THE PROOF OF THE PUDDING

BY

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O for a Muse of fire, that would ascend
The brightest heaven of invention!—SHAKESPEARE, *Henry V*

'The proof of the pudding is in the eating'—perhaps, also, in something else. Prophets are without honour in their own countries; their mouthings have, nevertheless, a certain fascination even if the majority hear them with little but scepticism. Many wish to foretell the future and to know with some confidence the likely outcome of their actions—and the 'Collective Wisdom' which is the Ministry of Defence is no exception. The question is, 'How is it to be done in the absence of reliable seers who, if recognized, cannot usually be recruited and, if recruited, have not usually been recognized?'

The excellent custom of looking at formers on the principle that 'there is nothing new under the sun' leads one to notice that the normal method of evaluation is in the present tense or nearly so. The published results come from building something and trying it out. In a competitive world (which it is) this often takes the form of judging rival entries. The expert descends on the cake-stall and scrutinizes the entries for finish, appearance, and consistency. Often a slice is sampled for flavour. Wines are judged similarly and so are many other things. It is the product that is tested—right at the end of the process—and there is no great objection to that when the investment involved is not great. However, when it comes to ships, the investment is undeniably vast, and so any method by which the characteristics of a product could be forecast from a study of the recipe becomes most attractive. Just such an attempt is being made.

The technique has been termed 'systems evaluation' and is being evolved during an assessment of the design of a mine countermeasures vessel (MCMV). Characteristics of a MCMV make the investment in an assessment potentially rewarding because of the peculiar requirements for low influence (acoustic, magnetic, and pressure) signatures; accurate manoeuvrability; navigation and pilotage; and similar needs. With the design organization that exists at present, the responsibility for such aspects might fall between two (or more) stools of category (professional persuasions and departmental divisions of design).

In assessing any design, the elements *performance*, *cost*, *time* and *availability* are so interrelated and interdependent that to consider one without simultaneous consideration of the other three barely has meaning (1); however, in this instance, the emphasis is on *performance*.

The method being used is still flexible because different features keep emerging which cause modifications in approach. At the onset, the decision was made to limit the time and cost to predetermined figures so that the depth of the study would be constrained. Thereafter it was aimed to peel off, as it were, the top layer(s) of information about the design and compare these with the requirements.

What are the requirements? This has already proved to be a good question and, in fact, the first stage of the study—after assembling relevant documents—was devoted to expanding the Naval Staff Requirement (NSR) to make this more amenable to exact interpretation (2). Such terms as 'the ability to turn rapidly' had to be broken down into component parts. The result of such activity was the compilation of a list of *capabilities* and *charactertistics* (Cs

and Cs). For those unused to the jargon: *capabilities* refer to fighting capabilities which describe the attributes necessary to fulfil the various roles required of the vessel; and *characteristics* describe the seagoing characteristics which form the attributes needed to keep the vessel at sea. These Cs and Cs were based on divisions evolved by MOD(PE) in house and also by some other firms (notably the British Aircraft Corporation).

The NSR, as cast, is a mixture of capabilities needed and of equipments which are to be fitted willy-nilly. To limit the study, this dichotomous approach was not challenged.

The next step involved the listing of major supporting systems and equipments down to that level which could be identified with a single (working level) design authority. So far as possible, the SUIS-based nomenclatures were used to describe level (i.e. Ship Definition Level; Ship Reporting Level).

As an aid to the process, Functional Block Diagrams (FBDs) on Design Disclosure System (DDS) lines were produced. The FBDs assisted in establishing the logic of functional needs or hardware requirements. These also threw up in highlight the requirements for personnel and the functions that they should carry out.

Finally Performance and Design Requirements (PDRs) in quantified terms were produced. These, if met by the design, would ensure that the NSR was met. That concluded the theoretical development of the NSR.

A further step was to devise questionnaires so that the identified design authority could certify how the outputs of the part of the design concerned would, in the event, match the related PDR. Where no exact design authority was identifiable, special arrangements had to be made.

The evaluation then took place involving the elimination (from further consideration) of matched PDRs, and the assessment of the remainder (the unmatching PDRs) for shortfalls, relating these to military significance. If necessary, recommendations for action to change designs or alter (operating) practices to counter shortfalls may follow.

Although the usual difficulties of definition, inseparable from new ventures, have been encountered, at the time of writing some progress has been made to overcome them. The very informality of the design process has caused some wonder. On the other hand, the considerable reservoir of experience on which so much depends, together with past results, gives confidence that the design will not be found wanting in many respects. The finest outcome would be a finding that no changes are needed—and confidence that this is so.

The successful pursuit of this task has depended on the readiness of all those involved to divulge their own experience and methods to those charged with doing the evaluation. Happily, whenever possible, this has been done willingly.

Possibly these ramblings will help not only to spread the news that a Systems Evaluation Group (SEG) is in being but also to give an indication of what it is up to (amongst other things). In the longer term, it is possible that this activity with the MCMV may set the pattern for other designs. At least a try is being made to view a design objectively 'in the round' by a (small) body which has not been directly involved in producing it. How successful will it be? To know this, even with a few new tasting rules, it may still be necessary to eat the pudding for proof!

Note: A team led by Mr. P. Deakin, Head of Mine Warfare Systems, Sperry Gyroscope, is undertaking by contract the evaluation of the MCMV characteristics. The contract is directed by Dr. C. French, R.C.N.C. Head of the Systems Evaluation Group (SEG), on behalf of the Project Manager Minesweeping (PMMS), Mr. W. D. Wallace, R.C.N.C.

References:

1. 'Reliability and Upkeep', Cdr. P. F. Driscoll, R.N., *Journal of Naval Engineering*, Vol. 17, No. 2, p. 240.
2. 'Universal Material Relationship', Cdr. P. F. Driscoll, R.N., *Journal of Naval Engineering*, Vol. 18, No. 1, p. 110.