measure by the utilization of the empirical faculty activity analysis in the distribution of the majority of the direct expenditures.

TOTAL PILOT STUDY EXPENDITURES OF THE SIX PARTICIPATING INSTITUTIONS:  
 BY PRIMARY ACTIVITY, WITH RESULTING PERCENTAGE OF  
 INDIRECT TO DIRECT EXPENDITURES SHOWN

(expressed in thousands of dollars)

GROUP #1

EDUCATION

Instruction

Special Instruction  
 Registrar & Student Services  
 Teaching Assistants  
 Faculty Salaries & Benefits  
 Staff Salaries & Benefits  
 Other Expenses

Direct	Indirect
1,500	204
	2,727
536	}
12,881	
2,156	
2,071	8,796
19,144	11,727

Total

61%

Research

Non-Sponsored Research  
 Sponsored Research  
 Non-Sponsored Research  
 Faculty Salaries & Benefits  
 Staff Salaries & Benefits  
 Other Expenses

Direct	Indirect
-	-
981	}
29	
2,859	
480	
461	2,357
4,810	2,357

Total

49%

Community & Professional Services

Community Services  
 Faculty Salaries & Benefits  
 Staff Salaries & Benefits  
 Other Expenses

Direct	Indirect
-	-
2,149	}
359	
345	
2,853	1,422

Total

50%

TOTAL

26,807	15,506
--------	--------

58%

TOTAL PILOT STUDY EXPENDITURES OF THE SIX PARTICIPATING INSTITUTIONS:  
 BY PRIMARY ACTIVITY, WITH RESULTING PERCENTAGE OF  
 INDIRECT TO DIRECT EXPENDITURES SHOWN

(expressed in thousands of dollars)

GROUP #2

HUMANITIES AND SOCIAL SCIENCES

<u>Instruction</u>	Direct	Indirect
Special Instruction	2,215	404
Registrar & Student Services	-	6,334
Teaching Assistants	3,716	} 27,543
Faculty Salaries & Benefits	36,997	
Staff Salaries & Benefits	3,710	
Other Expenses	2,596	
<u>Total</u>	49,234	34,281
		<u>70%</u>
<u>Research</u>	Direct	Indirect
Non-Sponsored Research	-	-
Sponsored Research	4,838	} 13,237
Non-Sponsored Research	926	
Faculty Salaries & Benefits	14,672	
Staff Salaries & Benefits	1,475	
Other Expenses	1,032	
<u>Total</u>	22,943	13,237
		<u>58%</u>
<u>Community &amp; Professional Services</u>	Direct	Indirect
Community Services	-	-
Faculty Salaries & Benefits	2,764	} 1,877
Staff Salaries & Benefits	272	
Other Expenses	191	
<u>Total</u>	3,227	1,877
		<u>58%</u>
<u>TOTAL</u>	75,404	49,395
		<u>66%</u>

TOTAL PILOT STUDY EXPENDITURES OF THE SIX PARTICIPATING INSTITUTIONS:  
 BY PRIMARY ACTIVITY, WITH RESULTING PERCENTAGE OF  
 INDIRECT TO DIRECT EXPENDITURES SHOWN

(expressed in thousands of dollars)

GROUP #3

BUSINESS, ADMINISTRATION AND LAW

Instruction

Special Instruction  
 Registrar and Student Services  
 Teaching Assistants  
 Faculty Salaries & Benefits  
 Staff Salaries & Benefits  
 Other Expenses

Direct	Indirect
234	46
-	1,820
293	} 6,856
8,494	
1,391	
794	
<u>11,206</u>	<u>8,722</u>

78%

Total

Research

Non-Sponsored Research  
 Sponsored Research  
 Non-Sponsored Research  
 Faculty Salaries & Benefits  
 Staff Salaries & Benefits  
 Other Expenses

Direct	Indirect
-	-
809	} 2,872
25	
3,039	
497	
284	
<u>4,654</u>	<u>2,872</u>

62%

Total

Community & Professional Services

Community Services  
 Faculty Salaries & Benefits  
 Staff Salaries & Benefits  
 Other Expenses

Direct	Indirect
-	-
601	} 469
99	
57	
<u>757</u>	<u>469</u>

62%

Total

TOTAL

<u>16,617</u>	<u>12,063</u>
---------------	---------------

73%

TOTAL PILOT STUDY EXPENDITURES OF THE SIX PARTICIPATING INSTITUTIONS:  
 BY PRIMARY ACTIVITY, WITH RESULTING PERCENTAGE OF  
 INDIRECT TO DIRECT EXPENDITURES SHOWN

(expressed in thousands of dollars)

COMBINED GROUP NOS. 1, 2 AND 3

Instruction

Special Instruction  
 Registrar & Student Services  
 Teaching Assistants  
 Faculty Salaries & Benefits  
 Staff Salaries & Benefits  
 Other Expenses

Direct	Indirect
3,949	654
-	10,881
4,545	} 43,195
58,372	
7,257	
5,461	
<u>79,584</u>	<u>54,730</u>

69%

Research

Non-Sponsored Research  
 Sponsored Research  
 Non-Sponsored Research  
 Faculty Salaries & Benefits  
 Staff Salaries & Benefits  
 Other Expenses

Direct	Indirect
-	-
6,628	} 18,466
980	
20,570	
2,452	
1,777	
<u>32,407</u>	<u>18,466</u>

57%

Community & Professional Services

Community Services  
 Faculty Salaries & Benefits  
 Staff Salaries & Benefits  
 Other Expenses

Direct	Indirect
-	-
5,514	} 3,768
730	
593	
<u>6,837</u>	<u>3,768</u>

55%

TOTAL

<u>118,828</u>	<u>76,964</u>
----------------	---------------

65%

TOTAL PILOT STUDY EXPENDITURES OF THE SIX PARTICIPATING INSTITUTIONS:  
 BY PRIMARY ACTIVITY, WITH RESULTING PERCENTAGE OF  
 INDIRECT TO DIRECT EXPENDITURES SHOWN

(expressed in thousands of dollars)

GROUP #4

PHYSICAL AND APPLIED SCIENCES

Instruction

Special Instruction  
 Registrar & Student Services  
 Teaching Assistants  
 Faculty Salaries & Benefits  
 Staff Salaries & Benefits  
 Other Expenses

Direct	Indirect
753	264
-	5,166
4,793	} 28,394
36,367	
11,577	
6,516	
<u>60,006</u>	<u>33,824</u>

56%

Research

Non-Sponsored Research  
 Sponsored Research  
 Non-Sponsored Research  
 Faculty Salaries & Benefits  
 Staff Salaries & Benefits  
 Other Expenses

Direct	Indirect
214	64
29,744	} 25,451
2,595	
14,262	
4,589	
2,576	
<u>53,980</u>	<u>25,515</u>

47%

Community & Professional Services

Community Services  
 Faculty Salaries & Benefits  
 Staff Salaries & Benefits  
 Other Expenses

Direct	Indirect
-	-
2,067	} 1,494
673	
377	
<u>3,117</u>	<u>1,494</u>

48%

TOTAL

<u>117,103</u>	<u>60,833</u>
----------------	---------------

52%

TOTAL PILOT STUDY EXPENDITURES OF THE SIX PARTICIPATING INSTITUTIONS:  
 BY PRIMARY ACTIVITY, WITH RESULTING PERCENTAGE OF  
 INDIRECT TO DIRECT EXPENDITURES SHOWN

(expressed in thousands of dollars)

TOTAL

GROUPS NOS. 1, 2, 3 AND 4

Instruction

Special Instruction  
 Registrar & Student Services  
 Teaching Assistants  
 Faculty Salaries & Benefits  
 Staff Salaries & Benefits  
 Other Expenses

Direct	Indirect
4,702	918
-	16,047
9,535	} 71,589
94,739	
18,834	
11,977	
139,787	88,554

63%

Research

Non-Sponsored Research  
 Sponsored Research  
 Non-Sponsored Research  
 Faculty Salaries & Benefits  
 Staff Salaries & Benefits  
 Other Expenses

Direct	Indirect
214	64
36,372	} 43,917
3,575	
34,832	
7,041	
4,353	
86,387	43,981

51%

Community & Professional Services

Community Services  
 Faculty Salaries & Benefits  
 Staff Salaries & Benefits  
 Other Expenses

Direct	Indirect
-	-
7,581	} 5,262
1,403	
970	
9,954	5,262

53%

TOTAL

236,128      137,797

58%

TABLE 4

PRIMARY ACTIVITIES OF INSTRUCTION, RESEARCH AND COMMUNITY AND PROFESSIONAL SERVICE AS A PERCENTAGE OF PILOT STUDY OPERATING EXPENDITURES: BY PARTICIPATING INSTITUTIONS AND THEIR TOTAL. THE SPONSORED RESEARCH PERCENTAGE OF THE TOTAL PILOT STUDY EXPENDITURES AND OF RESEARCH EXPENDITURES IS ALSO IDENTIFIED.

Primary Activities	PARTICIPATING INSTITUTIONS						Weighted Average(1) %
	A %	B %	C %	D %	E %	F %	
Instruction	63	59	60	59	63	63	61
Research	33	37	36	38	32	33	35
Community and Professional Service	4	4	4	3	5	4	4
	100	100	100	100	100	100	100

Sponsored Research  
as a Percentage of:

Total Pilot Study Expenditures	<u>9</u>	<u>9</u>	<u>11</u>	<u>13</u>	<u>8</u>	<u>8</u>	<u>10</u>
Research Expenditures	<u>27</u>	<u>24</u>	<u>31</u>	<u>34</u>	<u>25</u>	<u>24</u>	<u>29</u>

(1) Weighted on dollar volume of expenditures.



PRIMARY ACTIVITIES OF INSTRUCTION, RESEARCH, AND COMMUNITY AND PROFESSIONAL SERVICE AS A PERCENTAGE OF PILOT STUDY OPERATING EXPENDITURES BY DISCIPLINE GROUPS AND THEIR TOTAL. THE SPONSORED RESEARCH PERCENTAGE OF TOTAL PILOT STUDY EXPENDITURES AND OF RESEARCH EXPENDITURES IS ALSO IDENTIFIED.

|----- DISCIPLINE GROUPS (1) -----|

Primary Activities	1 %	2 %	3 %	Combined 1, 2 & 3 %	4 %	Weighted Average (2) %
Instruction	73	67	70	69	53	61
Research	17	29	26	26	45	35
Community and Professional Service	10	4	4	5	2	4
	100	100	100	100	100	100

Sponsored Research  
as a Percentage of:

Total Pilot Study Expenditures	<u>2</u>	<u>4</u>	<u>3</u>	<u>3</u>	<u>17</u>	<u>10</u>
Research Expenditures	<u>12</u>	<u>14</u>	<u>12</u>	<u>12</u>	<u>38</u>	<u>29</u>

(1) Discipline Groups

1. Education
2. Humanities and Social Sciences
3. Business, Administration and Law
4. Physical and Applied Sciences

(2) Weighted on dollar volume of expenditures.

Also shown are the sponsored research expenditures as a percentage of the total Pilot Study expenditures and of the research expenditures at each of the participating institutions, and their total. With the exception of University "B" there is also a correlation between the percentage of allocation to the Research activity and the proportion of sponsored research to the total Pilot Study expenditures. At University "B" there is obviously additional internal specific funding for research, as shown by the total percentage in the research activity, at 37%, and the sponsored research as only 24% of the research expenditures.

Table 5 shows the percentage of Pilot Study operating expenditures distributed to each of the primary activities, by discipline groups and the weighted average of the total. These results indicate a wide fluctuation among the groups, from a research activity of 17% in Group 1 to 45% in Group 4. These results are determined to a limited extent by the application of the empirical faculty activity analysis and to a greater degree by the inclusion of the sponsored research expenditures. Reference to Tables 3D and 3E show that sponsored research represents 5.6% of total direct expenditures for the combined groups Nos. 1, 2 and 3, and represents 25.4% of the total direct expenditures in Group 4. The percentages of sponsored research expenditures to the total Pilot Study expenditures and to the research expenditures, as also shown on Table 5, provide further substantiation of this differential.

#### Percentage of Indirect to Direct Expenditures

Table 6 shows the percentage of indirect to direct expenditures of the participating institutions, by primary activity and by institution total. Both the median and the weighted average, weighted on dollar volume of expenditures, are shown, with more credence being given to the weighted average as being a representative result for this Study.

A review of the six participating universities indicates significant differences in size, in geographic location, in mix of disciplines, in organizational structure, in budgeting methodologies, in centralized versus decentralized philosophy and in graduate and research programmes. Also, and of considerable importance, the pilot universities are situated in different funding jurisdictions and have varying levels of revenue from non-government sources. An examination of the expenditures of the six institutions, as reported in the annual Financial

TABLE 6

PERCENTAGE OF INDIRECT TO DIRECT EXPENDITURES OF  
THE PARTICIPATING INSTITUTIONS BY PRIMARY ACTIVITY  
AND INSTITUTION TOTAL.

PARTICIPATING INSTITUTION	INSTRUCTION	RESEARCH	COMMUNITY & PROFESSIONAL SERVICE	INST. TOTAL
	%	%	%	%
A	55	48	47	52
B	64	47	46	56
C	65	55	59	61
D	69	48	57	60
E	70	57	58	65
F	71	63	70	68
MEDIAN	67	52	58	61
WEIGHTED AVERAGE (1)	63	51	53	58
STANDARD DEVIATION (from weighted average)	+ 4	+ 3	+ 3	+ 3

(1) Weighted on dollar volume of expenditures.

Statistics of Universities and Colleges of CAUBO, indicates that there are significant differences in the reporting by funds and by function among the six universities, even though the reporting guidelines and definitions are being followed.

An analysis of the results indicates that there are some economies of scale and, where the research activity is more heavily funded there are lower indirect cost ratios because the base of direct costs is greater. The analysis of the results, and the correlation to the Financial Statistics of CAUBO confirm that the differences in the financial reporting from the centralized versus decentralized organizational structure, along with some economy of scale and relative size of sponsored research activity, accounts for the majority of the differences.

In light of the differences noted, and the range of institutions included in the Pilot Study, the results as shown on Table 6 indicate a reasonable cluster around the median and the weighted average. The calculation of one standard deviation from the weighted average also provides a relatively narrow range. The application of the methodology and the empirical faculty activity analysis, given the foregoing variety of circumstances, requires that the results be viewed as "gross measures of the costs of university research" and therefore indicative of the indirect to direct cost relationships, but not precise or definitive.

Table 7 shows the percentage of indirect to direct expenditures by primary activity and institution total, within the discipline groups. In each case the median, the weighted average and the standard deviation from the weighted average is shown and, as noted previously, the results of the Combined groups 1, 2 and 3 is included.

The wider range of results in Group 1 is partly attributable to the differences in treatment of the costs of Physical Education at the participating universities. The size and complexity of the Physical Education programme and some differences in the determinations of support cost allocations as between the educational activity and the general student services athletic activities has had some bearing on the results. The wider fluctuations among the institutions in Groups 1 and 3 are smoothed by the addition of Group 2 in the Combined table, with Group 2 representing 64% of the dollar value total of the Combined Groups 1, 2 and 3. In the overall dollar values of the Study the Combined Groups 1, 2 and 3 represent 52% and Group 4 represents 48%.

PERCENTAGE OF INDIRECT TO DIRECT EXPENDITURES  
OF THE PARTICIPATING INSTITUTIONS BY PRIMARY  
ACTIVITY AND INSTITUTION TOTAL WITHIN DISCIPLINE  
GROUPS.

GROUP (1)	INSTITUTION	INSTRUCTION	RESEARCH	COMMUNITY & PROFESSIONAL SERVICE	INSTIT. TOTAL
1  Education		%	%	%	%
	A	49	41	41	47
	B	57	36	36	50
	C	77	75	76	77
	D	81	68	67	77
	E	77	57	57	72
	F	70	72	72	71
	MEDIAN	74	63	62	72
WEIGHTED AVERAGE (2)	61	49	50	58	
STANDARD DEVIATION (from weighted average)	+ 5 - 5	+ 4 - 4	+ 4 - 4	+ 5 - 5	

GROUP	INSTITUTION	INSTRUCTION	RESEARCH	COMMUNITY & PROFESSIONAL SERVICE	INSTIT. TOTAL
2  Humanities and Social Sciences		%	%	%	%
	A	62	56	56	60
	B	73	54	54	66
	C	64	55	55	61
	D	77	60	61	71
	E	71	58	58	66
	F	85	88	88	85
	MEDIAN	72	57	57	66
WEIGHTED AVERAGE (2)	70	58	58	66	
STANDARD DEVIATION (from weighted average)	+ 4 - 4	+ 4 - 4	+ 3 - 3	+ 4 - 4	

GROUP	INSTITUTION	INSTRUCTION	RESEARCH	COMMUNITY & PROFESSIONAL SERVICE	INSTIT. TOTAL
3  Business, Administration and Law		%	%	%	%
	A	70	58	58	66
	B	80	55	55	71
	C	71	57	57	66
	D	84	70	69	79
	E	94	83	83	91
	F	90	81	80	87
	MEDIAN	82	64	63	75
WEIGHTED AVERAGE (2)	78	62	62	73	
STANDARD DEVIATION (from weighted average)	+ 7 - 7	+ 5 - 5	+ 5 - 5	+ 6 - 6	

PERCENTAGE OF INDIRECT TO DIRECT  
EXPENDITURES (continued)

TABLE 7

GROUP	INSTITUTION	INSTRUCTION	RESEARCH	COMMUNITY & PROFESSIONAL SERVICE	INSTIT. TOTAL
Combined 1, 2 and 3		%	%	%	%
	A	59	53	49	57
	B	71	52	47	63
	C	68	58	63	65
	D	78	61	63	73
	E	77	60	60	70
	F	81	84	79	81
	MEDIAN	74	59	61	68
	WEIGHTED AVERAGE (2)	69	57	55	65
	STANDARD DEVIATION (from weighted average)	+ 4 - 4	+ 4 - 4	+ 3 - 3	+ 4 - 4

GROUP	INSTITUTION	INSTRUCTION	RESEARCH	COMMUNITY & PROFESSIONAL SERVICE	INSTIT. TOTAL
4  Physical and Applied Sciences		%	%	%	%
	A	51	45	45	48
	B	54	43	43	48
	C	62	54	54	58
	D	55	41	43	47
	E	64	54	55	59
	F	62	55	55	59
	MEDIAN	59	50	50	53
	WEIGHTED AVERAGE (2)	56	47	48	52
	STANDARD DEVIATION (from weighted average)	+ 4 - 4	+ 3 - 3	+ 4 - 4	+ 3 - 3

(1) Discipline Groups. (See Appendix "E" for description.)

(2) Weighted on dollar volume of expenditures.

An examination of the results on Table 7 with the results on Table 6 confirms the manner in which the weighting of the discipline groups impacts upon the totals of the institutions, and their total. That is, whereas the total expenditures for Combined Groups 1, 2 and 3 and Group 4 are in the ratio of 52% to 48% and this results in a weighted average of 58% on Table 6, the Research activity is in the weighted dollar ratio of 39% to 61%, for Combined discipline Groups 1, 2 and 3 and Group 4 respectively and therefore it is not surprising to see the weighted average of 51% on Table 6 being closer to the weighted average for Group 4 on Table 7.

### Sensitivity

Comment has been made in this report regarding the effect that changes in the faculty activity analysis may have on the results. In developing the methodology particular note was taken of the need to separate the distribution of the indirect costs from the distribution of the direct costs through the E.F.A.A. (for reference see Methodology, Page 18 ). The indirect to direct ratio is relatively insensitive to changes in the E.F.A.A. and this is illustrated on Table 8. The weighted results of the Study produced an "average" E.F.A.A. of 69% for instruction, 25% for research and 6% for community services. On Table 8 two alternative E.F.A.A.s have been selected, with quite significantly different percentages from those produced by the Study. When the alternative E.F.A.A.s are applied to the total results of the six participating universities they produce virtually no change in the indirect/direct ratio. This illustrates that even if the E.F.A.A. varies by as much as  $\pm 10\%$  in the research activity, the methodology results in the same indirect to direct expenditure ratio.

Table 9, using the same alternative E.F.A.A.s as for Table 8, shows that the total expenditure allocation is sensitive to changes in the faculty activity analysis. This is understood because the methodology calls for the distribution of the direct expenditures based on the E.F.A.A. and shows that the total expenditure allocation to the primary activities varies directly with changes in the E.F.A.A.

SENSITIVITY OF CHANGES IN THE EMPIRICAL FACULTY  
ACTIVITY ANALYSIS (EFAA) ON TOTAL RESULTS OF THE  
PILOT STUDY.

- AS THE CHANGE AFFECTS THE:  
Indirect/Direct Ratio, by Primary Activity

	PRIMARY ACTIVITIES					
	INSTRUCTION		RESEARCH		COMMUNITY AND PROFESSIONAL SERVICES	
<u>Per Pilot Study</u>	<u>%</u>	<u>% Change</u>	<u>%</u>	<u>% Change</u>	<u>%</u>	<u>% Change</u>
E.F.A.A.	69		25		6	
Indirect/Direct Ratio	63		51		53	
<u>Revisions:</u>						
<u>. Alternative 1</u>						
E.F.A.A.	60	- 9	35	+10	5	- 1
Indirect/Direct Ratio	65	+ 2	51	-0-	53	-0-
<u>. Alternative 2</u>						
E.F.A.A.	74	+ 5	20	- 5	6	-0-
Indirect/Direct Ratio	63	-0-	51	-0-	53	-0-



SENSITIVITY OF CHANGES IN THE EMPIRICAL FACULTY  
ACTIVITY ANALYSIS (EFAA) ON TOTAL RESULTS OF THE  
PILOT STUDY.

— AS THE CHANGE AFFECTS THE:

Proportionate allocation of expenditures to each  
primary activity.

PRIMARY ACTIVITIES

	INSTRUCTION		RESEARCH		COMMUNITY AND PROFESSIONAL SERVICES	
	%	% Change	%	% Change	%	% Change
<u>Per Pilot Study</u>						
E.F.A.A.	69		25		6	
Percentage	61		35		4	
<u>Revisions</u>						
• <u>Alternative 1</u>						
E.F.A.A.	60	- 9	35	+ 10	5	- 1
Percentage	54	- 7	42	+ 7	4	-0-
• <u>Alternative 2</u>						
E.F.A.A.	74	+ 5	20	- 5	6	-0-
Percentage	65	+ 4	31	- 4	4	-0-

INDIRECT COSTS OF THE TOTAL DIRECT EXPENDITURES ON SPONSORED RESEARCH

The results of this Study have identified the percentage of indirect to direct expenditures of the research activity at the six participating institutions, based on the methodology as applied. From these data it can be seen that the indirect percentage to the direct expenditures on sponsored research is the same as for any other research activity. Sponsored research grants include as direct expenditures the costs of graduate research assistants, expendable supplies and expenses, travel, equipment, and within limits the charges for time allocation by technicians and secretarial staff. Excluded from the expenditures are a portion of faculty salaries and benefits representing a time allocation and a real cost of the sponsored research.

A secondary objective of this Study was to examine the possibility of identifying the total direct expenditures of sponsored research and, in relation to that total cost, calculate an indirect percentage that would recognize both the included ("allowable") and the excluded direct costs. The resulting percentage would not represent an indirect/direct ratio for sponsored research expenditures but rather a formula or proxy to recognize the additional indirect support for direct expenditures not normally funded within the sponsored research grant.

During the course of this Study several attempts were made to relate the allocation of faculty salaries to the dollar value or activity level of sponsored research, however, it was determined that such direct relationships did not necessarily exist and there is insufficient data available within this Study to develop such a formula or proxy ratio. It was noted that at three of the universities that submitted data for the empirical faculty activity analysis, there had been developed a percentage of faculty time allocation to the sponsored research activity. Although it was not possible to draw conclusive or comparative data from the three universities for use in the Study, the results were sufficiently "clustered" to provide the data used in the following analysis.

Using the data it may be assumed that a reasonable allocation of faculty time to sponsored research as a percentage of the average time spent on the total research activity is as follows:

Groups 1, 2 & 3	Education, Humanities and Social Sciences, Business and Law	From 20% to 30%
Group 4	Applied and Natural Sciences	From 60% to 75%

The percentages can be applied to estimate a ratio of indirect costs to the total direct expenditures on sponsored research, and the results used as a proxy or formula.

Table 10 shows the application of the percentages to the dollar values and the indirect/direct ratios taken from the total of the six participating universities. The resulting values, or "indirect costs attributable" are then given as a percentage of the actual sponsored research expenditures, i.e. those currently funded by external agencies.

Assuming that the percentages of faculty time are appropriate, the results on Table 10 are indicating that in the combined discipline groups 1, 2 and 3 a factor of approximately 100% would have to be added to the "allowed" sponsored research expenditures to provide for the indirect costs of those expenditures plus the indirect costs supporting the faculty time allocation. Note that the percentage does not include a factor for the faculty salary itself but only the indirect support costs over the faculty time allocation. Table 10 does include a dollar value for the total direct costs, including the allocation of faculty time, but the application of a percentage or ratio to the total dollars is inappropriate. The amount does, however, show the relationship between the current sponsored research expenditures and the total direct costs derived by application of the estimated percentages of faculty time.

Similarly in Group 4, the assumed percentage of faculty time produces an indirect cost factor of approximately 62%. Here it should be noted that the change in the final percentage is relatively insensitive to the change in the percentage of faculty time, because of the relative magnitude of the "allowed" sponsored research expenditures in this discipline group. The lower percentage is not an indication that the absolute cost of research in this discipline group is lower, nor can it be said that there is a greater or lesser degree of efficiency, but it does identify that where the sponsored research expenditures are greater the overall base is larger and therefore the indirect cost relationship is lower.

The results from Table 10 have been graphed on Table 10A and the relative insensitivity of the changes in percentage of faculty time for Group 4 is demonstrated. Extrapolation of the results beyond certain limits has not been assumed because the effect of the changes may not be linear.

Table 11 has been included to demonstrate the application of the faculty time assumption to the individual institutions and the standard deviation from the weighted average has been included as additional information.

The foregoing has not been substantiated in the methodology and the inclusion of the results at the individual institutions does not indicate that the representatives of the institutions concur with the results.

ESTIMATING A RATIO OF INDIRECT COSTS TO SPONSORED RESEARCH EXPENDITURES, INCLUDING A FACTOR FOR FACULTY SALARIES AND BENEFITS AS A DIRECT COST USING AS A BASIS AN ESTIMATE OF THE PERCENTAGE OF FACULTY RESEARCH TIME ALLOCATED TO SPONSORED RESEARCH.

(expressed in thousands of dollars)

<u>COMBINED GROUPS 1, 2 AND 3</u>	<u>Percentage of Faculty Research Time Allocated to Sponsored Research</u>		
	<u>20%</u>	<u>25%</u>	<u>30%</u>
Allocate from Total faculty salaries and benefits of 20,570 (Table 3D)	4,114	5,143	6,171
Add, sponsored research expenditures (Table 3D)	<u>6,628</u>	<u>6,628</u>	<u>6,628</u>
Total direct costs	10,742	11,771	12,799
Apply indirect ratio for research activity (Table 7)	57%	57%	57%
Indirect costs attributable	<u>6,123</u>	<u>6,709</u>	<u>7,295</u>
Total costs	<u>16,865</u>	<u>18,480</u>	<u>20,094</u>
Indirect costs as % of sponsored research	<u>92%</u>	<u>101%</u>	<u>110%</u>
 <u>GROUP 4</u>	 <u>Percentage of Faculty Research Time Allocated to Sponsored Research</u>		
	<u>60%</u>	<u>65%</u>	<u>75%</u>
Allocate from Total faculty salaries and benefits of 14,262 (Table 3E)	8,557	9,270	10,696
Add, sponsored research expenditures (Table 3E)	<u>29,744</u>	<u>29,744</u>	<u>29,744</u>
Total direct costs	38,301	39,014	40,440
Apply indirect ratio for research activity (Table 7)	47%	47%	47%
Indirect costs attributable	<u>18,001</u>	<u>18,336</u>	<u>19,007</u>
Total costs	<u>56,302</u>	<u>57,350</u>	<u>59,447</u>
Indirect costs as % of sponsored research	<u>61%</u>	<u>62%</u>	<u>64%</u>

FROM TABLE 10  
ESTIMATED RATIO OF INDIRECT COSTS TO SPONSORED RESEARCH EXPENDITURES, INCLUDING A FACTOR FOR FACULTY SALARIES AND BENEFITS AS A DIRECT COST.

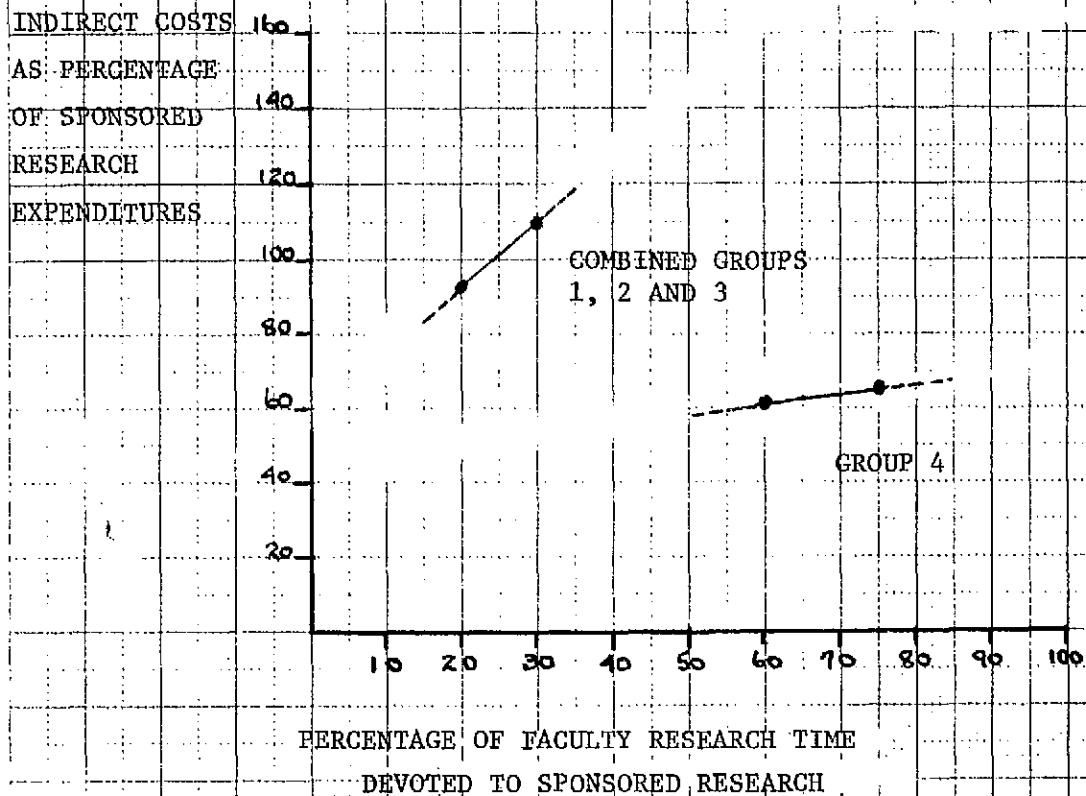
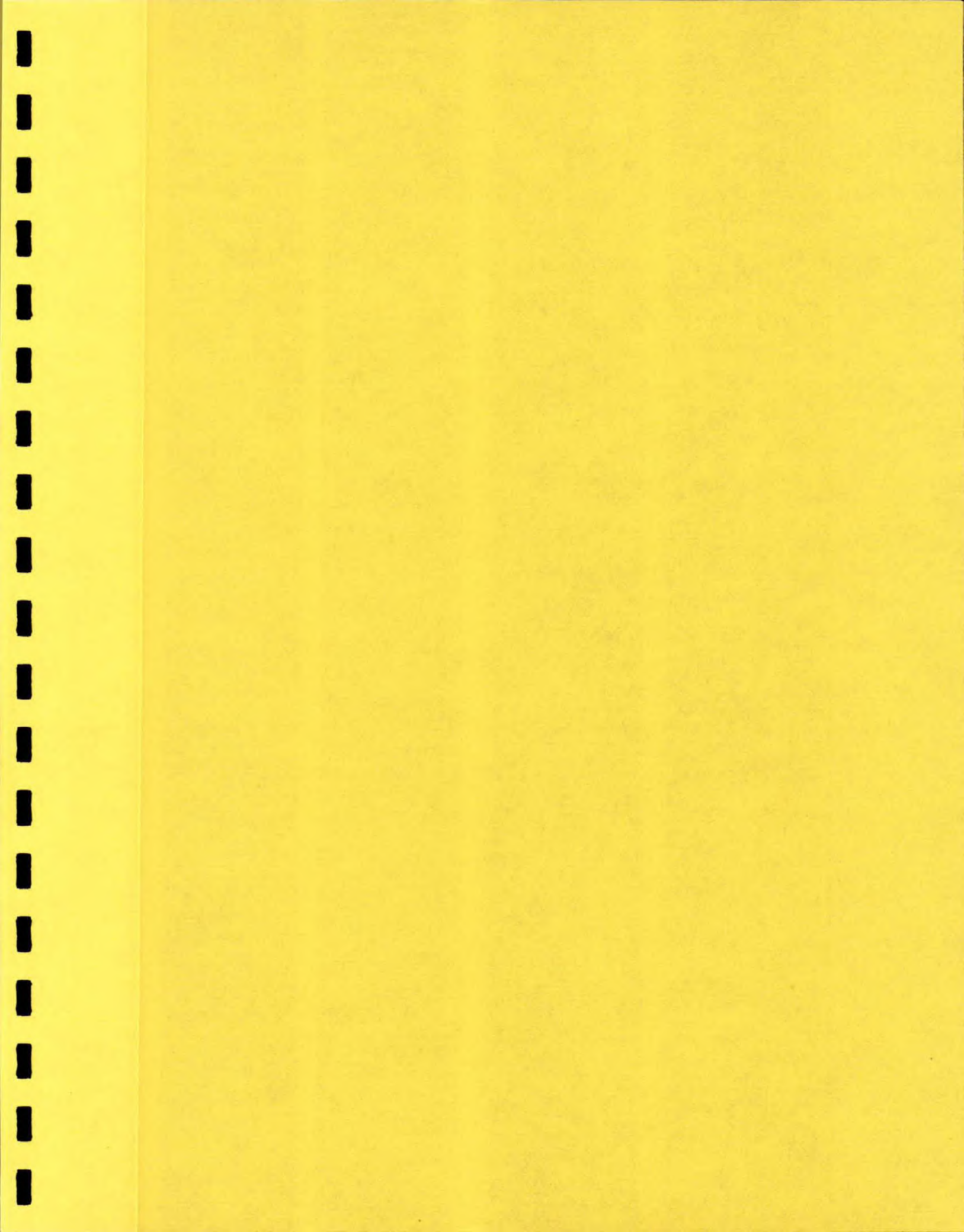


TABLE 11

RESULTS OF APPLYING ESTIMATES OF THE PERCENTAGE OF FACULTY RESEARCH TIME ALLOCATED TO SPONSORED RESEARCH, AND ESTIMATING A RATIO OF INDIRECT COSTS TO SPONSORED RESEARCH EXPENDITURES, INCLUDING A FACTOR FOR FACULTY SALARIES AND BENEFITS AS A DIRECT COST.

<u>Institution</u>	Combined Groups 1, 2 and 3 Faculty Time		Group 4 Faculty Time	
	<u>25%</u>	<u>30%</u>	<u>65%</u>	<u>75%</u>
A	103	113	60	62
B	75	80	58	60
C	116	128	70	72
D	97	104	49	50
E	149	167	71	74
F	242	274	76	79
Weighted Average	101	110	62	64
Standard deviation	+ - 8	+ - 8	+ - 4	+ - 4

NOTE: The above results were not provided by the participating universities and are included only to illustrate the range of results obtained by applying the estimates to the values derived in the Study.





PILOT STUDY ON COSTS OF UNIVERSITY RESEARCH

Members of the Steering Committee are as follows:

- |  |  |
|--|--|
| <p>* A. H. Headlam,<br/>Comptroller,<br/>University of Waterloo<br/>(CHAIRMAN)</p>   | <p>F. Aldrich,<br/>Dean of Graduate Studies,<br/>Memorial University of Newfoundland</p>   |
| <p>* E. K. Desrosiers,<br/>Director of Research<br/>Council of Ontario Universities</p>  | <p>A. M. Kristjanson,<br/>Director of National Programs,<br/>Association of Universities and<br/>Colleges of Canada</p>                  |
| <p>* K. Clements,<br/>Executive Director,<br/>Canadian Association of University<br/>Business Officers</p>   | <p>T. G. Falconer,<br/>Director of Finance,<br/>University of Manitoba</p>   |
| <p>W. H. M. Selby,<br/>Vice-President, Administration,<br/>Memorial University of Newfoundland<br/>(President, Canadian Association of<br/>University Business Officers)<br/>(EX OFFICIO)</p>    | <p>F. Sanfacon,<br/>Directeur des finances,<br/>Universite du Quebec</p>   |
| <p>J. McCarthy,<br/>Assistant Vice-Rector (Admin.),<br/>University of Ottawa<br/>(President, Canadian Association of<br/>University Business Officers - from<br/>July 1978)<br/>(EX OFFICIO)</p> | <p>B. Stevenson,<br/>National Programs Officer,<br/>Association of Universities and<br/>Colleges of Canada<br/>(RECORDING SECRETARY)</p> |
| <p>T. Wildi,<br/>Adjoint au Vice-Recteur a l'enseignement et<br/>a la recherche,<br/>Universite Laval</p>  |  |
| <p>* Project Resource Group</p>  |  |

PILOT STUDY ON THE COSTS OF UNIVERSITY RESEARCH

Members of the Technical Advisory Group are as follows:

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A CHRONOLOGY OF THE THREADS OF THE STUDY  
OF THE COSTS OF UNIVERSITY RESEARCH  
(Bernard S. Sheehan)

It is difficult to know where to start the story of the various enquiries into the question of the costs of university research in Canada. The roots of the current study can be traced far back through the history of Canadian university education. Its genealogy is hard to separate from that of the discussion in the 1977-78 session of Parliament on Canada's science policy and the proportion of GNP assigned to research, how this ranks with the proportion in other countries, what this foretells for our economy and why we find ourselves in this position.

BLADEN COMMISSION REPORT

Since we are concerned with university aspects of research it is perhaps appropriate to begin the chronology with the Bladen Commission Report prepared for AUCC. The Bladen Report made universities and the public aware of the universities' rapidly increasing need for more federal and provincial monies and hence the report marks the awakening of government's perception of these as *public* institutions. While the Commission is remembered for its advice in respect of operating and capital grants it did make several recommendations that might have been of significance to university research. These include:

That the federal responsibility for financing research be recognized by a great increase in the grants for research to the universities, to their staff members and to their research students. . . .

That all Federal Government research grants to universities . . . should carry with them a 30 per cent supplement as an unconditional grant to the university.

That a general sustaining grant for research be paid to every university . . . that this grant be 10 per cent of the aggregate salaries of the full-time academic staff.

The Bladen Commission, without criticizing the Dominion Bureau of Statistics or the Canadian Association of University Business Officers, called for improvement in the quality of statistical information:

That the Dominion Bureau of Statistics be supported in its efforts to improve the statistical information on university and student finance available to policy makers.

The research related recommendations of the Bladen Commission did not fare much better than most of the rest which all assumed an expanding direct role of the federal government in postsecondary education. The Commission recommended immediate increases in research grants for 1966-67 and a commitment for 20% per year escalation thereafter. The recommended 30% supplement was justified not only on the basis of the indirect costs of research, but on the grounds that the federal government's responsibility extends to the payment of the portion of the faculty members' salaries since federal grants to researchers do not allow for these costs. A recent statement by the Science Council of Canada, perhaps puts these recommendations in perspective "Unfortunately, federal funding for R & D, expressed in deflated dollars per capita of the total labour force, will in 1978-79 be less than it was in 1963-64."

#### MACDONALD REPORT

Early in 1967, the Science Council commissioned a study to examine and make recommendations on the level, sources and conditions of financial support for research in universities. The Macdonald Report recommended that "The indirect cost allowance payable by the federal research council over and above the direct research support be 35 per cent of the direct research support given to each university."

Macdonald arrived at this recommendation relying on information from the AUCC Cost Studies. The 35 per cent figure was based on a reasonably elementary separation of university costs into direct and indirect. The procedure did not involve any allocation of non-basic salary programs to teaching and research since the Macdonald study group took the view that

the full cost of all academic salaries should be paid to the universities. They concluded this aspect of their work by saying that while the 35 per cent for indirect costs associated with university grants is rough it is realistic but not accurate. "It does not appear to be possible to achieve better estimates at the present time. Hence our suggestion above that the universities go beyond the AUCC Cost Studies and establish accounting procedures suitable for the estimation of the indirect costs to be associated with research grants. . . ."

AUCC COST STUDY

The AUCC Cost Study Report apologetically reviewed the study of the costs of university programs in Canada in 1966-67. The Cost Study Report did not appear until a year after the Macdonald Report and lacked sufficient statistical detail to allow analysis of what indirect research costs might be. However, the report has the following interesting paragraph:

The subordinate problem; - whether the universities subsidize research by providing administrative and other overhead facilities to assisted research projects or whether, on the other hand, research grants subsidize instruction by providing equipment and operating funds without which graduate instruction could not be carried on, will also, presumably, be resolved by the kind of detailed analysis of actual relationships which is proposed here. It may turn out, when all the facts are in, that the arrangements are so varied and the relationships so variable that there is no solution except a form of detailed cost accounting for each project. Such a system (which would involve charging the research project for all the university facilities which it used or benefited from and charging the university, in turn, with all the costs relating to the use of the project facilities by staff and graduate students) might at last clear the air to the point where the allocation of the net cost to the educational programme, if any, could be properly determined and attributed. Even if the actual relationships could not be deduced from the facts revealed by such calculations, the existence of accurate figures of this kind could provide the data needed for a statistical analysis of the relationships or at the least for the application of arbitrary estimates of the relative benefits derived.



HURTUBISE, ROWAT REPORT

The Canadian Association of University Teachers and AUCC appointed Professors Hurtubise and Rowat as a commission to study the relationships of universities and governments in Canada. This study covered the part played, or to be played, by provincial governments as well as the federal government in support of university research, but the Hurtubise-Rowat Report did not explore the impact of research activities on the universities themselves nor our specific concern on the question of indirect costs. They recommended that:

. . . before giving support to a large project costing more than a specific amount, federal agencies, including the research councils, should obtain the approval of the appropriate provincial Committee on University Research. Furthermore, since federal support for university research involves such heavy indirect operating and capital costs to the universities and the provinces, representatives of the federal and provincial governments and of the universities should agree on a method of calculating and paying for these costs. If the federal government is to pay the full costs it should do so in a way that will not interfere with the development priorities of the universities and the provinces. For example, it should not pay the salaries of academic staff as part of the grant for a specific project.

BONNEAU, CORRY REPORT

In 1971, the Board of Directors of the Association of Universities and Colleges of Canada formed a commission to study, report and make recommendations on the mechanisms, structures and processes required to ensure that research undertakings in the universities of Canada can be planned to serve, without undue duplication, both the advancement of knowledge, and provincial, regional and national development. The Report of the Commission to Study the Rationalisation of University Research, was seen by its authors as complementing the other studies completed or underway around the same time on the general question of research in Canada. Besides the Macdonald Report, these included The Study of the Organisation for Economic Cooperation and Development, which was a review of national science policy in Canada covering research in the physical and life sciences,

also the Special Committee of the Senate on Science Policy which was assigned in 1967 to consider "the science policy of the Federal government", dealt with the natural and social sciences but not humanities.

The Bonneau-Corry Report drew a distinction between reflective enquiry as "vital for all good teaching at all levels because the breadth of its sweeps enlarges the vision and stimulates the mind" and frontier research which is "not in itself a vital direct service to teaching at all levels." They conclude "so the distinction helps to sort out the responsibilities for, and the financing of research and teaching within the university itself. It also helps to sort out the roles appropriate to the federal and provincial governments in their financial support of university work." The Commission recommended, not very convincingly

. . . that the federal granting agencies make payments to universities designed to cover the indirect costs of research they sponsor, including salaries that, failing a federal-provincial agreement on an alternate figure, these be set at 45 per cent of the amount of each grant, and paid as contributions to the general revenues of the universities. Additional sums to cover these amounts should be added by the federal government to the annual votes of funds for the three funding agencies.<sup>11</sup>

#### PEITCHINIS REPORT

The Peitchinis Study , had as one of its topics the question of federal government support of university research and graduate students. One of the extensive background studies prepared for the Peitchinis Report presented considerable original data on federal funding of university research. The need for an independent, data gathering effort is consistent with another theme that has been repeated by many national studies, that is, the desirability to improve statistical information available to policy makers. In a later paper, Sheehan discusses the three related questions of direct and indirect costs of university research, university research as an embedded activity and the problem of relating university activity costs to incomes received from specific sources. These are reviewed as "general issues" in the next section.

Peitchinis treats the problem of indirect costs in some length. He recalls the 1953 National Conference of Canadian Universities at which A. M. Parent of Laval University said that research grants from governments or from industry instead of helping the universities balance budgets, proved, most of the time, to be an additional financial burden. Parent went on to suggest that university administrators should make it clear to governments and industry that at least the grants offered for applied research should not become a financial and administrative burden to the universities but should enable them to maintain the necessary standards in the basic disciplines.

Peitchinis recognized the problem of continuing costs and recommended that the provinces not assume the burden of research initiated and supported by external funding agencies, unless they were parties to the contract establishing the programs. On a related question, Peitchinis notes that the existing organizational structure under which scientific and cultural development is being assisted, is chaotic. His solution is a Commission for Social, Cultural and Scientific Development with the existing federal Councils being absorbed into the Commission and constituted into evaluative committees.

Peitchinis opines that the actual indirect costs of research may exceed substantially the identified indirect costs. He says that costs have escalated in part because of the influence of research on the composition of the student body, on the composition of programs, on student-staff ratios and teaching loads. Peitchinis recommends that research which is directly related to the instructional process and the training of specialized manpower, should be financed through the institutions, and that which is not, should be financed directly. Research not directly related to the instructional process should be carried out for the most part in research institutes.



SPECIAL COMMITTEE OF THE SENATE ON SCIENCE POLICY

Over the past decade, the Government of Canada has shown a continuing interest in evolving a science policy for the nation. The work of the Special Committee of the Senate on Science Policy is important in the current context because ultimately, the universities will be instruments in the implementation of any policy and the question of costs will thereby be raised. The Committee produced four reports. The first volume reviewed the historical evolution of Canadian science policy, the national science effort compared to other countries', and the evidence received from public hearings and briefs. The second volume described the targets and strategies needed for strengthening Canadian innovation in science and technology, while the third volume set out the government organization that would be needed for formulating and implementing a coherent national science policy.

In the fourth volume, the period between early 1972, when the Committee began to present its comprehensive recommendations, and late 1975, when it initiated its second enquiry, are referred to as the "wasted years for science policy." The Committee goes on to note that there has been a recent take-off in respect of consideration and implementation of its recommendations. It notes, in evidence of this, that MOSST seems to be getting a more important role in the science budget formulation, and that the granting function is split away from the National Research Council by organizational changes which include the establishment of the Natural Sciences and Engineering Research Council and the Social Sciences and Humanities Research Council. As further evidence the Committee cites the setting up of a special committee by the Science Council to propose solutions to the undesirable consequences of the immobility of university researchers as a result of the aging of faculty members, that the government decided that the make-or-buy principle should be extended to all intramural scientific activities, and that the Department of Industry, Trade and Commerce is taking a more integrated and comprehensive approach to grants for R & D activities in industry.

The Committee noted that although the take-off stage has been reached, the job to be done, even in the immediate future, is far from finished.

With respect to the Ministry of State for Science and Technology, the Committee noted that budgets ought to get to MOSST sooner for analysis. The Ministry needs a period of stability for this and for getting on with two important studies; one on the mobility of scientific personnel in the Public Service, and another on current intramural scientific programs. It will have to provide leadership for the Inter-Council Coordinating Committee and for the Canadian Committee on Financing University Research. MOSST has not done much concrete work to prepare a plan. A coherent science policy seems inconceivable without a plan and targets indicating, at least in general terms, the directions that Canadian science efforts should follow. The Committee says it regards targets as ". . . the quantitative expressions of objectives: they do not necessarily have to be reached but they are useful guides for action and concrete criteria of performance."

The Committee said that the public climate for private innovation needs to be nurtured. Government action ought to be coordinated and monitored so that R & D encouragement is not inadvertently weakened by other government action. Public support to the private sector should encourage innovation, especially in existing small/medium-sized firms. Government reorganization should continue in order to maintain viability and flexibility to consolidate remaining programs. The NRC should be transformed into a national academy where intramural basic research and long-term applied research would be concentrated, and the industrial mission of ITC ought to be further developed and strengthened. The Committee concluded that there ought to be future involvement of parliamentarians with science policy and the House of Commons ought to have a committee on science policy.

The Committee noted that:

The emerging crisis of the research effort in the university sector is caused mainly by inadequate public support and the immobility of researchers. The extension of the make-or-buy policy will mean that more funds out of the existing science budget will be available to universities. However, such transfers will be inadequate to surmount the crisis. We believe that research in universities corresponds to a basic long-term

national requirement that should not be submitted to short-term austerity considerations. The science budget devoted to this purpose should be increased regularly in the future, at least, enough to take the inflation and sophistication factors into account. But even under these ideal conditions, financial resources will always be relatively scarce. Universities and the granting councils will have to develop strategies designed to increase the mobility of researchers in the academic sector and give greater opportunities to young and promising scientists to pursue a research career.

In the above connection, the Committee also noted:

If Canada is threatened with the loss of a new generation of scientists and is left with aging researchers, this must be a source of serious concern to all Canadians, the government especially. We hope that the group established by the Science Council in May 1976 will soon be able to identify the real dimensions of this crisis and make proposals to overcome it. We expect that the Canadian Committee on Financing University Research set up by the Minister of State for Science and Technology in November 1976 will also help correct the situation. . . .

In its earlier recommendations, the Senate Special Committee recommended that government support for basic research in universities should cover indirect as well as direct costs, on the grounds that much of this activity met an obligation on Canada's part to contribute to the international pool of free knowledge. The Committee's Final Report continues:

The implementation of that proposal would certainly have helped universities. MOSST indicated in December 1975 that this specific issue and other problems associated with the government-university interface had been thoroughly investigated with university authorities and officials of the granting councils. There was no indication, however, that any decisions had been reached. We hope that the recently created Canadian Committee on the Financing of University Research will soon help to accelerate the process.

The Committee's main recommendations regarding future public support of the university sector are as follows:

The budget of the granting councils should increase by 12 per cent annually during the next five years as it did in the fiscal year 1977-78 to compensate for inflation and to support a greater research effort in the university sector.

R & D grants to universities should include the indirect cost of projects.

The extended make-or-buy policy, especially in the area of basic and applied research, should apply to the university sector as quickly as possible. NRC should be transformed into a multi-purpose national academy where most of the government intramural basic research and long-term applied research activities would be concentrated.

Although not a recommendation, the Committee noted ". . . universities should encourage their older researchers to increase their teaching load, thus leaving more opportunities for younger scientists to begin a research career. We are confident that such an overall program could prevent the crisis that is threatening the research performance of the university sector."

#### OECD REVIEW 'CANADA'

The most recent OECD study on Canadian education does not deal in much length with university research. It does suggest that there is advantage from direct contacts between the university and the relevant federal authorities with respect to the financing of university research.

. . . Other ways of transacting business are too complicated and time-wasting, and in questions of research financing the granting agencies need to have special technical expertise. The attention now being given by the federal authorities to strengthening the financial support given to the humanities and the social sciences (until now somewhat neglected) meets with the Examiners' emphatic approval.

#### MOSST DISCUSSION PAPER

On June 1, 1978 the Minister of State for Science and Technology released a discussion paper "Research and Development in Canada." It contained measures to stimulate industrial research in Canada, to create jobs for scientists, engineers and technicians, and to provide additional support for university research. In announcing this new national priority for research and development, the Minister stressed that government would strengthen industrial research efforts through the tax incentives already announced, through direct assistance, through change in government

procurement policies, by encouraging Canadians to take advantage of the results of research conducted by university and government scientists, and through close consultation and collaboration with the provinces. Included among the measures announced were:

- a national target for research and development expenditure of 1.5% of the gross domestic product by 1983
- a three million dollar program under Canada Works to create jobs for scientific and technical personnel to undertake research projects in universities at the request of Canadian firms
- expansion by \$350 000 of the NRC's technical information service for small businesses through the employment of senior students in science and engineering for the establishment, over the next two years of up to five regional university-based industrial research and innovation centres (IRIC), for two million dollars being available this year
- creation of centres of excellence on a regional basis to achieve better integration of government, university and industrial research capacity that will be based on the natural and human resources of that area
- an increase of ten million dollars this year in the budget for the granting councils for university research in areas of national concern.

TASK FORCE ON UNIVERSITY RESEARCH

In 1972, a joint Task Force of the Council of Ministers of Education, Canada, and the Government of Canada as represented by the Ministry of State for Science and Technology (MOSST), the Department of Secretary of State and the Federal/Provincial Relations Office commissioned a study group on the costs of university research. The terms of reference of the study group are as follows:

- (1) Identify and discuss possible principles affecting the definitions and determination of the costs of research. Samples of these principles are: the extent to which precise accounting of costs versus administratively simpler methods are to be used; and the degree of standardization of calculating costs among universities.
- (2) Identify and define the primary operations of a university to which all costs may be allocated.

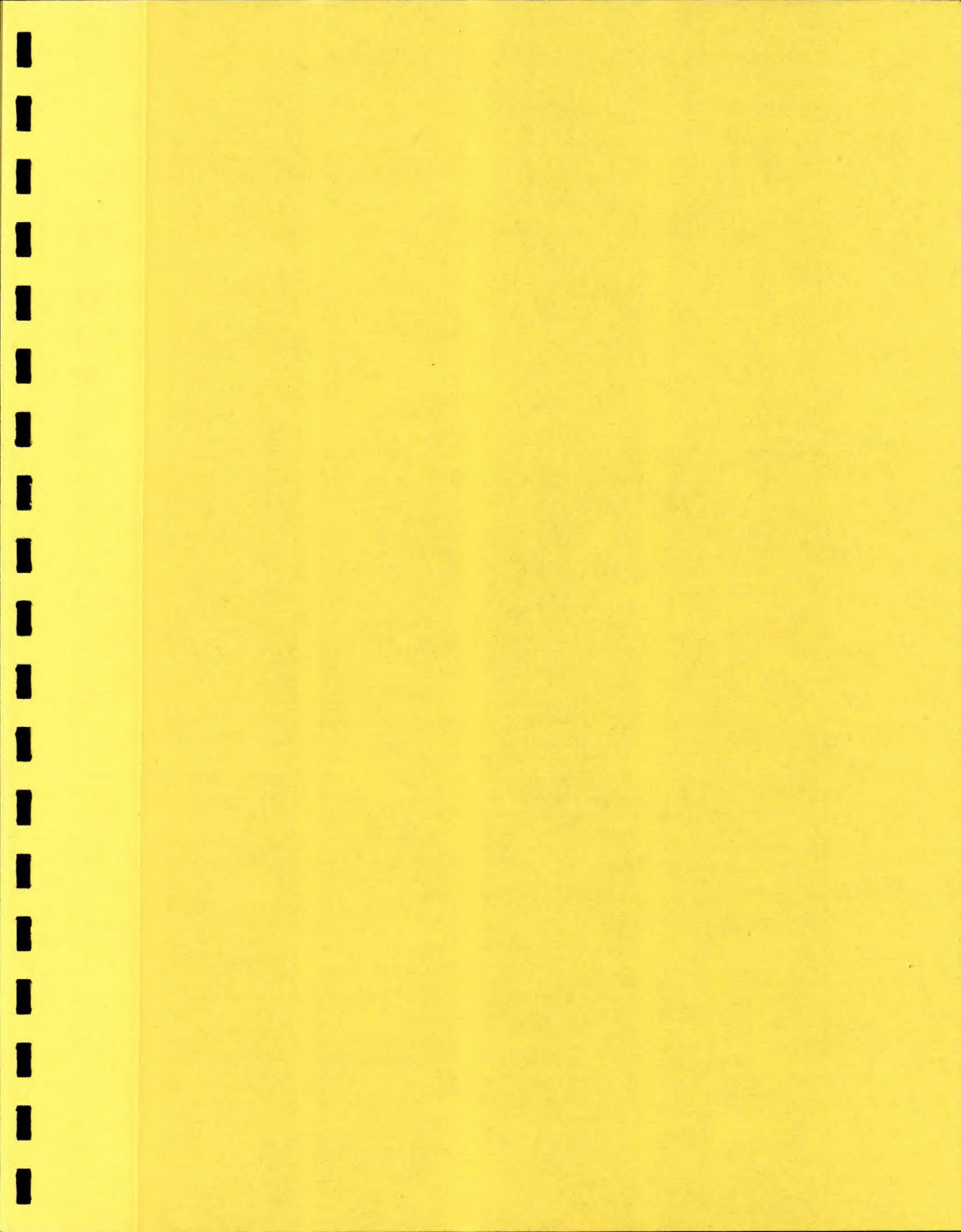
- (3) Identify the time period over which costs may be calculated. The fiscal years of universities, provincial governments and the federal government may all differ.
- (4) Identify and define expenditures within a university that may be considered direct costs of research.
- (5) Identify and define expenditures within a university that may be considered indirect costs.
- (6) Establish methods of assigning direct costs to the primary operation of the university.

The 1974 report of the study group contains a fairly good state-of-the-art review of analytical approaches to determining the costs of university research. The study group made eleven recommendations. The study group further suggested to the Task Force on University Research that ways be found to create incentives for university participation in the proposed cost studies. These might include government funding of startup costs which could be as much as \$50,000 per university.

One of the recommendations for further action in the original Study Group Report was:

If it is decided to implement the report, an Implementation Group should be created composed of representatives from the Task Force, AUCC, CAUBO, Statistics Canada and DSS that will be charged with the development of procedures and the implementation of the cost study. The study should be conducted by CAUBO together with Statistics Canada.

In April, 1975 the AUCC Committee of Executive Heads approved a motion that, ". . . CAUBO be authorized to proceed in co-operation with the Task Force towards an extension of aggregated financial statistics on a national basis".



REVIEW OF CERTAIN GENERAL ISSUES ON UNIVERSITY

RESEARCH COSTS, ACTIVITIES AND FUNDING

(Excerpted from: Bernard S. Sheehan, The University of Calgary, Internal Report on the Pilot Study on the Costs of University Research; with additional comment by E. K. Desrosiers).

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The segregation of direct and indirect costs of university research does not seem to be based on universal rules and often the distinction depends upon the institution's internal accounting practice. Usually items such as salaries, supplies, equipment and travel are considered direct costs while costs connected with space, administration and university services provided to the research project are indirect. Universities which have a fee for use of a computer, for example, are likely to bill a project for computer time and classify the cost as direct, whereas institutions which do not have a fee-for-service system are more likely to lump this cost into overhead. The use across Canada over a number of years of CAUBO/Statistics Canada reports has improved the uniformity of reporting practice.

Governments could argue that they should not pay indirect costs on the grounds that if universities provide these funds from general revenue, costs would be held to a minimum. Similarly, university researchers may argue that indirect costs should not be paid so that the amount going "directly" into research is maximized. Arguments for payment of indirect research costs include the notion that funds received for indirect costs provide the university administration flexibility. Overhead charges must otherwise be siphoned off general university funds which could be allocated to other activities. In a strictly program sense, if basic university research expedites important national or provincial goals, then it should be fully funded.

This raises the problem of institutional distortion caused by external research funds. If governments pay all costs of sponsored research, the university will not have to divert funds from other institutional activities. Hence, if overhead costs of scientific research are the more expensive, then funds currently used for the overhead of scientific research could be redistributed; this would tend to lessen distortion among disciplines. On the other hand, the traditional checks and balances which allow the university to determine its own internal growth patterns might be weakened if agencies paid indirect costs. Since more money is available for research in scientific or professional faculties than for other research activities, science and professional departments can be built up more "cheaply", in terms of university funds, than other departments.



Under the current policy, most federal grants do not allow stipends to the principal investigator and most accounting procedures consider salaries as direct costs. The arguments for and against this policy are similar to those advanced with respect to federal payment of indirect costs. Beyond these arguments is the effect external contributions to the salary of the principal investigator could have on academic freedom and on the institution's internal integrity and autonomy. If a federal agency paid a salary to the grantee, the professor may become dependent on the agency and relatively independent of the institution; and, consequently, the internal organization of the university may be weakened. This view may not be shared by all professors, especially those capable of commanding considerable outside support. Finally, there are the arguments that the overhead payment ought to depend on the nature of the project and the institution. A flat rate would hurt some institutions; and, if it were to be applied to all funding agencies, could lessen the effectiveness of some agencies because they vary considerably in purpose, available funds, and academic interests.

The notion of university research as an embedded activity is now a familiar one. Nonetheless, the separation of research activities from other professorial activities is essential to costing. The availability of suitable faculty activity analysis information will prove to be the major limitation of this study as it has been with other Canadian attempts in this direction.

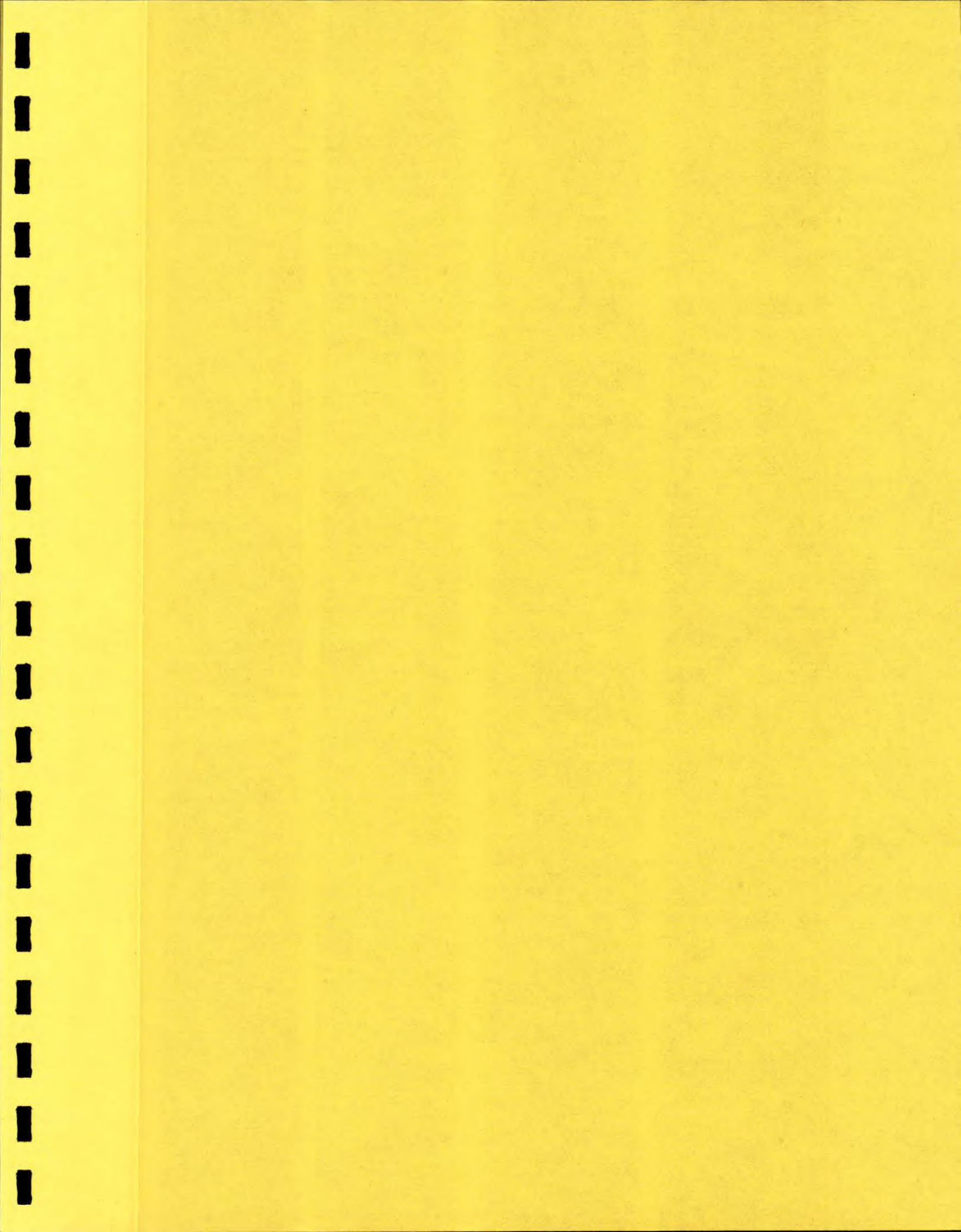
The third notion, that of the relationship of university activity costs to incomes from specific sources, is important also. It is an umbrella concept which forces consideration of a number of questions which impinge on our current topic of the costs of university research. One of the purposes of determining costs is to get a basis for setting prices. In the case of our current study, it is the price of overhead of university research which ought to be charged various clients. The "price" to clients may differ if, for example, these clients provide income to the university which would contribute to the overhead costs of university research. Also, there is an implication that total costing is essential. That is, all costs, all incomes, all outcomes must be related and accounted for. Thus, job pricing methods which may be excellent in an operational sense would have to be developed out of a complete cost study which produces the unit costs needed. This would challenge any procedure which attempted to define research costs as "incremental". At the very least it would suggest the need for explicit statements of the assumptions on which any

incremental procedures would be built. A final idea that is suggested is whether the way universities receive income, including sources and purposes really influence institutional activities very directly. Specifically, how sensitive is the relationship between instruction, research and public service activities to the amount of sponsored research dollars, to the sources of sponsored research dollars and to the "string" on sponsored research dollars?

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The determination of an appropriate level of support for research activity at our universities is at present complicated by a general desire to increase the level of research activity at a time when demographic evidence would suggest that teaching activity is likely to decline through much of the rest of the present century. As has been noted, teaching and research activities in Canadian universities are intertwined. During the last two decades, despite independently developed responses to the challenges for increased activity in both sectors, the volume of support to teaching and research has grown in almost locked step. Direct expenditure on sponsored research represented 12% of total university operating expenditure in 1957-58; the same figure applies to the pattern of expenditure in 1977-78. Clearly, greater understanding of the relationship between teaching and research costs is required if the general goal of increased research activity is to be addressed at a time when declining enrolment and financial constraint are combining to enforce a compression of our university system.

With regard to the basic question of financing, we face the dilemma of discussing cost sharing, again in the absence of any hard information about who pays what now. In theory, the issue is not of primary concern to university researchers - at least, not so long as federal and provincial research policy and funding patterns remain in basic agreement. The issue is obviously of practical concern, however, when policies and practices at these two levels diverge. Given that universities serve provincial, national, and international objectives with human resources for whom the teaching and research functions are often viewed as one and the same, such divergence is likely to produce inner tensions within our university institutions which will prove detrimental to both functions. Clearly then, we require greater insight into the existing sharing of the resource burden not only to understand the extent of the respective shares but also the essential character of what each share pays for.



EMPIRICAL FACULTY ACTIVITY ANALYSIS

1. NOTE

This section is a brief overview statement on the need for a faculty activity analysis (F.A.A.) as a key concept in the cost study methodology, and the development of an empirical FAA from previous Canadian studies.

The development of the empirical FAA was carried out as a separate exercise by the consultant, and involved seven Canadian universities with previous experience with the FAA topic, in the last decade. The survey was conducted during the summer months while the six pilot universities were gathering data for the cost allocations. The empirical FAA for each Discipline Group was then used to distribute costs, with each university using identical profiles.

2. NEED FOR FACULTY ACTIVITY ANALYSIS (FAA)

According to the project methodology, all direct costs (salaries, supplies, travel, equipment, etc.) of the appropriate teaching units are eventually aggregated to the level of a discipline group. If some specific and separable costs can be identified on behalf of a specific primary activity, then such an assignment is made and those costs are removed and kept separate from the joint product costs.

In addition according to usage data, the indirect costs of library, plant maintenance, computing, etc. have been allocated to the discipline groups on the basis of library usage, net assignable square feet, computing

usage, etc.. Where necessary, other measures are used by specific universities as a proxy for usage.

It next becomes necessary to apply a distribution scheme to assign the appropriate cost components (salaries, benefits, supplies, etc.) to the appropriate primary activities of Instruction, Research, and Community and Professional Service, as well as Administration and Other. Because these activities are imbedded, their costs have never been continuously maintained by universities. The FAA serves as a vehicle for those activities that cannot be directly assigned. The assumption that salary costs follow faculty time seems quite safe, and also for fringe benefits, but less safe for other costs.

Over the last two decades, there has been a great deal of inquiry into the distribution of faculty time, although much of the interest was directed at the timetabled load or subdivisions of simply the instruction component. Latterly, the measurement of faculty member activity widened to include all activities that the university might expect the faculty member to undertake.

The development of an FAA profile for this cost study is a critical step because faculty compensation (salary and benefit) is the largest single expenditure item in the university budget. The distribution of faculty compensation to the primary activities also affects the distribution of other costs of the academic departments.

3. HISTORICAL INTEREST IN FAA

The first lasting work was in 1919 by KOOS through U.S. Department of Interior. He was examining the influence of various factors on teaching loads, and other faculty activities.

During the 20s and the 30s individual universities (e.g., Chicago) undertook and reported studies, and also in the 40s and 50s, culminating with a conference on the topic at Purdue University in 1959.

1961 Stecklein published the first "classic" dealing with methods of measuring faculty workload.

In 1950, 1960 and 1970, there have been many reports by individual universities or by systems of universities.

In 1972 - present, NCHEMS (National Center for Higher Education Management Systems) through WICHE (Western Interstate Commission for Higher Education) has developed and documented a standard approach that is currently the basic methodology for most studies in progress.

In 1969 in Canada, as part of the AUCC/CAUBO National Cost Study, guidelines were developed for a standard approach (as far as possible) to obtain and use the FAA. Several universities carried out the exercise although documentation of the FAA is not readily available.

4. PROBLEMS

Although the topic has been open for fifty years, problems have persisted. Recent publications by NCHEMS will alleviate some problems

associated with standards, but other problems will persist. Differences of definition can be reduced but institutional differences of size, programme, emphasis, etc. should not and will not be standardized. Deficiencies in the data will gradually be improved, but the cost of complete resource data in a university context will soon outweigh the benefit of such data, until better opportunities exist for resource reallocation are made available to academic departments.

Literature on the subject stresses the requirement that all FAA studies should be designed specifically for a well defined purpose with precise purposes for use of the results. Historically, each institutional study had slightly different objectives and uses for the results, and this was also true for our sample of seven. Each university had slightly different definitions and methodology of data gathering and analysis. Hence, it is difficult to make comparisons.

There is a definite risk associated using results of FAA studies out of context. Results are only valid within that study for the definitions, and methodologies were tailored for specific objectives.

The use of previous studies in this pilot study exposes the project to that very risk. However, the risk is acceptable because the study is a pilot study and because the purpose is to develop a cost allocation scheme.

##### 5. ACCURACY OF RESULTS OF EFFA

The accuracy of FAA profiles compiled from reports of chairmen or from faculty members is difficult to measure because several considerations are involved.

Reliability is the extent similar results would be obtained if the survey was repeated at a different point of time. There are no studies of this question but many professionals in the field of higher education do not consider this a problem in practical terms. Diaries would greatly assist, as would a second opinion but neither are used with any regularity.

Validity is the degree to which the time reported did occur in actual fact. Depending on the retrospective impression of the faculty makes this consideration impossible to estimate. No studies have examined this question and the consensus is that it is highly debatable, and worse than the errors of approximation.

Errors of approximation are induced when unclear or imprecise definitions are used and arbitrary assumptions are made. Other errors of round-off are accumulated. Errors are often worse when the original questionnaire allowed for different interpretations. No studies attempted to measure these errors, but many advocated great precision for future definitions.

In order to show the variance in the results of the individual institutions, Table 4 is included. The Standard Deviation of each discipline is shown for each profile percentage.

#### 6. DATA FOR EFAA CALCULATION

Three of the pilot institutions had recently conducted an FAA study, and were in a position to adopt their own results (Calgary, Manitoba, McMaster). One major problem however was the fact that each had used different methodologies and definitions. Although each was highly



influenced by NCHEMS/WICHE, they were not considered sufficient to represent all the pilots.

The original plan was to develop an empirical FAA based on all studies that could be aggregated with reasonably consistent definitions and methodologies. The U.S. and U.K. studies as well as the three Canadian studies were considered sufficient, and the sample would be as large as possible.

Attempts to make the results of each study comparable with other studies required so many arbitrary adjustments and assumptions, that the results would not be defensible. Differences were many and the documentation was very limited.

Also, the Canadian content in the large sample was minimal and one could argue that results of such an aggregation were not applicable to Canadian universities.

An alternative plan was adopted, to concentrate the empirical survey on Canadian universities to produce profiles which would be the aggregate of only Canadian universities, and to illustrate how the U.S. and U.K. studies yield similar results.

It was necessary to obtain information from other Canadian universities, outside the pilots who had not published results from earlier studies of faculty activity.

Since most of these studies had been conducted with different definitions and methodologies, over a full decade, there were differences. There was no opportunity to repeat or redo sections. Considering that the purpose of these profiles is to develop a cost distribution scheme, the aggregation problems of mixed methodologies can be lived with. The empirical profiles can be defended for the purpose they are intended to serve.

#### 7. MECHANICS OF DATA COLLECTION AND TABULATION

Each of the seven universities that provided data for the empirical FAA submitted the data in confidence to the consultant. The data described the percentage members' time that was applied to each of several activities (Instruction, Research, etc.). The data was provided by discipline group, representing the weighted average time of all faculty members in the group, including chairmen.

Several of the universities reported at many as fifteen activities, and several reported at smaller levels of teaching unit such as Department or Faculty. This input data was aggregated into four activities for each of six discipline groups. There were some problems in the aggregation due to the different definitions between universities, but none that would significantly alter the cost study results. A comparison or aggregation at a sub-level would be very difficult with this data.

8. EFAA RESULTS

TABLE 1 ADJUSTED TIME DISTRIBUTION BY DISCIPLINE & UNIVERSITY displays the first stage of the EFAA development. The institutional data supplied in a variety of formats and levels of detail typical of the earlier studies, is adjusted and aggregated, and displayed as a five-element vector.

As an example, the vector or profile of the Natural Sciences at University 2 is displayed -

66	22	I	R
3	9	CS	AO
200.6		FTE	

This vector represents the time distribution of the 200.6 members of faculty (FTE) in the Natural Sciences where:

I = % Time allocated to Instruction	66%
R = % Time allocated to Research	22%
CS = % Time allocated to Community & Professional Service	3%
AO = % Time allocated to Administration & Other	9%
	<hr/>
	100%

FTE = No. of FTE faculty members            200.6

## EMPIRICAL FACULTY ACTIVITY ANALYSIS

TABLE 1 ADJUSTED TIME DISTRIBUTION BY DISCIPLINE AND UNIVERSITY

	U 1	U 2	U 3	U 4	U 5	U 6	U 7
EDUCATION,	39 14	65 14	62 10	65 18	57 12		
PHYS. EDUCN	3 44	8 13	16 12	3 13	15 17		
	25.2	120.1	127.5	18.3	71.0		
HUMANITIES,	48 30	64 20	70 19	62 24	53 29	61 29	59 31
FINE ARTS,	4 18	4 12	5 7	3 11	6 12	3 7	1 9
SOCIAL SCIENCES	258.0	329.9	388.8	285.2	123.0	244.4	224.2
BUSINESS, LAW	52 26	73 8	68 21	52 33	57 18		63 12
	3 19	5 13	4 8	3 12	5 20		7 18
	39.0	22.9	87.8	40.0	11.0		6.0
NATURAL SCIENCES	51 32	66 22	72 19	53 36	49 33	61 28	65 26
	4 13	3 9	3 6	2 8	6 13	2 8	1 7
	122.0	200.6	206.8	117.2	92.0	255.7	184.7
APPLIED SCIENCES	58 20	57 21	67 18	63 26	52 26	72 17	65 19
	4 18	5 16	7 9	2 10	8 14	3 9	2 14
	240.0	63.8	224.0	73.8	69.0	200.5	134.9
OTHER DISCIPLINES	58 8	60 16		48 18		60 29	
	5 29	8 16		17 17		6 6	
	74.0	24.2		14.0		40.3	

TABLE 2 DISTRIBUTION OF FACULTY TIME displays the second step in the EFAA development. The results from each of the seven universities are aggregated using FTE faculty as the weight. The result, an empirical profile for each discipline group is the representative of the seven, and it is presumed appropriate for the pilots. As an indication of the variance of the original data, Table 4 is included here to remind the reader that these profiles are not discrete numbers and should be considered as ranges.

Each of the pilot universities then used the empirical profiles to distribute the appropriate joint costs. Where possible, the pilots also undertook sensitivity studies or new calculations using their own profiles.

The summary or bottom line of the table is included for information only; the numbers are not used in the cost study because the individual discipline groups are maintained throughout. This summary line is the aggregate of all disciplines by FTE faculty. The profile is typical of the seven universities and presumably the pilots and the entire university system (Health Sciences excluded).

EMPIRICAL FACULTY ACTIVITY ANALYSIS

TABLE 2 DISTRIBUTION OF FACULTY TIME (AGGREGATE OF 7 UNIVERSITIES)

	INSTRUCTION	RESEARCH	COM & PROF'L SERVICE	ADMIN & OTHER
EDUCATION, PHYS, EDUCN.	60%	12%	12%	16%
HUMANITIES, FINE ARTS, SOCIAL SCIENCES	61	25	4	10
BUSINESS, LAW	62	22	4	10
NATURAL SCIENCES	62	27	3	8
APPLIED SCIENCES	63	20	4	13
OTHER DISCIPLINES	58	15	7	20
ALL DISCIPLINES COMBINED	62	23	4	11

TABLE 3 DISTRIBUTION OF PRIMARY FACULTY TIME is the last step in the development of the EFAA. In the four element profile of Table 2, "Admin. & Other" is not truly a primary activity in the sense that "Instruction" and "Research" are. Dollars allocated to Admin. & Other are eventually shifted to the other primary activities.

Table 3 and the 4-element profile are used to identify the "Admin. & Other" cost, which is then combined with other admin. costs. Having thus eliminated the admin. portion of the 4-element profile, the primary activities are renormalized.

Table 3 contains the same information as Table 2 with "Admin. & Other" eliminated and the other three activities adjusted. Table 3 then is used as the distribution scheme for the allocation of joint product costs.

ADDENDUM:

Subsequent to a further review of the EFAA application, the Steering Committee and TAG determined that a time allocation to non-departmental administration should be standardized across the discipline groups at 10%. Tables 5 and 6 are included to show the recalculation of the EFAA both for the administration adjustment and for reduction to the four discipline groups.

EMPIRICAL FACULTY ACTIVITY ANALYSIS

TABLE 3 DISTRIBUTION OF PRIMARY FACULTY TIME (AGGREGATE OF 7 UNIVERSITIES)

	<u>INSTRUCTION</u>	<u>RESEARCH</u>	<u>COM &amp; PROF'L SERVICE</u>
EDUCATION, PHYS. EDUCN.	72	15	13
HUMANITIES, FINE ARTS, SOCIAL SCIENCES	68	28	4
BUSINESS, LAW	70	26	4
NATURAL SCIENCES	68	29	3
APPLIED SCIENCES	73	22	5
OTHER DISCIPLINES	73	19	8
ALL DISCIPLINES COMBINED	69	26	5



## EMPIRICAL FACULTY ACTIVITY ANALYSIS

TABLE 4 UNWEIGHTED STANDARD DEVIATION & FACULTY ACTIVITY (AGGREGATE OF 7 UNIVERSITIES)

	INSTRUCTIN		RESEARCH		COM & PRO SERVICE		ADMIN & OTH	
	%	S.D.	%	S.D.	%	S.D.	%	S.D.
EDUCATION, PHYS EDUCN.	<u>60</u>	<u>10.9</u>	<u>12</u>	<u>2.97</u>	<u>12</u>	<u>6.28</u>	<u>16</u>	<u>13.66</u>
HUMANITIES, FINE ARTS, SOCIAL SCIENCES	61	7.23	25	4.97	4	1.60	10	3.80
BUSINESS, LAW	62	8.66	22	9.14	4	1.52	12	4.73
NATURAL SCIENCES	62	8.72	27	4.69	3	1.63	8	2.79
APPLIED SCIENCES	63	6.78	20	3.65	4	2.37	13	3.58
OTHER DISCIPLINES	58	5.74	15	8.66	7	5.48	20	9.42

% IS THE WEIGHTED AVERAGE OF ALL FACULTY INCLUDING CHAIRMEN

S.D. IS THE STANDARD DEVIATION OF THE AGGREGATE PROFILE OBTAINED BY COMBINING PROFILES ON THE BASIS OF FTE FACULTY. S.D. IS CALCULATED FROM THE UNWEIGHTED INDIVIDUALS FROM EACH UNIVERSITY.

Table 5

## REVISED TIME DISTRIBUTION BY DISCIPLINE AND UNIVERSITY

	Univer.	Univer.	Univer.	Univer.	Univer.	Univer.	Univer.	Average	Combined Groupings	All Disciplines
	1	2	3	4	5	6	7			
1. Education, Physical Education	63 23 4 10 25.2	67 15 8 10 120.1	63 10 17 10 127.5	68 19 3 10 18.3	61 13 16 10 7.0			65 14 11 10 297.7	65 14 11 10 297.7	62 24 4 10 4,695.4
2. Humanities, Fine Arts, Social Sciences	53 33 4 10 258.0	66 20 4 10 329.9	68 18 4 10 388.8	63 24 3 10 285.2	54 30 6 10 123.0	59 28 3 10 244.4	58 31 1 10 224.2	61 25 4 10 1,853.5	61 24 5 10 2,006	
3. Business, Law	58 29 3 10 39.0	76 9 5 10 22.9	66 20 4 10 87.8	53 34 3 10 40.0	64 20 6 10 11.0		69 13 8 10 6.0	63 23 4 10 206.7	63 23 4 10 206.7	
4. Natural Sciences	53 33 4 10 122.0	65 22 3 10 200.6	69 18 3 10 206.8	52 36 2 10 117.2	50 34 6 10 92.0	60 28 2 10 255.7	64 25 1 10 184.7	61 26 3 10 1,179	63 24 3 10 2,185	
5. Applied Sciences	64 22 4 10 240.0	62 23 5 10 63.8	65 18 7 10 224.0	62 26 2 10 73.8	54 27 9 10 69.0	70 17 3 10 200.5	68 20 2 10 134.9	65 21 4 10 1,006		
6. Other Disciplines	74 10 6 10 74.0	64 17 9 10 24.2		52 20 18 10 14.0		57 27 6 10 40.3		66 17 7 10 152.5		

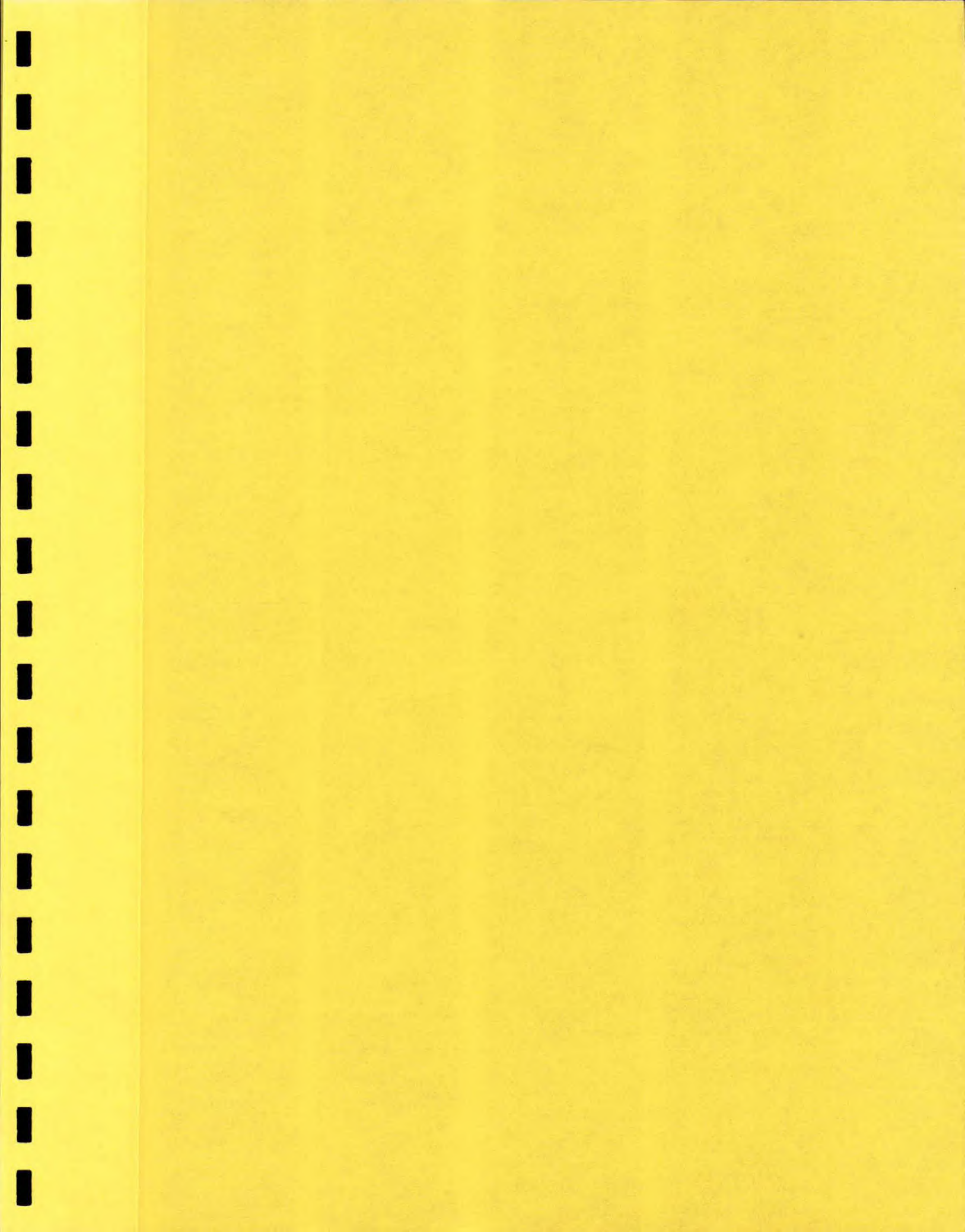
Table 6

## DISTRIBUTION OF PRIMARY FACULTY TIME (BY DISCIPLINE AND UNIVERSITY)

	Univer. 1	Univer. 2	Univer. 3	Univer. 4	Univer. 5	Univer. 6	Univer. 7	Average	Combined Groupings	All Disciplines
1. Education	70 26 4 25.2	74 17 9 120.1	70 11 19 127.1	76 21 3 18.3	68 14 18 7.0			72 16 12 297.7	72 16 12 297.7	69 26 5 4,695.4
2. Humanities	59 37 4 258.0	73 22 5 329.9	76 20 4 388.8	70 27 3 285.2	60 33 7 123.0	66 31 3 244.4	64 35 1 224.2	68 28 4 1,853.5	68 27 5 2,006	
3. Business, Law	65 32 3 39.0	84 10 6 22.9	73 22 5 87.8	59 38 3 40.0	71 22 7 11.0		77 14 9 6.0	70 25 5 206.7	70 25 5 206.7	
4. Natural Sciences	59 37 4 122.0	72 25 3 200.6	77 20 3 206.8	58 40 2 117.2	55 38 7 92.0	67 31 2 255.7	71 28 1 184.7	67 30 3 1,179	69 27 4 2,185	
5. Applied Science	71 25 4 240.0	69 26 5 63.8	72 20 8 224.0	69 29 2 73.8	60 30 10 69.0	78 19 3 200.5	76 22 2 134.9	72 23 5 1,006		
6. Other Disciplines	82 11 7 74.0	71 19 10 24.2		58 22 20 14.0		63 30 7 40.3		73 18 9 152.5		

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Pages 156 to 161



DISCIPLINE GROUPS

STATISTICS CANADA GROUPINGS

Group 1-Education

- 1.18.00 ELEMENTARY/SECONDARY TEACHER
- 1.23.00 HIGHER EDUCATION, POST-SECONDARY  
TEACHER TRAINING
- 1.36.00 KINDERGARTEN, PRE-SCHOOL TEACHER  
TRAINING
- X.XX.XX NON-TEACHING FIELDS
  - 1.38.01 school librarianship
  - 1.38.02 education administration
  - 1.38.03 education psychology
  - 1.38.05 guidance and counselling
  - 1.38.06 curriculum specialization
  - 1.38.07 measurements and evaluation
  - 1.38.08 education foundations
  - 1.38.09 other non-teaching fields
- 1.39.00 PHYSICAL EDUCATION
- 1.40.00 KINESIOLOGY, HUMAN KINETICS  
AND KINANTHROPOLOGY
- 1.41.00 RECREATION

Group 2 - Fine Arts, Humanities, and  
Social Sciences

- 2.03.00 FINE ART
- 2.05.00 MUSIC
- 2.08.00 OTHER PERFORMING ARTS
- X.XX.XX APPLIED ARTS
  - 2.14.01 industrial design
  - 2.14.99 other applied arts
- 3.03.00 CLASSICS, CLASSICAL STUDIES
- 3.05.00 ENGLISH LANGUAGE AND/OR  
LITERATURE
- 3.06.00 FRENCH LANGUAGE AND/OR  
LITERATURE
- 3.09.00 HISTORY

Group 2 - cont'd

- 3.10.00 JOURNALISM
- X.XX.XX LANGUAGES, OTHER
  - 3.11.01 comparative literature
  - 3.11.02 mediaeval languages
  - 3.11.03 asian languages and  
literature
  - 3.11.04 slavic languages and  
literature
  - 3.11.99 other languages and  
literatures
- 3.12.00 LIBRARY SCIENCE
- 3.13.00 OTHER RECORDS SCIENCE
- 3.14.00 LINGUISTICS
- 3.17.00 OTHER MASS COMMUNICATION  
STUDIES
- 3.21.00 PHILOSOPHY
- 3.24.00 RELIGIOUS STUDIES
- 3.25.00 THEOLOGICAL STUDIES  
(professional programme,  
preparation for the ministry)
- 4.03.00 ANTHROPOLOGY
- 4.06.00 ARCHAEOLOGY
- 4.08.00 CANADIAN STUDIES
- X.XX.XX AREA STUDIES, OTHER
  - 4.09.10 mediaeval studies
  - 4.09.20 asian studies
  - 4.09.40 slavic studies
  - 4.09.99 other area studies
- 4.13.00 CRIMINOLOGY
- 4.15.00 DEMOGRAPHY
- 4.27.00 ECONOMICS
- 4.30.00 GEOGRAPHY

Group 2 - cont'd

- X.XX.XX MAN/ENVIRONMENT STUDIES
  - 4.40.08 regional, rural, urban, city planning and community development
  - 4.40.10 resource management, environmental studies
- 4.43.00 POLITICAL SCIENCE
- 4.46.00 PSYCHOLOGY
- 4.49.00 SOCIAL WORK AND SOCIAL WELFARE
- 4.52.00 SOCIOLOGY
- 4.55.00 MILITARY STUDIES
- 4.57.00 OTHER SOCIAL SERVICES

Group 3 - Business and Law

- 4.12.00 COMMERCE, MANAGEMENT, BUSINESS ADMINISTRATION, ADMINISTRATIVE STUDIES/SCIENCES
- X.XX.XX SPECIALIZED ADMINISTRATION STUDIES
  - 4.14.01 public administration
  - 4.14.02 health administration
  - 4.14.03 hotel and food administration
  - 4.14.99 other specialized administration studies
- 4.33.00 LAW AND JURISPRUDENCE

Group 4 -Natural and Applied Sciences

- X.XX.XX AGRICULTURE
  - 5.03.10 animal science
  - 5.03.22 plant science
  - 5.03.26 soil science
  - 5.03.99 other agriculture
- 5.06.00 BIOCHEMISTRY
- X.XX.XX BIOLOGY
  - 5.09.10 genetics
  - 5.09.12 microbiology
  - 5.09.99 other biology
- 5.12.00 BIOPHYSICS

Group 4 - cont'd

- 5.15.00 BOTANY
- 5.16.00 FISHERIES AND WILDLIFE MANAGEMENT
- X.XX.XX HOUSEHOLD SCIENCE AND RELATED
  - 5.18.08 food science and nutrition
  - 5.18.99 other household science and related
- 5.21.00 VETERINARY MEDICINE
- 5.22.00 VETERINARY SCIENCES
- 5.23.00 VETERINARY MEDICINE SPECIALTIES
- 5.24.00 ZOOLOGY
- 6.03.00 ARCHITECTURE
- 6.05.00 AERONAUTICAL AND AEROSPACE ENGINEERING
- 6.06.00 CHEMICAL ENGINEERING
- 6.07.00 CIVIL ENGINEERING
- 6.08.00 DESIGN, SYSTEMS ENGINEERING
- 6.09.00 ELECTRICAL ENGINEERING
- 6.10.00 INDUSTRIAL ENGINEERING
- 6.11.00 MINING ENGINEERING
- 6.12.00 MECHANICAL ENGINEERING
- 6.13.00 METALLURGICAL ENGINEERING
- 6.14.00 OTHER ENGINEERING
- 6.15.00 ENGINEERING SCIENCE
- 6.16.00 ENGINEERING GENERAL
- 6.20.00 FORESTRY
- 6.22.00 LANDSCAPE ARCHITECTURE
- 8.06.00 COMPUTER SCIENCE
- 8.12.00 MATHEMATICS
- 8.15.00 CHEMISTRY
- 8.18.00 GEOLOGY AND RELATED
- 8.21.00 METALLURGY, MATERIALS SCIENCE
- X.XX.XX METEOROLOGY
  - 8.24.01 climatology
  - 8.24.99 other meteorology

Group 4 - cont'd

8.27.00 OCEANOGRAPHY AND WATER STUDIES

X.XX.XX PHYSICS

8.30.01 astronomy

8.30.02 aerospace sciences

8.30.99 other physics

Medical Science

7.03.00 DENTISTRY (professional programme)

7.04.00 DENTAL SPECIALTIES

7.05.00 MEDICINE (professional programme)

X.XX.XX BASIC MEDICAL SCIENCES

7.06.04 anatomy

7.06.06 biochemistry

7.06.10 embryology

7.06.12 endocrinology

7.06.14 genetics

7.06.16 histology

7.06.22 neurophysiology

7.06.26 pharmacology

7.06.28 physiology

7.06.99 other basic sciences

7.08.00 MEDICAL SPECIALTIES

X.XX.XX PARACLINICAL SCIENCES

7.10.06 immunology

7.10.10 microbiology

7.10.14 pathology

7.10.99 other paraclinical sciences

7.12.00 SURGICAL SPECIALTIES

7.15.00 NURSING

7.18.00 OPTOMETRY

7.21.00 PHARMACY

Medical Science - cont'd

7.24.00 EPIDEMIOLOGY AND PUBLIC HEALTH

X.XX.XX REHABILITATION MEDICINE

7.27.02 aural and oral rehabilitation

7.27.04 occupational therapy

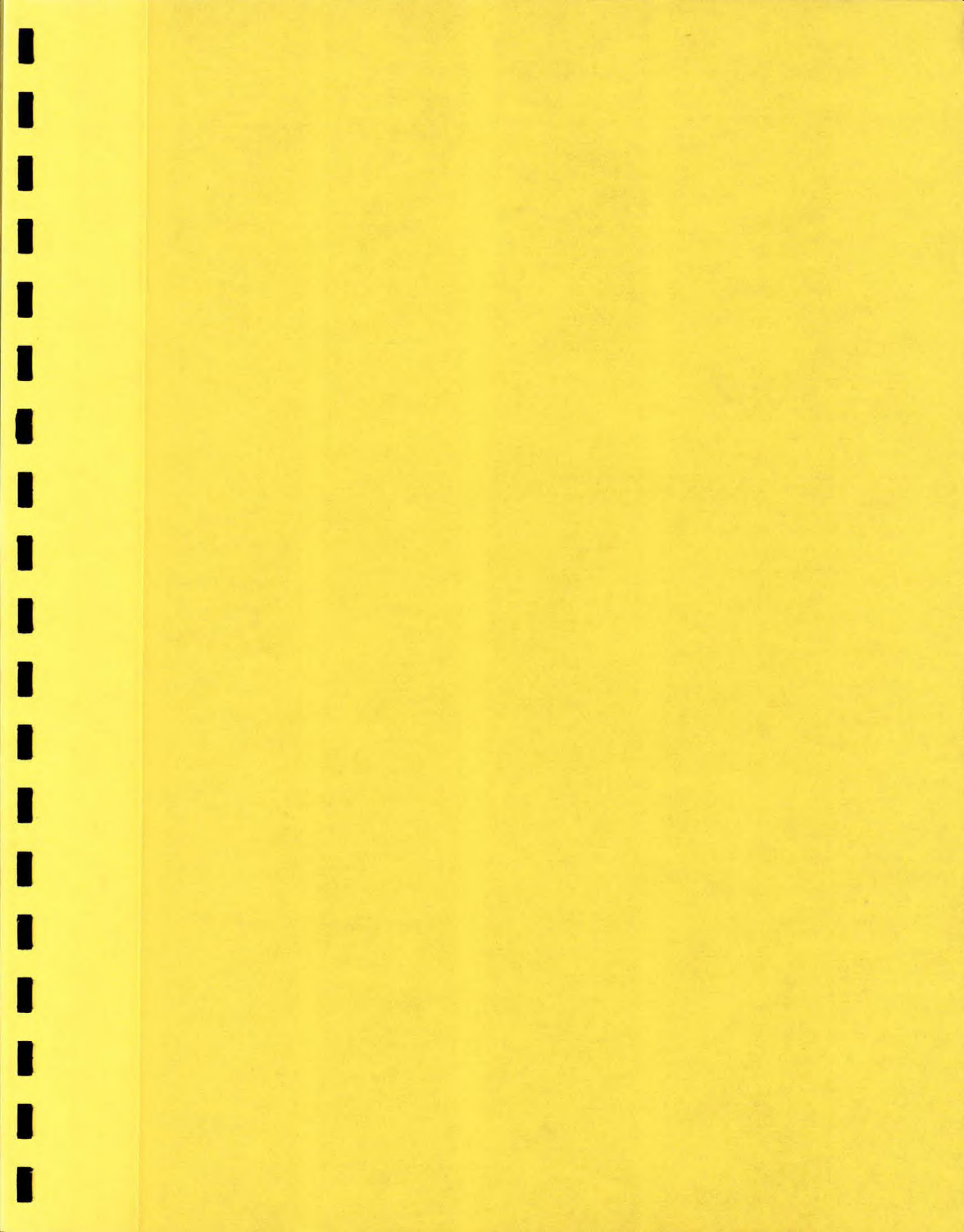
7.27.06 physical therapy

7.27.99 other rehabilitation

7.36.00 MEDICAL TECHNOLOGY

7.99.99 OTHER HEALTH PROFESSIONS AND OCCUPATIONS

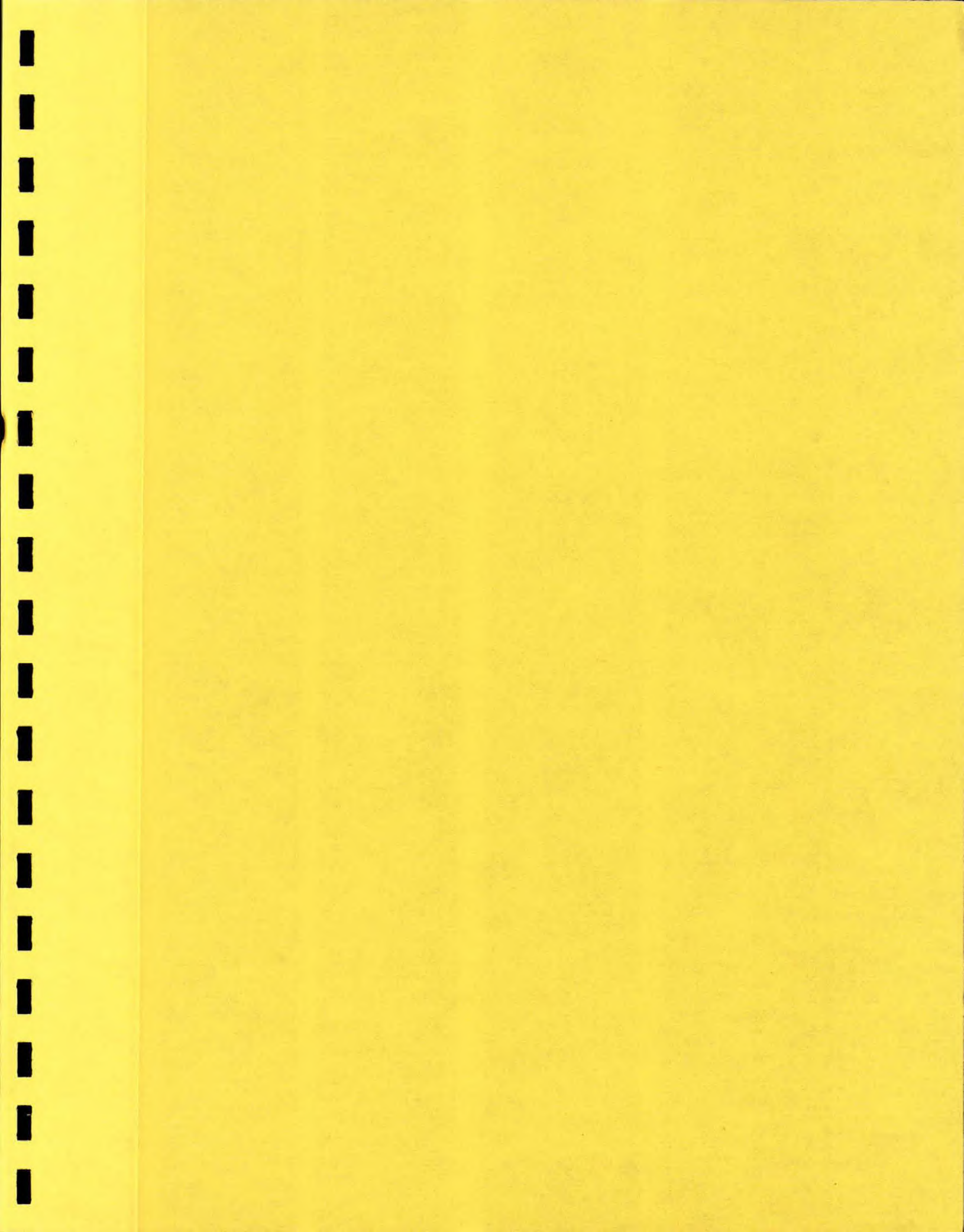




OPERATING EXPENDITURES<sup>(1)</sup> AND SPONSORED RESEARCH EXPENDITURES BY  
REGION: FOR THE 6 PILOT UNIVERSITIES AND FOR THE 31 MEMBER INSTITUTIONS OF  
CAUBO HAVING SPONSORED RESEARCH IN EXCESS OF \$1 MILLION IN 1976-77  
(expressed in thousands of dollars)

<u>6 Pilot Study Universities</u>	<u>Operating Expenditures \$000</u>	<u>Sponsored Research Expenditures \$000</u>	<u>Sponsored Research Percentage %</u>
Atlantic	35,173	2,286	6.5
Quebec	100,164	13,456	13.4
Ontario	69,457	13,114	18.9
Manitoba	94,664	14,863	15.7
Alberta	68,129	6,543	9.6
British Columbia	<u>143,648</u>	<u>16,949</u>	<u>11.8</u>
Total	<u>511,237</u>	<u>67,211</u>	<u>13.1</u>
 <u>31 Member Institutions</u>			
Atlantic	128,963	13,917	10.8
Quebec	528,622	73,079	13.8
Ontario	809,659	106,413	13.1
Manitoba	94,664	14,863	15.7
Saskatchewan	91,437	10,983	12.1
Alberta	194,620	19,923	10.2
British Columbia	<u>220,636</u>	<u>20,759</u>	<u>9.4</u>
Total	<u>2,068,601</u>	<u>259,937</u>	<u>12.6</u>

(1) Total operating expenditures, including sponsored research and excluding ancillary enterprises. Financial Statistics of Universities and Colleges, 1976-77; prepared by Statistics Canada for the Canadian Association of University Business Officers (CAUBO).



SPONSORED RESEARCH INCOME<sup>(1)</sup> BY GRANTING AGENCY FOR THE 6 PILOT UNIVERSITIES

## AND THE 31 MEMBER INSTITUTIONS OF CAUBO HAVING SPONSORED RESEARCH IN EXCESS OF \$1 MILLION IN 1976-77

(expressed in thousands of dollars)

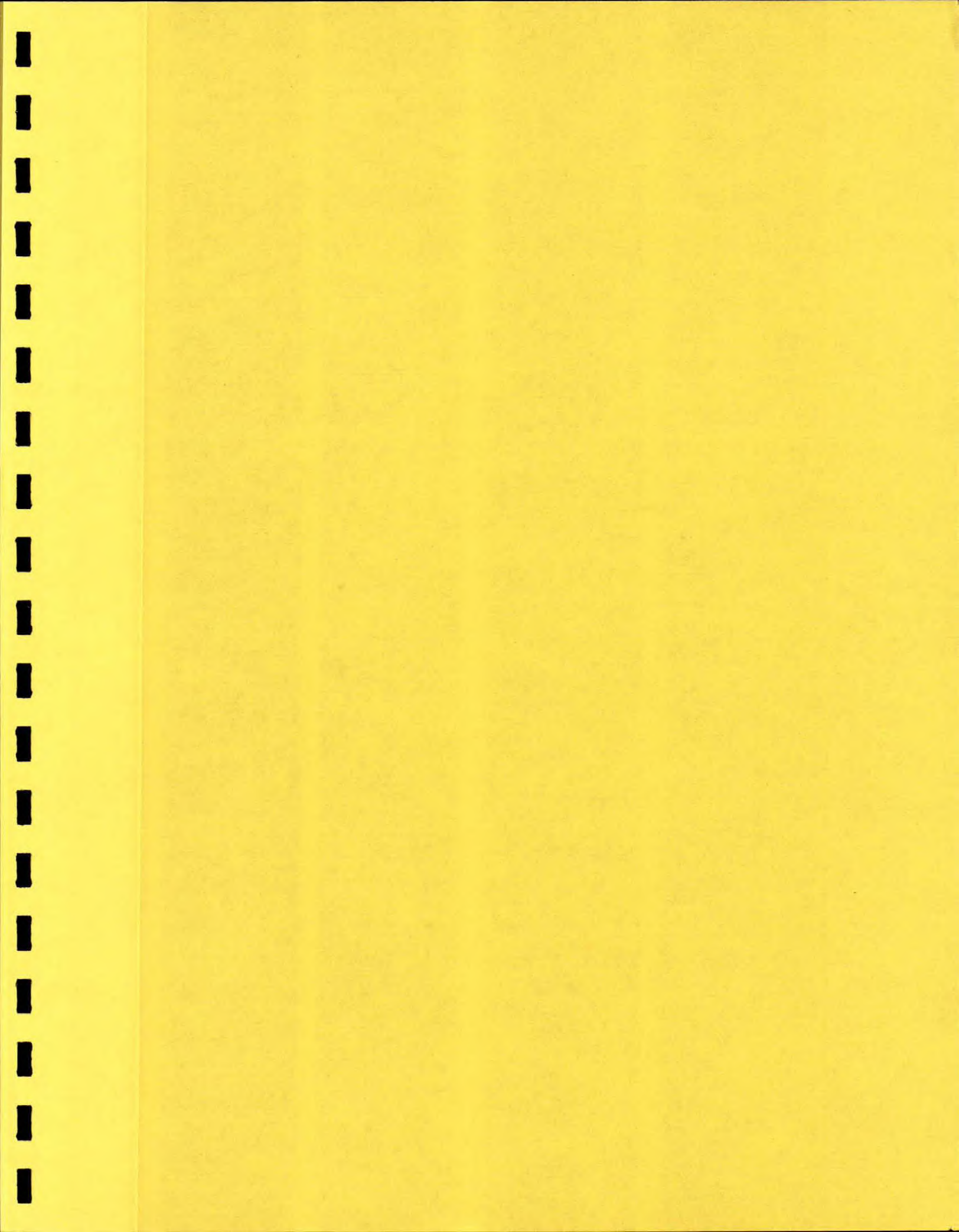
	ATLANTIC \$000	QUEBEC \$000	ONTARIO \$000	MANITOBA \$000	ALBERTA \$000	BRITISH COLUMBIA \$000	TOTAL \$000
Canada Council	159	369	261	112	153	520	1,574
National Health and Welfare	91	-	571	883	82	759	2,386
Environment Canada	88	-	69	27	192	-	376
N.R.C.	1,620	2,394	3,806	3,008	2,434	6,212	19,474
A.E.C.B.	9	-	285	65	25	-	384
M.R.C.	-	1,801	2,575	3,144	1,166	2,868	11,554
Other	584	2,908	459	2,853	339	1,460	8,603
Sub-total	2,551	7,472	8,026	10,092	4,391	11,819	44,351
Provincial	353	4,369	1,249	2,319	1,391	1,386	11,067
Municipal	-	-	14	-	10	16	40
Gifts/Non-Government Grants	531	1,615	3,825	4,186	1,226	2,719	14,102
Other	-	-	-	246	236	1,036	1,518
Total	3,435 <sup>(2)</sup>	13,456	13,114	16,843	7,254	16,976	71,078

## Includes:

(2) Special vocational education grant, excluded from Pilot Study.

	ATLANTIC \$000	QUEBEC \$000	ONTARIO \$000	MANITOBA \$000	SASKATCHEWAN \$000	ALBERTA \$000	BRITISH COLUMBIA \$000	TOTAL \$000
Canada Council	534	1,967	3,031	112	252	335	824	7,055
National Health and Welfare	718	1,770	2,569	883	488	299	818	7,545
Environment Canada	94	217	1,251	27	982	415	91	3,077
N.R.C.	4,263	13,787	28,455	3,008	3,027	7,614	7,934	68,088
A.E.C.B.	9	4	2,897	65	4	217	371	3,567
M.R.C.	2,033	12,960	15,853	3,144	1,496	3,512	2,901	41,899
Other	4,152	9,305	7,695	2,853	1,070	1,224	2,051	28,350
Sub-total	11,803	40,010	61,751	10,092	7,319	13,616	14,990	159,581
Provincial	614	16,498	18,985	2,319	2,829	3,681	2,067	46,993
Municipal	-	45	22	-	-	10	18	95
Gifts/Non-Government Grants	1,291	12,526	26,341	4,186	1,556	4,315	2,934	53,149
Other	80	2,097	3,388	246	( 2)	228	1,036	7,073
Total	13,788	71,176	110,487	16,843	11,702	21,850	21,045	266,891

(1) Financial Statistics of Universities and Colleges, 1976-77; prepared by Statistics Canada for the Canadian Association of University Business Officers (CAUBO).



SPONSORED RESEARCH - EXPENDITURE<sup>(1)</sup> - BY OBJECT AND BY REGION FOR

APPENDIX "I"

Page 1

THE 6 PILOT UNIVERSITIES IN 1976-77

(expressed in thousands of dollars)

	<u>ATLANTIC</u>	<u>QUEBEC</u>	<u>ONTARIO</u>	<u>MANITOBA</u>	<u>ALBERTA</u>	<u>BRITISH COLUMBIA</u>	<u>TOTAL</u>
	<u>\$000</u>	<u>\$000</u>	<u>\$000</u>	<u>\$000</u>	<u>\$000</u>	<u>\$000</u>	<u>\$000</u>
Academic Salaries - Academic Ranks	938	1,227	987	1,110	470	3,999	8,731
- Other Inst. and Research	135	1,851	2,094	2,700	935	2,145	9,859
Other Salaries and Wages	687	4,497	5,703	3,905	2,590	4,904	22,286
Fringe Benefits	<u>70</u>	<u>553</u>	<u>971</u>	<u>352</u>	<u>149</u>	<u>537</u>	<u>2,632</u>
Total Salaries and Benefits	1,830	8,127	9,755	8,067	4,144	11,585	43,508
Travel	54	882	876	716	494	1,201	4,223
Books and Periodicals	-	-	-	20	-	116	136
Supplies and Expenses	1,519	2,562	1,753	4,593	1,185	1,590	13,202
Furniture and Equipment - Purchase	32	1,100	452	937	485	1,768	4,774
- Rental	-	-	5	22	11	487	525
Ext. Contracted Services	-	23	-	-	124	-	147
Professional fees	-	459	-	57	4	171	691
Inst. Membership Fees	-	-	-	-	-	13	13
Miscellaneous	-	<u>274</u>	-	<u>119</u>	<u>18</u>	<u>18</u>	<u>429</u>
Sub-total	3,435	14,105	12,841	14,531	6,465	16,949	68,326
Internal Cost Allocation	-	<u>29</u>	<u>273</u>	<u>332</u>	<u>78</u>	-	<u>712</u>
Total	<u>3,435<sup>(2)</sup></u>	<u>13,456</u>	<u>13,114</u>	<u>14,863</u>	<u>6,543</u>	<u>16,949</u>	<u>68,360</u>

(1) Financial Statistics of Universities and Colleges, 1976-77; prepared by Statistics Canada for the Canadian Association of University Business Officers (CAUBO).

Includes:

(2) Special vocational education grant, excluded from Pilot Study.

SPONSORED RESEARCH - EXPENDITURE<sup>(1)</sup> - BY OBJECT AND

## BY REGION FOR THE 31 MEMBER INSTITUTIONS IN 1976-77

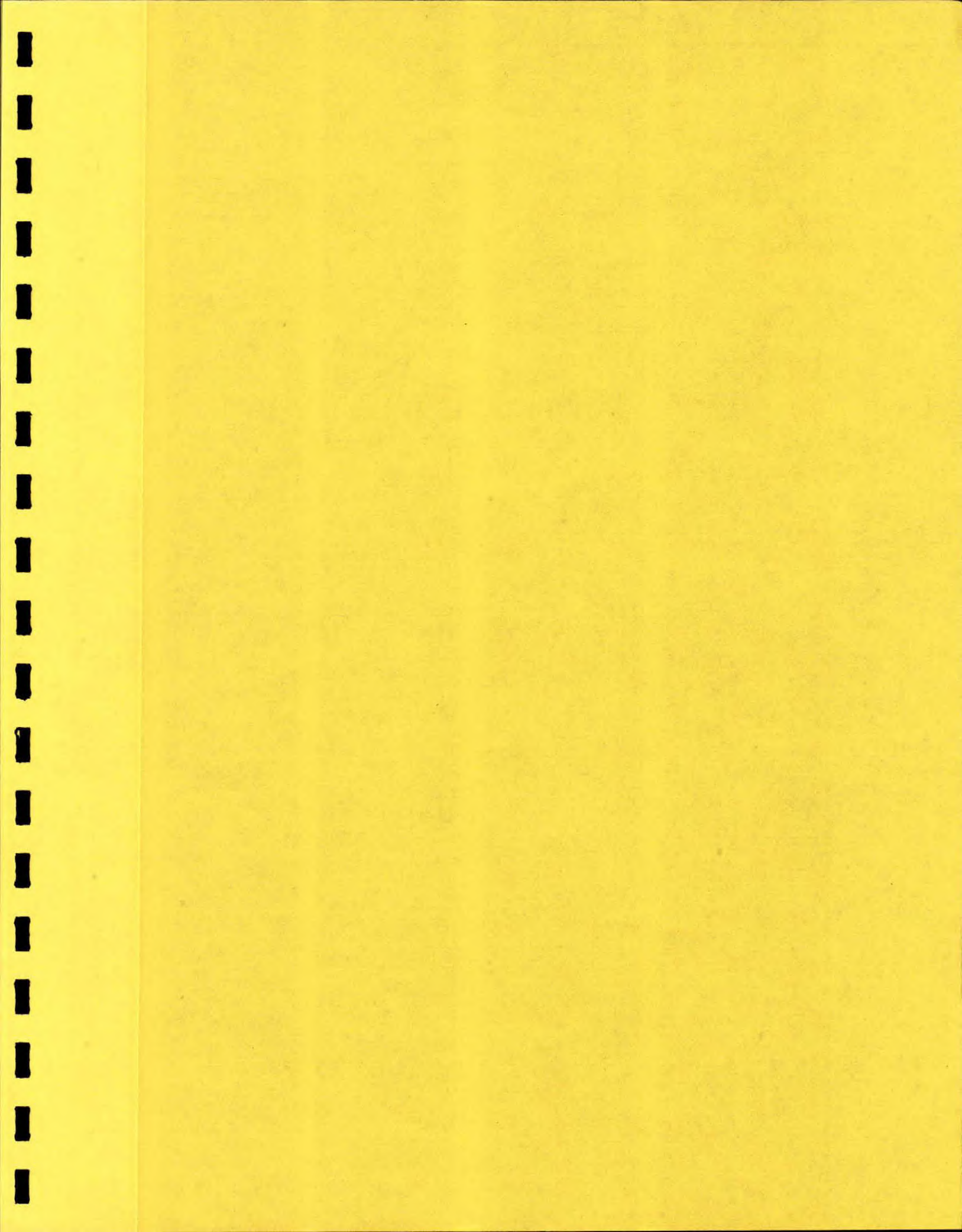
(expressed in thousands of dollars)

	<u>ATLANTIC</u> \$000	<u>QUEBEC</u> \$000	<u>ONTARIO</u> \$000	<u>MANITOBA</u> \$000	<u>SASKATCHEWAN</u> \$000	<u>ALBERTA</u> \$000	<u>BRITISH COLUMBIA</u> \$000	<u>TOTAL</u> \$000
Academic Salaries								
- Academic Ranks	1,548	5,987	9,945	1,110	451	4,086	4,285	27,412
- Other Inst. and Research	1,659	18,098	19,093	2,700	5,933	1,762	4,378	53,623
Other Salaries and Wages	5,238	19,067	31,908	3,905	415	6,084	4,930	71,547
Fringe Benefits	265	3,143	4,256	352	313	477	637	9,443
Total Salaries and Benefits	8,710	46,295	65,202	8,067	7,112	12,409	14,230	162,025
Travel	1,113	4,531	4,731	716	713	1,650	1,583	15,037
Books and Periodicals	-	198	158	20	1	69	131	577
Supplies and Expenses	3,605	12,742	24,203	4,593	3,047	3,427	1,966	53,583
Furniture and Equipment								
- Purchase	1,197	5,134	7,234	937	-	1,797	2,127	18,426
- Rental	118	221	138	22	-	55	487	1,041
Ext. Contracted Services	17	411	53	-	89	124	-	694
Professional fees	-	1,723	36	57	-	153	176	2,145
Inst. Membership Fees	-	172	1	-	-	15	13	201
Miscellaneous	306	1,443	578	119	21	18	18	2,503
Sub-total	15,066	72,870	102,334	14,531	10,983	19,717	20,731	256,232
Internal Cost Allocation	-	209	4,079	332	-	206	28	4,854
Total	<u>15,066</u> <sup>(2)</sup>	<u>73,079</u>	<u>106,413</u>	<u>14,863</u>	<u>10,983</u>	<u>19,923</u>	<u>20,759</u>	<u>261,086</u>

(1) Financial Statistics of Universities and Colleges, 1976-77; prepared by Statistics Canada for the Canadian Association of University Business Officers (CAUBO).

(2) Includes: Special vocational education grant, excluded from Pilot Study.

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REPORT  
OF THE  
ACCOUNTING RESEARCH COMMITTEE  
CANADIAN ASSOCIATION OF UNIVERSITY BUSINESS OFFICERS  
ON  
STATUS OF RESEARCH COSTING INFORMATION AND  
PROCEDURES AT CANADIAN UNIVERSITIES

May 18, 1977

CANADIAN  
ASSOCIATION OF  
UNIVERSITY  
BUSINESS  
OFFICERS

- 106 -

ASSOCIATION  
CANADIENNE DU APPENDIX "J"  
PERSONNEL Page 1  
ADMINISTRATIF  
UNIVERSITAIRE

13 May 1977

Mr. L. D. Hudon,  
Chairman,  
Canadian Committee on Financing University  
Research,  
c/o Council of Ministers of Education, Canada,  
252 Bloor Street West,  
Suite S 500,  
Toronto, Ontario.  
M5S 1V5

Dear Mr. Hudon:

The Canadian Association of University Business Officers is pleased to attach its report on the status of research costing information and procedures at Canadian universities. In the limited time available, following the approval received at the 12 January 1977 meeting of your Committee, we have held meetings in each of the regions or provinces and have invited representatives of the universities, the higher education commissions and government departments. In addition a questionnaire has been circulated to a select number of universities, contact has been made with other committees and relevant materials have been reviewed. Time did not permit extensive follow-up to the regional meetings and the descriptions contained in the appendices to the report may therefore be lacking in some detail, however they do provide an overview of the current activity.

At the 12 January 1977 meeting we gained the impression that CCFUR would be interested in considering some alternatives to a full cost study. Our preliminary review has confirmed that a full scale feasibility study, conducted at selected institutions presently involved in a fairly detailed costing exercise, will take at least two years before any meaningful results can be anticipated. We have therefore included in the report two suggestions for future action that do not involve the implementation of new studies at institutions. The alternatives provide for data gathering and procedure development based on existing studies to determine overhead on specifically funded contract research and/or to extend the procedures to include research funded by grants.

Mr. K. Clements, Executive-Director of CAUBO, and Mr. J. G. Houwing, Assistant Director of Research, AUCC, have acted as resource persons to our Committee for Phase I and we are indebted to them for their assistance. We would also acknowledge the time taken by the many individuals who have attended the meetings and who have contributed to the gathering and review of the information.

We look forward to meeting with your Committee in June for a discussion of this report, the alternative courses of action and the objectives to be established for the second phase.

Yours sincerely,

  
A. H. Headlam,  
Chairman,

Accounting Research  
Committee of CAUBO.

AHH/mfh  
Attach.

ACCOUNTING RESEARCH COMMITTEE

Page 2

Chairman: A.H. Headlam, Comptroller, University of Waterloo

Vice- Chairman: M.E. Dedrick, Director of Finance, University of Toronto

Members: J. Armour, Comptroller, McGill University

P.S. Boyle, Chief Accountant, Simon Fraser University

R. Chouinard, Directeur des Finances, Université de Montréal

T. Falconer, Director of Finance, The University of Manitoba

Y. Fortin, Director, Education Science and Culture Division,  
Statistics Canada

M.C. Lyle, Comptroller, Mount Saint Vincent University

N.M. Sullivan, Comptroller, University of Guelph

F. Sanfaçon, Directeur des finances, Université du Québec

S.G. Mann, President of CAUBO and Controller, The  
University of Regina (ex-officio)

K. Clements, Executive Director, CAUBO (ex-officio)

Invitees for the Study

J.F. Houwing, Assistant Director of Research, Association  
of Universities and Colleges of Canada

Dr. A.M. Kristjanson, Director of National Programs,  
Association of Universities and Colleges of Canada

Théodore Wildi, Adjoint au Vice-recteur à l'enseignement  
et à la recherche, Université Laval (designated represen-  
tative of the Canadian Association of University Research  
Administrators)

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REPORT ON

STATUS OF RESEARCH COSTING INFORMATION AND  
PROCEDURES AT CANADIAN UNIVERSITIES

1. BACKGROUND

In its letter of June 3, 1976, addressed to the Canadian Association of University Business Officers (CAUBO), the Council of Ministers of Education, Canada (CMEC) expressed interest in, and requested CAUBO to submit a proposal for, the development of procedures and the implementation of a feasibility study on the costs of university research as outlined in the 1974 *Report of the Study Group on the Costs of University Research*<sup>1</sup>. In its reply of August 16, 1976, CAUBO pointed out that in the two years which had elapsed since the Report was issued, some rather interesting developments had taken place which might require some updating of the Report; it therefore recommended that the project be carried out in two phases. Phase 1 would be an inventory of the developments presently being carried out in the various regions and provinces of Canada; the purpose of this inventory would be (1) to update the Report and (2) to form the basis for a recommendation on the method of implementing pilot studies on a regional or provincial basis. Phase 2 would be concerned with the actual implementation of these pilot studies.

At its initial meeting of January 12, 1977, the Canadian Committee on Financing University Research (CCFUR) discussed this recommendation with representatives of CAUBO and agreed to the two-phase approach with Phase 1 being carried out immediately and Phase 2 being deferred until the results of the inventory are available. It was agreed that the results of Phase 1 would be available for the next meeting of CCFUR, to take place June 9, 1977. To meet this time constraint the Accounting Research Committee of CAUBO, which had accepted responsibility for the project, obtained technical assistance from the Association of Universities and Colleges of Canada (AUCC). The Committee has also been extended to include a member from AUCC and, at the request of CCFUR, a representative of the Canadian Association of University Research Administrators (CAURA).

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<sup>1</sup> Commissioned by a joint Task Force of CMEC, the Ministry of State for Science and Technology, the Department of the Secretary of State and the Federal-Provincial Relations Office, the Report was prepared by a Study Group consisting of Mr. K. Clements (Project Coordinator), CAUBO, Dr. E. Vogt, The University of British Columbia, Dr. P. Glynn, Ministry of Colleges and Universities, Ontario, Dr. C. Lee, Department of Advanced Education, Alberta, Mr. M. Spalding, Secretary of State Department, and Dr. F. Ogilvie, Ministry of State for Science and Technology.

## 2. RESEARCH AND ITS COSTS

The total costs of research can be split into two parts: direct costs and indirect costs. Direct costs are those expenditures that are readily identifiable with a cost objective such as, for example, a particular research project. Indirect costs, on the other hand, are those that have been incurred for common or joint objectives and thus are not readily identifiable with a specific objective.

Items such as salaries, supplies, equipment and travel are usually considered direct costs, whereas costs connected with space, administration, library and other university services are seen as indirect costs. However, there are no universal rules for determining whether costs are direct or indirect; for example, universities which have a fee for the use of their computer will probably classify computer costs as direct, whereas universities without a fee-for-use system are more likely to consider the same costs as indirect. Whether a cost is direct or indirect depends also on the level of aggregation: the salary of the department head is a direct cost if the department is the cost objective, but an indirect cost if one of the courses offered by the department is the objective.

It should be clearly recognized that the matter of costs is completely unrelated to that of funding: if research is done, costs will be incurred regardless of the source of the funds. The problem of distinguishing between direct and indirect costs thus applies to all research, whether it is specifically funded research, contract research or free, unfunded research.

It was not the Committee's task to gather data on the cost of research. However, to provide a general setting for the cost problems discussed in this report, some statistics are presented in Appendix L.

## 3. INVENTORY OF DEVELOPMENTS

Information for Phase 1 of the study was obtained mainly through a number of regional and provincial meetings where members of the Committee met with appropriate groups in order to discuss recent developments and to gain insight in the present state of the art of costing research in Canadian universities. Additional information was gathered through contacts with individual universities; a questionnaire (see Appendix A) circulated to all Canadian universities through regional representatives of the Accounting Research Committee; a meeting with the research officer from the Healey Commission on the Financing of Graduate Studies; a review of pertinent materials such as costing information emanating from the United States; and a study commissioned by the Ministry of State for Science and Technology in 1973 on the relation of research use of university library materials to the cost of providing these services.

The following is a brief summary of some current costing activities that are pertinent for the purposes of the present study.

3.1 Atlantic Provinces Universities Financial Information System

Analysis of financial data for the Atlantic region is carried out under the Atlantic Provinces Universities Financial Information System. The basic objective of the system, which has been developed over the past six years and encompasses 19 institutions, is to meet the financial information requirements of the universities, the Maritime Provinces Higher Education Commission and Statistics Canada. The system concentrates on the cost of instruction and produces average program costs. As to research, only direct costs chargeable to specific research are identified; amounts recovered from external funding are also disclosed but then deducted and the remaining net balance is spread over the instructional programs. Additional details of the systems may be found in Appendix B.

3.2 Study at Université Laval on Indirect Costs of Research

On the Quebec scene, mention should be made of a method devised by the Université Laval, which is used to calculate the indirect costs of research contracts. Two points are noteworthy. The first is that indirect costs are expressed as a percentage of direct salaries only. In this, the method differs from those adopted by other Canadian universities involved with contract research, which use total direct costs, including both salaries and other direct costs, as the basis for expressing an overhead cost ratio. The second point is that, for overhead costs, the method does not distinguish between instruction and research. It sees these two functions as complementary and states that, since it is impossible for faculty members and others to divide their time with accuracy between them, the costs of each cannot be calculated separately. Instruction and research are therefore treated as a whole and it is assumed that the percentage of indirect cost is the same for both. The method is more extensively described in Appendix C.

3.3 Research Cost Study at the Université de Sherbrooke

In view of the rather substantial increase in research at the Université de Sherbrooke and the resulting increase in operating expenditures, a study was carried out to determine the costs of research for the year 1972-73. These costs were defined as the additional costs which were occasioned by research or, with other words, those expenditures in the university's operating budget that would not have been incurred if, theoretically, there had been no research. The study, which was limited in that it excluded faculty salaries and research other than funded research, arrived at total research costs per faculty and expressed these as unit costs per faculty member, per student, etc. It also compared research costs with research grants received; the resulting table is reproduced in Appendix D which contains a fuller description of the study.

3.4 Cooperative Expenditure Analysis at Three Ontario Universities

In Ontario, the University of Guelph, McMaster University and the University of Waterloo are involved in a cooperative expenditure analysis which has three goals: (1) to compare the costs of similar programs among participating universities; (2) to give a means to plan and develop academic programs from

a more informed perspective, and (3) to develop an objective basis for submissions to government for funding. Initiated in 1974, the project has developed a common methodology, using the cost and management system of the National Centre for Higher Education Management Systems (NCHEMS) as a guide, but incorporating certain modifications in order to adjust it to Canadian universities. The methodology which is now being applied to the year 1975-76, produces separate costs for the universities' three main functions: instruction, research and community services. As to research, it should be noted that the faculty activity analysis form, which forms the basis for allocating faculty salaries to programs, generally distinguishes four kinds of research and asks for a separate allocation of time to each: externally sponsored research; internally sponsored research; contract research; and research, scholarship and creative activities not directly associated with students' supervision or supported by external agencies. Results are now becoming available, but they are treated in a confidential manner and have not (yet) been released. Further details may be found in Appendix E.

### 3.5 Province of Manitoba Information System

In Manitoba, a province-wide system - UNICOM - has been in operation since 1970. It is a joint project of the Universities Grants Commission, Brandon University, the University of Manitoba, the University of Winnipeg and St. Boniface College which aims at developing and maintaining a unified information system to meet the needs of the participants. More specifically, its goals are to develop adequate data bases to answer ad-hoc questions; to determine unit costs and analyze university expenditures for use in forecasting budget requirements and distributing operating grants; and to develop a student flow model. As an integral part of the system, a yearly profile of academic staff activity is assembled, which is not based on reports by individual faculty members, but on a report completed by the dean or department head who provides an average profile of all his faculty members. Since the profile contains a separate category for research, the system is able to produce costs of research by department in addition to instructional costs by degree program. See Appendix F for details.

### 3.6 Cost Studies at the Universities of Alberta and Calgary

In the first part of the present decade, both the University of Alberta and the University of Calgary undertook a series of cost studies in order to monitor the validity of the enrolment weight structure used in the distribution of operating funds to Alberta universities. Although the two universities adopted basically similar methodologies, the studies were not conducted jointly and since no common definitions and allocation procedures were agreed upon, some questions as to the comparability of their results were raised. The main objective of the studies was to produce costs per student academic program. With the aid of a faculty activity analysis, data were obtained on the time devoted by faculty members to research and the direct costs of research were determined; however, no overhead costs were allocated and the studies therefore did not produce insight into the total costs of research. Both universities have discontinued this series of cost studies: Calgary in



1973 and Alberta in 1974. See Appendix G for additional information.

It is reported that the University of Alberta is conducting some limited studies by converting financial results for the fiscal year ending in 1976 to a program format and that the University of Calgary through its Office of Institutional Research, has just completed a study on formula financing which involved some updating of their previous studies.

### 3.7 Overhead Rate Calculation for Research Contracts

In addition to the aforementioned study at the Université Laval, several other universities have made calculations of overhead rates which are being applied on research contracts. For projects involving the United States government, procedures are available in a detailed manual. Some provincial governments have also recently issued guidelines in this area. With the advent of Canada's *Make or Buy Policy*, the Department of Supply and Services is now responsible for negotiating research contracts with universities and has issued a *Costing Memorandum for Contracts with Universities and Colleges* (see Appendix H), which contains guidelines for establishing overhead costs for research contracts.

Through an examination of working papers, policy statements, etc. supplied by the Universities of Alberta, Dalhousie, Guelph, Laval, Manitoba, McGill, McMaster, Sherbrooke and Toronto, the Accounting Research Committee has drafted a preliminary paper entitled *Guidelines for Calculating Overhead on Specifically Sponsored Research* which attempts to summarize the major approaches followed at the aforementioned nine institutions for establishing overheads for contracts. (Appendix I).

It should be mentioned here that these studies are limited to establishing the costs of performing a particular contract which mostly specifies the time to be devoted to it and usually avoids the joint cost problem of graduate student instruction.

### 3.8 Cost Behaviour Analysis

Most of the above described cost studies are what could be called full cost analyses which involve the process of examining and evaluating the total cost, including both direct and indirect cost, attributable to a cost objective. This type of costing is useful in establishing funding and price structures in higher education for such items as tuition fees, appropriation requests, and recovery of grant and contract costs. It provides historical data, but, as a recent American report<sup>1</sup> points out, it does not

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<sup>1</sup> *Cost Behavior Analysis for Planning in Higher Education*, Peat, Marwick, Mitchell and Co., January 1977 (prepared for the National Association of College and University Business Officers).

provide insight in the behaviour of costs and does not reflect the effects that changes in service and volume will have on costs. This report states that an important finding of a number of studies on costing and the use of cost information in higher education is that average historical full cost per unit of service, representing the cost of past activities, is not a valid tool for projecting the cost of alternative courses of action. It suggests that a cost behaviour analysis which would determine the fixed and variable components of total cost would be more valuable to planners in rationally estimating the future consequences of various alternatives of providing educational services within the institution's available resources. Although such analyses are still in their infancy and much empirical research still has to be done to devise a methodology for them, the Committee discovered a certain interest in this approach as, for example, evidenced by a study to be undertaken by the Ontario Planning and Analysis Group which aims at designing a model for separating fixed and semi-fixed costs from variable costs and for decoupling the former type of costs from enrolment growth in determining universities' formula grants.

### 3.9 Faculties of Medicine and Formula Approach at the University of Toronto

Faculties of medicine pose particular problems in costing studies. They differ from most other faculties in that they maintain complicated relations with hospitals and often receive funding from more than one source with funding patterns varying from province to province. There is also the need for a more complicated faculty activity analysis because a teacher in the faculty of medicine may be involved in a number of activities which are not found in other faculties, such as patient care, supervision of interns and residents, and hospital administration. These additional tasks also result in an aggravation of the joint cost problem since faculty members are frequently involved in activities which simultaneously produce three products: instruction, research and patient care.

For these reasons, a number of the above cost studies have excluded the faculty of medicine from their analysis. Some separate cost studies which investigated only the faculty of medicine have been conducted (for example, at Dalhousie, Manitoba and Toronto), but they were generally limited to the faculty's own expenditures, omitting university overhead costs. In addition, medical faculties at Calgary and Alberta have been involved in a recently completed two-year review of their funding which could be useful for designing procedures for segregating costs of patient care and the overhead costs incurred by teaching hospitals.

Costing efforts of Toronto's medical faculty are noteworthy. Over the three-year period 1972-74, costing studies were conducted with the use of an extensive annual activity report which is divided into six sections - education, research, patient care, administration, extramural responsibilities and scholarly work. However, considerable resistance by the faculty to activity analyses was experienced and for the past two years this exercise has been replaced with a proxy or formula type system which allocates faculty time, or what is referred to as "faculty contribution", on the basis of

university income generated by each activity. Data is assembled on primary measurements such as scheduled teaching hours and converted to revenue derived from government grants and tuition fees. Teaching income is then compared with research dollars in order to arrive at a split between the instruction and research functions. As a result, faculty activity analyses are circumvented.

### 3.10 Other Studies

Without being involved in full-fledged cost studies, a number of universities have studied cost aspects of certain of their functions and operations. Sufficient to mention as examples, the development of budget allocation and library costing systems at the University of Western Ontario and an investigation of the direct costs of instruction at the Université du Québec.

## 4. MAJOR PROBLEMS

A major objective of this study was to undertake an inventory of costing developments presently being carried out in the various regions and provinces. As part of this exercise some concerns for existing problem areas were noted. In addition, statements were made, or at least impressions obtained, at the various meetings on subjects such as the value of full-fledged cost studies and problem areas which require further investigation. A listing of these additional findings and a summary of the key items which should be taken into account before discussing any further action, can be summarized as follows:

### 4.1 Raison d'être of Existing Studies

With the exception of limited studies on the calculation of overhead rates for research contracts, it may be said that not a great deal of activity is directed towards uncovering the cost of research and that the main emphasis seems to be on instructional costs, internal allocation of resources and budget justifications. Also, in most cases some external pressure or need would seem to be required for continuing cost studies on an annual basis. As a corollary to this point, it was stated on occasion that the initial undertaking of a full-fledged cost study was extremely worthwhile for internal management purposes and often resulted in detecting beneficial or inefficient parts of a university or, if nothing else, provided a good insight into the detailed operations. Some doubt was expressed whether annual updating of the exercise was worthwhile.

### 4.2 Allocation of Faculty Salaries

A crucial problem in costing studies is the treatment of faculty salaries, the most important single item in any university's budget. To solve this problem, a questionnaire is usually administered, requesting the faculty members to indicate the activities in which they are involved and the percentage of their time devoted to each of these activities (a typical questionnaire is reproduced in Appendix J). The time distribution thus found is then used as a basis for allocating faculty salaries to the activities concerned. This procedure, however, meets with a great deal of scepticism.

In the first place, there is the problem of jointness or commonness found in any costing situation, but of particular importance in universities where certain faculty activities clearly produce joint products. The most frequently occurring activities of this type are those involving simultaneously instruction and research. An example is the faculty member who while working at his research project, also provides instructional assistance to a graduate student. It is felt that, in such situations, there is no meaningful criterion by which a faculty member can split his time between the two joint products of his activity and that any estimate he makes cannot be more than arbitrary. In addition, it is argued that since a faculty member's activities are not spread out evenly over the year with some being concentrated in one part of the year and others in another, he cannot properly account for the time devoted to each of them and may, for example, overstress the significance of those activities in which he is currently involved. It is also said that a certain degree of bias is inherent to this method of time allocation and that, in many cases, a faculty member will report not what he actually has been doing, but rather what he thinks he ought to be doing.

Although these problems have, so far, remained unresolved, mention should be made of some alternative approaches in the United States which are worthwhile considering. At Colorado State University, for example, a faculty salary distribution system based on work assignments has been developed; under this system, standard class loads are established and used as criteria for the allocation of faculty effort and related academic salaries. An added feature is the segregation of academic salaries between research and teaching activities, again through an overall standard workload which compares time expected to be devoted to a research project with the normal effort required for instruction and course preparation. Another example is the system developed at Princeton University (see the description in Appendix K) which attributes "unit values" to the various functions in which a faculty member is involved and then uses these values to build up a standard workload. Although these approaches are still in their infancy and sometimes, as in the case of the Princeton system, do not take research into account, they may in time be further developed and provide an alternative to the present system of faculty time allocation.

It should be noted here that in the United States it is quite customary to have the time or effort of academic staff devoted to research work clearly identified and to receive reimbursement for related faculty salary costs under federal government contracts and grants. Moreover, both in the United States and Canada, academic departments often allow release time from teaching duties in order that a faculty member may devote additional time to research. Consideration might be given to use work assignments as an alternative to detailed time and effort reporting.

Another alternative which might be pursued with respect to the aforementioned problem of inseparability of faculty effort between graduate student instruction and related research projects, is to use statistics of time expended by

graduate students themselves as parameters for allocating faculty salaries.

#### 4.3 Library Costs

In addition to the continuing problem of allocation of faculty salaries referred to above, another major costing problem is that of the distinction between the library's research and instructional functions and of appropriately distributing its costs between them. A 1970 report stated:

"The statistical and other information regarding library activities which is available at the present time, although it is very voluminous, has not been prepared for the purpose of relating library activities to the university's objective and there is really very little information on which conclusions regarding the costs of providing adequate library support for various types of university programmes could be based."<sup>1</sup>

It can be argued that library expenditures are not too material since, in 1975-76, they only amounted to 5.6% of the universities' total operating expenditures.<sup>2</sup> However, they may become important if, instead of being evenly spread out over all programs and functions of a university, it would appear that they should be charged mainly to only some of these programs and functions. If, for example, "advanced work in the social sciences and humanities need library resources to a degree comparable to the need of the natural sciences for equipment and laboratories",<sup>3</sup> then it seems appropriate not to distribute library costs evenly, but to allocate a proportionally greater share to the social sciences and humanities.

In 1973, the Ministry of State for Science and Technology commissioned a study by Louis Vagianos and John H. Oxley of Dalhousie University to report on the relation of research use of university library materials to the cost of providing these services. The resulting findings contained in a report entitled *Cost vs. Use: A Hypothesis for Assessing Library Costs of Materials Needed for Research Use*, are worthy of review in order to be aware of appropriate allocation parameters and costing procedures. Measures such as use of circulation data and sampling of persons who patronize library services are mentioned.

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<sup>1</sup> *An Exploratory Cost Analysis of Some Canadian Universities*, The Report on the Study of the Costs of University Programmes in Canada, Association of Universities and Colleges of Canada, Ottawa, 1970, p.50.

<sup>2</sup> *Part II: Financial Statistics of Universities and Colleges, 1975-76*, Canadian Association of University Business Officers-Statistics Canada.

<sup>3</sup> *A Commitment to Excellence*, Report of a Task Force on Graduate Studies and Research in the Humanities and the Social Sciences, Queen's University, 1975, p.82.

#### 4.4 Capital Costs

The area of capital expenditures may also require further study and investigation. Most costing studies have abstained, to a greater or lesser degree, from including any use allowance or depreciation in view of the difficulties met in placing a realistic value on capital assets and in arriving at an appropriate depreciation rate. It can be argued that exclusion of capital costs in existing cost studies has seriously understated total real costs.

#### 4.5 Feasibility of Inter-Institutional Comparisons

*The Report of the Study Group on the Costs of University Research* provided a fairly precise model for conducting a full costing study with the normal three primary cost centres of instruction, research and public service and a list of allocation procedures for overhead costs. Methods and procedures followed at campuses such as Calgary, Manitoba and McMaster are strikingly similar. This is not surprising, since most studies in Canada rely heavily on a format developed by the National Centre for Higher Educational Systems (NCHEMS) in the United States. If a pilot costing study is undertaken, it is the Committee's opinion that agreement can be reached on a common methodology and definitions which will be practicable and acceptable to the participating universities.

It is perhaps worthwhile to note that the whole notion of comparability was considered questionable by some universities that have attempted to make comparisons with others. Factors such as dissimilar educational missions, age of an institution which impacts on such things as maintenance and library costs and mix of faculty, size of institutions, and different funding systems especially in the medical school area, were all cited as items which tend to distort cost comparisons with others.

### 5. FUTURE ACTION

Approaches to further study have been identified and are classified under four main headings below. In each case, the purpose and major advantages and disadvantages are included, along with an approximation of the costs of implementation.

The first approach entails the establishment of a costing methodology for the limited area of contract research whereas the latter three involve more comprehensive research costing. The four approaches are not mutually exclusive and can be carried forward concurrently under one coordinating group to avoid duplication.

#### 5.1 Guidelines for Costing Contract Research

The purpose of this approach is to provide a set of guidelines for the definition, calculation and inclusion of indirect costs in research contracts and for procedures to determine the direct and indirect costs of research contracts which will be acceptable to universities and outside agencies.

The results will be of use in negotiations in conjunction with research

contracts and establish a basis for the acceptability of the apportionment of indirect costs to these readily identifiable activities.

As covered in Section 3.7, a fair amount of work has already been undertaken by individual institutions, the Accounting Research Committee of CAUBO, and the Department of Supply and Services in establishing policies for calculating the costs of contract research. Further elaboration and standardization of definitions and procedures is considered necessary, including some testing at selected universities, in order to arrive at a more precise set of guidelines. This approach could also develop appropriate guidelines for capital costs and review the exclusion by the Department of Supply and Services of certain expenses.

This project does not require a full costing exercise and because of the work that has been carried out to date, should be completed in a period of four to six months and at a cost of from \$10,000 to \$15,000. In view of the direct involvement of the Canadian Association of University Research Administrators (CAURA) in this subject, CAUBO would seek its active participation.

#### 5.2 Examination and Analysis of Existing Cost Studies

The purpose of this approach is to examine and compare the methodologies used in existing studies; to study research costs produced by these studies; to investigate whether patterns of cost structure and composition as found in the universities under study have applicability outside these institutions; and to examine whether or not the application of a common average overhead rate to all research is feasible. Included would be empirical findings on the breakdown between the indirect and direct costs of research projects and insight into the portion incurred for salaries' expenditures.

Additional output of this approach could hopefully be formulae or proxy measures which could be used to arrive at the full costs of research at all Canadian universities, coupled with a breakdown among major disciplines. The main focus would be on externally sponsored research, including research funded by grants as well as contract research; unfunded research would also be investigated. Another output might be the publication of a detailed description of the methodology, definitions and procedures followed at the selected institutions, especially the cooperative expenditure analysis at the three Ontario universities, which could be used by other universities interested in undertaking a full costing study.

It is expected that this approach would concentrate on the methodologies and findings of the joint study being conducted by Guelph, McMaster and Waterloo and the results emanating from the studies at the Universities of Alberta, Calgary, Laval, Sherbrooke and the UNICOM system in Manitoba.

This project is limited to the extent that a small number of institutions

would be involved, and would lack representation from all regions. A corollary to this disadvantage would be a concern for non-comparability in applying proxy measures or formulae to the financial data of institutions of varying size and discipline mix and with different provincial funding mechanisms. Offsetting advantages would be that results will become available within a fairly short period of time and that by capitalizing on work already done, the effort and expense of conducting a more extensive costing exercise are avoided.

Since use will be made mainly of already available data and since it is expected that there will be only a minimal need for the production and computation of additional data, it is estimated that this project can be completed within twelve months.

For the execution of this project, CAUBO would intend to add representation from AUCC, CAURA and institutional researchers. Since a full-time investigator will have to be attracted, the costs of this project are estimated to be in the order of \$50,000.

### 5.3 Pilot Costing Study

The third approach is to undertake what was envisaged in the recommendations of the 1974 *Report of the Study Group on the Costs of University Research*, namely to cost out research in a representative sample of universities on the basis of common definitions and a common methodology. Within this general approach, two alternatives can be considered: (a) such a study would focus only on the cost of research; (b) the study would not be limited to research, but would aim at producing cost data on the three primary functions of a university: instruction, research and community services.

The advantages of such costing studies, whether limited or extended in scope, are manifold. They provide the fullest possible information on the cost of research and its composition from a range of institutions. Since information is gathered in a common manner, the findings will be reasonably comparable. The data can be manipulated in the manner suggested for the study mentioned in Section 5.2 above and can be used to validate the findings of this study.

The main drawback of this approach is that it is time consuming. The joint study by Guelph, McMaster and Waterloo, which was carried out by universities in the same financial jurisdiction and with previous costing experience, took well over two years before any results were produced. Even if the limited approach is adopted, it will probably take at least the same time, if not more, to undertake a pilot costing study involving a larger group of universities in different financial jurisdictions and with different accounting systems.

The limited approach - research costs only - presents a somewhat easier concept. Costs would have to be split only into two components (research - other functions), whereas the extended approach would require a fuller analysis with costs distributed over a larger range of functions (research,



instruction and community services) and over various levels within instruction such as undergraduate instruction, graduate instruction, etc. The latter approach, moreover, would require detailed analysis of course enrolments in order to arrive at meaningful instructional unit costs. In view of this and because, as far as research is concerned, both approaches would presumably produce the same results, it might be decided to opt for the limited approach. However, a study which sheds light on the cost of all functions might be more attractive to the participating universities. It is therefore suggested that this study be set up in such a manner that it can accommodate both the limited and the extended approach, and that it be left to the participating institutions to decide which approach they will carry out.

A sample of universities would have to be constituted with appropriate regional and discipline representation. However, it should be noted that this might present difficulties: the number of universities which fulfill the requirement of having a sophisticated accounting system is relatively small, and even in this group there may be only limited interest in participating in the study.

To carry out this project, CAUBO could coordinate a group comprised of representatives from AUCC, CAURA, institutional researchers and faculty. This group would need the services of a full-time investigator with a technical assistant. The cost of operating the committee and its staff will require an amount in the order of \$70,000 per year. In addition, funds will be required to meet the financial requirements of the participating universities.

#### 5.4 Medical Cost Study

Section 2.10 of this report outlines the unique problems involved with costing in the specialized medical field. It is pertinent to note here that the costing studies conducted by the Universities of Calgary and McMaster and some of those conducted by the University of Alberta excluded their faculties of medicine. However, because of the importance of medical research, with grants from the Medical Research Council accounting for over 15% of the total sponsored research income received by universities for the fiscal year ending in 1976, the Committee feels that an attempt should be made at investigating the costs of medical research on university campuses. It therefore recommends that separate costing studies be undertaken in an appropriate sample of faculties of medicine.

Such a study would require up to two year's work involving a group that includes representation from medical faculties as well as CAUBO. Technical assistance should be solicited from the Association of Canadian Medical Colleges (ACMC), and a full-time investigator will have to be engaged. It is foreseen that the work could be combined with that performed by personnel involved with the approaches outlined in Sections 5.2 and 5.3 above. This would be helpful in order to coordinate these separate studies with the overall cost study of the related parent institutions and would ensure that all indirect costs are properly accounted for.

If this study is conducted by itself, an annual budget of about \$50,000 would be required; if conducted in conjunction with one of the approaches outlined in Sections 5.2 and 5.3 above, the cost would be about one-half this amount.

In summary, an inventory of present costing studies at Canadian universities has indicated some fairly extensive efforts but at a selected number of institutions and with greater emphasis on costing instructional activities than on costing the research function. Special problem areas requiring further investigation such as faculty activity analyses, allocation of library costs and appropriate treatment of capital expenditures have also been identified. In lieu of a specific recommendation for a single course of action, four approaches or projects have been proposed for further consideration.

APPENDIX A

QUESTIONNAIRE ON COSTING ACTIVITY

- 1. Are there any functional cost studies or cost analyses currently under way, planned for the near future, or have any recently been undertaken?

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- 2. If so, would you please describe the activity, giving the participants and the sponsoring agency, and covering in your report items of the following nature:

- (a) Who initiated the project, the institution or some outside agency, such as a university cooperative group or a government?

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- (b) What are the objectives of the study? Are they internal objectives such as management of resource allocations, or external objectives related to funding?

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- (c) Whether internal or external objectives, are the results being exhibited outside the university and being used by the government or other agencies? If so, how?

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- (d) Within the institution, how is the work being done, e.g., by institutional research, by accountants, or some combination? Is the study related to WICHE or NCHEMS and if so, how closely? Perhaps you could point out significant variations.

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(e) What work is being done on faculty activity analysis? How is it being done, i.e. by faculty, department or individual? What activities are being identified?

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(f) Have common definitions been established for functions being measured such as research; for expenditures; for the measurement of student activity such as by courses, credits, contact hours, etc.?

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(g) Describe briefly the method used in loading indirect costs to the direct costs of the various functions being costed.

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3. If the answer to question #1 is "no", could you please provide the committee with an expression of your institution's capability to carry out a study such as the costing of research.

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APPENDIX B

ATLANTIC PROVINCES UNIVERSITIES  
FINANCIAL INFORMATION SYSTEM

Resulting from joint efforts of the universities in the Atlantic provinces, the grants authorities and Statistics Canada, the system has as its main objective to meet, through uniform reporting, the financial information requirements of these groups and to produce program cost data. This information is to be used for considering resource allocations to programs within universities, for inter-university comparisons, and as a basis for the Maritime Provinces Higher Education Commission to support its recommendations to governments.

The system has been developed in three phases. Phase I consisted of the establishment of standard definitions and a common reporting format for revenue and expenditure categories and items. Phase II saw the integration of financial data with space and student data and the allocation of overheads to academic departments to arrive at average course credit costs. The system is now in its third phase during which a faculty questionnaire is being administered in order that faculty time and salaries can be analyzed and specific program costs can be produced.

Each university in the system collects basic data on its own institution. These data are reported to Statistics Canada where a computer program has been developed to produce the required outputs.

All expenditures of a university are classified under three major categories: operating, capital and ancillary enterprises. Capital expenditures other than debt servicing charges and ancillary enterprises are presently excluded from further analysis. Operating expenditures are classified under primary cost centres (teaching departments) and secondary cost centres (plant, computer centre, administration and general, student services, research, library, dean's offices, and community services). At this stage cost recoveries are deducted, thus leaving a net cost for each centre. For research this means that total expenditures are reduced by the amounts received for assisted and contract research and that, practically, only the expenditures related to university funded research are left in this cost centre.

The net costs of the secondary cost centres are allocated in a step-down method. For example, plant costs are allocated to other secondary cost centres and to teaching departments; once this has been done, plant costs are closed as a cost centre and no further costs are allocated to this centre. The sequence and the bases of allocation are as follows:

1. Plant costs: allocated to other secondary cost centres on a square-footage basis and to primary cost centres on the basis of course credits.

2. Computer costs: to all remaining centres on actual computer hour usage.
3. Administration and general: to all remaining centres on the basis of their total direct costs.
4. Student services: to teaching departments according to course credits; scholarships and bursaries, however, are allocated on the basis of actual costs.
5. Research costs: direct transfer to the departments which incurred the costs.
6. Library: direct transfer for book and periodical acquisitions; the allocation of the remaining costs is based on course credits.
7. Dean's offices: on the basis of teaching staff salaries to teaching departments.
8. Community services: to teaching departments on the basis of course credits.

Once all net operating expenditures have been assembled under teaching departments, student course information is related to the financial data. In phase II of the system, this results in an average course credit cost per department and, through aggregation of course credit costs, in average program costs.

In phase III of the system, now underway, a questionnaire is being administered that will ask for a percentage distribution of the time a faculty member devotes to his main activities: instructional courses, directed graduate studies and other activities such as research, committee meetings, etc. With this information, departmental costs will be further analyzed. Faculty salaries and other direct costs will be distributed across a department's courses on the basis of the time distribution reported in the questionnaire; indirect costs will be allocated to courses on the basis of course enrolments. By dividing the number of registrants in a course into its total cost, a specific - not an average - cost per course credit will be obtained which can be used for calculating program costs.

The manner in which the questionnaires are to be completed has been left to the individual universities. In some, it is done by the faculty members themselves, whereas it is done by the department heads in others. In one university instead of completing a questionnaire for each faculty member, a profile of the activities of an average faculty member in each department has been assembled.

The system is still in a development stage. In addition to consolidating work that has been done so far, further activities are envisaged. These will aim, for example, at establishing cost indicators in the area of ancillary enterprises and at the fuller integration of capital expenditures into the system.

APPENDIX C

UNIVERSITE LAVAL

In a 1975 report entitled *Coûts indirects des activités d'enseignement et de recherche à l'Université Laval*, a method is described which aims at evaluating the indirect cost to be taken into account in contract negotiations with outside agencies. It has as its objective the development of a method for calculating direct and indirect costs which can be applied to the great variety of Laval's contracts, grants and professional services; is simple to administer; and can be employed in the natural sciences as well as in the humanities and social sciences.

It should be noted that the proposed evaluation method does not distinguish between instruction and research. The report sees instruction and research as complementary and states that since it is impossible for faculty and others to divide their time with accuracy between these functions, it is not feasible to calculate separate costs for each of them. Instruction and research are therefore treated together with the same indirect cost percentage.

The report defines direct costs as those which are related to the use of human and material resources and which can be identified with and charged to a given project. They comprise, on the one hand, the direct salaries of staff involved in teaching and research (faculty, teaching and research assistants, professional and technical staff) and on the other hand, such direct costs as social benefits, supplies and materials, travel, telephone, fees of outside consultants, equipment rentals and computer charges.

Indirect costs are those which are incurred in the use of resources with a view to carrying out various projects simultaneously without it being possible to identify and charge clearly that part of the costs that is attributable to each separate project.

A third category are the non-relevant costs. They refer to ancillary enterprises such as cafeterias, residences, student services and certain athletic activities, and are eliminated from the cost calculation.

Indirect costs are expressed as a percentage, not of total direct costs, but of total direct salaries only. The report points out that salaries are chosen because they are considered to be the most equitable bases for the various faculties, and adds that, in this respect, its approach differs from the one adopted by most other Canadian universities which applies an overhead rate to the total of direct salaries and other direct costs. In the opinion of the report, this approach places far too much emphasis on the purchase of supplies and materials as compared to direct salaries and, thus, favours science faculties over those faculties where research involves mostly faculty time and salaries.

On the basis of the above definitions, the annual budget of the university is analyzed and, after elimination of non-relevant costs, all expenditures are grouped in three categories: direct costs, direct salaries and indirect costs. Indirect costs are further divided into five sub-categories, and both the total indirect costs and the cost of each sub-category are expressed as a percentage of total direct salaries. For the fiscal year 1973-74, an overhead rate of 104.7% of direct salaries was found, broken down as follows:

1. indirect costs applicable to all faculties, schools and centres	78.8%
2. depreciation of buildings	6.0%
3. depreciation of equipment	8.4%
4. depreciation of rolling-stock	0.2%
5. interest on loans	11.3%
	<hr/>
	104.7%

With this information, it is now possible to calculate the cost of a given project. First, an estimate is made of the time which will be devoted to the project by faculty, research assistants, technicians, students, etc; multiplied by the hourly or daily rate of each this will provide the direct salary component of the project's total cost. Next, other direct costs are added and as a last step, the overhead rate is applied to the salaries in order to find the indirect costs. By adding together these various cost elements, the total cost of the project is established. A further refinement is that a distinction is made between projects of natural science faculties and those of other faculties regarding the application of the indirect cost percentage related to depreciation of laboratory equipment.

The report stresses that calculating the total cost of a project does not imply that this cost should also be charged to whoever commissioned the project. The breakdown in salaries, other direct costs and the five categories of indirect costs makes it possible to analyze a project and to decide which cost elements should, and which should not, be charged to the client.



APPENDIX D

RESEARCH COST STUDY  
UNIVERSITE DE SHERBROOKE

In view of the growth of research at the Université de Sherbrooke between the years 1965-66 and 1972-73 which reflected itself in a considerable increase in the university's operating expenditures, it was decided to investigate the cost of research in the academic year 1972-73.

The report on this study<sup>1</sup> defines the costs of research as the additional outlays or expenses or costs which are occasioned by research. In essence, the study is thus concerned with those costs in the operating budget of the university that would not have been incurred theoretically, if there had been no research. It should be noted that the study was limited to assisted research; non-assisted research and research undertaken by graduate students were excluded.

For practical reasons, it was decided to exclude costs related to the time devoted by faculty members to research. However, costs related to the time spent by department heads on research administration and to the time spent on research by researchers without any teaching load were included.

The analysis commenced by assigning all expenditures of the 1972-73 operating budget to faculties and support cost centres. Once this had been done, the research team interviewed faculty deans, department heads, those in charge of support cost centres and others, and asked them to indicate which expenses in their budgets they could have avoided if, theoretically, no research had taken place. For salary expenditures (as far as included), this was usually done by identifying the persons affected by research and then estimating the portion of their time involved. For other expenditures it was, as far as possible, done on a direct costing basis; if this could not be done, some pro-rata basis was adopted (e.g. floor space for building costs).

Having thus found the research costs of both the faculties and the support cost centres, the costs of the latter were allocated to the former. For some support cost centres such as the library, the audio-visual centre, the computer centre, and grounds and buildings, the basis for this allocation was determined through special studies; the cost of the remaining support cost centres (for example, the president's office, financial services, public relations, purchasing office, etc.) were pro-rated to faculties on the basis of the research grants received by each faculty. As a result of these allocations, all research costs were assembled at

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<sup>1</sup>Gregg Beaudoin and Gilles Valence, *Etude sur l'évaluation des frais indirects de la recherche*, Bureau de développement institutionnel, Université de Sherbrooke, Septembre/Décembre 1973.

the faculty level, and for each faculty, the total costs of research which emanated on the one hand from the faculty's own budget and on the other hand from the allocations of the various support cost centres, were established.

The study continued by analyzing the costs of research of the various faculties and by expressing them as a cost per faculty member, per student, etc. It also compared these costs with the research grants received by the faculties, as shown in the following table:

Faculty	Cost of Research as calculated	Research Grants	%
Arts	\$ 107,008	\$ 127,431	84%
Administration	30,827	12,998	237
Law	20,379	50,334	40
Medicine	1,172,890	2,492,047	47
Education	27,146	25,467	106
Sciences	582,110	781,087	75
Applied Sciences	485,896	580,650	84
Theology	12,562	29,734	42
D.G.F.M.	52,597	0	∞
<b>Total</b>	<b>\$2,491,415</b>	<b>\$4,099,748</b>	<b>61%</b>

The rather wide range of the percentages in the last column is noteworthy. For example, in arts, a research grant of \$1.00 generated \$0.84 in research costs, whereas the same dollar generated \$2.37 in research costs in administration and only \$0.40 in law.

APPENDIX E

COOPERATIVE EXPENDITURE ANALYSIS  
UNIVERSITY OF GUELPH, McMASTER UNIVERSITY  
UNIVERSITY OF WATERLOO

In 1974, a proposal was put forward to conduct a joint cost study among four Ontario universities. Three of them, the University of Guelph, McMaster University and the University of Waterloo<sup>1</sup>, adopted the proposal and undertook to carry out a cooperative expenditure analysis for the fiscal year 1975-76 on the basis of a common methodology. Three goals were set for the analysis: (1) to compare the costs of similar programs among universities in order to understand better the unique differences which have arisen from their various methods of resource allocation; (2) to give the academic community a means to plan and fund academic programs from a more informed perspective; (3) to develop an objective basis for submissions to government for funding. In order to realize these goals, it was decided to determine a per-student cost for each academic program within the participating institutions, to work toward an exchange of these data and to encourage follow-up studies.

A fairly elaborate structure was devised to execute the analysis. A committee made up of the presidents of the three universities served as a policy-making group with responsibility for the inception of the study, for monitoring its progress and for final decisions regarding exchange and external release of data. A three-member steering committee was responsible for day-to-day progress, determining procedures governing the information exchange, the timetable of the project and its strategy, as well as for making recommendations on methodology, program classification structure, definitions, account crossover procedures and the faculty activity analysis. In addition, a number of ad-hoc groups were established to study aspects of the project and each university had its own procedures in order to participate in the analysis.

Four steps can be discerned in the implementation of the cooperative expenditure analysis. As a first step, the traditional university line-item accounts were identified as primary activities (instruction, research and community service) and support activities (student services, academic services and institutional support). Academic programs to be costed were determined and a program classification structure and common definitions for activity centres were established.

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<sup>1</sup>The University of Western Ontario, initially involved in this project, withdrew in 1976.

The second step saw the collection of data on courses, students, faculty and space, and of financial data obtained from the actual expenditures of the fiscal year 1975-76. To determine computer costs, the actual usage time per department or program was determined and a cost was then calculated using the rental charge for a similar machine for that time. To smooth out the fluctuations over the years in equipment purchases and unusual expenditures such as renovations, a four-year average (1972-76) was established with actual costs adjusted for inflation. This phase also saw the development of a faculty activity analysis form which was administered about half way through the year 1975-76. Although the detail of information to be gathered was left to the discretion of the individual institution, the faculty questionnaire generally asked for the distribution of faculty time over such activities as instruction, supervision of student research and thesis work, research, administration by level, professional activities and community service. The first three activities were generally further sub-divided: instruction into undergraduate courses by year, graduate courses, non-credit courses, and counselling; supervision into master's, doctoral and post-doctoral levels; research into externally sponsored, internally sponsored, contract, and free research. Different methods of gathering faculty activity data were adopted: in some departments, the questionnaires were completed by faculty members themselves, whereas in other departments, the department heads undertook this task on behalf of the faculty.

The establishment of common data bases was not without problems. The accounting systems of the universities, having been developed from diverse backgrounds, lacked uniformity. Even where accounts had similar titles, further analysis often showed up differences which undermined their comparability. Likewise, information systems differed between the universities and were, even within the universities, not always integrated. This disarray made data collection more difficult and time-consuming because of the numerous sources which had to be consulted in order to obtain and correlate data.

During the third step, basic direct costs such as salaries, benefits, supplies and services were assigned to departments; other costs, such as audio-visual and computer costs which were charged directly to departments, were isolated. Within academic departments, direct costs were distributed among the primary activities of instruction, research and community services on the basis of the distribution found through the faculty activity analysis. Finally, a basic direct cost for each department was computed.

The fourth step involved the allocation of indirect costs and the calculation of full costs per student. University administration and physical plant operation costs were stepped down over all university departments. A charge for physical plant operation was first assigned to administration and the administration costs were then distributed over all university departments, including physical plant, by the proportion of basic direct costs per department to total university direct costs. Plant operation costs were allocated to buildings and, within buildings, to primary and support activity centres on the basis of assignable square footage. Within buildings, space usage was determined for research areas such as laboratories and graduate offices as well as undergraduate class room space. Library costs

were allocated to the primary activities (instruction, research and community service) by means of circulation data and/or purchasing statistics. The remaining indirect costs such as academic administration and student services were allocated on the basis of appropriate faculty and student measures. At this point, all instructional costs had been allocated and research costs and community service costs had been accumulated by department. This allowed the calculation of costs per student per academic program for each of the three primary activities and also, by folding back research and community service costs onto instruction, the calculation of the full cost per student per program. In these calculations, use was made of an instructional workload matrix.

It should be noted that research costs are accumulated at the departmental level: costing of individual projects, though deemed feasible, was felt to be beyond the scope of the study because of the detailed data collection required. Moreover, it should be noted that, because of the specific problems which faculties of medicine pose, this faculty has been excluded from the McMaster cost analysis.

APPENDIX F

UNICOM INFORMATION SYSTEM

In 1970, the Universities Grants Commission in Manitoba, Brandon University, St. Boniface College, the University of Manitoba and the University of Winnipeg initiated a project - later named UNICOM - that aimed at an investigation of the status of the universities' record systems and the development of a space inventory system. Experimental work on computer-based budgetary systems was also pursued. A new stage was introduced to this project late in 1972, when a study of unit instructional costs was undertaken to provide information from which the Universities Grants Commission could derive an improved granting formula. Major efforts were directed toward developing comparative measures for each institution and determining useful methods of analysis. Following this study, attention was focused on the improvement of the computer systems used to analyse the data and on the improvement of the data base itself. Efforts to establish adequate data base definitions and structures form a continuing part of the project. Unit costs are re-determined annually and computer programs for modeling student flow and projecting staffing and financial requirements are being developed.

Within its general aim of developing and operating a unified information system to meet the individual and joint needs of the participants, UNICOM has three specific goals: (1) to develop adequate data bases and supportive systems to answer questions from the Universities Grants Commission, federal agencies such as Statistics Canada and university members; (2) to determine unit costs and to analyze university expenditures according to various categories for use by the Universities Grants Commission in forecasting budgetary requirements and distributing operating grants to universities; and (3) to develop a student flow model.

In connection with its first goal, UNICOM has built up extensive data bases which include information on the universities' staff, undergraduate and graduate enrolments, course offerings, space and finances.

In view of the second goal, a simulation model has been devised for each of the participating universities in order to facilitate the analysis of costs. Using historical data, parameters have been generated and the model is now operational and used to estimate university costs.

The method by which costs are calculated can be briefly described as follows. Department heads are requested to provide an average profile of the activities of their staff which indicates the percentage of effort of the total faculty in a department (not of individual faculty members) devoted to the following programs: committee activities at the faculty and university levels; public service activities; teaching activities subdivided in four levels of undergraduate instruction, graduate instruction, supervision of master's students and supervision of doctoral students; and research, scholarship and creative work not included under the foregoing activities. It should be noted that there is no special program for departmental or research committees; time spent on such committees is

included in one of the other programs as appropriate. The time distribution thus found is utilized for allocating the departmental salaries to the programs in which the department is involved; other direct costs of the department are also assigned to these programs. Next, overhead cost centres (for example, plant maintenance and operation, library, central administration, dean's offices, instructional media, and computer centre) are established and their costs are apportioned to the teaching departments using appropriate allocation measures such as assignable square feet, total expenditures, numbers of student or staff, actual usage reports, etc. Departmental costs related to faculty and university committee activities have been transferred to appropriate overhead cost centres and are thus included in the above allocations. Within departments, these overheads are further allocated - on the basis of the faculty time distribution - to the various levels of teaching activities, to public service and to research. At this stage, therefore, the full cost of these programs, including both direct and indirect costs, are established. The simulation model permits the further manipulation of these costs and can produce such unit costs as the cost per student contact hour, the cost per credit hour, and the cost per degree program.

The third goal of the UNICOM system is the development and maintenance of a student flow model. Based on historical data and incorporating specific needs of society and industry, the model uses trend and prediction analyses to forecast future enrolments and student continuation and exit patterns.

APPENDIX G

COST STUDIES CONDUCTED BY  
THE UNIVERSITIES OF CALGARY AND ALBERTA

In 1967, formula financing was introduced in Alberta as a method of distributing provincial government grants to universities. This approach weights student enrolments in various categories of programs to reflect differences in the costs of operating these programs, and uses the resulting weighted enrolments as the basis for the distribution of operating funds. In order to determine whether the enrolment weighting formula as used by the then Alberta Universities Commission fairly reflected actual costs, the University of Calgary and the University of Alberta each undertook a series of cost studies. Calgary's studies covered the years 1969-70 to 1972-73 and Alberta's studies the years 1969-70 to 1973-74. The main objective of both universities was to produce costs per student by program of study which would be used to investigate the validity of the weighting formula, but since their studies were not conducted jointly and since there were differences in the methodology, the program costs are not entirely comparable. In view of the stated objective - student program costs - research was not costed out as a separate activity.

The University of Calgary

As a first step of the methodology devised for the University of Calgary cost studies, all direct expenses are assigned to support activities (physical facilities maintenance; academic support services; library; student and community services; university administration) and to academic department activities (instruction divided into junior, senior and graduate levels; master's and doctoral levels of supervision of student research and thesis work; graduate students' assistance; research; departmental, faculty and university administration; student and community services). The assignment of the direct costs of the academic departments is based on the time distribution which is obtained by requesting faculty to complete a questionnaire and to allocate their time to the afore-mentioned activities.

It should be noted that instruction and supervision of graduate student research and thesis work are the primary activities, to which, in the end, all costs will be allocated. Moreover, it should be noted that the analysis excludes medicine, evening credit, summer session and continuing education.

In the second phase of the analysis, various overheads are allocated. The costs related to physical plant maintenance are allocated to the other support activities and to academic departments in proportion to their square footage of assignable area. Accumulated costs are used as basis for the allocation of the costs of academic support services to the remaining support services and to the activities of the academic departments. Library costs are also allocated in this phase: to academic departments in proportion to the number of enrollees taught.



Within departments, library costs, combined with departmental administration costs and the departments' share of plant maintenance costs, are further distributed to instruction and supervision of graduate research and thesis work on the basis of these activities' accumulated costs. Lastly, departmental research costs are allocated: to instruction and supervision in proportion to faculty salaries assigned to these activities.

The third step consists of the transfer of the costs which so far have been accumulated under instruction and supervision of graduate student research and thesis work, to academic programs of students. In each department, the costs of the various levels of instruction are distributed among the courses taught at each level (in proportion to the number of teaching units generated) and next by means of a crossover matrix which calculates costs per course enrollee, transformed into academic program costs per student by faculty, degree sought, major and year of study. Departmental costs of master's and doctoral supervision and those of the till now separate activity of graduate student's assistance, are assigned to graduate programs in proportion to the number of full-time students in each program.

This leaves the costs of faculty and university administration and student and community services. Weighted student numbers serve as the basis for their allocation to student programs. The analysis thus results in full costs per student by program of study.

It will have been noted that the analysis does not treat research as a primary program which is fully costed out. Its direct costs are established in each department, but except for a share of the costs of the academic support services, no university or departmental overhead costs are specifically allocated to it, either because research is directly excluded from an allocation (for example, in the case of library costs) or because the basis of allocation chosen (such as student numbers) is not appropriate for costing-out research. In fact, research as a separate activity disappears at the end of the second stage of the analysis when it is folded back onto instruction and supervision.

#### The University of Alberta

The methodology used in the cost studies of the University of Alberta was developed originally from that described in the report *An Exploratory Cost Analysis of Some Canadian Universities* (Association of Universities and Colleges of Canada, Ottawa, 1970), but in the course of the years, a number of changes have been introduced. The description below refers to the methodology as it was used in the 1973-74 cost study.

The study is comprised of three major phases. In the first place, the university's operating expenditures are reconciled and grouped under the following categories: plant maintenance, library, computer centre, administration, student and community service, and teaching departments. The first three categories are then allocated to the others. For plant maintenance costs the basis of allocation is square footage of assignable space. As to the library, book acquisitions are charged

directly to the departments concerned, processing costs are allocated in the same proportion as book acquisitions, and library circulation statistics are used for allocating the remaining costs. Direct costing is used to allocate computer expenses. Within the teaching departments, primary and support programs are defined. Primary programs are: instruction subdivided into two undergraduate and two graduate levels; supervision of student research and thesis work at the master's and doctoral levels; supervision of student teaching (for the faculty of education only); research. Support programs are: departmental, faculty and university administration; student and community service.

In the second phase, a faculty activity analysis, which indicates the distribution of time faculty members devote to the various primary and support programs, is applied to allocate departmental expenditures - salaries and other direct expenses - to the programs carried out in each department. In previous cost studies, time distributions were requested from departmental chairmen; however, for the 1973-74 study it was decided to use the percentage time distribution reported by faculty members for 1971-72.

Lastly in this phase, the plant, library and computer costs allocated to each department and the costs of the program departmental administration are distributed to the departments' primary programs of instruction, supervision and research.

The third phase consists of the allocation of the expenses of each department to students. Instruction costs at each of the four levels of instruction are pro-rated to courses at those levels (based on the number of teaching units which each course generated) and the instruction cost per course is then divided by that course's registration to derive a cost per registrant. The research costs of the department are pro-rated to the programs instruction and supervision based on faculty activity in these programs. Research costs related to instruction are next pro-rated to courses and course registrants in the same manner as indicated above for instruction costs, resulting in two costs per course registrant: one for instruction and one for research.

Supervision costs and research costs related to supervision are allocated to graduate students on a per-head basis with part-time students receiving an appropriate fraction.

Two more steps complete this phase. The cost of faculty administration, including the share of departmental expenses allocated to this program, are distributed on a per-head basis to the students in each faculty. The costs of university administration and of student and community services, accumulated from departments (phase 2) and from the reconciliation and classification of expenditures (phase I), are distributed on a per-head basis to all students on campus.

Since no other data than student enrolments were available for the faculty of medicine, the 1973-74 cost study had to exclude this faculty from the unit cost calculations. Such programs as TRIUMF research, summer session and evening credit were excluded from all cost studies.

APPENDIX H

COSTING MEMORANDUM FOR CONTRACTS  
WITH UNIVERSITIES AND COLLEGES

The federal Department of Supply and Services has recently issued a document entitled *Costing Memorandum for Contracts with Universities and Colleges*, which contains guidelines and definitions for the costing of contracts with universities. A summary is presented below:

The general rule, according to the guidelines, is that the cost of performing a particular contract shall consist only of expenditure made by the contractor in connection with the contract, and shall be the sum of:

1. direct materials;
2. direct labour;
3. direct expenses specifically identifiable with the contract such as, for example, royalty payments, fringe benefits, computer time and travel;
4. indirect costs, i.e. costs which having been incurred for joint objectives cannot be identified specifically with a particular research project or other university activities, and which are normally classified under such functional categories as physical plant, audio-visual, computers, library, departmental administration, research administration and general administration.

Regarding indirect costs, the guidelines state that they should be allocated to research, instruction and other activities in ratios which are consistent with the nature and extent of the use of the university's resources by research personnel, faculty, students and others. It is foreseen that it may be necessary to provide for selective distribution by establishing separate cost groupings within one or more of the above functional categories, but it is left to the university's judgement to decide on a case-by-case basis whether and how this should be done.

The guidelines contain a lengthy list of excluded costs such as, to name but a few of the more important ones, interest on capital, loans, mortgages, etc.; amortization of unrealized appreciation of values of assets; and legal, accounting and consulting fees in connection with fund raising.

In addition, the guidelines mention non-allowable costs. To be allowable, costs must be reasonable and in accordance with the terms of the research contract, they must be pursuant or allocable to the contract, and they must be accorded consistent treatment through application of generally accepted accounting

principles appropriate to the circumstances. Within this framework, the guidelines specifically exclude costs related to academic teaching, ancillary enterprises, debt retirement, expenditures supported by the federal government, purchase of land, purchase of machinery and equipment, and capital improvements and renovations. However, regarding the last two exclusions, depreciation or use allowance is recognized in lieu of capital outlays and expensing of individual items costing \$200 or less is permissible.

A further group of costs is disallowed because they are linked entirely or substantially with education, ancillary enterprises or other university objectives not related to research. This rather extensive group consists of costs related to academic activities (non-credit instruction, seminars, teaching, etc.); alumni activities; community services (bookstores, cafeterias, dormitories, lecture halls, museums, rental properties, residences, etc.); public relations (corporate relations, development office, fund raising, news bureau, university press, etc.); and student services and activities (admissions, convocations, commencement, counselling, athletics, health services, placement, registrar's office, student aid and scholarships, student organizations and unions, etc.).

APPENDIX I

GUIDELINES FOR CALCULATING OVERHEAD  
ON SPECIFICALLY SPONSORED RESEARCH<sup>1</sup>

1. INTRODUCTION

The main purpose is to provide guidelines to universities and colleges in arriving at an overhead rate for inclusion in the cost of research services and facilities. In most cases it is expected that a department or agency of the Canadian Federal Government is involved<sup>2</sup> and that a contract is negotiated in conjunction with the Federal Department of Supply and Services. In order to arrive at an appropriate base against which to apply an overhead rate, procedures for determining direct costs applicable to the research function are also included. It is expected that a significant amount of externally sponsored research is being conducted. Otherwise, a rate of 30% of specific direct costs (mainly salaries and supplies) can be obtained already without further cost analyses.

2. DIRECT COSTS

2.1 Elements

Direct cost is defined as "an item of cost that may reasonably and conveniently be identified with a specific unit of product or with a specific operation, process, department, or other cost centre<sup>3</sup>." For a university, typical transactions chargeable to a research agreement as direct costs would be the appropriate payroll costs (including group benefits in most cases if specifically identifiable) for research assistants, and any stipend paid to principal investigators; the costs of materials consumed or expended in the performance of a research project; and any service or other costs which can be specifically assigned. Included in other costs could be a purchase of research equipment which is required specifically for a research project and not a type which would be usable for activities of a university other than research.

2.2 Direct Materials

As mentioned in a costing memorandum available from the Department of Supply and Services (referred to as Form DSS 1031), direct materials includes "material purchased solely for the contract and processed by the contractor, or material issued for the contract from contractors' general stocks". The latter component should especially be noted to ensure that items such as

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<sup>1</sup> Draft prepared by the Canadian Association of University Business Officers.

<sup>2</sup> For contracts with the United States Government, detailed procedures are contained in a circular entitled *Cost Principles to Educational Institutions* (referred to as FMC 73-8).

<sup>3</sup> Canadian Institute of Chartered Accountants, *Terminology for Accountants*, page 36, 1976.

scientific supplies or chemicals from central stores are being charged to a research project. DSS 1031 also points out that material should be charged at the "net laid-down price", which simply means the actual invoice plus sales tax, where applicable, less any trade discounts. The costing memorandum also permits the inclusion of transportation and material handling costs (including mainly duty and brokerage fees).

### 2.3 Direct Labour

DSS 1031 mentions that compensation for persons such as professional engineers and draftsmen can be charged as a direct expense to a research project provided the work is performed directly on and "is properly chargeable to the contract". Compensation in this case includes both salary and related fringe benefit costs.

It is expected that adequate payroll records are maintained to substantiate the charges for a person working directly and full-time, such as a laboratory technician or research assistant. Also, costs of personnel assigned part-time to a project, such as a secretary working on various research projects, could also be charged if the costs can be easily identified and apportioned.

A portion of a full-time faculty member's compensation can also be charged to a research project. In this case the apportionment should be based on some analyses of time or effort devoted to the research project and a reasonable split of compensation related to normal university teaching workload and other commitments. Charges to a research agreement may include their reasonable amounts for activities contributing and intimately related to the work, such as consulting with colleagues and graduate students with respect to the related research, and attending appropriate scientific meetings and conferences which cover the subject area.

It is expected that allocation of compensation charges for full-time faculty will be based on the individual faculty member's regular compensation for the period which constitutes the pay practice of the institution concerned. The twelve months from July 1 to June 30 is considered the normal period here. Charges for any extra compensation above the base salary may be allowed if for time or effort in addition to regular workload. Calculation for such charges would be at a monthly rate applicable to the base salary.

### 2.4 Direct Expenses or Charges

DSS 1031 provides for direct charging of costs on the basis that the costs are directly related to and identifiable to a specific project and not included in distributable overhead. Items such as travel expense, consultant fees, equipment acquisitions used specifically for the project, and patent fees are examples here. In addition, central support costs, such as computer or audio-visual services which are easily assigned, say under a charge-out system, can also be included.

### 3. INDIRECT COSTS

#### 3.1 Definition

Indirect expenses have been defined by the Canadian Institute of Chartered Accountants as "an item of cost that cannot be conveniently identified with a specific unit of product or with a specific operation or other cost centre". For a university, indirect costs can therefore be described as those that have been incurred for common or joint objectives and therefore cannot be identified specifically with a particular research project, an instructional activity or any other institutional activity. Such costs are also normally classified under the following categories : library, audio-visual services, computing, administration and general, physical plant, community services, and student services. The latter two categories are normally considered by the Federal Government to be for non-research activities and therefore considered an unallowable component of overhead costs. However, in the case where a large number of graduate students are engaged in work under research contracts, it would seem appropriate to allocate a portion of student services costs to the research function. One alternative suggested here, as described on pages 38-39 of FMC 73-8 for United States contracts, is to consider some fraction of student services costs to be part of research administration expenses.

#### 3.2 Research Administration Expenses

In addition to the expenses included in the functional categories mentioned in Section 3.1 above, the functional costs of academic administration and the office of research administration should also be identified. The latter item represents an identifiable administrative unit established solely to administer the research activity, including such functions as contract administration, personnel administration, and editing and publishing of research projects. The expenses included in this category, which should be easily separated from the general and administrative functional expenses, can be treated entirely as an overhead item charged to specifically funded research activities.

The academic administration category includes overhead expenses incurred in academic deans' offices, academic departments and any research centres or institutions, which benefit common or joint academic departmental activities or objectives. In the functional format followed in *Financial Statistics of Universities and Colleges* these expenses would be included with the instruction, non-sponsored research function.

#### 3.3 Capital Costs

Both DSS 1031 and FMC 73-8 permit institutions to be compensated for the use of buildings and usable equipment on hand through the means of "reasonable provision in overhead for capital cost allowances". It is expected that detailed fixed records be maintained and calculations of estimated useful life be made. Depreciation rates on a straight-line basis of 2% for buildings and either 6 2/3% or 10% for equipment are cited in the U.S. contract guidelines. Rates followed by commercial enterprises for income taxes such as

5% for buildings and 20% for equipment (on a declining balance basis) would also seem acceptable.

An alternative approach is to consider expenditures for current year acquisitions, especially if it can be indicated that the capital additions are the result of a policy of maintaining the original value of building and equipment at a consistent level, and that a university does not maintain capital asset records.

4. ALLOCATION PROCEDURES

4.1 Objective

The primary functions of universities are traditionally considered to be instruction, research and public service. The arrangements of the operations of a university into these three major cost centres involves arbitrary classifications since a university accounting structure tends to identify expenditures such as salaries, supplies and travel costs by organizational units. However, as mentioned previously, there are main functional categories of an overhead nature which are already grouped together for financial reporting purposes. The problem then is to allocate these overhead costs to the three primary functions (plus any functions which are not directly related to the research function such as student services) on an arbitrary but rational basis.

4.2 Basis for Allocation

DSS 1031 requires that a "proper proportion of indirect costs" be allocated to research projects financed by the Federal Government. It is recognized that the methods of allocating indirect costs are many and varied, thus no specific examples are cited. One main criteria suggested however are that bases used should be representative of the activity level. In other words, the methods to be used in the allocation process should rely on parameter data that have a high correlation with the level of services provided to the activity centre utilizing those services.

4.3 Allocation Parameters

Costing studies published by the National Centre for Higher Education Management Systems (NCHEMS) as well as material supplied by various CAUBO member institutions indicate a fairly consistent approach to the allocation process, which for the aforementioned functional categories can be illustrated as follows:

<u>Function</u>	<u>Allocation Parameter(s)</u>
Library	Book acquisitions; circulation data; academic staff payroll costs; number of graduate students.
Audio-visual services	Actual usage data.
Computing	Actual usage data.
Administration and general	Total direct costs.



<u>Function</u>	<u>Allocation Parameter(s)</u>
Physical plant	Assignable square feet.
Academic administration	Total direct costs; percentage of deans' and department heads' salaries; proportion of deans and departmental office expenses if budgeted separately.

5. DISALLOWABLE ITEMS

5.1 Specific Expenses

DSS 1031 contains a list of 19 elements of costs which must be deleted from indirect cost allowable to government work. The main items which might apply to a university are as follows:

- 5.1.1 Bad debts, collection expenses, and losses on investments;
- 5.1.2 Fines and penalties except in compliance with a research contract;
- 5.1.3 Debt retirement and servicing.

5.2 Non-Research Activities

The following expenditures would also be disallowed because they are linked entirely or substantially with the instruction function, or other institutional objectives not furthering research work:

- 5.2.1 Losses or any expenses related to ancillary enterprises;
- 5.2.2 Student services;
- 5.2.3 Registrarial and admission offices;
- 5.2.4 Community services;
- 5.2.5 Convocation expenses.

6. COSTING MODEL

In order to present the guidelines in a manner which covers the points discussed above, attached are figures derived from *Financial Statistics of Universities and Colleges 1975-76* which can be used to arrive at an overhead rate for research. These figures are aggregate figures for all the 66 reporting institutions. It is arbitrarily assumed that all overhead costs are evenly allocated on the basis of direct costs. The overhead rate for research would then be calculated as follows:

Total overhead	$\frac{640}{1,435} = 44.6\%$
Total direct costs	
Research administration	$\frac{6}{245} = 2.5\%$
	<u>47.1%</u>

CALCULATION OF OVERHEAD RATE

(in millions of dollars)

Overhead Costs

Library		128
Audio-Visual Services		16
Administration and General	151	
Less disallowed expenditures:		
Admission and Registrarial (estimated)	30	
Miscellaneous (bad debts, convocation, etc.)	15	
Debt Servicing	<u>7</u>	<u>52</u>
		99
Less Research Administration	<u>6</u>	93
Computing		57
Physical Plant		253
Academic Administration (estimated at 8% of Instruction)		<u>93</u>
		<u>640</u>

Direct Costs plus activities not related to Research

Instruction, Non-Sponsored Research	1,168	
Less Academic Administration	<u>93</u>	1,075
Non-Credit Instruction		23
Community Services		5
Student Services	62	
Add Admission and Registrarial	<u>25</u>	87
Sponsored Research		<u>245</u>
		<u>1,435</u>

APPENDIX J

THE UNIVERSITY OF ALBERTA COST STUDY 1971-72  
TEACHING DEPARTMENT FACULTY ANALYSIS FORM

RANK:

\_\_\_\_\_

DEPARTMENT:

\_\_\_\_\_

AVERAGE  
PERCENTAGE  
OF TIME

<u>PROGRAMS</u>	<u>WINTER SESSION</u>	<u>SUMMER MONTHS</u>
<u>INSTRUCTION:</u>		
Lower level undergraduate (courses numbered 1-299)....	_____	_____
Upper level undergraduate (courses numbered 300-499)..	_____	_____
Graduate level 500 (courses numbered 500-599) .....	_____	_____
Graduate level 600 (courses numbered 600 and up) .....	_____	_____
<u>SUPERVISION OF GRADUATE STUDENT THESIS WORK:</u>		
Master's program .....	_____	_____
Doctoral program .....	_____	_____
<u>SUPERVISION OF RESIDENT PHYSICIANS AND INTERNS: (FACULTY OF MEDICINE ONLY) .....</u>		
<u>STUDENT TEACHER SUPERVISION: NOT DIRECT SUPERVISION OF THE EDUCATION PRACTICUM COURSES IN YOUR DEPARTMENT (FACULTY OF EDUCATION ONLY)</u>		
Elementary Route Students .....	_____	_____
Secondary Route Students .....	_____	_____
Industrial and Vocational Students .....	_____	_____
<u>RESEARCH:</u> .....	_____	_____

ADMINISTRATION:

Departmental Administration .....	_____	_____
Faculty Administration .....	_____	_____
University Administration .....	_____	_____

STUDENT, PUBLIC AND COMMUNITY SERVICES: .....

TOTAL	100%	100%
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ACCOUNT FOR ALL TIME SPENT IN THE WINTER AND SUMMER MONTHS FOR WHICH REMUNERATION IS RECEIVED FROM OPERATING FUNDS IN THIS DEPARTMENT, EXCLUSIVE OF SUMMER SESSION AND EXTENSION PROGRAMS.

APPENDIX K

MEASURING FACULTY WORKLOADS: AN ALTERNATIVE APPROACH<sup>1</sup>

*The Fall 1973 Educational Record included a short article entitled "A Fair Measure for Faculty Workloads," prepared by S. Frederick Starr, assistant professor of history, Princeton University. Based on this article, and on some additional materials supplied to NACUBO by Dr. Starr, the following summary represents an alternative to the "teaching hour" method on analyzing faculty time allocation.*

The "UNIT SYSTEM" of measuring faculty workloads takes into account the full complex of duties and responsibilities comprising the time expended by a faculty member. With the proliferation of managerial duties and professionalization of the administrative function in modern colleges and universities, the "teaching hour" approach to faculty time is no longer an accurate measure of comparative faculty time allocations.

The unit system, developed by the Department of History at Princeton University, is established through a five-step process of faculty time analysis:

1. Each department member lists all of his or her academic functions (e.g., lectures, classes, advising, departmental administration).
2. A complete list of functions is compiled, with each department member then making an estimate of the time required to perform each function.
3. All estimates are compiled and "unit values" are attributed to each function.
4. The number of units comprising a "full schedule" is computed.
5. Schedules based on the "full schedule" concept are drawn up and distributed to department members for approval.

In the Princeton history department, undergraduate teaching assignments range from 17 units for an undergraduate lecture course offered for the first time, to one half unit for the supervision of juniors for one semester. In graduate teaching, 14 units are attributed to a graduate seminar offered for the first time, with 2 units allowed for dissertation supervision. In administration, the department chairman is assigned the full 20 units, the freshman adviser the lowest, 1 unit.

A full schedule is equivalent to 33 units. All overloads and underloads are dealt with through a "unit bank" (a pool with which faculty members may deposit or withdraw units from one semester to another, based on the relation of their total units to the 33-unit full schedule). No faculty member participates in more than two courses per semester, or is responsible for more than one major administrative function.

Advantages of the unit system include: a registry of all workloads in a given department; the acquisition of data on which more rational decisions with regard to staffing needs may be based; and the improvement of morale within a given department, with the gradual equalization of workloads and formal knowledge of time expended by fellow faculty members.

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<sup>1</sup> Taken from *The College and University Business Officer*, published by the National Association of College and University Business Officers, VII, 8, Feb. 1974, p.5.

APPENDIX L  
STATISTICAL TABLES

TABLE I: SPONSORED RESEARCH INCOME BY SOURCE, TOTAL OPERATING INCOME, AND ENROLMENTS OF CANADIAN UNIVERSITIES, 1975-76 (in millions of dollars)

	ATLANTIC	QUEBEC	ONTARIO	WEST	TOTAL
Sponsored Research Income:					
National Research Council	5.3	13.1	30.0	20.6	69.0
Medical Research Council	2.2	13.4	12.9	10.6	39.0
National Health and Welfare Canada Council	0.9	1.8	3.0	2.7	8.4
Environment Canada	0.5	2.6	2.8	1.3	7.1
Atomic Energy Control Board	0.1	0.3	0.7	1.3	2.4
Other Federal Govt. Grants	-	0.5	0.4	1.1	2.0
Provincial Government Grants	3.1	10.2	8.1	5.5	27.0
Municipal Government Grants	0.4	14.2	17.2	9.7	41.4
Total Government Grants	-	-	0.1	-	0.1
Gifts, Non-Government Grants	12.4	56.1	75.3	52.8	196.6
Investment Income	1.5	8.6	21.3	12.1	43.6
Miscellaneous	-	1.6	0.9	0.3	2.7
Interfund Transfers	0.2	1.4	1.2	0.3	3.0
	0.2	0.9	2.7	(0.1)	3.6
<b>Total Sponsored Research</b>	<b>14.4</b>	<b>68.5</b>	<b>101.4</b>	<b>65.3</b>	<b>249.5</b>
<b>Total Operating Income</b>	<b>218.3</b>	<b>545.6</b>	<b>929.3</b>	<b>624.5</b>	<b>2317.6</b>
<b>Sponsored Research as % of Total Operating Income</b>	<b>6.6%</b>	<b>12.6%</b>	<b>10.9%</b>	<b>10.5%</b>	<b>10.8%</b>
FTE Undergraduate Students	41172	86322	173432	106386	407312
FTE Graduate Students	3527	10216	18394	10371	42508

Source: CAUBO-Statistics Canada, Financial Statistics of Universities and Colleges, 1975-76.

TABLE II: FEDERAL SUPPORT OF RESEARCH AND DEVELOPMENT IN CANADIAN UNIVERSITIES AND NON-PROFIT INSTITUTIONS BY DEPARTMENT OR AGENCY, 1975-76 (in millions of dollars)

DEPARTMENT OR AGENCY	GRANTS	CONTRACTS
National Research Council	66.7	0.2
Medical Research Council	41.4	-
National Health and Welfare	9.6	0.1
Canada Council	8.2	-
Environment Canada	2.6	2.3
Atomic Energy Control Board	8.8	0.1
Industry, Trade and Commerce	1.5	-
Agriculture Canada	1.1	0.5
National Defence	2.4	0.6
Energy, Mines and Resources	1.5	0.3
Transport Canada	0.5	0.9
Privy Council Office	0.9	0.1
Indian and Northern Affairs	0.3	1.2
Ministry of State for Urban Affairs	1.4	0.4
Department of Supply and Services	-	1.1
Secretary of State	0.7	0.1
International Development Research Centre	0.6	-
Solicitor General	0.1	0.2
Department of Communications	-	0.7
Atomic Energy of Canada	-	0.6
Other	0.5	0.6
Total Federal Support	149.0	9.9

Source: Ministry of State for Science and Technology -  
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