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MASSACHUSETTS INSTITUTE OF TECHNOLOGY

Department of Physics

MEMORANDUM

To: Mr. N. McL. Sage

From: Professor Philip M. Morse

Date: February 20, 1951

Subject: Proposal for Research and Training Project in Applied Mathematics, Using Large-Scale Computing Equipment, Particularly Whirlwind

Whirlwind Project has now reached a stage of development where its potentialities can be utilized, together with the other computing equipment at Technology, in a coordinated research and training program, of the sort anticipated by ONR during its several years of support of the Project. Both the Institute and the Navy are vitally interested in the use of large-scale computing devices for the solution of scientific and engineering problems, and for the promotion of training for students interested in this field.

Of course a part of the time of Whirlwind will be used for the solution of a special Air Force problem, and it is expected that the Air Force will contribute an appreciable part of the support of the Whirlwind Project, for the development of equipment and methods for the solution of this problem. Nevertheless, approximately half the working time of the machine itself will be available for the fundamental program, mentioned above and outlined below.

Since a research and training program must be closely linked with other faculty activities, it is proposed that supervision of this part of the program be undertaken by the recently created Center for Machine Computation. The interdepartmental Advisory Committee to this Center provides a broad representation of the various scientific, engineering and training activities likely to be involved.

The program which ONR might wish to support can be divided into four sections:

1. Research in methods of numerical analysis and the formulation of scientific problems for machine solution, together with support of training of students in these methods.

2. Support of the scientific and engineering applications group previously referred to with Project Whirlwind so as to make the WW computer useful and available for the above research, and an aid to the research being carried on by MIT faculty and students.

3. A partial support of the maintenance of the WW computer.

4. Research on and investigation of digital computing machine components.

It is understood that details of the program, which is necessarily evolutionary in character, will be worked out from time to time with the Scientific Officer of the ONR.

It is contemplated that $300,000 per annum for a period of at least two years will be required to get this program under way. Detail of the budget is as follows:

Item 1	$100,000
Item 2	100,000
Item 3	50,000
Item 4	50,000

The detailed budget for each of the items may run approximately as follows:

Item 1 - Research and Training in Numerical Analysis

Technical Supervision; 1/3 Prof. Salary	$ 3,200
16 Research Associates (some part time) @ average salary $3,000	48,000
Other salaries and wages (secretarial and administrative)	6,000
Total salaries and wages	$57,200
MIT overhead @ 42%	24,000
	$81,200
Materials and Services	5,000
Travel	2,500
Service charges for computing equipment other than WW	10,000
	$98,700

Item 2 - Support of Scientific and Engineering Applications of Whirlwind

5 Engineers or mathematicians @ $5,200	$26,000
2 Research Associates @ $3,600	7,200
6 Research Assistants @ $2,400	14,400
6 Part-time Students @ average $1,200	7,200
2 Computers @ $3,000	6,000
2 Secretaries @ $2,200	4,400
	$65,200
MIT overhead @ 42%	27,400
	$92,600
Materials and Services	5,000
Travel	1,500
	$99,100

Item 3 - Partial Support of Maintenance of Whirlwind

1 1/2	Engineers @ $5,200	$ 7,800
2	Research Assistants @ $2,400	4,800
4	Technicians @ $3,500	14,000
1	Clerk	2,500
		$29,100
	MIT overhead @ 42%	12,200
		$41,300
	Materials and services including a share of replacement parts and storage tubes	8,000
		$49,300

Item 4 - Research on Computing Machine Components

1/2	Senior Engineer	$ 3,600
2	Engineers @ $5,200	10,400
1	Research Associate	3,600
2	Research Assistants @ $2,400	4,800
2	Technicians @ $3,500	7,000
1	Secretary	2,200
		$31,600
	MIT overhead @ 42%	13,200
		$44,800
	Materials and Services	5,000
		$49,800