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TASK 5(A)R: REPORT ON EXPECTED TYPES OF ANALYSES FOR
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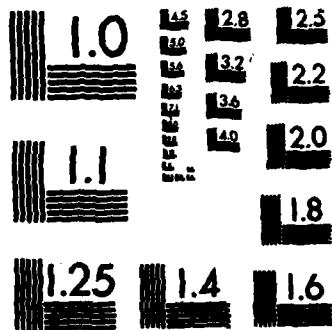
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Task 5(a)R: Expected Types of Analyses for Requirements

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August 4, 1980

ADA 124179

Mr. Coye Bridges
DCS/Plans and Programs
Air Force Logistics Command
Wright-Patterson AFB, OH 45433

Reference Contract No. F33600-80-C-0414

Dear Coye: *(Handwritten initials)*

Enclosed are ~~two~~ copies of the "Task 5(a)_R: Expected Types of Analyses for Requirements" deliverable due 13 weeks after contract award.

Please let me know if we need to get together to discuss the deliverables.

Sincerely,

(Handwritten signature)
J. Douglas Hill
Research Leader
Defense Systems & Military Electronics
Technology Section

JDH:eah

Enc. (2)

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TASK 5(a)_R: REPORT ON EXPECTED TYPES OF ANALYSES
FOR REQUIREMENTS

Purpose and Description of Task

The objective of this task is to provide an effective means for analyzing the results of the Requirements Planning Sessions to ensure that the full range of requirements have been identified and effectively documented. The means of analysis must ensure that the outputs have resolved conflicts resulting from different scenarios or different perspectives.

Information to be Analyzed

The information to be analyzed consists of the full set of inputs, the set of output requirements, and the relationships between them. The inputs consist of:

- o LMS principles tailored to the topical area
- o LM and LMS concepts for the topical area
- o LAG representation for the topical area
- o Decision structure for the topical area
- o Information needs for the topical area
- o Scenarios tailored to the topical area.

In addition to the formal inputs there is a set of informal inputs that consist of the technical expertise that the participants bring to the sessions. This expertise will be used to enrich the formal inputs.

The outputs consist of:

- o Expanded LMS principles to include participant feedback
- o Modified LAG definition for the topical area
- o LMS information needs and decision structure
- o Definition of LMS data and data processing requirements for the topical area
- o Definition of requirements that will impinge on other topical areas
- o Recommendations from the participants for changes to the topical area.

Purposes of the Analyses

In the process of defining requirements for a topical area there is a potential that either an incomplete set or conflicting sets of requirements will be identified. This could adversely affect the resulting LMS design for the topical area in question. To preclude this, a formal process of analysis will be applied to the results of each planning session. In these analyses the inputs, outputs, and processes will be analyzed to ensure continuity, completeness, and compatibility of the results. In adapting those purposes more specifically to the analyses of requirements, the following are proposed:

- o To ensure completeness of LMS data requirements in fulfilling LMS information needs for topic area
- o To ensure justification of LMS data requirements for LMS design of topic area
- o To ensure consistency of LMS data requirements and decision structure with LMS principles
- o To ensure consistency of LMS requirements with LM and LMS principles for topic area
- o To ensure traceability of LMS data requirements from/to the validated/enhanced LAG decision structure and policies for topic area
- o To ensure visibility of the critiques of the requirements session from the perspectives of the participants, facilitators, and presenters.

The analyses consist of three sequential steps: profiling the results, analyzing the profiles, and enhancing the results. Every effort should be made to make the analyses as objective and self-documenting as possible. The techniques for accomplishing this will be explored in Tasks 5(b)_R and 5(c)_R respectively.

Profiling the Results

The first step in the analyses is to profile the results of the requirements planning sessions in a comparative manner so that the evaluation and enhancement of the planning results and methods are facilitated. These profiles should be consistent with the objectives of the requirements planning study and the purposes of the requirements analysis if objective comparisons

and evaluations are to be made. The purposes were stated in such a manner as to reveal basic requirements' planning dependencies or relationships.

Evaluating the Profiles

The profiles should be evaluated in the second step of the analyses to validate the requirements planning process (including the role of the planning sessions), the inputs to that process, and the outputs from that process. The profiles should reveal holes, redundancies, and extraneousnesses. Examples of profiles and how they could be evaluated with respect to the topic area follow:

- o Consistency. Validate traceability of LMS requirements to the policies and decision structure developed in previous planning session, the LM and LMS concepts, and the LMS principles. Note those information needs, concepts, and principles which find little or no fulfillment in the LMS information requirements. Note those requirements which are not broadly based on information needs, concepts, and principles. Note inconsistencies with the decision structure and policies for the topical area.
- o Coverage. Validate the LMS requirements (and needs) in terms of completeness with respect to covering the LAG representation of the logistics processes, the management functions, decision structure, and the data requirements and sources for the topic area. Completeness implies the three levels of management needs/requirements (strategic, directive, and production) and the three categories of needs/requirements (continuation, changing, and future).
- o Documentation. Validate LMS requirements documentation to ensure that it is necessary and sufficient both in content and format from an LMS design perspective. The design options should not be unnecessarily restricted by extraneous detail.
- o Interface. Validate interface assumptions at the LAG, needs, and requirements levels to ensure that they are consistent for the topic area and the greater LMS concept. These interface assumptions should be documented for reference for future topic areas and validated with prior topic areas.
- o Methods/Materials. Validate the appropriateness of planning materials and methods and their impact on the achievement of quality results and the planning purposes.

Enhancing the Results

In the third step of the analyses, the results are enhanced as necessary in light of the evaluation and the purposes of the analyses, Since the results of the requirements planning sessions cannot be expected to be complete and suitable in their initial form and content, the enhancing of them to that end is extremely important. A timely follow up to the requirements planning session and the profiling and evaluation of its results affords an opportunity to modify, augment, and document the LMS requirements for the topic area in a comprehensive and consistent manner. In the enhancing process the best of the requirements planning can be combined with the insight from the requirements analyses.

Expected Outputs

The expected outputs should be a product of the previously described analyses; i.e., profiling of the LMS requirements information, the use of those profiles in the evaluation of the requirements, and the consequent enhancement of the requirements for the topic area. In this manner the outputs of the planning process are validated and/or enhanced in a manner consistent with the requirements' planners; the LMS needs, concepts, and principles; and the needs of the LMS design process which follows. The requirements planning process can be expected to produce useful results in a directive sense but not necessarily sufficient in the senses of completeness, consistency, and rigor. The outputs of the requirements analysis should compensate for those deficiencies.

Recommended Groups and Sequence of Analyses

The three levels of analysis work must be accomplished over at least five aspects of the topic area. The levels of analysis work as previously defined are: profile, evaluate, and enhance. The aspects of the topic area include consistency, coverage, interface, documentation, and methods/materials.

The recommended groups for doing the work, A through C, are shown in the following table. The analyses would be performed in order by row, top to bottom, and by column, left to right, within each row. The group makeup would

appropriately draw from representatives of the participants, XR, AC, and Battelle as deemed appropriate for the aspect(s) of the topic area. The groups and their work would be discussed at the requirements planning session so that the involvement of the participants and open communication with them could be maintained.

Aspect of Topic Area	Levels of Analysis Work		
	Profile	Evaluation	Enhance
Consistency	A	A	A
Coverage	A	A	A
Interface	A	A	A
Documentation	B	B	B
Methods/Materials	C	C	C

Group A should consist of those persons best qualified to analyze the requirements from the perspective of the inputs that determined them; i.e., LMS principles, LM and LMS concepts, LMS needs, and the LAG representation of the topic area and interfaces to other LAGs. Group B should consist of those persons best qualified to analyze the requirements and their documented form from the perspective of the LMS design effort which the requirements must drive. Finally, Group C would be comprised of those persons best qualified to analyze the planning methods and materials in light of the results of the requirements planning sessions and the critiques of the participants.

Carryover and Feedback

The carryover from analysis level within aspect and from aspect to aspect can be facilitated by some common members across groups and by formalized documented revisions in the requirements arising from the aspect of the topic area. As changes or enhancements are finalized at any analysis or aspect level,

then feedback of that change and assessment of impact on prior work completed must be ensured. These feedbacks and assessment can be accomplished on a relatively infrequent basis so they are not too disruptive. The original participants should approve the final form of the results of the requirements planning session to ensure that there has not been consequential, undesirable deviation from the original results.