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ABBREVIATED HISTORY  
OF  
SPECIAL CRYPTOLOGIC ADVISORY GROUP  
(SCAG)

FEBRUARY 1951 - FEBRUARY 1952

~~APPENDED DOCUMENTS  
CONTAIN CODE WORD MATERIAL~~

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ABBREVIATED HISTORY OF SCAG

1. In February 1951 the idea emerged that, although the Armed Forces Security Agency (AFSA) had acquired in its year and a half of existence a highly competent and experienced staff, nevertheless the services of a definite group of outstanding technical consultants in certain fields of interest to AFSA would provide a valuable source of advice and assistance in meeting special problems.

2. An agreement was therefore reached in March 1951 between the Chairman of the Research and Development Board (RDB), Dr. William Webster, and the Director, AFSA, RADM Carl E. Stone, U.S. Navy, whereby RDB would provide the necessary funds for the support of such a group of specialists (to be designated the Special Cryptologic Advisory Group or SCAG), and AFSA would maintain the technical records and provide the appropriate assistance. Mr. Edwin A. Speakman of RDB was designated by Dr. Webster to assist representatives of AFSA in working out necessary details. As an initial program for the group, it was decided to begin with a course of familiarization of members with AFSA's organization, tasks, problems, and accomplishments, after which the views of members would be sought to how they might, both collectively and individually, best provide the advice and assistance needed by AFSA.

3. The first meeting of SCAG, held 4-5 June 1951, at the Naval Security Station, Washington, D. C. and at Arlington Hall Station, Arlington, Virginia, was attended by eight prominent scientists:

- Dr. Stewart S. Cairns - University of Illinois
- Mr. Joseph R. Desch - National Cash Register Co.
- Dr. Howard E. Engstrom - Engineering Research Ass.
- Mr. John C. McPherson - International Business Machines
- Dr. John von Neumann - The Institute for Advanced Study
- Dr. R. K. Potter - Bell Telephone Laboratories
- Dr. Claude E. Shannon - Bell Telephone Laboratories
- Dr. Charles B. Tompkins - George Washington University

The program for the first meeting included orientation of the members of SCAG on AFSA organization and technical problems and a tour of the analytic machinery at both stations. Captain J. S. Harper, USN, Chief, Office of Research and Development, AFSA, was designated as the official contact of AFSA with SCAG members.

4. At the second meeting of SCAG, held 10 July 1951, members of the Group made individual visits to working sections of AFSA and held discussions with technical personnel on specific problems in their field of interest.

5. Between the second meeting of SCAG (July 1951) and the third meeting (September 1951) various suggestions were made how SCAG could function most profitably for AFSA and with most convenience to its members. These suggestions included:

- a. SCAG should be divided into two sub-groups, one for mathematical problems and one for engineering problems. This suggestion was vetoed on the

ground that many of the problems considered by SCAG involve close collaboration between the mathematicians and the engineers. Concentration of members on particular problems in their own field was not, of course, precluded.

b. The organization of SCAG should be formalized. The consensus indicated that the greatest contribution of SCAG members to the problems of AFSA would probably be of an individual nature and that any formalized organization of SCAG should in no way inhibit personal consultation or initiative in attacking technical problems. It was agreed, however, that some formal organization would be desirable, including a secretariat to provide minutes of discussions.

c. Special problems should be given the members of SCAG, with time and opportunity provided to discuss with each other and with members of AFSA the problems which were set.

d. A counterpart of SCAG within AFSA should be established, consisting of 12-15 persons divided into panels for special subjects.

e. Friendly social relations of SCAG members with AFSA personnel should be established, thus affording opportunity and stimulation toward the solution of AFSA problems.

f. More members should be added to the group, chosen by common agreement among members of SCAG, with the approval of the Director, AFSA.

6. At this time RADM Stone suggested that an attempt be made to establish, on the model of the Board of Visitors at the U.S. Naval Academy, a small, select group of outstanding men who might give advice and general guidance to AFSA's effort. The names of Dr. Webster, retiring Chairman, RDB, RADM (Ret.) Joseph R. Redman, and Dr. Vannevar Bush were proposed as possible choices for membership on this Board. The close of Admiral Stone's tour of duty as Director, AFSA brought this plan to at least a temporary ending.

7. As a result of the above suggestions, steps were taken between the second and third meetings of SCAG toward its formalization. Such a step was the election at the end of the second meeting of Dr. Howard T. Engstrom, ERA, as Chairman of SCAG. At the request of SCAG members, Dr. Engstrom prepared for discussion at the next meeting a statement of the mission of SCAG (attached as Appendix A) and the task priorities of AFSA (attached as Appendix B).

8. At the third meeting of SCAG, held 12-13 September 1951, members were presented to Dr. Walter Whitman, who had succeeded Dr. Webster as Chairman, RDB, and to Major General Ralph J. Canine who had succeeded RADM Stone as Director, AFSA. It was announced that for the present no counterpart of SCAG would be formed within AFSA, that Mr. William F. Friedman had been appointed AFSA representative for SCAG members, and that as "cover" outside AFSA the designation SCAG would be understood to refer to "Special Communications Advisory Group." Matters of an organization and technical nature discussed at the third meeting were:

a. Statement of the mission of SCAG: It was decided that the statement as prepared by the Chairman should be amplified by a more detailed

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statement of the mechanics by which SCAG could best carry out its mission. The Chairman of SCAG and Mr. John Howard were delegated to draft such a supplement.

b. Statement of task priorities: Although it was generally agreed that the task priorities had been correctly set, it was also the opinion that the problems were closely inter-related and that it would, therefore, be difficult to consider them separately. The Chairman pointed out that one of the primary purposes in drawing the statement of task priorities had been to permit SCAG members to devote their time to individual problems in their field of interest. After general discussion, however, it appeared that the SCAG members preferred to consider the problems as a whole.

c. Additional members: The names of approximately 20 scientists were proposed as possible new members. A membership committee, consisting of the Chairman, Dr. Robertson, and Mr. McPherson was appointed to consider the problem of additional membership.

d. Board of Visitors: The desirability of establishing a Board of Visitors was dropped from discussion as being outside the province of SCAG.

e. Intercept: The effect of quality and quantity of traffic on analytic success was discussed. Although the major difficulty appeared to be centered in the personnel problem, the technical possibilities of late developments in such fields as search receivers and antenna designs were pointed out. Dr. Potter of Bell telephone Laboratories was asked to determine whether SCAG should give this problem its further consideration.

f. Ultra-high speed electronics: In order to fulfill AFSA's excessive requirements for ultra-high speed computation, it was recommended that AFSA undertake a program of basic research into ultra-high speed electronics.

g. Methods of exhaustion or scritchng: Since methods of exhaustion or scritchng in connection with wiring recovery were subject to abstract exposition, it was recommended that AFSA prepare an abstract of this problem on a SECRET level for consideration by SCAG.

h. Wheel simulation and bombing: It was recommended that a report on the numerous methods suggested for wheel simulation and bombing be prepared for review by SCAG.

i. Plain language recognition: The problem of plain language recognition in connection with bombing and other techniques was referred to Drs. Potter and Shannon for consideration.

9. In the months following this meeting the question AFSA's position in regard to basic research was crystallized in a letter written 30 October 1951 by Dr. Charles B. Tompkins of George Washington University to the Chairman, SCAG, suggesting that "the SCAG contribution, at least in mathematics, could be materially strengthened by arranging for some time-consuming research by members and possibly others in congenial surroundings." Such a research facility, he thought, could be established on a year-round basis by means of a contract between the Director of Central Intelligence and the Rand Corporation, Santa Monica, California.

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10. Within AFSA there were various reactions to this proposal. Although it was realized that distinct long-term advantages might accrue from the proposed arrangement, there were disadvantages from the point of view of availability of qualified scientists, compliance with Civil Service Regulations, control of the project by CIA, location in California, and the short-term value of such a project. It was suggested that the solution to many of AFSA's complex problems might be advanced rather by such internal measures as an increase in the number of high-level positions open both to AFSA members and to newcomers, a raising of the standard of AFSA facilities and surroundings, protection of the scientists from administrative details, and gearing of the administrative functions to the efficient performance of tasks.

11. At the fourth meeting of SCAG, 6 December 1951, SCAG authorized its Chairman to address a letter to the Director, AFSA, suggesting that AFSA appoint a committee to investigate the possibilities of implementing a program of basic research, by contract or otherwise, and to delineate in general terms the nature of this program.

12. In connection with the proposed program Dr. Tompkins representing SCAG and members of the Mathematical Division of the Office of Research and Development representing AFSA drew up lists of installations where such basic research might be conducted. AFSA's survey included also (a) contracts already let; (b) subjects suitable for further contracts; and (c) potential contractors.

13. At the close of its first year of existence, it seemed appropriate for SCAG to draw for the Director, AFSA, the Chairman, RDB, a report on its accomplishments and recommendations. Members were therefore asked to assemble in a private opening session at the fifth meeting, to be held 12-13 March 1952, to consider basic topics and questions from which such a report might be drawn. These questions, as outlined by Mr. Speakman in a letter to members of SCAG, are attached as Appendix C.

14. Upon the answers to these questions rested in large measure AFSA's future course in scientific research.

15. A list of the members of SCAG as of March 1952 is attached as Appendix D.

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APPENDIX A

12 September 1951

Mission of the Special Cryptologic Advisory Group (SCAG)

1. The Special Cryptologic Advisory Group (SCAG) was set up by the Research and Development Board at the suggestion of the Armed Forces Security Agency. Its fundamental objective is to provide advice and assistance to the Armed Forces Security Agency in meeting special problems in the general field of communications intelligence. In view of its statutory responsibilities in the whole field of intelligence, the Central Intelligence Agency has expressed a deep interest in SCAG.
2. The members of SCAG are as follows:
  - Dr. Stewart Cairns, University of Illinois.
  - Mr. Joseph E. Desch, National Cash Register Company.
  - Dr. H. T. Engstrom, Engineering Research Associates, Inc.
  - Mr. John H. Howard, Burroughs Adding Machine Company
  - Mr. J. C. McPherson, International Business Machines Corp.
  - Dr. R. K. Potter, Bell Telephone Laboratories.
  - Dr. H. P. Robertson, Central Intelligence Agency.
  - Dr. Claude Shannon, Bell Telephone Laboratories.
  - Mr. E. A. Speakman, Research and Development Board.
  - Dr. C. B. Tompkins, George Washington University.
  - Dr. John von Neumann, Institute for Advanced Study,  
Princeton, New Jersey
  - Mr. William Webster, Former Chairman, Research and  
Development Board.
3. Members of SCAG will be appointed jointly by the Chairman of the Research and Development Board and the Director of AFSA. It is understood that the present SCAG members will consider needs for additional membership and make recommendations to the above agencies.
4. It is recognized that the problems facing AFSA in the field of communications intelligence are of great complexity and of utmost importance. The Special Cryptologic Advisory Group was formed for the following purposes:
  - a. To provide advice and assistance to AFSA in meeting special problems.
  - b. To maintain familiarity with these special problems and make recommendations to AFSA in connection with their solution.
  - c. To furnish information on advances in outside fields of interest to the special problems of AFSA.

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5. The present membership of SCAG gives representation of the various technical fields involved in the solution of these problems, such as mathematics, statistics, electronics and computing machinery. SCAG membership also includes individuals who are familiar with the latest industrial progress in fields which may be applicable to these problems.

~~WALTER G. WHITMAN~~  
Chairman, Research and  
Development Board

~~RALPH J. CANINE~~  
Major General, US Army  
Director, Armed Forces  
Security Agency

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~~CONFIDENTIAL~~APPENDIX CQuestions in letter from Mr. E. A. Speakman

- (1) How does SCAG feel it can help? Collectively or individually?  
Is the concept of SCAG worthwhile?
- (2) Is SCAG properly constituted or organized?
- (3) Are the members so in demand by other agencies that their effort is diluted?
- (4) What can be done to facilitate the solution of the primary problem?
- (5) What additional requirements should be met (funds, buildings, sites, equipment, personnel, etc.)?
- (6) Suggested future plans regarding AFSA.
- (7) Should outside contracts be let? If so, to what purpose and extent?
- (8) To what extent and where should long term or basic research be conducted?
- (9) To what extent could individual members contribute more time to AFSA problems?
- (10) Have SCAG members any comments or suggestions regarding AFSA's organization for an attack on the major problem?
- (11) Other comments.

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## Names of Persons Accepted as Members of SCAG as of December 1951

CAIRNS, Stewart S.	- University of Illinois
DESCH, Joseph R.	- National Cash Register Company
HIGSTROM, Howard	- Engineering Research Associates, Inc.
HOWARD, John	- Burroughs Adding Machine Company
MCPHERSON, John C.	- International Business Machines Corp.
NEUMANN, John von	- The Institute for Advanced Study
POST, Dean	- Research and Development Board
POTTER, Ralph K.	- Bell Telephone Laboratories
ROBERTSON, H. R.	- Weapons Systems Evaluation Group
SHANNON, Claude E.	- Bell telephone Laboratories
SPEAKMAN, Edwin A.	- Research and Development Board
TOMPKINS, Charles B.	- George Washington University
WEBSTER, William	- New England Power Company

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APPENDIX B

~~ARCANE~~

12 September 1951

EO 3.3(h)(2)  
PL 86-36/50 USC 3605STATEMENT OF TASK PRIORITIES FOR SCAG

1. [REDACTED]

The top priority under the main problem is the task of recovering the [REDACTED]. This task is subdivided as follows, in order of importance based upon probability of results:

[REDACTED] This recovery should provide additional information concerning the basic machine. The type of information and how to find it is considered of highest priority.

[REDACTED] Results of this test should be examined.

[REDACTED] Because of the large number of trials involved, the problem of mechanizing these methods is of great importance. One solution which has been proposed is the NOMAD equipment. Preliminary discussions have taken place considering possible other methods.

[REDACTED] The ROBIN project is designed to carry out the search for depths. Preliminary searches, utilizing the present two ROBIN equipments, have resulted in questions concerning criteria for depth which need investigation.

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PL 86-36/50 USC 3605

[REDACTED]

In this connection, numerous methods have been presented for simulation of wired wheels. Evaluation of these methods is desirable, together with suggestions for possible new approaches.

#### 4. Plain Language Recognition

In connection with [REDACTED] questions exist concerning optimum statistics to use for recognizing plain text. Problems also exist concerning mechanical methods of applying such statistics.

#### 5. General Research Problems

The following problems of general nature have been suggested:

##### (a) Ultra-Highspeed Computation.

Certain preliminary researches have been carried out on basic computing circuits operating at speeds of the order of 1,000 megacycles. Should additional support be given to work in this field?

##### (b) Transistor Techniques.

The development of the transistor appears to have reached a point of practical utilization in highspeed computation. Does this program require special attention?

##### (c) Photographic Techniques.

Since photographic methods provide the most compact form of digital data storage, as well as highspeed integration, should further and more attention be given to extension of these techniques?

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