

NASA - Manned Spacecraft Center
Houston 1, Texas
December 3, 1962

MEMORANDUM for Members of Technical Evaluation Panels Participating in
Evaluation of Response to RFP No. MSC-63-297P

Subject: Guidelines for the Technical Panels in Conducting the Evaluation
of the Bidder's Response to RFP No. MSC-63-297P

1. Each technical panel will evaluate the responses to RFP No. MSC-63-297P on the Integrated Mission Control Center based on the criteria specified below.
2. To assist the panels in establishing the rating of each bidder, guidelines or yardsticks have been determined in the areas that the bidder is required to respond to Appendix C of the RFP. These are attached as Enclosures 1 through 4 for the respective panels. The numbering system of these enclosures correspond to the numbering system of the appropriate paragraph of Appendix C in the RFP.
3. Each panel is responsible for preparing for the technical committee a report on each bidder, listing the favorable or unfavorable features relevant to the criteria. Under specific comments the panel will justify the rating assigned in two or three sentences, and reference the appropriate pages of the bidder's response. See Enclosure No. 5 for sample sheet to be completed by the panels.
4. Each panel will use the weighting values indicated for the criteria listed for their panel. In the general comments of Enclosure No. 5, each panel will summarize the bidder's response, and apply an overall rating according to the score attained by use of the adjectives of Enclosure No. 6.

e.g. Total score = 70

Maximum possible score = 100

Rating - $\frac{70}{100} \times 7 = 4.9 \equiv$ Very good

5. Technical panels criteria and weighting:

a. Panel No. 1: Design, Development and Implementation

<u>Criteria</u>	<u>Maximum Score</u>
(1) Understanding of overall scope and tasks	25
(2) Feasibility of scheduling approach	5
(3) Recognition of major milestones	10
(4) Practical technical operational approach	20

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<u>Criteria</u>	<u>Maximum Score</u>
(6) Capability in voice transmission techniques	10
(7) Recognition of system interfaces and capability in achieving system integration	10
(8) Control techniques including internal distribution	10
(9) Maintenance and procedures to assure operational integrity	5
(10) Capability of system to support overall operational concept.	15


d. Panel No. 4: Simulation

<u>Criteria</u>	<u>Maximum Score</u>
(1) General overall concept	25
(2) Flight controller training	10
(3) Network exercise	10
(4) Simultaneous SIM/Mission support	10
(5) Approach and philosophy of checkout	15
(6) Data generation, handling and use of same	10
(7) Communication requirements imposed by simulation	5
(8) Appreciation of simulation system interfaces	15

6. Individual panel members should review the resumes of the Key Personnel, the manning concept, and related company experience the bidder proposes to utilize in performing the tasks of the RFP. The panel members should advise their panel chairman of any first-hand knowledge, or comments, they may have related to these items. The panel chairmen are responsible for ensuring that any information of this kind is made available to Mr. S. Sjoberg, who will ensure that these inputs are considered by the Management Panel in their evaluation. To this end all panels should consider:

- a. Adequate technical management and organization to accomplish tasks
- b. Adequate manning level and physical location
- c. Applicable experience of technical personnel
- d. Applicable experience of management personnel

7. Questions regarding the technical evaluation should be referred to the undersigned.



Tecwyn Roberts
Chairman, Technical Evaluation Committee

Encl 6: a/s

TR: jas

Sections 1 and 2: Scheduling, Design and Implementation

- 1.0 Schedule. - The discussion should briefly summarize the bidder's approach to meeting the required schedule. The bidder is expected to recognize, for example, that a fast build-up for highly qualified project engineers is needed in order to resolve interface problems, develop a better understanding of requirements, and to present design proposals to MSC representatives.
- 1.1 Milestone Chart. - The bidder should recognize major milestones adequately. The milestone chart should allow realistic times for all items, especially test and checkout and training of M/O personnel.
- 1.2 Summary PERT Network. - The bidder should show his understanding of the problem by developing a network complete enough and with adequate identification of milestones to indicate a complete comprehension of the problem areas.
- 1.3 Problem Areas. - The bidder should recognize that his biggest problem will be working out interface agreements and getting MSC direction and approval of designs fast enough to meet schedules. He should propose methods to expedite solutions to these problems, for example: Propose adequate engineering staff at Houston to expedite information gathering and MSC approvals. He should identify expected long lead time items and point out the need for expediting proposals and approvals for the items.
- 2.0 Design, Development and Implementation Approach.
- 2.1 Design, Development and Implementation Plan.
- a. The bidder should recognize that a highly qualified technical and business team must be made available immediately at Houston to proceed with initial tasks. The bidder should consider, for example:
1. Locate office space near HPC.
 2. Brief MSC on immediate plans for staffing at Houston.
 3. Set up briefings by MSC and IBM on status of the RTCC Contract, and IMCC building, and on MSC organization to monitor and direct the IMCC Contract.
 4. Set up meetings to agree on the terms of contract.
 5. Set up meetings to organize joint contractor-MSc teams to work out interface problems with JPL, GSFC, AFMTC, etc.

GUIDELINES FOR EVALUATION

TECHNICAL PANEL NO. 1: DESIGN, DEVELOPMENT
AND IMPLEMENTATION

2.3 Overall Systems Approach and Block Diagram . - The discussions and block diagram will be judged on a relative basis between bidders.

2.4 Integration and Unification Tasks. - The bidder is expected to list and propose solutions to interface problems to an extent showing a good understanding of the problems:

- a. RICC input interfaces
- b. RICC output interfaces
- c. Communications network input
- d. Communications network output
- e. Spacecraft simulation trainer input/output
- f. Cape Canaveral Launch Operations in/out

2.5 Overall Checkout and Testing Procedures.

- a. The bidder should recognize that final acceptance of his task will be based on acceptable demonstrated performance.
- b. The bidder should recognize that SCATS is primarily a training tool and should propose testing methods to insure the operational readiness of SCATS as such.
- c. The bidder should recognize that some tests including communications systems tests must be carried on nearly continuously to insure that troubles do not accumulate and get out of control.
- d. The bidder should recognize the importance of developing checkout operational readiness tests in cooperation with IBM to make maximum practical use of the RICC (computer complex) capability to exercise and evaluate systems within the IMCC and the overall network readiness.
- e. The bidder should recognize the importance of carefully documented test procedures.

2.6 Maintenance, Operation and M/O Training.

- a. The bidder should recognize the importance of retaining key installation and checkout personnel for manning equipment M/O crews.
- b. The bidder should recognize the importance of contracting for specialists from outside companies which supply complex specialized equipment, at least for the period of initial checkout, test, and on-job training of permanent M/O crews.
- c. The bidder should recognize the need for retaining a few key engineers or high level technicians who participated in the IMCC project to head up the M/O effort. These key personnel should have a complete understanding of the entire IMCC and the network interfaces.

INTERPRETATION OF SOME EVALUATION CRITERIA

1. Understanding of Overall Scope and Tasks (completeness)
2. Feasibility of Scheduling Approach. (Does contractor simply show he intends to meet all end dates, or does he recognize problem areas in scheduling and propose specific methods to expedite the job?) (Does he allow reasonable time periods for design, procurement, test, etc.?)
3. Recognition of Major Milestone (and Identification of Milestones Requiring NASA Direction and Approval)
4. Practical Operational Approach. (Does his approach to a problem show appreciation for need to keep system design and equipment simple as possible to meet the need and operationally feasible and maintainable?)
5. Flexibility and Growth Potential. (Does the design approach consider the advantages of modular units where feasible - and standardized interface specifications where feasible?)
6. Appreciation of Interface Problems. (Does the contractor show appreciation for the many difficult interface problems between systems, elements, etc.? Does he propose reasonable solutions to these problems?)
7. Originality - Clever but Practical Solution to Problem. (Does the contractor show competence in devising original methods [which he shows to be feasible] or does he at least have a practical if not an unusually well thought out solution?)
8. Reliability and Quality Control. (Does the contractor show appreciation for need; detailed plans for achieving?)

GUIDELINES FOR EVALUATION

TECHNICAL PANEL NO. 2: DISPLAY AND MISSION
CONTROL ROOM OPERATIONS

3.0 MOCR and SSR Operations

3.1 General. - The bidder should briefly describe his understanding of the Mission Control concept and the relations of the IMCC and the network to Mission Control in real-time. IMCC is basically a data collecting agency for the network, and within the MOCR and SSR are the persons responsible for analyzing and evaluating of the data, providing recommendations, making decisions and initiating actions that may result in termination of the mission or reshaping of the mission profile. In general, the bidders approach should be coherent and his grasp of the operational concept should be adequate.

3.1.1 The bidder should indicate that the concept provides primarily for operational control in real-time, and secondarily as a scientific data gathering system.

3.1.2 He should indicate an understanding of the effect of the control concept of a manned and unmanned vehicle. In this area he should realize that for the Gemini Rendezvous mission, the majority of the Agena Flight phases will be initiated by ground command, and this requires an extremely rapid network response to command decisions. Control of the unmanned vehicles are surely the most difficult flight plans that would be accomplished in either the Gemini and Apollo test program.

3.1.3 The bidder should indicate an understanding of the division of Flight Control versus Mission Control. Flight Control will be an effort shared between the Flight Crew and the ground based Flight Controllers. Mission Control will be the responsibility of the ground based Flight Controllers in the IMCC Mission Operations Control Room.

3.2 Centralized Control Concept.

3.2.1 The bidder should recognize that the IMCC will have full control of the mission operations, including:

a. Network Control during both up and down mission time. This will require that network personnel be assigned positions in the MOCR and SSR, in order to accomplish tasks such as radar hand-over, determination of best function times for commands, assistance in real-time maintenance of the network, provisions for detailed network status throughout the mission, determination of alternative routes and systems usage.

b. Data processing control. This includes control of all incoming and outgoing traffic on the voice, teletype, and data lines, determination of best transmission times for data, the prevention of contention through circuit sharing and routing. Also included under data processing control is the control of

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contingency solutions to these problems. The bidder should indicate the amount of data required in the MOCR to evaluate information from the support staff rooms, its method of presentation, and its effect on staffing and the division of responsibility.

3.3.2 The bidder should demonstrate an understanding that some decisions will be made prior to the mission, while others must be made in real-time. By this, it should be understood that Mission Rules will outline certain specific decisions required for any phase of the mission; however, the Mission Rules cannot cover all contingencies that may occur.

3.3.3 The bidder should demonstrate that he understands that control actions may be taken by personnel in either the MOCR or the SSR's. However, those control actions taken by the SSR's must have approval by the MOCR prior to the SSR taking action. Further, nominal control actions taken by the SSR's (i.e., TM on and off or radar handover) based on premission decisions may be approved prior to the mission.

3.3.4 The grouping and relative size of the operational staffs for the MOCR and the SSR, should be evaluated on the basis of span of control, and delegation of authority. In order to maintain effective control, the number of persons reporting to a single supervisor should be held to a minimum, and is dependent on requirements of the position.

3.4 MOCR and SSR Communications

3.4.1 The bidder should discuss the communications system and its tie-in with the display system. Basically, communications should be designed to provide primary and alternate loop capabilities, and the design of the system should not require excessive loop discipline to maintain effective communications control. Visual indicators should be utilized wherever possible to reduce communications traffic. In addition, for mission critical communications, the visual cue should also be backed up by the use of aural communications or vice versa.

3.5 Long Duration Missions

3.5.1 The bidder should indicate that a requirement exists for providing operational support personnel back up. This should be accomplished by changes of entire operating teams. In order to enhance the training function and provide confidence within the team, it is believed that the MOCR and SSR personnel would generally function as a complete operating team.

3.5.2 The bidder should indicate what factors bear on the length of the shifts, and indicate when he would change shifts, or operational groups of personnel.

3.6.3 The dual mission support concept will require that some equipment be duplicated and what equipment shared. The bidder should indicate what equipment must be duplicated and what shared. He should indicate what concept he would employ in this separation of tasks within the shared equipment.

3.7 Influence of Mission Phases

3.7.1 The bidder should indicate an understanding of the phases of a mission. He should indicate an understanding of what periods tend to be most critical, such as:

- a. Powered Flight
- b. Transition Between Phases
- c. Landing, Docking or Re-Entry
- d. Contingency Situations

3.7.2 He should indicate that since the communications and display traffic density will be the highest during the critical period, the systems and staffing structure must be designed to handle this situation.

3.7.3 The staffing structure should be such that the same operational personnel could handle all phases of the mission. Any alternates to this approach should be considered in the light that the same personnel will have to handle unplanned changes in Flight Plans as well as contingency problems that may arise.

3.8 Influence and Variations in Missions

3.8.1 ~~The~~ bidder should indicate what effect the variations between different types of missions will have on the staffing, organization, control procedures, systems configurations. In as far as possible, the key operational personnel should be able to handle any type of mission as well as any phase of that particular mission. His concept should provide that all of the above factors should be similar for different types of missions with minor variations to satisfy longer mission durations, different mission phasing, and different traffic densities. If the bidders concept departs from the above, it should be evaluated based on the simplicity and flexibility of his alternate concept as compared to the above.

4.0

Displays

4.1

General. - The bidder should briefly outline the concept for the display system. This concept should present a logical, reasonably defined approach towards the system in general. Items to be generally inherent in his system proposal are:

- a. The system should be as simple as possible. Where simplicity is compromised, possibly too many tasks have been allocated to this particular system.
- b. The system should be flexible, having the capability of limited (15 percent) expansion within the system before going to additional modules. Is modular expansion within the system possible?
- c. The display system should be unified. Changes in display techniques between the various consoles and the MOCR and SSR should be held to a minimum.
- d. The system should be reliable. (This may be considered under Item a). The system should not require redundancy to obtain reliability.
- e. The system should be easy to maintain and checkout. Where possible, checkout should be accomplished through controls built into the display. They should not require special tools to perform the calibration and checkout function.
- f. System Response. Will the system respond, and is it geared to real-time decision making?

4.2

Personnel Console Displays

- a. The displays should be readily adaptable for real-time decision. These displays can be broken into three areas:
 1. Visual (meters and lights, etc.)
 2. Aural (tone generators, intercom)
 3. Combination of visual and aural.

The contractor should logically utilize the combinations of these displays. For mission critical items, he should provide for positive recognition of data; i.e., association of warning lights or tones with some displays.

- b. The bidder should select display information based upon each position's requirements in MOCR and SSR. This means that meters, lights, CRT, TV, strip charts, etc., should be selected based upon the type of information required for that particular position.

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- a. The levels of display selection, and resolution should be similar. Normal use may differ and display formats may differ, but the MOCR should have the physical capability of displaying any data available to the SSR.
- b. The only significant difference would be the volume of data normally handled in the SSR's would be greater than the MOCR's.
- c. Any variation to the above approach must fully justify the new approach in terms of flexibility, simplicity and reliability.

4.6

Concept Display Selection

- a. The data selection concept should include the three modes of operation: (1) Programmed (2) Requested and (3) Forced.
- b. The display data selection technique must be capable of accepting varying types of inputs and driving varying types of displays at varying rates.
- c. Conversion of data for display should generally be done in the selection subsystem. Applicability of alternate solution should be indicated.
- d. The display request technique should provide for the physical capability of requesting large numbers of different displays at most positions in both the MOCR and SSR. Further, the technique should include a method of selectively restricting request capability. Request capability restriction should be based on the individual's requirement for a given mission.

4.7

Display Priority. - The priority technique should apply primarily to the forced mode of display.

- a. It should accomplish the division of information that must be recognized from that information that may be deferred.
- b. The bidder should indicate whether the limited use of logic to automatically override displayed data with forced data is practicable. In all cases, it should provide an indication that forced data is available.
- c. If required, the priority selection logic must be programmed. Procedures for handling all forced data should be indicated.
- d. Any alternatives should be considered in the light of (1) accomplishing the requirements, (2) the simplicity of programming the priority logic, and (3) the procedures for handling the non-override forced data.

GUIDELINES FOR EVALUATION

TECHNICAL PANEL NO. 3: COMMUNICATIONS

5.0 Communications.5.1 Communication Requirements.

- 5.1.2 Bidders discussion should emphasize the importance of communication system in terms of integrity, reliability, expedient handling of mission traffic, simplicity of network control and configured to produce the maximum of systems effectiveness throughout the support of manned missions.
- 5.1.3 The bidder should approach the reliability aspects on the premise that if anything can fail, it will (Murphy's law). He should understand that there should be no single critical paths within the system, such that a system failure could influence the success of the mission. However, he should also understand that a systems concept which is paralleled to the nth degree is unacceptable since economics must be considered.
- 5.1.4 The bidder should understand that expansion will occur (Parkinson's law.) He should allow up to 50 percent expansion capability and should design the original equipment so that it can be expanded in modules of about 5 or 10 percent.
- 5.1.5 The bidder should understand that the diversification of outgoing and incoming circuits should be arranged such that in the event of a circuit path failure, critical network data would not be interrupted, significantly delayed, or reduce the overall systems effectiveness with IMCC.

5.2 Communication System.

- 5.2.2 The bidders proposal to support his basic understanding developed under 5.1 of his proposal. His system must be technically feasible, comprehensive, the use of off-shelf system should be predominant and should demonstrate good application of the current state of the art. He must demonstrate that he is technically qualified to handle the DD-9 of the IMCC Communications System.
- 5.2.3 The bidder must demonstrate that he is technically capable of selecting and operating the best equipment available for terminating circuits, and for correcting transmission errors. He should be aware of the different correction methods available and give sound definitive justifications for choosing a particular one.
- 5.2.4 The bidder must define the exact job that the communications processor is to perform. He must then demonstrate that he is technically capable of providing the various interfaces which are created both efficiently and with an understanding of the operational requirements. He should also demonstrate

GUIDELINES FOR EVALUATION

TECHNICAL PANEL NO. 4: SIMULATION

- 6.0 Simulation, Checkout, and Training System. - A valuation criteria for the SCATS system. The criteria reflecting the NASA thinking on the SCATS has been included in Appendix B of the IMCC RFP. It is felt that these criteria provide sufficient guidelines from which an evaluation of the bidder on specific items (i.e., telemetry, command trajectory, etc.) may be undertaken. The questions below cover both general philosophy and specific equipment for use in evaluating the proposal.
- 6.1 Training and Simulation.
- 6.1.1 MOCR flight controller training. The bidder should state the mode and phases of training he intends for the MOCR flight controllers and support area staff. He must show what equipment is required for both the open loop and closed loop simulations and explain to what extent each will be carried out.
- 6.1.2 Remote site flight controller training. The bidder must specify how he intends to accomplish flight controller team training from an equipment standpoint. He should define an open and closed loop approach for remote site flight controller training.
- 6.1.3 Simulated mission exercises within the IMCC. The bidder should specify the approach for accomplishing simulated network exercises, emphasizing the equipment configurations and the data flow paths. Of special importance is the integration of the flight crew and the flight crew trainer into the data flow.
- 6.1.4 Network exercises. The bidder should specify how network exercises may be achieved when the flight controllers are located at the world-wide remote sites. The bidder should specify how he intends to use the operational equipment to its maximum to achieve as realistically as possible, mission simulations. The bidder should also specify any changes required to the operational remote site necessary to achieve network simulations. The integration of the flight crew trainers into these simulations via real-time or stored data will be evaluated.
- 6.1.5 Simultaneous simulation and operational support. The bidder should specify and show an equipment configuration that makes it possible to perform simultaneously, a MOCR flight controller training exercise, a remote site flight controller training exercise and support an operational mission. This assumes use of both MOCR's. The bidder should specify to what extent the training of the remote site and MOCR flight controllers will be achieved. The bidder should also show that simultaneous operational mission support and simulated network exercises are possible and show the equipment configurations to accomplish the aforementioned.

6.4 SCATS Equipment.

6.4.1 SPAF. Particular emphasis will be placed on this section with respect to the degree of flexibility prescribed by the bidder and the extent to which he describes its functions. The bidder should recommend general purpose equipment wherever possible to allow ease of modification and to accomplish requirements as they occur.

6.4.2 Building communications. The bidder should specify use of the building communications facilities expanding these into the simulation area showing the suitable circuit modifications in block diagram, detailed to show deviations from the normal system. The intercommunications connection should allow for the simulation of network communications, remote site to support area personnel, simulation instructor intercom facilities, and other circuits.

6.4.3 Displays. The bidder should specify the control consoles and their displays necessary to achieve simulation mission control over the training exercises. A display system should utilize but is not limited to the operational systems data source, tentative floor layouts, and console arrangements should be given.

6.5 Special Evaluation Questions.

6.5.1 The bidder will be evaluated on his equipment usage.

6.5.2 The bidder will be evaluated on his ability to show the need and value of training and checkout.

6.5.3 The bidder will be evaluated on his understanding of the SCATS.

6.5.4 The bidder will be evaluated on the operational feasibility of the SCAT system.

6.5.5 The bidder will be evaluated on the scope of the SCATS as compared to the overall IMCC systems.

PANEL EVALUATION

COMMITTEE:

PANEL:

LEADER:

COMPANY:

FAVORABLE FEATURES:

Criteria: 1.	Score:
2.	
3.	
4.	

UNFAVORABLE FEATURES:

Criteria: 5.	Score:
6.	
7.	
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SPECIFIC COMMENTS ON THE ABOVE EVALUATION:

GENERAL COMMENTS:

PANEL MEMBERS:

TECHNICAL PANELS ADJECTIVE RATING SYSTEM

Outstanding	7
Excellent	6
Very Good	5
Good	4
Satisfactory	3
Fair	2
Poor	1
Unsatisfactory	0