

# PROJECT HORIZON RISK MANAGEMENT

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## ABSTRACT

Procurement of defence equipment is an activity fraught with uncertainty and examples of projects that have been delivered late and substantially over budget abound.

Project Horizon, the co-operative warship venture between the UK, France and Italy, will be the Royal Navy's largest programme with a total project cost of several billion pounds. To demonstrate to the UK Government that the requirements for this new class of warship can be met within acceptable schedule, cost and performance margins, a comprehensive project risk analysis and programme management programme has been established.

This article details the risk analysis work that has been completed to date, together with the management procedures that have been put in place for the future.

## Introduction/Background

Project Horizon is a co-operative warship procurement programme between the UK, France and Italy. The UK intends to procure up to 12 Common New Generation Frigates (CNGF) for the Royal Navy together with France and Italy procuring up to 4 each. The requirement is for a class of Anti-Air Warfare (AAW) based frigates, to replace existing ships, and which will deploy a new generation of AAW missile system, together with being highly capable in other areas of naval warfare (FIG. 1). The whole of the combat system will be controlled by a comprehensive command and control facility. Many of the ship systems and equipments will also be developed and procured on a co-operative basis between the three nations. It is the Royal Navy's largest current programme with a total UK project cost of several billion pounds.

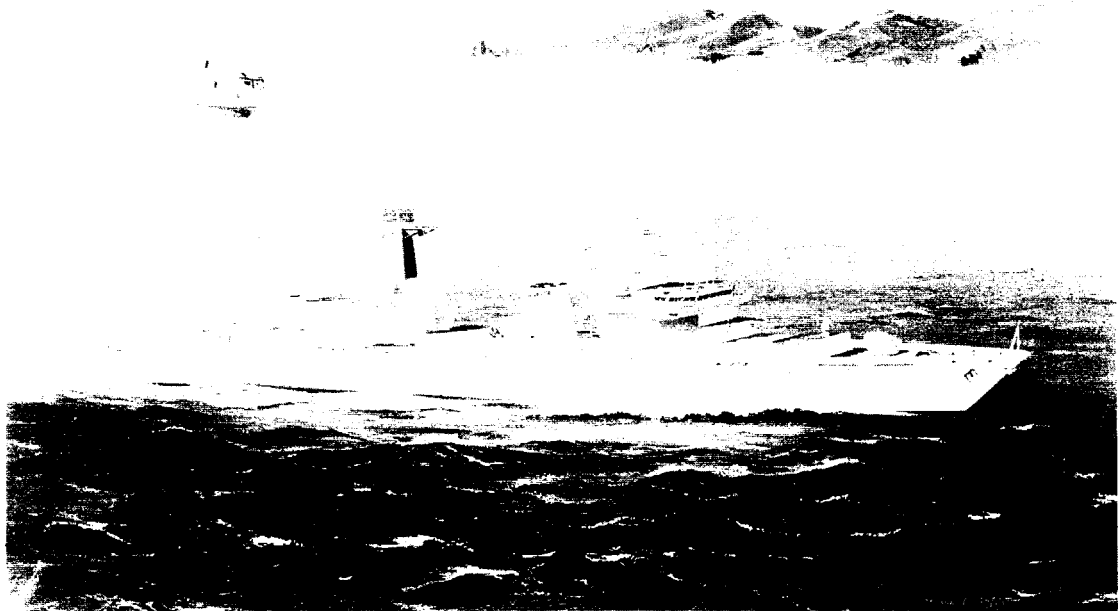


FIG. 1—THE COMMON NEW GENERATION FRIGATE  
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The programme will be controlled from a Joint Project Office (JPO), staffed by Ministry officials from the three nations, and established in London. Co-operation is currently concentrating on achieving a common procurement strategy, leading to the signing of a memorandum of understanding. This will formally initiate full joint co-operation on Project Horizon under JPO control. Delivery and acceptance of the first vessels is currently planned by the year 2002.

British Maritime Technology Defence Services Limited (BMT DSL) were awarded the Future Frigate Design Services Contract in 1990 to provide design and programme management services direct to the UK MoD Project. An essential part of this support is to demonstrate to the UK Government that the stated requirements for the CNGF can be met within acceptable schedule and cost margins before Ministerial and Treasury approval for the project will be given. To achieve this a comprehensive risk analysis and management programme has been established that is the largest ever undertaken for a naval project. This risk management programme was initially put in place by the UK MoD Project and BMT DSL. This was then further developed with the assistance of Euro Log Limited, who were engaged to bring to the project their extensive practical experience gained through over 18 years of risk management for both commercial and defence projects.

### **Purpose/Requirement**

Procurement of complex defence equipment is an activity fraught with uncertainty. The need for major defence projects to assess risk early in the programme has been recognized for some time. It is vital to undertake detailed risk management early in the life of a project, as the implementation of any identified risk reduction measures are likely to be less costly than future remedial action. Management of risk through the life of the project aims to maximize the chances that equipment will be delivered within the planned time, cost and performance goals.

The UK MoD have published guidelines for risk management which, by combining the skills of Euro Log, BMT DSL and the MoD Project, resulted in the development of a formal risk management programme for the UK elements of Project Horizon (FIG. 2). This programme involves:

- Production of a policy for risk management that details the methods to be used for the identification, analysis and management of risks.
- The conduct of a phased programme of risk data collection and analysis spanning the full scope of the warship and supporting equipment programmes.
- Production of a periodic UK Risk Report and Management Plan detailing the options for the control and management of risk to all programmes.
- Implementation of the identified risk management actions.
- Regular review of the effectiveness of the Risk Management Plan and provision of briefs to management on the current risk status of the project.
- Presentation of the risk analysis results for endorsement by the UK Government as part of the overall approval of the Project Horizon programme.

### **Practice**

The principal method of risk identification and data collection is through personal interview and discussion with Equipment Project Managers (EPMs) and programme managers. These meetings ensure that, at the early stages, as wide a view as possible of the potential project risks is taken. Use is made where possible of the EPMS own technical risk management programmes. These provide useful

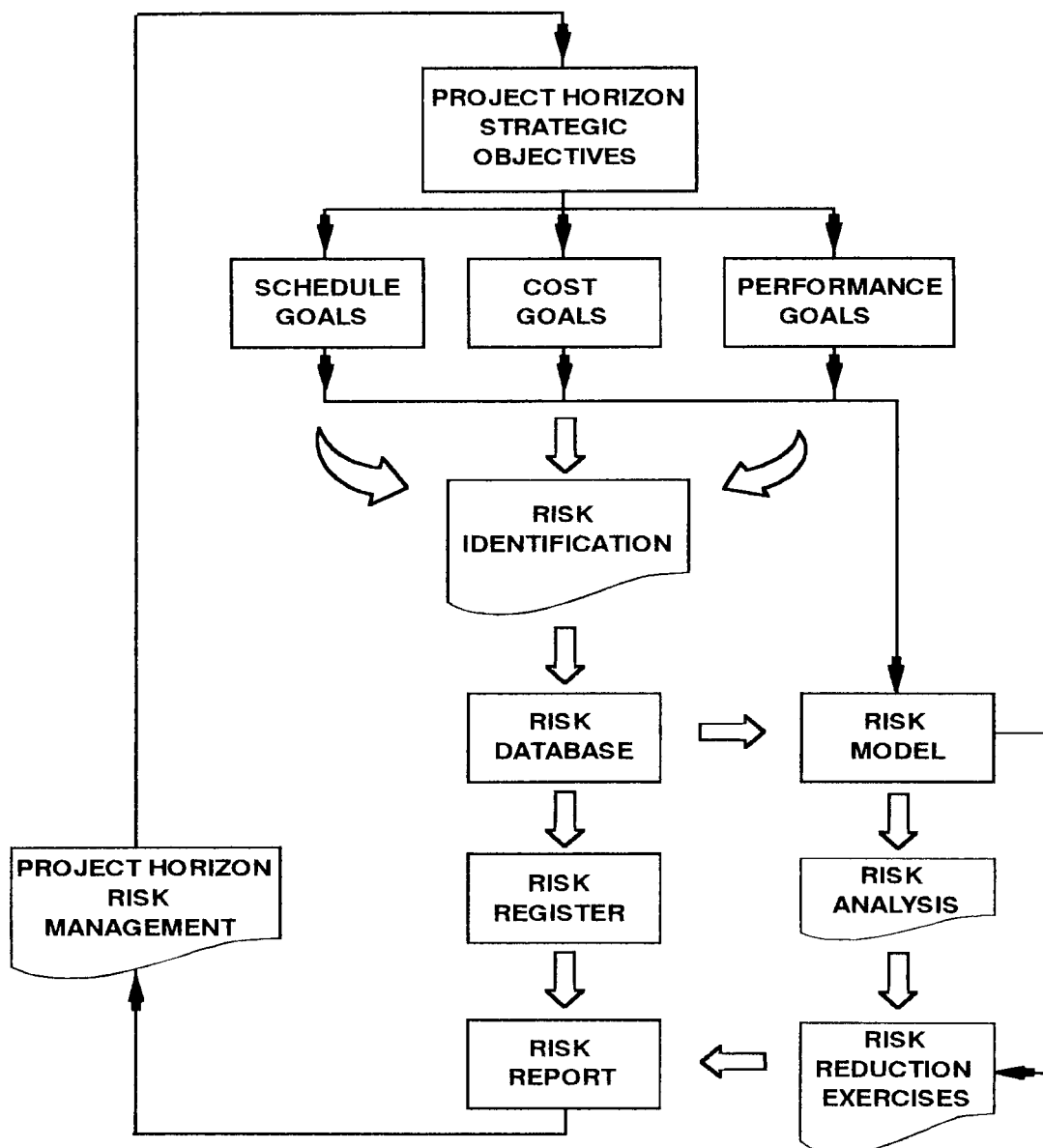


FIG. 2—PROJECT HORIZON RISK MANAGEMENT PROCESS

data for overall project risk management although having a more limited perspective.

Each identified risk is assessed, initially by the EPM, using a scoring system which assigns a qualitative high, medium or low score for both likelihood of occurrence and severity of impact. These scores are then combined to determine an overall significance for each risk. Potential risk reduction responses and contingency plans for each risk are identified, together with any secondary risks associated with the adoption of a particular response. For each response any implied schedule, cost or performance penalties of adoption are determined and, where possible, expressed in quantitative terms. The date by which the preferred risk reduction response for each risk would need to be implemented, for it to be effective, is also identified.

Following the collection of all risk data, a brainstorming session is held with Project Horizon management. This ensures that the qualitative assessment of individual risks is balanced in terms of the total warship programme and that the appropriate weighting is applied to each area of the project.

In a project of the size and complexity of Horizon it is clearly impractical to review and analyse in detail all identified risks. To provide a means of highlighting potential risks and focusing management attention on the key issues a summary risk matrix (FIG. 3) is produced. This provides:

- (a) Risks grouped by cause and area affected.
- (b) An indication of where the concentration of risks lies.
- (c) An overview of the total risks.

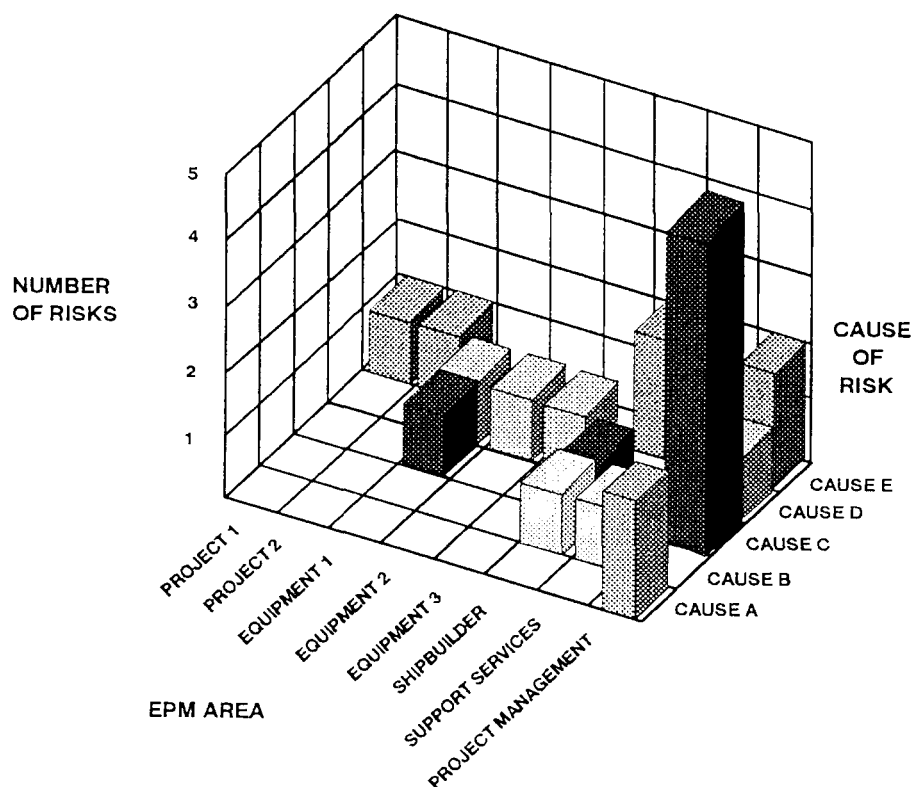


FIG. 3—SUMMARY RISK MATRIX

The qualitative assessment provides an overview of the significance of individual risks, and an indication of their potential impact on the achievement of the project schedule, cost and performance goals. It provides a common management focus on the key risk issues and a framework for accountability for risk reduction. However, the likelihood of Project Horizon meeting its goals depends on the dynamic interaction of all risks. In order to examine this interaction and provide a basis for quantitative analysis a project risk model was developed. This combines all identified uncertainties within a detailed project plan (logical sequence of events) to provide a global statement of risks to the defined project targets.

The risk model incorporates all areas of the warship programme. It is divided into sub-networks representing each individual equipment and programme area and is validated against the latest Horizon master schedule to confirm the activity logic and deterministic durations used. Uncertainties in respect of duration estimates, together with the schedule implications of overcoming identified performance risks, are applied to the model activities using three-point estimates (minimum, expected, maximum). This quantitative data is also supplied by the EPMs.

Monte Carlo™ risk analysis software is used to run the model. The simulation is achieved by running several hundred iterations of the model randomly sampling from the variable estimates applied to each activity. The results are then

presented in terms of a range of possible outcomes for each event. For any selected project milestone the simulation will provide the latest and earliest dates for the event together with the probability of achieving any date between the two.

The model also focuses attention on risk issues by means of relative criticality. This expresses as a percentage the number of times that an activity fell on the critical path in the project simulation. A high relative criticality therefore implies that the activity is very likely to affect the project end date. Activities with high criticality should therefore be examined first in the risk reduction process. Close monitoring of criticality trends across subsequent phases of risk analysis, will therefore provide early indication of emergent risk issues before they impact on the Project objectives.

Formal risk reports, summarizing the results of the analysis and providing recommendations for action, are produced for use by senior management within the project. These reports provide a clear statement of:

- The risks to the success of the project assessed against the project goals of schedule, cost and performance.
- The probability of achieving the established targets.
- Recommendations for management action to reduce the overall level of risk to the programme.
- Timescales and responsibility for the implementation of the risk reduction measures.

The final step in the risk management process is the implementation by Project Horizon of the recommended risk management actions. At this stage management may take into account further known outside political and strategic factors and adjust the project objectives in light of the identified risks to ensure that new targets are established that are achievable within an acceptable level of risk.

## **Conclusions**

It is recognized that a project of the size and complexity of Project Horizon requires a formal and structured control mechanism for risk identification, analysis and management. Such an approach, as well as being good project management practice, is a prerequisite for obtaining Ministerial level approval.

Project Horizon risk management is conducted against a top level statement of strategic programme objectives geared towards providing senior management with a focus against which to implement risk reduction measures. The reporting strategy provides management with timely information stating the risks to the programme and a measure of their impact in terms of cost, schedule and performance. In addition, risk reduction measures, and the effect of their adoption on the achievement of the strategic objectives, are identified together with the responsibility and timescales for implementation.

The use of an integrated approach to risk analysis and management ensures that project targets are set at realistic and achievable levels, whilst its visible presence shows clearly to the customer that an effective aid to project decision making is in place.

Finally, following Treasury approval of Project Horizon, and as part of the International Joint Venture Company (IJVC) tendering process, potential IJVCs will be required to submit their own risk analysis and management plans. These will be assessed as part of the overall tender evaluation and will ensure that risk management is practised from project conception through to warship acceptance.

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