COMBINED EARTH RESOURCES ESTIMATING SYSTEM (CERES)

A STRATEGIC OUTLINE

NOTE: It is assumed that the readers of this outline are familiar with much of the detail of both classified and unclassified earth orbiting satellite programs and proposed programs. Therefore no attempt is made to explain the technical substance; operational intentions and results; or political and organization by-play relative to these programs. This outline is a sketch of a possible national course of action from a National Security Council point of view.

I. THE UNITED STATES PROBLEM

A. The Dilemma

1. Satellites are the means for gaining a large and crucial percentage of intelligence concerning the USSR and the CHICOM areas. To lose this capability would be a national disaster. To weaken or threaten the capability is serious mischief.

2. Satellites show increasing promise of some day providing at acceptable cost on a routine basis much information important to civil economies. To seriously or permanently frustrate this capability is not only politically unwise but also may work to U. S. disadvantage by damaging its international posture; by preventing a means for beneficial exploitation of its own resources; and by accelerating the drain on U. S. resources in contrast to developing unutilized resources elsewhere.

II. COROLLARY FACTORS

NOTE: The factors listed below are in random order. They are important forcing functions related to the construction of a workable national strategy.

A. Viewed as a space program and given suitable budget, a CERES program presents no serious technical or operating problems. It does present serious international relations and diplomatic problems which receive occasional comment, but relating to which there is little applicable working experience. Concrete plans and specific actions in this important area are scanty.

B. The lead time required to launch simple, but adequate, CERES systems is on the order of 14-18 months. The political consequences of the results of such missions are therefore in the future--but not far off. The data management problems are likewise situated.

C. Given budget and lead-time, space technology and operational capabilities are now fully adequate. However, the selection of suitable sensing systems is still an open question. More importantly, the problems of data reception, reduction, formatting, processing, quality control and distribution on a mass-production, routine basis as a service to consuming users has not been faced. Collecting masses of data in an unclassified program (with attendant press-agentry) when the data cannot be exploited is not only wasteful, but likely to bring serious political consequences.

D. The NASA Act and legislative history currently seem to prevent NASA from being the lead agency in routine, service-oriented space activities. A pattern has been set in providing a launch service to the Weather Bureau and to COMSAT. However, these are "single" customers for a specific kind of space operation, and care is exercised to turn operations over to them when orbit is achieved. In contrast the customers for space-gathered earth-resource information will be dramatically multiple. Common agreement as to which one should "operate" a satellite is unlikely.

E. There is a permanent censorship problem connected with space-gathered information. For example there is a constantly shifting pattern of more than 150 places in the U. S. over which aerial photography is prohibited. In addition, strong and permanent safeguards must be provided to avoid diplomatic or military embarrassment (or disaster) when foreign coverage is being accomplished. It is necessary to face the problem of providing for a delicate and somewhat unpalatable censorship function. How does one operate a civil data-handling function which incorporates a highly visible--yet inaccessible--censoring activity? Such a function seems highly likely to draw public, press and Congressional fire.

F. Among civil agencies, the USGS would seem to have the beginning of a capability to receive and process earth resources data. However, it has the following drawbacks:

a. Its charter limits its attention to the U. S. with rare exceptions, it has no background or experience in foreign entanglements.

b. While there are some energetic and forward-looking employees, its history of budgetary limitations has led to a slow, steady but stodgy environment, relatively inflexible and little adapted to rapid change.

c. Its total orientation is toward maps and cartographic photography. Other sensing systems and surveillance for economic purposes are not its forte.

G. The ESSA is a "headquarters" organization, not a capability. It has no suitable limbs with massive data-handling capability.

H. The DOD and related organizations possess a collection of independent principalities--namely the AMS, the ACIC, the Navy Hydrographic Office and NPIC--which possess collectively an appropriate data-processing capability at least four years in advance and many times more capacious than any civil agency.

They could be elevated to a DOD level and centrally directed as a single organization--as opposed to an assemblage of treaty-states monitored by staff action--and constituted by Congress in a kind of Corps of Engineers mold. So arranged they may be able to handle a massive data flow as well as provide astute and unexposed management of the permanent censorship function. The National Security Council could require DOD to face up to the national problem. Then the roles-and-missions arguments likely to be advanced by the Army, Navy and Air Force may well be subordinated to the common welfare--provided that the aforementioned principalities--under clear charter--continue to provide mapping and charting to the Services in an unimpaired way.

I. There is rapidly increasing intelligence community interest in the status of agriculture (and other economic indicators) in the U.S.S.R., the CHICOM areas and other "closed" countries. In the past this material has mostly been gleaned from statistical information published in the countries of concern. This is generally accurate since countries can neither make economic information secret nor afford to deceive themselves. However, aircraft or satellite collected information is increasingly interesting since routine statistics are:

a. substantially out-of-date after collection, reduction and analysis.

b. subject to sudden, massive falsification as an element of offensive strategy.

c. subject to selective falsification or deception in ways difficult to detect if the bulk of the data is true.

d. not available (or highly inaccurate) from the undeveloped countries.

e. requiring the services of many analysts for statistical data reduction and cross-verification.

It is likely that the intelligence community will precipitate active programs of aircraft and satellite coverage for agricultural and economic reasons which are in advance of NASA programs both in schedule and in desired sensor performance. This situation will give birth to many interesting possibilities in regard to NASA vs. civil user vs. intelligence community vs. military-space-program relationships. These situations may be adverse or beneficial depending upon the skill with which they are manipulated.

J. There is a rapidly growing claque of persons of various levels of naiveté in NASA and in potential users (eg ESSA, Interior, Corps of Engineers, Agriculture) who are exerting substantial and increasing pressure for some kind of earth-resources satellite program. It is essential to develop a program strategy which is simultaneously in the highest national interest and able to satisfy or control this clamour.

K. It is not generally recognized by the above claque that aircraft (at least one of U-2 capability) could supply data in quantities greatly in excess of the amounts they are prepared to handle at levels of quality in excess of any likely satellite returns. From scanty evidence, it seems that both the operations and the product from the two NASA aircraft in the Earth Resources program at Houston are oriented toward "university doctoral thesis" kinds of results rather than orderly, regular and frequent generation of data for consumers with problems other than research on their minds.

L. There is an unconfirmed report that the USSR, France and Zeiss are engaging in a joint program to orbit an unclassified camera payload with resolutions somewhat in excess of that of photographs which to date have been publically exposed. Problem:

a. Let them pave the way by being first to open a Pandora's box?

b. Rush to beat them for international-face reasons?

c. Ignore the whole affair and proceed at our own pace?

III. BASIC SPACE PAYLOAD AND MISSION PROFILE STRATEGIES

A. Allow NASA and civil customers to launch payloads of any technically possible level-of-performance on any schedule within their ability to secure program and budget support outside the National Security structure. Ignore the possible complaints of other countries.

Comment: Strong foreign complaint inevitable. Internationally minded U. S. citizens with no "security" commitment will press for international or U. N. control of earth orbiters. Major damage to (or complete cessation of) satellite reconnaissance a likely outcome. Unacceptable alternative.

B. Program NASA launches for near-equatorial to avoid overflight of major adversaries impose either no, or some, payload constraints. Negotiate with all overflown countries for "permission" and/or delivery of data to them.

Comment: Sets an adverse space-law precedent in "negotiating overflight." Concluding negotiations with all overflown countries would take ten or more years. One USSR or China-oriented country could stall the program.

C. Under either no, or some, payload constraints program NASA launches for near-equatorial orbit for the above reason. Negotiate agreements, with several friendly countries. Provide neutral (or U.N.) observers to certify that operation over dissenting countries did not occur.

Comment: Sets an adverse space-law precedent in "negotiating overflight." Provides an opening gambit for those who may wish to internationalize or force U.N. control of all space flight.

D. Proceed on a course of "muddling through" in the framework of ad hoc agreements among governmental agencies (and of interproject conflicts) treating each problem of propriety, utility and diplomacy after it has arisen.

Comment: Rapidly increasing operational and technical capabilities in space plus the "what after Apollo" problems seem to indicate that this strategy can no longer be useful.

E. Orbit either polar or near-equatorial payloads selected for a progressing performance capability with the initial launch being of substantially low photographic performance--possibly worse than 500' ground-resolved-distance. Other sensing payloads can be selected so as to produce scientifically useful results. The low photographic performance can be explained to the scientific and user communities as due to lead-time problems--and this may well be true. Or IMC can be omitted and poorer film and lenses used since the best may not be commonly available. The initial mission may be hard to justify technically or operationally, but may be easily and completely justified as the opening move in a national strategy to actively test world readiness to accept space surveillance. Low performance is selected deliberately on the "safe" side so that objections arising from foreign countries are certain to be minimized. If such objections are minimal or nonexistant then a national policy decision (i.e. not scientific, technical or user requirement decisions which should be subordinate to the general problem) can be made as to the suitable performance level for the next launch. A series of launches with performance increasing by steps will enable the U. S. to determine world readiness to accept open surveillance for economic purposes with (somewhat censored) data being supplied in finished form by U. S. government agencies.

Meanwhile, depending upon intelligence community requirements, essentially the same booster-space vehicle-payload combination could be in use with the capability of the payload maximized rather than minimized through the use of better film, better lenses and IMC.

IV. SPECIFIC PROGRAM SUGGESTIONS

A. Initiate regular and frequent coverage of relatively small, selected U. S. areas for agricultural and geologic purposes using existing U-2 and existing camera capabilities. The photographic geometry will be relatively unsuitable for some purposes. However, the intention of the program is to load the civil users of such photography with a bulk of product furnished as a service rather than as an input to a scientific investigation. This product will be better in resolution than Precursor-type photography. It is easy to develop supportable requirements for frequent U-2 coverage. Two examples among many are (1) major-crop irrigation timing in the California Central Valley, and (2) Sierra snow-water resources measurement. The purpose of this program would be to furnish photography of higher resolution, more frequent and well-timed coverage, and more square-miles-per-month than can be accommodated by the using agencies. They would not have time for large quantities of satellite photography. The result will be that unclassified NASA earth-resources satellite programs are neither killed nor over-supported. The cost of the U-2 program would be limited to program management, aircraft operational and data preparation costs, all of which should be minimal since the aircraft are currently active and have appropriate camera installations.

B. Cause a modification to the current Precursor program as called out in the present work statement by arranging the following course of events:

1. The contending contractors--i.e. LMSC and GE--will furnish a responsive and no more than military SECRET (checked-with-R. Ford-in-advance) proposal to NASA.

2. Our company in any event will furnish a closely held, Special Handling version of the Precursor program to 4C1000 with no other distribution. It will tie in the U-2 aspects; describe the satellite payloads and their launch-by-launch "development" along the "launch-a-poor-one-first" rationale; and a conceptual description of a potential classified spacecraft/payload configuration for possible intelligence community use. Our version of the latter would use Program 846 hardware and techniques, and would differ from the unclassified Precursor mainly in that STF command, control and telemetry would be substituted for NASA range and operational equipment and technique. Aside from minor planning effort--and possibly costs connected with improved payload versions--the Special Handling program is largely "free" (until decision is made to launch) since NASA would be paying for the camera development. Booster, vehicle and operating cost would then be essentially the same as a regular Program 846 launch. In other words this can be a stand-by system-in-being at very low cost, ready for quick use in the event that an approved intelligence requirement develops. Probably the unclassified NASA Precursor would be handled by a company Program Office working with NASA, while the special access program would be a task of the Program 846 office functioning in essentially their normal mode. These activities would be linked only by higher level management personnel with special access operating in accordance with DOD plans and program supervision which integrates both activities. Given normal precautions and vehicle and payload contractors with a depth of Special Program experience, it appears that the NASA program

would provide excellent "cover" for the Special program.

3. A potential side benefit of the U-2 program would be the possibility of extensive test and experience with the satellite camera system prior to space use. It would also provide the user with the desired geometry even though the altitudes are different.

4. Both "white" and "black" sides may try to "wish" the data processing and censorship problem away for a few years. Nevertheless it is almost upon us. Considering the potential importance of economic information about unfriendlies or "inaccessibles" to the intelligence community (as well as censorship) it seems to me that DOD (DIA?) should step up to the problem. A massive roles-and-missions argument is unnecessary. The melding (both in the pinochle and regular senses) of AMS, ACIC, etc. can be done for straightforward military reasons. It can accidentally be discovered later that this organization is ideally suited for the routine (i.e., not scientific-exploratory) production of civil earth orbiting data.