

~~TOP SECRET EIDER~~~~TOP SECRET EIDER~~SUMMARY OF A MEETING AT WHICH NSA AND
SCAMP PROBLEMS WERE DISCUSSED0. Conferees and objectives.

The conference summarized here was held in the office of Mr. W. F. Friedman on the afternoon of 7 February 1955. Mr. Friedman, Mr. A. B. Clark and Dr. R. A. Leibler of the National Security Agency and C. B. Tompkins (the author of these notes) from SCAMP participated.

The meeting was held largely on the request of Tompkins, who had been asked by Dean Rees, Chairman of SCAMP, to seek such a meeting. His intention was to try to give his evaluation of the winter session of SCAMP, which had ended the preceding week at NSA.

This evaluation (as will be noted below) was generally high, but there was one specific criticism — that no mention had been made to the members of the group of one problem facing the Agency of probable importance exceeding any other problem, and that they had received no problems related to this outstanding problem which might help them contribute to its solution. This criticism led to a lengthy discussion of means of attacking this problem, and the views of Tompkins were solicited (it seemed) and offered (certainly) with the understanding that lack of clearance generated lack of information, and that this certainly left his suggestions with at most questionable reliability and value.

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This diversion led the discussions into several phases not originally contemplated. The main topics discussed were:

1. Appraisal of the SCAMP sessions, page 3
2. Discussion of the withholding of one problem, page 6
3. Questions of overcompartmentation, page 8
4. A suggestion that a problem be transferred to the research group at NSA, page 10
5. A suggestion that this problem be attacked by an ad hoc task force of the type recently assembled so successfully for other problems by Zacharias, page 12
6. The reluctance of mathematicians to serve in assignments where their effectiveness is in serious doubt, page 14
7. A proposed Institute of Intelligence and its relation to SCAMP, page 17

In the preparation of these notes, an attempt has been made to summarize the sense of the discussions. There was no set agenda, and the conversations were occasionally somewhat rambling. Hence the grouping into the above topics does not present the conversation in the chronological order which actually occurred. Each of these topics will be discussed in a separate section, beginning on the page noted after the topic in the list above.

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1. Appraisal of the SCAMP winter sessions.

This appraisal of the SCAMP winter sessions was offered by Tompkins as an immediate reaction by one of the participants.

He had been surprised and disappointed by the lack of facility for applying himself to an important problem. Some time had been left available for this, of course, and some contributions were made to problems by the group; probably most notable ones were made by Albert and Spanier who were working under conditions not shared by the rest of the workers. In this connection, however, the considerable diversions always encountered in Washington (the Air Force was trying to dislodge the SWAC computer from UCLA at the time, for example, and this occupied some of the time of Dean Rees, Professor Albert and Tompkins) must be realistically appraised in any estimate of what contributions would be made by unherded scientists in Washington.

In any event, the general program was applauded as one providing a highly necessary education in cryptology. None of the participants in SCAMP is particularly familiar with this field and the general program here seemed highly desirable.

It is not obvious that such a general education in the future is desirable. It is expected that, by and large, the same participants will be participating in SCAMP year after year and with the considerable (although admittedly meager) background they received during

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this session it would seem possible for them to apply themselves individually and effectively to detailed problems in the future.

It seems almost essential that these sessions in Washington continue if the summer sessions of SCAMP are to furnish the contributions desired. However, it seems likely that more will be gained if the participants come to Washington individually and work on particular problems than if the session just ended were to be repeated annually. This modification would certainly be more convenient to the participants, most of whom find it particularly difficult to devote a stipulated three weeks to the meetings, and it would probably be better for the Agency, which would not have to prepare and present the course of lectures.

It should be remarked that the preparation of the course of lectures was by no means a total loss for the Agency. In the first place, Mr. Clark reported that he learned much from them, the writer suspects that the people who prepared the lectures learned much from them, the lectures themselves revealed some faulty communications within the organization of NSA (particularly between the Production and the Research and Development Offices), and at least one non-SCAMP consultant and probably several members of the Agency's regular staff learned much from the lectures. However, it is probably true that these goals could all be achieved in the future by summary written presentations prepared

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in good expository style. This would require a rebirth of the summary report activity which has from time to time flourished at the Agency and its predecessor activities.

Several of the papers seemed poorly prepared for the audience to whom they were addressed. While this is inevitable in any course of lectures prepared by so many different lecturers, a strong impression was still left that the lecturers from the Office of Production had not been instructed to summarize their problems tersely in a form as definitely quantitative as possible. The inability of the mathematically trained participants in SCAMP to follow the narrative accounts of attacks made by these (certainly highly competent) cryptanalysts on the various problems they described left a feeling that the SCAMP participants, and probably the people presenting the papers, had wasted time and energy. There was a feeling that the presentations might have been unconsciously colored strongly by the typical sales presentations which must be made from time to time; there is no feeling in SCAMP that a mathematician is a substitute for a cryptanalyst, there is no doubt concerning the importance of the Agency's work and the value of the contributions already made by its cryptanalysts, and there is a great desire for problems which can be extracted in quantitative form from the work done.

The most serious seeming defect in the course was the complete absence of anything pertaining to the ALBATROSS problem. When

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this was mentioned, the conversations immediately turned to the other points listed above.

2. Discussion of the withholding of one problem.

Concerning ALBATROSS, Mr. Friedman pointed out that the high security considerations and the Agency's estimate of the low probability that anyone would contribute to the problem by working a short period had led them to withhold it. The wisdom of this decision was not completely clear to everyone in the room.

Tompkins pointed out that the problem had existed for some while under these restrictive conditions without a solution. While he understood the requirement for extreme care with regard to the security aspects of the problem, particularly if the problem were to be solved, he was inclined to doubt that the security aspect should be allowed to dominate the complete need for a solution to the problem.

He noted that he could not accept the estimate that three months is the shortest length of time in which anyone could be expected to be effective in the study of the problem. If the problem is properly summarized and indexed (and Mr. Friedman assured that it was), then a person experienced in some aspect of the problem might make a crucial contribution in a matter of a few minutes. He was assured that competent mathematicians are working on this problem, both in the Office of

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Production and the Office of Research and Development, however, he would not accept this as pertinent to the argument. Explicitly, it was the feeling expressed by Tompkins that SCAMP had made an effort to gather the strongest group of cleared mathematicians available for mathematical attacks on SCAMP problems, each of these is likely to have a greater knowledge of some fields of mathematics than any other living mathematician, and it is completely illogical to withhold from them a problem which is largely mathematical in character and which has defied solution for several years.

The lack of solution of this problem does not obviously imply incompetence on the part of those who are working on the problem. In the first place, there may be too few data for a solution to be obtainable. In the second place, as pointed out above, no organization can have a staff which is superb in every field, and consultants serve the purpose of suggesting approaches outside the experience of the presumably competent consultants.

Dr. Leibler stated his guess that there are enough data to permit a solution of the problem.

Tompkins stated, pointing out the inadequacy of his information, that he believed the arguments against submitting any part of this problem to SCAMP were specious and that the decision seemed to him to be completely consistent with a policy of fighting the problem rather than solving it.

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Mr. Friedman pointed out that any member of SCAMP who would be willing to devote three months or more of his time to continuous work on this problem would be welcome. This led to a discussion of the reluctance of mathematicians to serve in assignments where their effectiveness is in serious doubt and to discussions of the dangers of overcompartmentation.

3. Questions of overcompartmentation.

There is no doubt that intelligent compartmentation promotes security and that it interferes with productiveness. The questions raised were questions concerning the difficulty of attracting mathematicians to work on Agency problems if the compartmentation is sufficiently great to interfere with their effective work.

Mr. Friedman assured that there is every effort to avoid undue interference with production, and this assurance was repeated by Dr. Leibler and Mr. Clark. However, it could not be denied that the presentation by Mr. Holcroft to the SCAMP group had indicated serious gaps in the communications between cryptanalysts and mathematicians.

In particular, Mr. Holcroft had described his work on a particular problem. This work had progressed ingeniously (but, it turned out later, not toward the correct answer) for several months.

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The problem seemed to be solved by a British team a few days before his presentation. The solution to this problem would have been attained by any mathematician in the audience within a few hours after he had heard Mr. Holcroft's presentation. Presumably, this solution was held up for several weeks because of inadequate communications.

In this, it is not true that mathematicians claim to be superior to cryptanalysts at cryptanalysis, they do claim to be better at mathematics. The ingenious work by Mr. Holcroft had pushed the problem to a point where verbal analysis and analysis by drawing geometric designs were difficult and misleading but where algebraic analysis was simple and direct. The fact that the mathematical problem was not made clear indicates defective communications somewhere.

The statements above summarize remarks made largely by Tompkins and usually with Dr. Leibler's concurrence. They led to an attempt to outline a better organization structure.

It seemed accepted that each problem has a proprietor, who is in the Office of Production. Research and Development help is available to the proprietor of the problem on request. The good will of the proprietor, on the one hand, and of the researcher, on the other, is not challenged, however it is true that each fairly jealously is responsible to his organization.

Tompkins raised the question as to whether the mission of the PROD is not most properly to assure that facilities (men and machines)

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are available for productive attacks on problems met and whether the mission of R/D is not most properly to assure that facilities are available to carry out desirable research. It seemed questionable to him as to whether the research could be separated from the productive problems, and he recalled that it is frequent in organizations to provide a sort of maternal boss and a paternal one. The first, in the Pacific Fleet for example, might be the Commander of Cruisers and Destroyers, Pacific Fleet, and the second might be the commander of a fast carrier task force using a destroyer as a screen in foreign waters.

He suggested that a task force be organized as an ad hoc group to attack each problem, that this problem be assigned to whichever office seemed most appropriate, that the individuals assigned to the problem be responsible to the task force director for this problem during the term of their assignment, and that their competence be guaranteed and maintained by their maternal boss at all times. For research personnel, this would imply that the work on the task force would be dominated by a boss who might be from the Office of Production but that their well-being would be fostered by the Office of Research and Development (who would, probably, demand that a quarter of the researcher's time be left free for his own uninhibited researches).

4. A suggestion that a problem be transferred to the research group at NSA.

Specifically, Tompkins suggested that the ALBATROSS problem

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should be transferred to the Office of Research and Development at NSA along with those members of the force now working on it who seem to be necessary to the strongest possible attack on the problem.

Mr. Friedman immediately challenged this suggestion as unwise because of the ultimate productive ambitions with regard to the problem.

All sides realized that this discussion was not going to be explicit, for there will be no production without solution, and the probability of a solution under any assignment is a matter of opinion. Tompkins argued that an Office of Research and Development could be expected to attack unsolved problems in the field of interest to its organization, and that the ALBATROSS is certainly both unsolved and of interest. He pointed out that an assignment to the Office of Research and Development (that is, to a task group located in this office and answerable to its Chief) would not preclude transfer back to the Office of Production after effective production starts. He mentioned that the assembly of members of the task group for both departments would assure that this transfer back to the Production Department would go smoothly. He mentioned the work on the large German Naval problem during World War II as an assignment of this type where the solution was attained under the direction of Captain Engstrom, USNR, rather than under the direction of the group which was then carrying out the productive routine. (He also noted that there was no subsequent transfer of responsibility to the production group, an omission which he felt had not been wise.)

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Mr. Clark and Dr. Leibler did not enter into this phase of the discussion. Mr. Friedman was polite, but gave no visible evidence of being overwhelmed by the logical force of the arguments presented. He did not attempt to answer the argument, however. The author of these notes has somewhat better insight into his own mind than into that of Mr. Friedman, but it might reasonably be assumed that the indefinite nature of the argument and the lack of probable clarification induced Mr. Friedman from refraining from trying to examine this suggestion in detail.

5. A suggestion that this problem be attacked by an ad hoc task force of the type recently assembled so successfully for other problems by Zacharias.

An alternative method of bringing more research power to bear on the ALBATROSS problem was proposed. This was the assembly of a special group of scientists to devote a few months to an intensive study of the problem and to make recommendations concerning a proper ultimate attack on the problem. This type of attack has been spectacularly successful on several problems connected with physical aspects of military science. A leader in attacks of this type is Professor Jerrold R. Zacharias, who is Head of the Laboratory of Nuclear Science at the Massachusetts Institute of Technology. He is mentioned as typical, but there are several other scientists who have undertaken similar tasks.

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Professor Zacharias has been involved in Project Hartwell, Project Charles and the Lincoln Laboratory. These were set up in an attempt to contribute constructively and ingeniously to outstanding military problems through intensive study. They all had support to an extent which seemed extravagant to some onlookers and which guaranteed effectiveness if applicable ideas were developed.

The type of support required for such projects seems to include intimate and unrestricted support from the highest authority (the Joint Chiefs of Staff in the case of the projects mentioned above) and generous financial support. Many false leads are expected to be investigated at considerable cost. Following the original study the unrestricted support from highest authority is needed to set up a mechanism for carrying out the recommendations of the group.

It is unfortunately true that this highest authority must be convinced of the almost infallible genius of the workers. This seems to involve some definite wagers, for almost any genius has his detractors. These wagers are unattractive to many scientists, who feel that they are being forced to stake their reputations on something which is not an assured success in the start. They are acceptable to some scientists, who may feel that the wager is actually being made by their supporters who must bet one way or the other.

In any case, it is necessary at some time to convince some people of the probable success of the attack, and this almost always results in

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someone making a statement which sounds very much like a guarantee of success. If the success is not forthcoming (and up to date there have been no bad failures from the Manhattan District Project through the latest studies) the cause of quantitative science in military applications would take an unjustified loss.

Actually no one in the conversation in Mr. Friedman's office knew much about the details of such task groups. However, Dr. Robertson has been involved with most of them, and it was agreed that his advice would be required before any action along these lines was taken.

Mr. Clark seemed to feel that the setting up of such a task group for the summer of 1955 was not feasible. He did not preclude considering establishing such a group later.

6. The reluctance of mathematicians to serve in assignments where their effectiveness is in serious doubt.

The natural reluctance of mathematicians to serve in assignments where their effectiveness is in serious doubt was mentioned repeatedly through the conversations. The first remark of the type was one made by Tompkins that he would be unwilling to devote his full summer to SCAMP in 1955. His reason seemed simple: the Agency had been unwilling to divulge to him details of the problem in which he felt he would be most effective, and he was unwilling to give up his vacation to

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work for the Agency on lesser problems. He mentioned in this regard that the employees of UCLA do a considerable amount of work for SCAMP without remuneration, for the University will pay them for no more than eleven months work. Because of other commitments, Tompkins works twelve months during the years he spends a full session with SCAMP, and one of these months yields him no extra income.

He similarly noted that Mr. Friedman's unchallenged contention that competent mathematicians are devoting their efforts to ALBATROSS did not reassure him that his work for three months would be effective. He was by no means certain that the ineffectiveness was not due to organizational difficulties. He is willing to concede that the Agency must function with a considerable privacy, but under present conditions of freedom of choice of assignment and high demand it is to be expected that the mathematician will naturally devote his efforts to other problems. He seriously contended that he could not morally agree to spend three months at the Agency based on his present estimate of his probable effectiveness there and his present estimates of his probable effectiveness in his other assignments.

This did not represent a petulant feeling or a feeling of unfriendliness; it simply represented an opinion that either he is uninformed concerning the present possibility of productive work by a person of his temperament at the Agency (in which case others are probably also uninformed and the Agency might consider a public relations job) or

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(more likely) that the Agency set up working conditions which preclude productive efforts by people with this temperament and ability in the belief that the efforts of others would be more productive and that the overall goals of the Agency would be advanced.

One should note carefully that this attitude is completely different from the attitude of a striker. Several workers have given much time to Agency problems at considerable expense. They do not do this to get in a position to deny help to the Agency; they stop doing this, however, when it becomes apparent that the help they can expect to give the Agency is small.

There appears to be a kind of deadlock due to the fact that the Agency is reluctant to clear and brief a consultant for a high-level, compartmented problem unless he agreed to come to the Agency and work on the problem for at least three months, and mathematicians are reluctant to commit themselves to at least three months on a problem about which they know almost nothing.

At present, it seems that the SCAMP group will give the Agency valuable help by working in a relaxed and congenial atmosphere during the summer months at Los Angeles. This help will be in the form of reports which are intelligible to the mathematicians working at the Agency. To the extent that these mathematicians are aware of outstanding problems, they can bring them to the attention of the SCAMP

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workers and to the extent that they can work effectively then can apply these results to important problems. In any event, however, the SCAMP sessions seem likely to build up a workable set of mathematical tools applicable to cryptanalysis. These tools will remain in the possession of the Office of Research and Development until they can be used effectively, and there seems to be no superior way to get these valuable tools developed. The particular talents of presently available mathematicians will not be repeated, and their contributions will be basic in future years as the Agency's program continues.

Thus, it is reasonable to suppose that the talents devoted to general problems at SCAMP are not being wasted. It is not so easy to demonstrate that these same talents would be applied effectively to problems attacked over a comparatively long period by the same mathematicians working within the Agency.

7. A proposed Institute of Intelligence and its relation to SCAMP.

During the conversation the Institute of Intelligence which had been suggested by Dr. Howard T. Engstrom was mentioned. It was brought up both as a suggested instrument for alleviating the difficulties described in the section above and as a matter of historic interest in connection with the formation of SCAMP.

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No particular conclusions were reached. However, some narrative and descriptive statements were made, these described early suggestions not known to Mr. Clark.

Dr. Engstrom wrote his suggestion in a paper believed to have been commissioned by the Central Intelligence Agency. Mr. Friedman had seen the paper; Tompkins had never seen it, but he had discussed it with Dr. Engstrom in connection with SCAG deliberations. (SCAG was the forerunner of NSASAB.) Dr. Leibler had heard something of the paper at SCAG meetings also.

The suggestion was that an Institute of Intelligence (possibly more properly an Institute of Intelligence Science) be set up separate from the government intelligence agencies but in such a way that the members have full access to the material at the agencies.

Tompkins had not been in full accord with what he had heard of this plan unless it could be shown that a more direct approach to the problems of intelligence research is not feasible. (His general attack would be those implied in section 4 above.) However, there was and is strong reason to believe that these direct attacks are not feasible. Many industrial organizations have set up their own "Institutes of Research" separate from their productive facilities because of the friction generated by the seemingly different living standards required for effective production and effective research.

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At the time of the SCAG meetings this problem was being discussed by Dr. Engstrom and the people who had commissioned the report. It was noted by Tompkins at those meetings that at least a small scale version would almost certainly be productive, and he suggested the summer SCAMP program. Professor Cairns immediately agreed to be chairman of the first SCAMP meeting, and the meeting was scheduled to begin within less than three months of the date of the decision to hold it (from memory, this date was in April 1951 and the first session was under way on 1 July 1951, having started with a few workers present during part of June).

There has been some development of SCAMP since then, but mainly in the acquisition of more suitable personnel. It seems worthwhile to examine the desirability of a large scale development in an attempt to meet some of the problems mentioned in earlier sections of this report and the problems which Dr. Engstrom was commissioned to study.

Dr. Leibler mentioned that he had heard some discussion of this point, particularly with the increased difficulties which might be contemplated when the Agency moves to Fort Meade. He had been led to believe that General Canine is aware of the problems and that the obvious difficulties in morale in the Agency which would occur if an

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institute were set up would be faced by General Canine with equanimity if the General is convinced that this is the strongest attack possible on the research problem.

C. Tompkins
Washington, D. C.
17 April 1955

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On page 8 of the document listed under the control number 530 0604 the word "ingenuously" on the second line from the bottom of the page should read "ingeniously". I would appreciate it if you would insert this correction on your copy of this report.

FOR THE ASSISTANT DIRECTOR, RESEARCH AND DEVELOPMENT:



R. A. Leibler
Chief
Mathematical Research Division

cc: 3012 (2)