Procedures for Project Formulation and Management (PPFM) in DRDO

January 2006

Directorate of Planning and Coordination
Defence Research and Development Organisation (DRDO)
Ministry of Defence, New Delhi – 110011
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M Natarajan
SA to RM, Secretary Department of Defence R&D and DG R&D

Message

DRDO has the mission of achieving technological self-reliance in weapon systems and platforms for the Armed Forces. We are undertaking large number of projects in all areas of military sciences. We undertake Mission Mode (MM) staff projects involving deliverables for the Services, technological development to develop Technology Demonstrators (TDs), Science & Technology (S&T) projects for emerging technologies and Infrastructure Facility (IF) projects for setting up infrastructure facilities, like pilot plants, etc. We have currently more than 400 projects costing about Rs. 20,000 crore.

The main activity of our laboratories/establishments is undertaking and executing these projects in specified time and cost to achieve the desired goals for meeting urgent requirements for the Services, technologies and competence for future development. Completing the project in specified time and cost is a big challenge to us due to technological complexities, uncertainties, technology embargos imposed by advanced countries and poor industrial infrastructure in the country. The procedures for various activities for project management i.e., conceptualization; feasibility studies; peer reviews; sanctioning, monitoring and reviews; closure of projects; and transfer of technologies evolved over the years, are in place but their documentation is very essential. This has assumed greater significance now when various wings of the Ministry of Defence (MoD), users, HQrs IDS, are in the process of streamlining the procedures and working out several policy documents. This is a comprehensive document covering all procedures of project management including transfer of technology and execution of Limited Series Production (LSP) orders by the DRDO laboratories/establishments. I strongly believe that this document will serve as a useful input from DRDO for the various procedures being evolved in the MoD.

We have multi-tier review mechanisms composed of experts, users and other stakeholders from MoD and production agencies. These Review Boards help in early detection of bottlenecks and suggest their resolutions. Composition and role of these Boards have been defined. Various procedures for preparing project proposals, peer reviews and project closure have been outlined. Apart from procedures, formats for all these activities have also been included in this document. Some more formats, like sample of Memorandum of Understanding (MoU) with development partner is also desirable. Procedure outlined here can also be adopted for sub-projects given by one DRDO laboratory/establishment to other DRDO laboratories/establishments and small value tasks under the power of Laboratory Director.

Finally, I wish all the project leaders start using the procedures and formats given in this document and also provide feedback for further improvements in future issues of this document. I wish success to all project leaders of DRDO in their project endeavours.
Project is a specific, time constrained task, the performance of which cuts across the traditional lines of structure and authority within a given organization.

If we look broadly, Project Management has been in vogue from long time in history. Much that has been accomplished in human progress has come by dedicating and organising human energies and physical resources to meet specific goals. Modern industrialized society has become dependent on this type of management to a higher degree than ever before. Not only in the areas of technology development and basic sciences but also in the fields of social, economic and political affairs, there is an increasing tendency to use project management approach.

DRDO, being the prime and largest government organization engaged in R&D for defence services, has evolved project management methodology procedures and practices. These have been issued and changed from time to time based on the specific needs of project tasks and technology development undertaken by DRDO.

On assuming charge as Chief Controller of Resources & Management last year, in our regular reviews each of the Corporate Directorate under CC R&D (R&M) was requested to come up with areas of improvement. Directorate of Planning & Coordination in its approach paper suggested to work in the following areas:

- Issues of Procedures for Project Formulation and Management (PPFM);
- Creating data base on Parliament Questions; and
- Effective Project Information System.

We decided to take these improvements head on. For working on PPFM, we decided to first collate all the information and various instructions issued from time to time. Then we tried to bring it in the form of a compendium in a logical order and as comprehensive as possible. The result of that effort has come in the form of this exhaustive document.

I am confident that this document will serve as a reference document for Laboratory Directors, Programme Directors, future Project Directors and Project Management Teams. The technology is continuously changing and so are the project management techniques. We would be too glad to receive any constructive feedback on this document so that the next version becomes more user-friendly.

I wish all the best for all project directors in implementation of these guidelines.
I have been getting inquiries from project leaders on various aspects of project management since inception of the new role of the Directorate in June 2000. I have been clarifying their doubts and providing them old documents to support my arguments and many a times, I could not find a supporting document. Since then, I started working out various guidelines i.e., for project proposals including format and for Peer Reviews. These guidelines were issued in the year 2003.

In the year 2004, the project closure became a big issue for DRDO HQrs as well as laboratories/establishments. We started working out on guidelines for project closure because comprehensive guidelines were not available. I made it my first priority in Jan 2005 to bring out Procedures for Project Formulation and Management (PPFM) document by July 2005.

With the arrival of Sh SC Narang at DRDO HQrs as Chief Controller Research & Development (Resources & Management), my priority was further strengthened. It became my topmost priority. We spent several sessions together on its draft and expedited its timely approval and publication. Input of several project directors and other colleagues have become essential part of this document.

I acknowledge with all sincerity the efforts and inputs received from Sh S Ravi Scientist ‘F’ from LRDE, Bangalore, Sh MS Bishnoi, Joint Director from Directorate of Budget, Finance & Accounts, Sh Rajeev Gupta, Joint Director and Sh Mausam Chakraborty both from Directorate of Planning & Coordination at DRDO Hqrs in making this document. I request feedback from project team members for incorporating improvements in future issues. I wish all DRDO families a very happy and prosperous new year!
# ABBREVIATIONS

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>ADA</td>
<td>Aeronautical Development Agency</td>
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<tr>
<td>APR</td>
<td>Annual Project Report</td>
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<tr>
<td>ASR</td>
<td>Air Staff Requirement</td>
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<td>ATP</td>
<td>Acceptance Test Procedure</td>
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<tr>
<td>BE</td>
<td>Budget Estimate</td>
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<tr>
<td>CAD</td>
<td>Computer Aided Design</td>
</tr>
<tr>
<td>CAM</td>
<td>Computer Aided Manufacturing</td>
</tr>
<tr>
<td>CARS</td>
<td>Contract for Acquiring Research Services</td>
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<td>CCS</td>
<td>Cabinet Committee on Security</td>
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<tr>
<td>CDA</td>
<td>Controller of Defence Accounts</td>
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<td>CDR</td>
<td>Critical Design Review</td>
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<tr>
<td>CFA</td>
<td>Competent Financial Authority</td>
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<tr>
<td>CI</td>
<td>Capability Index</td>
</tr>
<tr>
<td>CIDS</td>
<td>Chief of Integrated Defence Staff</td>
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<td>CIDSS</td>
<td>Command Information &amp; Decision Support System</td>
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<td>CII</td>
<td>Confederation of Indian Industries</td>
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<td>CP</td>
<td>Central Purchase</td>
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<td>CPM</td>
<td>Critical Path Method</td>
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<td>DA</td>
<td>Developing Agency</td>
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<td>DAC</td>
<td>DATE Analysis Committee</td>
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<td>DATE</td>
<td>Decision Aid for Technology Evaluation</td>
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<tr>
<td>DFR</td>
<td>Detailed Feasibility Report</td>
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<td>DPR</td>
<td>Detailed Project Report</td>
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<tr>
<td>DRC</td>
<td>DRDO Research Council</td>
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<tr>
<td>DRONA</td>
<td>DRDO Rapid Online Network Access</td>
</tr>
<tr>
<td>DT&amp;E</td>
<td>Developmental Test &amp; Evaluation</td>
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<tr>
<td>FE</td>
<td>Foreign Exchange</td>
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<tr>
<td>FM</td>
<td>Finance Minister</td>
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<tr>
<td>G-FAST</td>
<td>Group of Forecasting &amp; Analysis of Systems and Technologies</td>
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<tr>
<td>GSQR</td>
<td>General Staff Qualitative Requirement</td>
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<tr>
<td>HQrs</td>
<td>Head Quarters</td>
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<tr>
<td>IC</td>
<td>Indian Currency</td>
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<tr>
<td>IDC</td>
<td>Integrated Defence Council</td>
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<td>IDS</td>
<td>Integrated Defence Staff</td>
</tr>
<tr>
<td>IF</td>
<td>Infrastructure Facility</td>
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<tr>
<td>JSQR</td>
<td>Joint Services Qualitative Requirement</td>
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<tr>
<td>LP</td>
<td>Local Purchase</td>
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<tr>
<td>LSP</td>
<td>Limited Series Production</td>
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<tr>
<td>Abbreviation</td>
<td>Full Form</td>
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<tr>
<td>MM</td>
<td>Mission Mode</td>
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<td>MOD</td>
<td>Ministry of Defence</td>
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<tr>
<td>MOU</td>
<td>Memorandum of Undertaking</td>
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<tr>
<td>MTBF</td>
<td>Mean Time Between Failure</td>
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<tr>
<td>NSR</td>
<td>Naval Staff Requirement</td>
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<tr>
<td>OF</td>
<td>Ordnance Factory</td>
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<tr>
<td>OT&amp;E</td>
<td>Operational Test &amp; Evaluation</td>
</tr>
<tr>
<td>P&amp;A</td>
<td>Pay &amp; Allowances</td>
</tr>
<tr>
<td>P&amp;C</td>
<td>Planning &amp; Coordination</td>
</tr>
<tr>
<td>PA</td>
<td>Production Agency</td>
</tr>
<tr>
<td>PAR</td>
<td>Project Appreciation Report</td>
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<tr>
<td>PARC</td>
<td>Project Advisory and Review Committee</td>
</tr>
<tr>
<td>PBP</td>
<td>Project Business Plan</td>
</tr>
<tr>
<td>PCDA</td>
<td>Principal Controller of Defence Accounts</td>
</tr>
<tr>
<td>PDC</td>
<td>Probable Date of Completion</td>
</tr>
<tr>
<td>PDR</td>
<td>Preliminary Design Review</td>
</tr>
<tr>
<td>PEP</td>
<td>Project Execution Plan</td>
</tr>
<tr>
<td>PERT</td>
<td>Project Evaluation and Review Technique</td>
</tr>
<tr>
<td>PMB</td>
<td>Programme Management Board</td>
</tr>
<tr>
<td>PMC</td>
<td>Programme Management Committee</td>
</tr>
<tr>
<td>PPFM</td>
<td>Procedures for Project Formulation and Management</td>
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<tr>
<td>PPW</td>
<td>Pre Project Work</td>
</tr>
<tr>
<td>PRC</td>
<td>Peer Review Committee</td>
</tr>
<tr>
<td>PSU</td>
<td>Public Sector Undertaking</td>
</tr>
<tr>
<td>QR</td>
<td>Qualitative Requirement</td>
</tr>
<tr>
<td>R&amp;D</td>
<td>Research &amp; Development</td>
</tr>
<tr>
<td>RE</td>
<td>Revised Estimate</td>
</tr>
<tr>
<td>RM</td>
<td>Raksha Mantri</td>
</tr>
<tr>
<td>RRAT</td>
<td>Readiness, Review and Acceptance Team</td>
</tr>
<tr>
<td>S&amp;T</td>
<td>Science &amp; Technology</td>
</tr>
<tr>
<td>SITAR</td>
<td>Society for Integrated Technology Application &amp; Research</td>
</tr>
<tr>
<td>SMP</td>
<td>Stakeholder Management Plan</td>
</tr>
<tr>
<td>SRI</td>
<td>System Reliability Index</td>
</tr>
<tr>
<td>SWOD</td>
<td>Small Work Order Demand</td>
</tr>
<tr>
<td>TARB</td>
<td>Test Article Review Board</td>
</tr>
<tr>
<td>TD</td>
<td>Technology Demonstration</td>
</tr>
<tr>
<td>TEC</td>
<td>Technical Evaluation Committee</td>
</tr>
<tr>
<td>ToT</td>
<td>Transfer of Technology</td>
</tr>
<tr>
<td>TPC</td>
<td>Tender Purchase Committee</td>
</tr>
<tr>
<td>UATT</td>
<td>User Assisted Technical Trials</td>
</tr>
</tbody>
</table>
“Some people see a closed door and turn away.

Others see a closed door, try the knob…

If it doesn’t work, they turn away.

Still others see a closed door, try the knob…

If it doesn’t open, they find a key.

If the key doesn’t fit, they turn away.

A rare few see a closed door, try the knob….

If it doesn’t open, they find a key.

If it doesn’t fit, they make one”.

-----------------Amanda J. Montana
1.0 INTRODUCTION

Defence Research and Development Organization (DRDO) has vision to empower India with cutting edge defence technologies and its mission is self-reliance in critical defence technologies while equipping the Armed Forces with the state-of-the-art equipment, weapon systems and platforms in partnership with industries, academia and other R&D institutions.

With above vision, we are working on our mandate of strengthening the Armed Forces. We have a human resource pool of about 33,000 distributed all over the country in our network of fifty laboratories/establishments and two societies, namely Aeronautical Development Agency (ADA) and Society for Integrated Technology Application & Research (SITAR). Most of our objectives are achieved in project mode.

The management of project has three main considerations: performance, time and cost. Unfortunately, many of our projects are not completed in time due to technological complexities, uncertainties and risks inherent in R&D work and dynamics of technology control regimes. Delays cause cost overruns and loss of opportunities. Lack of clarity and absence of written procedures also contribute to the delays.

For quite some time, DRDO HQrs has been working to evolve an unambiguous project management methodology, which will help all the stakeholders to react to the projects needs in shortest possible time. Well defined guidelines and spelled out procedures not only facilitate our working but they do help us in documenting our endeavour for peers and posterity.

This document, which has been prepared after wide consultation across DRDO spectrum, is aimed to provide necessary guidelines and clarity to the Defence R&D managers for timely and successful completion of R&D projects.

From project management perspective, a typical project which is aimed at developing a reasonably complex equipment, weapon or platform goes through the following well defined phases or stages. The guidelines accordingly cover various stages of a typical R&D project, such as:

- Pre-project work :-
  - Feasibility study;
  - Planning of new project proposal;
  - Decision Aid for Technology Evaluation (DATE) analysis;
  - Peer review of projects; and
  - Sanction of project.
Execution of project.

Monitoring and review of project.

Preliminary and critical design reviews.

Testing and evaluation.

Closure of project.

Procedure for transfer of technology.

Limited series production order.

Detailed proforma for preparing statement of case for obtaining sanction of the project is given in Appendix ‘A’. Necessary guidelines and all other required formats/templates are given in the following sections.
2.0 PRE-PROJECT WORK (PPW)

Generally, some preliminary work in laboratory is done prior to formulating the objective of the intended project. This has to be adequately reflected in Project Appreciation Report (PAR).

For Technology Demonstration (TD) and Science & Technology (S&T) projects, PPW is to be seen if the requirement for which an R&D project is proposed to be undertaken, is prima-facie feasible and worthwhile from scientific, technical and economic angles. The cost of an S&T project should not exceed more than Rs10 crore and maximum duration should not be more than 48 months. If the major cost of the proposed S&T project goes towards creating new (capital) facilities then the project should be split in two, an Infrastructure Facility (IF) and further S&T projects.

In the case of IF projects, context of the requirement of the infrastructure has to be well established. The size and extent of the requirement has to be weighted by a team of experts at the national level.

The Mission Mode (MM) projects, are usually referred to DRDO by concerned Staff (Army, Navy & Air Force), in the form of GSQR. Based on referred GSQR, DRDO conducts pre-project or feasibility studies and offers expert comments on the project to the initiating Staff. The project is finalized, modified or dropped by the initiating Staff/Services. For MM, TD and S&T projects, the following stages are considered necessary in project preparation or formulation phase. They have to be adequately documented and presented with the PAR.

2.1 Feasibility Study

The feasibility report should precede the sanction of MM, TD and S&T projects costing Rs. 2 crore and above. The report should be prepared in a manner that it helps to identify and enable selection of suitable projects which can be successfully accomplished within the estimated cost and time and promote self-reliance in critical defence technology. The detailed feasibility study should examine the following aspects:

- Goals of the project;
- State-of-the-art analysis;
- Pre-feasibility work;
- Preliminary design;
- Resource assessment;
- Project execution plan;
- Cost-benefit analysis;
- Spin-offs;
- Quantification of indirect benefits; and
- Conclusion.
Detailed Feasibility Report (DFR) will be reviewed by a Peer Group constituted by the DRDO HQrs. Laboratories may like to frame a yearly time table for organizing and conducting peer review of DFR which is being finalized and submitted by laboratories/establishments. The time and venue of the meeting may be decided in consultation with the respective Chief Controller(s). Wherever applicable, following should be adhered to:

- The goals of the project should be defined after taking inputs from all stakeholders.
- The preliminary work to include drawing up of detailed specifications and possible system configurations to achieve the configuration. Availability of components, assemblies, etc. to realise the well defined project goals.
- Resource assessment may be done for internal and external resources. Internal resources to include qualified and skilled manpower, equipment, expertise etc. The external resources to include consultants in academia and industry, commitments of the user, production agency etc.

Project execution plan should include a scheme of setting up the project. Here, setting up the project means choosing the right members for the project team, appointing the right leader and creating the right physical infrastructure. It also means designing the right project organization consisting of sponsors, steering committees and the correct project processes including phases, milestones, tasks, and reporting lines.

2.2 Planning of New Project Proposal

After the feasibility study, following aspects of the intended project must also be re-examined carefully:

- Available resources;
- Probable duration of completion of the project; and
- Detailed project execution plan.

Project plan includes assessment of capabilities of the project team. Resources are associated with tasks and budgets while milestones structure the timeline. Project risks are broadly categorized as:

- High risk projects – A breakthrough product;
- Medium risk projects - Advanced version of existing product; and
- Low risk projects - Modification of existing product.
2.2.1 Detailed Project Execution Plan

A detailed project execution plan has to be submitted along with the project proposal. The plan can however be revised as project progresses during planned project reviews. It is recommended that detailed execution plan for project costing less than Rs 2 crore be prepared as per Appendix ‘B’ and for project costing more than Rs 2 crore as per Appendix ‘C’. This plan should specify major milestones of the project including Project Evaluation & Review Technique (PERT) chart. Critical activities also be identified. Major milestones to be linked with estimated financial outgo at the completion of activity or achieving the milestone.

2.3 Decision Aid for Technology Evaluation (DATE)

DATE is a decision support tool for technology evaluation of R&D projects. The methodology incorporated into DATE specifically addresses the system development projects of DRDO. It facilitates systematic analysis of a project for its technology content and evaluation of feasibility in the context of technological expertise and facilities available in the country.

Various engineering disciplines of interest to DRDO have been identified and grouped under different “Technology Groups”. Specific core technologies and sub-technologies have been identified in each technology group. To the extent possible, it has been ensured that these technologies are non-intersecting. The ‘National Resource Index’ for the technologies and sub-technologies has been evaluated by specially constituted expert groups taking into consideration the resources (expertise and facilities) available at DRDO laboratories, national research institutions, academia and industries in the country. DATE methodology is built over this index and the confidence of the project team in exploiting the national resources within the constraints of time, availability etc.

DATE analysis is not mandatory for the S&T projects; however, it is desirable particularly for the projects costing more than Rs 2 crore. It helps the competent authority to view the proposed R&D activity in the larger national perspective. DATE document is available on DRDO Rapid Online Network Access (DRONA) at the portal of Directorate of Planning & Coordination. The detailed guidelines for arriving at System Reliability Index (SRI) is enclosed at Appendix ‘D’.

2.4 Project Proposal

Once the project-planning phase is over, action has to be initiated for drafting the project proposal. The proposal details goals, tasks, budget, timelines, and responsibilities. Guidelines for the preparation of the project proposal are given below:
2.4.1 Scheme for Allotment of Project Number

The project number has to be in the form of “XX-ZZ/ABC-123”. Here, **XX** defines the category of the project, **ZZ** year of the sanction of project and **ABC** is the abbreviated initials of the name of the establishment to which the project is sanctioned.

<table>
<thead>
<tr>
<th>XX Category</th>
<th>ZZ Year of Sanction</th>
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<tbody>
<tr>
<td>RD  Existing Project under S&amp;T/TD</td>
<td>Only the last two digits of the year need to be given</td>
</tr>
<tr>
<td>SL  Mission Mode (Staff Project - Army)</td>
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</tr>
<tr>
<td>SN  Mission Mode (Staff Project - Navy)</td>
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</tr>
<tr>
<td>SA  Mission Mode (Staff Project - Air Force)</td>
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<td>SS  Mission Mode (Staff Project - Inter Services)</td>
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<tr>
<td>SM  Mission Mode (Staff Project Medical Services)</td>
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<tr>
<td>SD  Mission Mode (DRDO Lab &amp; all others than above)</td>
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<tr>
<td>ST  Science &amp; Technology</td>
<td></td>
</tr>
<tr>
<td>TD  Technology Demonstration</td>
<td></td>
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<tr>
<td>IF  Infrastructure Facility</td>
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The code names of DRDO projects like Arjun, Pinaka, Divyadrishiti etc., are to be given in consultation with the respective Chief Controllers. However, it is desirable to have alphanumeric name having a maximum 3 characters, It is also desirable that the codes are changed at least once a year during the currency of the project.

2.4.2 Guidelines for Submission of Project Proposal

The project proposal should be drafted in the prescribed proforma (refer Appendix ‘A’), adhering the following guidelines:
- All items of Part-I & Part-II including the enclosures should be indexed in the “Contents” list with respective page numbers.
- A-4 size paper be used in the “Portrait” orientation.
- Proposal may be prepared in running text for better readability.
- Optimum security classification be given. Care may be taken to ensure that the document is not over classified.
- Title/name of the project should be appropriate and meaningful. It should not be very long.
- Project proposals under IF category are only those, which have R&D activities and value additions (like pilot plant settings etc). The cases of procurement of machines/equipments should be processed under build up.
- Part-I, Item 10: Details may be given only for applicable budget heads under Revenue and Capital account heads.
- Details of the equipment, machinery and store costing more than Rs 10 lakh to be provided as annexure to the PAR, giving cost, FE (if any) and the month/year of procurement during implementation of the project.
- Part-II, Item 1 : Brief technical appreciation is required for decision making by management. Emphasis should focus on the technological aspects of the project (generally, it should not exceed few typed pages). The things described in the feasibility report, need not be repeated, rather they should be referred/linked).
- All costs may be given in lakh of Rupees.
- All time periods including PDC should be given in months.

2.5 Project Peer Review

All DRDO projects costing more than Rs 2 crore have to be peer reviewed by an expert committee for their viability. The purpose of the peer review is to tap the relevant expertise available outside the laboratory proposing the project with in DRDO and else where in the country. As far as possible views of the perceived and beneficiary or the main stakeholder, in the outcome of the project should also be incorporated prior to final formulation of the project. The Competent Authority (defined in Para 2.5.1.3) constitutes a committee known as Peer Committee or Peer Review Committee (PRC). The Committee examines the necessity of the project and adequacy of the core competence of the laboratory proposing the project, proposed time, cost, other resources, approach, methodology, etc. Norms for composition of the committee, responsibility of every member and guidelines for conduct of peer review is given in the following sections.
2.5.1 Guidelines for the Conduct of Review

2.5.1.1 Constitution of Peer Review Committee

1. The Chairman of the PRC must be an eminent person (preferably from outside DRDO) having expertise in the area of the project. He may either be from a premier research organization, academic institution or from industry. In exceptional cases, if from within DRDO, he should be from a different laboratory working in the similar area. However, the decision must be based on the capabilities and experience of the individual. It is desirable that the chairman should have experience of managing/coordinating/directing projects of similar costs and technological complexities.

2. The PRC must have a mix of members from within & outside DRDO and members should be eminent personalities from R&D institutions, academic institutions and industry. Members can also be co-opted in the PRC at the Chairman's discretion. The expert should not be nominated/opted from the groups/industry, which are likely to be contracted for CARs or development contract in the same project.

3. A representative from the user agency may also be a member of the PRC, if it is a specific user driven project.

4. Representatives from major partners in the development effort must be represented on the committee with the authority to take decisions about the scope, costs and time schedules assigned to them by the nodal laboratory.

5. Representatives from Directorate of Planning & Coordination, G-FAST and Integrated Finance (R&D) would be nominated on the PRC. DATE analysis and its review by the PRC would be an important aspect of recommendations of the Committee.

6. While processing the case for approval of a PRC for all systems development projects (TD/MM), the concerned Technical Director will send a copy of the project proposal (along with the DATE analysis conducted by the project team), to the Chairman of the corresponding regional DATE Analysis Committee (DAC). Its comments would be included in the executive summary for the members of the PRC.

7. Member nominated by the Chairman of the regional DAC will be a member of the PRC. He will present his comments and recommendations on the DATE analysis to the PRC particularly highlighting such aspects as technology gaps noticed, if any, critical technologies/subsystems planned to be imported, etc.

8. For S&T projects, Chairman PRC with help of the experts should also to evaluate relevance of the project objectives vis-à-vis over all (i) DRDO objectives, (ii) National and (iii) Global perspective. Commercial impact the project is likely to make and order of magnitude commercial value successful completion of the project is likely to generate in short, medium and long-term perspective.
9. If the purpose of the S&T project is to generate new knowledge in the area of the core activity of the laboratory, then the PRC should clearly bring out whether creation of such knowledge will result in an incremental increase or a quantum leap in the contemporary understanding in national and global context.

10. If the S&T project is for developing a product/process or technology, then who are the potential users? Time frame with in which it is likely to be used by the potential user? Estimated commercial or strategic (describe) impact in most optimistic scenario should be brought out by the PRC.

11. The relevant deliberations of the peer review to be minimized and issued after due approval of the Chairman.

12. In addition to the minute, the main recommendation of the PRC signed by the Chairman should be appended to the project proposal

2.5.1.2 Planning of Peer Review

The following steps are to be taken by the laboratories/establishments:

1. The laboratory to prepare a “Detailed Feasibility Report”. Even in cases where no separate feasibility study is being carried out, this document is a must.


3. After ensuring that the project proposal is as per the format and contains all information in the required detail, the document be sent to the regional DAC for their examination and comments.

4. Following documents be forwarded to the concerned Technical Director along with recommended composition of the PRC:
   - Project Proposal.
   - Detailed Feasibility Report.
   - Executive Summary.
   - Recommendations of the Regional DAC.

   Technical Directors may take the following steps on receipt of proposal from the laboratories/establishments.

1. To examine DFR, project proposal, executive summary. Technical Director need to satisfy itself that all documents mentioned earlier to the format and required details.

2. Technical Director to initiate file for approval for the PRC for their contribution for approval of the competent authority. The file need to be routed through Director Planning & Coordination, concerned Chief Controller, as may be the requirement. The tentative date for the PRC meeting to be indicated.
3. Technical Director in consultation with the laboratory to schedule the meeting after approval, and send the relevant documents along with a copy of Section 2.5.1.6. (Roles of the members of the PRC). It is very essential for the Chairman and outside members.

4. Technical Director to prepare the minutes. The minutes need to be necessarily vetted by the following before acceptance by Chairman:

- Director Planning & Coordination or his representative.
- Representative of Integrated Finance
- Representatives of participating laboratories in the project before the Chairman’s acceptance.

5. To initiate the file for approval of Competent Financial Authority (CFA) through route defined in respective sections.

2.5.1.3 **Competent Authority for Constitution of PRC**

No formal peer review is required for project costing less than Rs. 2 cr. For such projects, Laboratory Directors may evolve their own mechanism. For higher value projects, the following Competent Authorities would approve constitution of the PRC:

- Rs. 2 cr and above, but less than Rs. 5 cr: Laboratory Director in consultation with Technical Director.
- Rs. 5 cr and above, but less than Rs. 15 cr: Concerned Chief Controller
- Rs. 15 cr and above: SA to RM.

2.5.1.4 **Documents for PRC**

An executive summary document of the Detailed Feasibility Report (DFR) should be prepared and circulated along with the project proposal at least three weeks in advance to all participants. This should also include details on "what is expected from the PRC". The concerned technical director will ensure that this guideline has been adhered to. The Committee deliberations should include following aspects also:

1. Aim/scope/goals of the project vis-a-vis charter of the laboratory.
2. Need/requirements of the project.
3. Sufficiency/level of pre-project activities including Technology Demonstration(s), if any.
5. Available design alternatives, reasons for adopting a specific approach.
6. Identification of critical technologies and their maturity levels and/or their availability.
7. Available infrastructure for productionisation and selection of industry partners.
8. Contemporariness of the product, at the scheduled delivery time.
9. Time and cost estimates.
10. Whether end objectives are commensurate with the cost likely to be incurred.
11. Reliability of major milestones of the project as per schedule indicated in the PERT/CPM charts (given in Para 5 of Part II of the project proposal).
12. Comments of regional DAC constituted by SA to RM.

The following documents are to be given to all the members of the PRC:

- Detailed Feasibility Report.
- Executive Summary.
- Draft Project Proposal.

2.5.1.5 Recommendations of the PRC

The PRC's specific recommendations including recommendation of regional DAC need to be recorded for consideration/implementation, and should be a part of the final project proposal. Articulated recommendations of the PRC signed by the Chairman minutes of the deliberations of the PRC meeting both should be submitted.

2.5.1.6 Role of Constituents of PRC

Chairman

1. Examination of the documents submitted to the PRC and to call for additional information, if required.
2. To examine the necessity to co-opt additional members.
3. If necessary, can order another meeting of the Committee in order to resolve/address matters, which remained unresolved due to any reason.
4. To ensure that the recommendations of the PRC are unambiguous and recorded as decided by the Committee.
5. To approve the minutes of the meeting of PRC after ensuring that the important comments of all the members have been incorporated.
6. To ensure that the peer review is conducted as per the document made available to the PRC and all issues highlighted in the Executive summary ("what is expected from the PRC?") be addressed.
7. Any other issue not discussed but considered necessary by the Chairman in the interest of the project can be addressed and documented.
External Experts

1. To go through the documents made available and to ensure that issues and members from highlighted in the Executive Summary ("what is expected from academia/industries the PRC?") are addressed.

2. To closely examine the system configuration, technologies and sub-technologies and the import options, if any.

3. To ensure that where necessary, alternative technologies have been examined and given due consideration.

4. To look for the technological gaps/grey-areas and to examine how these are proposed to be overcome and to suggest alternate/suitable approaches for the same. Resources projected are adequate to meet the aim/scope of the project.

5. Any other issue not discussed but considered necessary by the Chairman in the interest of the project can be addressed and documented.

Technical Director

1. To assist laboratory and DRDO HQrs in finalizing constitution of the PRC.

2. To forward the Project Proposal, Detailed Feasibility Report (DFR) and the DATE Analysis to the Chairman of the Regional DAC.

3. To ensure that the Chairman and all the members receive the necessary documents (Project Proposal, DFR, Executive Summary including details of "what is expected from the PRC" etc) sufficiently in advance.

4. To also ensure that comments from the experts (including Chairman of Regional DAC) are solicited, and forwarded to the Chairman of PRC at least 15 days prior to the date of meeting.

5. To ensure that comments from the work centers are obtained and documented regarding the work packages identified and resources allocated.

6. To ensure that draft minutes incorporating important comments of the members are approved by the Chairman and issued at the earliest. (It is recommended that the minutes be issued within two weeks of the conduct of the review).

7. To ensure that guidelines issued by DRDO HQrs for conduct of peer reviews and DATE analysis are followed in letter and spirit.

8. Any other issue not discussed but considered necessary by the Chairman in the interest of the project can be addressed and documented.
Director Planning & Coordination or his Representative

1. To ensure that the project undertaken is as per core competence of laboratory and there is no duplication of work.
2. To ensure (that proper review and monitoring mechanisms are instituted and documented for) a uniform documentation and review mechanism across all laboratories.
3. To ensure that comments from the work centers are documented regarding the work packages identified and resources allocated.
4. To ensure that guidelines issued by DRDO HQrs for conduct of peer reviews and DATE analysis are followed in the right spirit.
5. To ensure that all necessary details are provided in the draft project proposal.

Representative of Integrated Finance

1. To examine that the project cost estimates are commensurate with the requirements and cost details are available vis-à-vis the milestones and list of equipment and stores.
2. To advise and ensure that the funds proposed are accounted for under the appropriate heads.
3. Additional administrative and financial powers sought, if any, are in accordance with those in force. Special powers other than those delegated are not generally given. These are considered only in specific cases according to their merit.

Project Leader

1. To prepare the entire documents including Executive Summary.

Laboratory Director

1. To bring out, "what is expected from the PRC?" based on the DRDO HQrs guidelines?
2. Any other issue not discussed but considered necessary by the Chairman in the interest of the project can be addressed and documented.

Representative of G-FAST

1. To ensure proper implementation of DATE. Regional DAC - to provide specific comments and inputs to the PRC on the DATE analysis, technological gaps and on the critical technologies.
2. To provide inputs about the user service perceptions/perspective plans which may have direct impact on the project activity proposed and about the appropriateness of the project vis-à-vis the technology trends elsewhere.
3. To apprise the PRC about the availability of required development expertise and infrastructure for development/production of the partners for targeted system/sub-systems.
4. Comment upon the scope of the work allocated to them by the project management vis-à-vis the availability of resources. Confirmation about the adequacy of resources and approval of their establishment to undertake the allocated activities for completion within the stipulated time.

5. To suggest essential enhancements of resources to meet the targets/scope of work allocated to them.

User Representative

1. To clarify issues relating to GSQR/ASR/NSR/JSQR, etc (wherever applicable).

2. To provide necessary inputs in absence of any formal QR.

3. To give details, if required, about the existing systems in use with them and elsewhere in the world and other details about the operation, maintenance and use of the product.

4. Views regarding scope and time estimates etc.

5. User commitments by way of total requirements (of indigenously developed) systems, part funding, etc as approved by the Competent Authority in their respective establishment.

2.6 Project Sanction

After completion of the peer review if necessary the Project Leader should modify the proposal incorporating the modifications suggested by the PRC. In case some suggestions are not incorporated justification for not incorporating suggestions of the PRC should be annexed to the proposal. The proposal has to be submitted for sanction to the competent authority through respective Technical Directorate of the laboratory/establishment. The Technical Directorate will allot the Project No and give title and recommend code name as described earlier. The code numbers should be preferred over the name and it should be alpha numeric having 3 to 4 character. The code should not be part of the Govt letter notifying the sanction. After the peer review is over, the file for sanctioning of the project should reach to the Director Planning & Coordination within a time period of three months.

2.6.1 Project Sanctioning Authorities and their Powers

The Competent Authority for the sanctioning of the project cost limits are as given below:

<table>
<thead>
<tr>
<th>Authority</th>
<th>Cost Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laboratory Director</td>
<td>Up to Rs 10 lakh</td>
</tr>
<tr>
<td>Chief Controller</td>
<td>Rs 10 lakh - Rs 50 lakh</td>
</tr>
<tr>
<td>SA to RM</td>
<td>Rs 50 lakh - Rs 15 cr</td>
</tr>
<tr>
<td>Raksha Mantri</td>
<td>Rs 15 cr – Rs 50 cr</td>
</tr>
<tr>
<td>Finance Minister</td>
<td>Rs 50 cr – Rs 100 cr</td>
</tr>
<tr>
<td>Cabinet Committee on Security</td>
<td>Rs 100 cr and above</td>
</tr>
</tbody>
</table>
2.6.2 Examination of Project Proposal

Before sanctioning any DRDO project by the Competent Authority, it has to be examined at various levels. Routing of project proposal for sanction is as shown in Fig–1.

The following time schedules, may strictly be adhered to, for sanctioning of the project:

- Technical Director: Not more than 4 weeks
- Director Plan & Coord: Not more than 1 week
- Director Budget, F&A: Not more than 3 working days
- Integrated Finance: Not more than 2 weeks

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Technical Director
(Through concerned Chief Controller)

Director, Planning and Coordination

Director, Budget Finance and Accounts

Chief Controller Research & Development
(Resources and Management)

Integrated Finance Branch

Competent Financial Authority
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Figure-1

2.6.3 Submission of Projects to CCS for Sanction

For CCS projects, specific format has to be followed as specified by Cabinet Secretary for submitting Briefing Papers to the CCS along with the Project Proposal, Feasibility Report and Executive Summary. CCS Guidelines are available on website www.cabsec.nic.in.
2.6.4 Issue of Project Sanction Letter

The Competent Authority sanctions the project on file, after which a Government letter is issued by authorized person (generally a Deputy Secretary or Under Secretary) of Defence R&D mentioning title, number, PDC, costs with break ups in main budget heads, special financial powers if any, monitoring and management mechanism. Unless or otherwise mentioned in the Government letter the date of issue of the Government letter is considered as date of commencement of the project.
3.0 PROJECT EXECUTION

Execution of the project should be governed by detailed execution plan explained earlier. It is advisable that monthly quarterly, half-yearly non-auditable reports and annual execution plans be prepared and executed based on the reflected milestones of the project. The Annual Project Report is auditable.

Project controlling authorities should identify deviations from the plan as soon as possible. Quality control is part of task controlling. Once deviations are identified, actions should be taken to bring the project back on plan. But one should be careful about the short-term solutions – they can lead to even worse situations.

Actual duration of tasks is compared with planned time. The critical path has to be identified. Usually, budget controlling is mainly focused on resources but there are other costs to be included too. Task controlling includes project and product related issues.

Plan and actual status of the control parameters are updated continuously or in periods and deviations are analyzed. If deviations are identified early, a completion of tasks in time is still possible. Once a deviation is identified, various actions can be taken to bring the current status back to plan. The simplest but worst solution is adjusting the plan - it is much better to use other means (e.g. motivation) to correct the status.

3.1 Outcome Realisation Plan

This plan is required to be prepared by the Project Teams for progress of the project execution on monthly, quarterly, half-yearly and annual basis. The Outcome Realisation Plan assists in ensuring the achievement of the project outcomes described in the Project Plan. The purpose of the Outcome Realisation Plan is to ensure that:

1. Stages of the project are managed in a satisfactory manner;
2. Utilisation of the project's outputs are linked to the planned project outcomes;
3. Success of the project's outputs are assessed and corrective action taken;
4. Planned project outcomes are achieved prior to formal project closure;
5. Benefits from the project will be measured and documented including the base line metrics;
6. Basis for reporting to senior management and the Steering Committee on progress towards achievement of these outcomes are provided;
7. Document what changes will be made by the user services to their tools, policies/procedures and organization in preparation for receiving the outputs from the Project Team;
8. Document the management and control activities to be undertaken by the user unit(s) upon receiving the outputs from the Project Team; and
9. Gain acceptance by the Steering Committee or User Services to the suitability of these activities.
4.0 PROJECT MONITORING AND REVIEW

In order to harness best available resources in terms of talent, expertise and resources, on as required basis, DRDO have to interact with Defence Public Sector Undertakings (DPSUs), academic institutions, research laboratories and private entrepreneurs, to execute its projects and programmes. The ‘concurrent engineering’ approach is to be followed in technology intensive projects to reduce the time lag between development and productionisation of weapon systems & platforms.

The mission mode programmes/projects are to be executed in close interaction/association with User Services. Involving users in PPRs, project progress reviews help into cutting short the delays and to know their views in advance including GSQRs and also to keep continuous visibility of the projects.

Various high level committees, including R&D Panels, Steering Committees, Advisory Committees and Boards, carry out reviews of DRDO projects. The Vice Chief of Army Staff reviews the staff projects for Army, twice a year. For all major programmes/projects, there are multi-tier ‘Programme Management Boards (PMBs)’, having representation from the Services, DRDO laboratories and in some cases from academic institutions and other national research laboratories. These PMBs periodically monitor and review the programmes and give mid-course corrective directions.

However, all DRDO projects should have integrated review and monitoring mechanism approved by the Competent Authority at the time of sanctioning the project. Review report be submitted in the format given at Appendix ‘E’ to the Technical Directors and copies to all concern at DRDO HQrs.

It is further recommended that Annual Project Report of all the projects progressed by the laboratory be forwarded to the DRDO HQrs in the format given at Appendix ‘F’.

All projects are to be reviewed by multi-tier committees of experts, constituted during formulation of the project proposal itself. These review boards/committees are constituted by respective Technical Directors with the approval of SA to RM except CCS approved projects wherein these boards are approved by CCS. The general terms of reference are:

- Reviewing technical progress of project w.r.t. planned objective, milestone achievement, time, cost, scope whenever changes are necessary, re-appropriation of funds within sanctioned cost.
- Recommending enhancement of funds & PDC extension.
- Recommending alternate approach, whenever necessary.

The actual approvals for cost, PDC revision will be obtained on file by moving the case file by Technical Directors. The constitution of various committees and their periodicity is given below:
4.1 Management and Monitoring of Project

4.1.1 CCS Project

Three tier management and monitoring mechanism is to be adopted for all the projects costing more than Rs. 100 cr. In the case of mega programmes, inter-ministerial apex board be constituted to manage and monitor it. These boards are the recommending authority (for cost, time, scope and fund re-appropriation). The monitoring mechanism is given below:

4.1.1.1 Apex Management Board

Chairman - SA to RM

Members - Vice Chiefs of Services
          - CIDS
          - CC R&D (R&M)
          - Representatives of other S&T deptts.
          - Representatives of PSUs
          - Production Agency
          - Representative of Integrated Finance
          - CMDs of PSUs
          - Technical Director

Member Secretary - Concerned CC R&D

Periodicity of Review - Once a year

Note:
1. The Boards have been referred where committees are headed by SA to RM or Chief Controllers.
2. The Committees have been referred when they are headed by Laboratory Director or lower level officer.

4.1.1.2 Executive Board

Chairman - Concerned CC R&D

Members - CC R&D (R&M)
          - Subject Experts from R&D Centres, Industry and Academics
          - User Representative
          - Inspection Agency
          - Development Partners
          - Representative of Integrated Finance
          - Technical Director

Member Secretary - Programme Director

Periodicity of Review - Once in six months.

The Board will review the whole programme.
4.1.1.3 Project Monitoring & Review Committee

Chairman - Program Director/Laboratory Director
Members - Senior scientists of the laboratory
- Expert scientist of the laboratory
- Director P&C or his representative
- Technical Director or his representative
- Representative of local finance

Member Secretary - Project Leader
Periodicity of Review - Once in three months
The Committee will review the specific project of the programme.

4.1.2 Projects Costing Between Rs. 50 cr & Rs. 100 cr

Two tier management and monitoring mechanism is to be adopted for all the projects costing between Rs 50 cr and Rs 100 cr. Suggested monitoring mechanism is given below:

4.1.2.1 Executive Board

Chairman - Concerned CCR&D
Members - CC R&D (R&M)
- Technical Director or his rep
- Subject Experts from R&D Centres, Industry and Academics
- User Representative
- Representative of CIDS
- Inspection Agency
- Development Partners
- Representative of Integrated Finance
- Director P&C or his representative

Member Secretary - Lab Director/Programme Director
Periodicity of Review - Once in six months
The Board will review the whole programme.

4.1.2.2 Project Monitoring & Review Committee

Chairman - Programme Director/Laboratory Director
Members - Senior scientists of the laboratory
- Expert scientist of the laboratory
- Director P&C or his representative
- Technical Director or his representative
- Representative of local finance

Member Secretary - Project leader
Periodicity of Review - Once in three months.
4.1.3 **Projects Costing Between Rs 5 cr & Rs 50 cr**

Two tier management and monitoring mechanism is to be adopted for all the projects costing between Rs 5 cr and Rs 50 cr. Monitoring mechanism is given below:

**4.1.3.1 Executive Board**

**Chairman**
- Concerned CCR&D

**Members**
- Subject Experts from R&D, Industry and Academics
- User Representative
- Inspection Agency
- Development Partners
- Representative of Integrated Finance
- Technical Director or his representative
- Director P&C or his representative

**Member Secretary**
- Project Director

**Periodicity of Review**
- Once in six months.

The Board will review the whole programme and Chairman can co-opt member/invitee.

**4.1.3.2 Project Monitoring & Review Committee**

**Chairman**
- Programme Director/Laboratory Director

**Members**
- Senior scientists of the laboratory
- Expert scientist of the laboratory
- Director P&C or his representative
- Technical Director or his representative
- Representative of Integrated Finance

**Member Secretary**
- Project Leader

**Periodicity of Review**
- Once in three months.

4.1.4 **Projects Costing Below Rs 5 cr**

Two tier management and monitoring mechanism is to be adopted for all the projects costing below Rs 5 cr. Monitoring mechanism is given below:

**4.1.4.1 Project Monitoring & Review Committee**

**Chairman**
- Laboratory Director

**Members**
- Subject experts from R&D, Industry and Academics
- Expert scientist of the laboratory
- Director P&C or his representative
- Representative of local finance

**Member Secretary**
- Project Leader

**Periodicity of Review**
- Once in six months.
4.1.4.2 **Project Review Committee**

**Chairman**
- Project Leader

**Members**
- Senior scientists of the laboratory
- Expert scientist of the laboratory

**Member Secretary**
- Deputy Project Leader

**Periodicity of Review**
- Once in three months.

**Note :**

1. In case of Staff Projects the Apex Boards are called Steering Committees chaired by Vice Chief/ Dy Chief/ SA to RM as per the case.

2. There is no need to constitute Project Assessment & Review Committee (PARC) in view of DATE analysis.

3. In addition to these reviews as integral part of project, there will be external reviews by Panels/ Integrated Defence Council (IDC), etc.

4. Project closure should be preceded by review by the Project Monitoring & Review Committee (PMRC).
5.0 PDC EXTENSION & COST ENHANCEMENT

PDCs for projects should be fixed on a realistic basis in consultation with the sponsoring agency and taking into account all relevant factors. The PDC once allotted to a project should not normally be changed except in very exceptional circumstances. Whenever, a need arise for a change in the PDC, a statement of case giving reasons for not meeting the original PDC and suggesting a fresh PDC should be forwarded before three months of expiry of PDC to Competent Authority in the format given at Appendix ‘G’.
6.0 DESIGN REVIEW

During execution of a project, two types of reviews are to be carried out where extensive design work is involved in development of a system under the project. These are described in brief in the following paragraphs:

6.1 Preliminary Design Review (PDR)

The PDR shall be a formal technical review of the basic design approach for the item. It shall be held after the technical specification, the software design document, the software test plan, hardware test plan are available, but prior to the start of detailed design. The PDR may be collectively done for an item as a system or individually for different sub-systems and assemblies, spread over several events. The over-all technical programme risks associated with each sub-system or assembly shall also be reviewed on a technical, cost and schedule basis. For software, a technical understanding shall be reached on the validity and degree of completeness of the software design document. The following articles will be included in the review:

1. Preliminary design synthesis of the hardware development specification for the item being reviewed.
2. Trade-off studies and design studies results.
3. Functional flow, requirements allocation data, and schematic diagrams.
4. Equipment layout drawings and preliminary drawings, including any critical design/process/components and information.
5. Environment control and thermal design aspects.
7. Power distribution and grounding design aspects.
8. Preliminary structural, mechanical and packaging design, especially of consoles, racks, printed circuit boards, connectors, etc.
10. Security engineering considerations.
13. Pertinent reliability/maintainability/availability data.
14. Preliminary weight data.
15. Development test data.
16. Interface requirements.
17. Development schedule.
18. Mock-ups, models, breadboards, or prototype hardware wherever appropriate.

19. Producibility and Manufacturing considerations (e.g., materials, tooling, test equipment, processes, facilities, skills and inspection techniques). Identify single source, sole source, and diminishing source.

20. Value engineering considerations.

21. Transportability, packaging and handling considerations.

22. Human Engineering and Biomedical considerations (including life support and Crew Station Requirements).

23. Standardization considerations.

24. Description and characteristics of commercially available assemblies and sub-stations including any optional capabilities such as special features, interface units, special instructions, controls, formats etc. (include limitations of commercially available equipment such as failure to meet human engineering, safety, and maintainability requirements of the specification and identify deficiencies.

25. Existing documentation and specification.


6.2 Critical Design Review (CDR)

CDR shall be conducted for each item when detailed design is essentially complete. For complex/large systems CDR may be conducted on an incremental basis, that is, progressive reviews are conducted for different sub systems and software, instead of a single CDR. The purpose of this review will be to:

1. Determine that the detailed design of each item under review satisfies the performance and engineering requirements of the design specification.

2. Establish the detailed design compatibility among the item (sub system, assembly, equipment) under review and other items of the system, facilities, computer software and personnel.

3. Assess risk areas (on a technical, cost and schedule basis) for each item of the system.

4. Assess productivity of each item of system hardware.

5. Review software detail design document, interface design document and engineering drawings to see that they satisfy the requirement established by Design Specification.

The following items shall be included in the review:

1. Adequacy of the detailed design reflected in the draft Design Specification.

2. Detailed engineering drawings including schematic diagrams.

3. Adequacy of the detailed design in the following areas.
Electrical design.
Mechanical design.
Environmental control and thermal aspects.
Electromagnetic compatibility.
Power generation and grounding.
Electrical and mechanical interface compatibility.
Mass properties.
Reliability/maintainability/availability data.
System safety engineering.
Security engineering.
Survivability/vulnerability.
Producibility and manufacturing.
Transportability, packaging and handling.
Human engineering and biomedical requirements.
Standardization.
Design versus logistics trade-offs.

4. Interface control drawings.
5. Design analysis and test data.
6. Initial manufacturing readiness (for example, manufacturing engineering, tooling demonstrations, development and proofing of new materials, processes, methods, tooling, test equipment, procedures, reduction of manufacturing risks to acceptable levels).
7. Life cycle costs.
8. Detail design information on all bought out items to be provided with the system.
9. Verify corrosion prevention/control considerations to ensure materials have been chosen that will be compatible with operating environment.
10. Findings/status of quality assurance program.
11. Software detailed design, data base design and interface design document(s). In case where the CDR is conducted in increments, complete documents to support that increment shall be available.
13. Schedules for remaining milestones.
14. Identify existing or potential support equipment provisioning problems.
7.0 TEST AND EVALUATION

Test and Evaluation is a continuous process during the development, production and induction of a system in the service. Tests are conducted to prove the design, to see that each assembly and sub assembly is able to perform its intended function to test for reliability growth, and on the system as a whole to see that developmental efforts have succeeded, and finally operational tests or User trials for acceptance for induction into Service.

In certain complex programmes, it may be desirable to form a Test Article Review Board (TARB) to clear test plan, test procedure, test set-up, acceptance criteria and other related issues.

7.1 Developmental Test and Evaluation (DT&E)

A system undergoes several tests and evaluations during its various development phases and these can be summarized as:

1. Feasibility Study Phase Tests.
2. Initial Development Phase Tests.

Various tests and measurements are required to be carried out in the above-mentioned first three phases. When a system has been successfully developed, user require to evaluate the same against the QRs. User trial readiness review and user trials is to be progressed as given below:

7.2 User Trial Readiness Review

After completion of development and DT&E, a review shall be carried out to ascertain whether the system developed is ready for User trials. An independent team shall be constituted for this review and acceptance of the developed system for user trials. For major systems, SA to RM may constitute this team.

The Readiness Review and Acceptance Team (RRAT) shall be multi-disciplinary and multi-laboratory. It shall review the results of development test carried out so far and the documents such as design specification, technical, operating manual and user handbook to ascertain that the system’s performance and reliability to meet all parameters of QR issued by the Users. The developing laboratory must provide reliability data & log book to this team to ascertain reliability figures given by the laboratory. Logbook is meant for recording deviations/defects or other observation. After acceptance of the system by the user, similar log book should also be given to user to record occurrence of defects, repair activity & down time etc during operating life of equipment.
7.3 Operational Test and Evaluation

OT&E (user trials) conducted to evaluate a system’s operational qualities with regard to effectiveness, suitability, reliability, maintainability, availability and supportability, and to identify any operational and logistics support deficiencies.

User trials focuses on two specific areas:

1. Operational Effectiveness.
2. Operational Suitability.

Both operational effectiveness and operational suitability go hand in hand and are virtually inseparable, as elements within one are readily inclusive in either test area.

Operational effectiveness is determined by how well a system performs its mission when used by service personnel in the planned operational environment relative to organisation, doctrine, tactics, survivability, vulnerability, and electronic, nuclear or non-nuclear threats.

Operational suitability is determined by the degree to which a system can be placed satisfactorily in the field, with consideration given to availability, compatibility, transportability, interoperability, reliability, wartime usage rates, maintainability, safety, human factors, manpower and logistics supportability, documentation and training requirements.

User trial is conducted under conditions, which are as operationally realistic as possible and must be representative of both combat stress and peacetime operating conditions, foreseen throughout the system life cycle.

Through User trials the test team measures the system against operational threshold (“need to have”) or what Army calls the “bottom line requirements” and objectives (“nice to have, but still important”) outlined in the qualitative requirements and trial directives issued by the Service HQrs.

User trial results provide information of organization structure, personnel requirements, support equipment, doctrine, training and tactics. It also provides data to validate operating instructions, maintenance, procedures, software and other documentation, and training programmes.

As much as is practical, User trial team should comprise personnel with same type of skills and qualifications as those who will operate maintain and support the system when deployed. This assures creditability of User trial results and findings.
7.4 Trial Directive

After the technical work on equipment development project is over, in-house and technical trials have been conducted along with the user and the trial results have been found satisfactory, then following steps are necessary:

1. DRDO & user should sign trial directives. The issues like number of samples, firms, trials, experiments & qualification test & number of stations, period of trials environment & evaluation must be defined.

2. In the case of an equipment development project, in the first phase of technical trials, the adequate number of trials be conducted by the joint team of developer & user. The number of trials will depend on the complexity of the equipment. After the successful completion of trials, the project may be treated as closed and completion report of the project be submitted for the project closure.

3. If more number of trials are to take place under various operating conditions like terrain, climatic conditions, altitude etc, then a new project be taken for such trials. An MOU be signed among the users & the developer which should cover the issues like number of trials, number of samples, firing trials, environmental & quality testing, number of stations, period of trials & evaluation must be defined in the MOU. When the technical trials are in progress with the user, the ToT action should be initiated along with the identification of the production agency. Both should process concurrently.

When the system is ready for the User trials, the User Service generally nominates a trial unit and a trial directive is issued. The trial directive describes in detail, the test, the test sequence and the procedures to be followed in User trials. This may include the acceptable performance limits and the bottom line requirements.

The trial directive also includes a trial questionnaire, which tries to ascertain whether the characteristics of the system developed (system specifications) are likely to meet qualitative requirement in respect of all parameters specified therein.

The trial directive should, therefore, be examined critically and any requirement which is unreasonable or beyond the design parameters should be negotiated, before commencement of User trials. The trial directive should also be analyzed to categorize the parameters into “requirements which must be met” and “requirements which are desirable”. It should be kept in mind that no compromise is likely to be made on the requirements of first category. DRDO labs must obtain copy of Trial Directive before commencement of the trials. The Project Director and the user should jointly sign it.

It should be recognized that performance under extremes of the conditions (like operating at high and low temperatures) couldn’t be the same as under normal conditions. The trial directive should be analyzed to see that this differentiation has been made.

As far as possible, the comparative User trials with a foreign item should be avoided. The performance limits should be specified by the User in QR and trial directive so that the User trials are objective and performance is not judged, subjectively with reference to one time, random performance of another item.
7.4.1 Development Activity Chart

Provisional QR by Service Headquarters

Feasibility Study & Feasibility Report (with DATE inputs)

Peer Review

Peer Review Committee Report with Recommended Approach for Development

Project Sanction

Initial Development Phase

Final Development Phase

Trial Readiness Review and User Handbook

Trial Directive & User Trials

Series Production

Figure -2
8.0 PROJECT CLOSURE

8.1 Post-Project Review

Most of the DRDO projects are a response to a user need, and a key stage in concluding a project is to confirm that the project has, in fact, met the expectations of the user or all the requirements of TD/S&T. This step requires a mixture of process and communication, addressing the following questions:

1. Have all agreed outputs/deliverables been received by the client?
2. Were they to the agreed quality?
3. Are there any resulting obligations on the provider, such as warranties?
4. Are processes for handling intellectual property established and agreed, including for any future revenue?
5. Is there a clear communication channel for follow-up contact between the user and the lab/estt. This is particularly important if a dedicated project team had been established to run the project?

Seeking this feedback as part of a broader, structured assessment of user satisfaction.

8.1.1 Project Evaluation

Once the last task is completed the product of the project has to be evaluated; measuring customer satisfaction is part of this process. The project has to be analyzed to find out reasons for positive and negative deviations.

8.1.2 Learning

These learning have to be documented and to be infused into the learning system to ensure that future projects will capitalize on these experiences. The last step is to disband the project and the project team. Often, termination seems to be the hardest part of project management; a lot of organizations suffer from projects, which were terminated officially but never died.

Once the post-project review has been completed, further tasks remain to ensure the project is well documented; ensure that staff is transferred to new tasks; and that financial resources are appropriately re-allocated. The project information systems should make it clear that the project is complete. After ensuring the above, action is to be initiated to close the project.
8.2 Competent Authority for Closure of Project

In case where a project has been finally completed with the specified objectives achieved, the authority that sanctioned the project will be the competent authority for its closure. In the remaining cases i.e., where a project is cancelled, dropped, the authority competent to order permanent closure of the project will be SA to RM.

8.2.1 Steps Involved in Closure of Project

When the project activities are nearing completion, the establishment should prepare the case as in the normal format to the R&D HQrs (Technical Director concerned), giving a brief account of work done, the results obtained, the actual date of completion, the date for submission of the final project report and any comments on the proposed utilization of the results obtained.

A sanctioned DRDO project may be closed under the following conditions:

**Cancelled Project:** The project has been approved and project no. allotted; but where the work on the project has not commenced and no expenditure has been incurred. Such projects can be cancelled through initiating a case of closure through Technical Director.

**Dropped Project:** Where the work on a project has already commenced and certain amount of expenditure has been incurred but for certain reasons (to be specified) it is decided to drop the project.

**Stage Closed Project:** Pre-mature closure of project is where considerable effort and funds have been spent yet no concrete results have been achieved. It is desirable that no project should be dropped/stage closed as it attracts audit objections and may even lead to PAC paras. Stage closing of a project is only resorted into extra-ordinary circumstances. For dropping/premature closing a project, statement of case has to be prepared in the format given at Appendix ‘H’ and submitted to the competent authority.

**Final Closure of the Project:** Completion of the project with the specified objectives accomplished

8.2.2 Factors Causing Delays in Submission of Closure Reports

- Some laboratories/establishments have been raising Small Work Order Demand (SWOD) orders on Ordnance Factories (OFs) for getting some arms & ammunition related work required for firing trials, etc. There are two problems which are experienced on SWOD orders:
  - Delay of several years in receiving statement of accounts.
  - Inflated bills to original expenditure about which labs have no information or control.
Some labs are creating facilities for User Services under projects and they continue their maintenance under the same projects, which is not correct. To cite an example, DIPAS created an High Altitude Research Facility at Siachin under a project sanctioned in 1988. Project is continuing even today only for maintenance. The project should be closed now and maintenance has to be entrusted to User Services.

Loss of data due to transfers/retirement, non-availability of audited statement of accounts. In such cases Statement of Accounts from Laboratory Accounts Officer countersigned by the Laboratory Director is accepted.

These factors causing delays should be avoided by laboratories/establishments.

**8.3 Final Closure of the Project**

Final closure of the project requires two stages as given below:

**Administrative Closure:** After expiry of PDC statement of case as given at Appendix ‘I’ be forwarded to the competent authority within the three months of the PDC for closure of the project. No expenditure should be incurred in the project after expiry of the PDC. This report serves the purpose of audit authorities.

**Techno-managerial Closure:** A detailed report be submitted to the competent authority after closure of the project highlighting post project activities, project documentation, post project responsibilities, technical achievements, further scope and limitations. This is a in-house document and not meant for audit. Techno-managerial closure, as per Appendix ‘J’ is necessary for project costing more than Rs. 15 crore.

This report is essential for closure of a project, however administrative closure action must start within the expiry of PDC & techno-managerial report within 3 months of administrative closure. This report should contain a copy of Govt letter on closure.

Guidelines for conduct & re-union of detailed feasibility report for high value Defence R&D project is given at Appendix ‘K’.
The best procedure of Transfer of Technology to Production Agencies in public & private sector is through joint development with the production agency and the users. The following steps are necessary:

Identify the production agency at the early stages of TD or Mission Mode/Staff Projects. The role and responsibilities between the stakeholders i.e. Developing Agency, (DA, DRDO laboratory), the Production Agency (PA, OF/DPSU/Industry) and the User Services should be governed by MOUs. MOUs should include the following:

**9.1 Responsibility of Development Agency**

1. Technology breakthrough, development and consultancy with international agencies;
2. Creating testing facilities and test procedures for prototype and production models;
3. Documentation (operating manual, maintenance manual, quality procedures & reliability data);
4. Training the engineers, technicians and managers of PA; and
5. Constituting project teams, review boards/committees to include users & PA.

**9.2 Responsibility of Production Agency**

1. Part funding the projects to bear the cost of plant, tooling and prototypes;
2. Joining development process for fabricating prototypes and testing them;
3. Deputing adequate number of staff/engineers/managers for joining training process of DA; and
4. Preparing production plan, budget estimates, amortizing the development cost on order quantity.

**9.3 User’s Role and Responsibility**

1. Part funding the project;
2. Finalise the GSQR, join the development process, project reviews, provide test platforms, provide test platforms and trial directive and feed back on usage of prototypes; and
3. Issue production orders to the PA after successful development.
9.4 Consortia Approach

The advantage of joint development through Consortia of production agencies and users are:

1. Saving time by concurrent development & transfer;
2. Giving advance information and sufficient time to DA for technology absorption and planning production and setting up free flow production; and
3. Insuring continuity of production orders and planning product upgradation.

9.5 Other Feasible TOT Models

TOT through Project Mode: This model is also workable for preparing drawings, process sheets documents, providing training to the PA and the users. Such projects should be for very short and specific time period.

TOT of Spin-off Technologies to Industry: This is through MOU between laboratories and industries. A team of officers is constituted by laboratory Director which has C-TEC as a member from DRDO HQrs of Finance representatives to workout the lump sum & royalty on sales. The documentation, consulting and training is provided by laboratories as per terms agreed in the MOU.

9.6 Vendor Search and Development

DRDO has following mechanism for identifying the development partners:

Visits of Industry Leaders Organized by CII to DRDO Laboratories: Several industries have joined us through such visits organized during 1995-99.

Industry Meets: CII organized industry meets in Hyderabad, Bangalore and Pune during 2000-2003 with DRDO HQrs. Industry leaders joined us in several development projects.

Aero Shows/Seminars/Defexpo: We are organizing International Aero Shows/Defexpo every two years, in addition to conducting several seminars. We are updating our products and technology and building international links for development and consultancy.

Cluster Meets: DRDO is organizing cluster meetings of laboratories, discipline wise. These meetings are chaired by Chief Controllers. This occasion can also be utilized by laboratories for displaying products and sharing future work plans with industry partners.

Expression of Interest: We are identifying our collaborators through expression of interest whenever it is deemed necessary in case of design audit, consultancy, fabrication of components.
9.7 Outsourcing Development Jobs

DRDO has a policy of working in core technology and in strategic areas—wherever technology has been established, Development work has been outsourced. For example, various types of launchers, equipment motors and ground operating systems have been outsourced to several industries like L&T, Tractor India Ltd and Badawe Engg., MTAR, Srijan Motors. We have hundreds of cases of successful partnerships with industries where they have come forward and become our partners in technology leadership. We have following opportunities for industry partners:

- Operating Pilot Plants: ARDE & HEMRL & TBRL have some pilot-plants where industry is required to produce specific quantity of propellants, explosive or transducers on GOCO basis. Other labs/estts have similar requirement.
- Product support & maintenance of high tech-systems.

High tech indigenously developed systems are manufactured by DPSU/OFs. Product support & their maintenance has been problem area. Large PSU/OF are not ideally suited for product support activities. Small industries are more suitable & they have great opportunities in this field for efficient operation of systems during exploitation.

Outsourcing offers us great opportunity and space to focus on cutting edge technologies while it also offers opportunity to industry to supply indigenous systems to Users, thereby contributing towards reduction of imports. We will not be able to achieve goal of self-reliance by doing all things ourselves. It is through outsourcing that we can spend our enhanced budget in coming years in a more cost-effective manner. (Elaborate guidelines on the subject are being issued separately by Director, C-TEC).
10.0 PROCEDURE FOR FUNDING OF LIMITED SERIES PRODUCTION ORDERS (LSP)

With a view to monitor expenditure and ensure that the linkages between financial outlays and physical outcomes is well formulated for efficient implementation of projects, it has been decided to streamline the procedure for funding of orders/projects entrusted to DRDO laboratories by Service HQrs. (both research and development projects as well as for LSPs/supply of goods and services by DRDO). This procedure shall be applicable for payments from Revenue as well as Capital heads by the Service HQrs. It is expected that the procedure will ensure that the resources are made available in time by Service HQrs to enable DRDO laboratories to smoothly implement such projects.

For a project to be undertaken by a DRDO laboratory for supply of goods and services, the Service HQrs will issue appropriate sanction after approval of their CFA. The sanction will be based on DPR prepared by DRDO at the initiation stage and shall inter-alia contain cost estimates and other necessary details such as schedule of release of payments linked clearly to achievement of well defined milestones in consultation with their Integrated Finance. This DPR shall also specify the mutually agreed milestones about the scope of work to be completed. The project sanction order will clearly indicate total cost of the project, time frame of the project and other necessary details like Head of Account to which expenditure is to be booked, etc. The sanction will authorize respective Principal Controller of Defence Accounts (PCDA/R&D)/Controller of Defence Accounts (CDA/R&D) to book expenditure directly to the relevant Heads of Accounts of the concerned services. This booking of expenditure shall be restricted to budget allocations made by the Service HQrs for the project during respective financial years.

While DRDO labs will have the authority to commit expenditure within the approved sanctioned cost or as amended, the expenditure to be booked will be restricted to budget allocations made by the Services HQrs for the project in each of the respective financial year. While issuing the sanction, funds availability for the first financial year will be simultaneously indicated in the sanction order.

The DRDO laboratories will commence orders/projects entrusted to them by DRDO HQrs only after appropriate sanction for project has been issued by Service HQrs. The responsible DRDO laboratories will send quarterly reports on the progress of each project, to DRDO HQrs and to the respective Service HQrs especially with reference to financial allotments made by them. Actual progress against each agreed physical milestones linked to time frame will also be reflected in these quarterly reports. A copy of the report shall also be forwarded to the concerned Directorate/Budget Centers or any other agency nominated by the Service HQrs to monitor the project.

In case, the actual cost of the project is likely to exceed the amount approved under initial sanction letter issued by the Service HQrs, the revised cost estimates will be projected by the DRDO to Service HQrs along with detailed justifications after due vetting by their Integrated Finance. Service HQrs will then issue suitable amendment to
the original sanction letter after seeking approval from their CFA based on clarifications/justifications given by DRDO and allocate the additional amount for the project. In case the project cost is likely to be less than the initial estimated cost, the expenditure booked will be restricted to the actual cost.

At the time of preparation of RE/BE each year, DRDO HQrs will project the total fund requirements for the projects being executed by the DRDO Laboratories, for which funds are provided by Service HQrs. These projects along with details of the projects will be made available by DRDO to Service HQrs, so that for all the on going projects, funds requirements are included in the committed liabilities. Service HQrs will ensure that adequate funds are allocated for each of these projects and allocation letters sent to DRDO laboratory and PCDA/CDA (R&D) in the beginning of the financial year.

As soon as the project is completed by DRDO laboratories, they should intimate the total expenditure on the project after due reconciliation duly vetted by respective and PCDA/CDA (R&D). They shall also intimate achievements against agreed milestones to the respective Service HQrs.

The procedure as prescribed above will be followed for all projects entrusted to DRDO HQrs, which shall be sanctioned henceforth for execution by DRDO establishments. There will be no change in procedure at present for existing “on going” projects, where substantial funds have already been transferred by Service HQrs to DRDO. These will continue to follow the existing practices till further instructions are issued for reviewing specific projects on case-to-case basis.

**Note:**

This Memorandum is issued with the concurrence of MOD – Finance (R&D) vide their I.D. No. 1207/Dir Fin (R&D) dated 28th July’ 2005 and the reference is taken from GOI letter No. 9(9)/2005/D(R&D) dated 28th July’ 2005.
### STATEMENT OF CASE FOR SANCTION OF PROJECT

**Name of the Project:**

| ______________________________________________________ |
| ______________________________________________________ |
| ______________________________________________________ |

**Category** (Please tick in appropriate box)

- [ ] Mission Mode (MM)
- [ ] Technology Development (TD)
- [ ] Science & Technology (S&T)
- [ ] Infrastructure Facilities (IF)

**GSQR/NSR/ASR No.**

(for MM Projects, if applicable)

: _______________________________________

**Cost (Rs. in lakh)**

: _____________________________

**Duration (in months)**

: _____________________________

**Is it a Plan Project?**

: Yes / No

**If yes, please give Reference**

: _____________________________

**Is Feasibility Study Report enclosed?**

: Yes / No

**Is DATE Analysis Report enclosed?**

(for MM and TD Projects)

: Yes / No

**Is Project Execution Plan attached?**

: Yes / No

**Project Deliverables**

(Please tick in appropriate box)

- [ ] Prototype
- [ ] Limited Series Production
- [ ] Technology
- [ ] Assembly or sub-assembly
- [ ] Process
- [ ] Knowledge
- [ ] Skill
- [ ] Others
## CONTENTS

### Part-I (Macro Details)

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<th>Description</th>
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### Part-II (Micro Details)

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</table>
Part –I

1. Name of laboratory/establishment : ________________________

2. a. Title of the Project : ________________________
   b. Short Name or Acronym : ________________________

3. Title of the Programme : ________________________
   (If the Project is part of a Program)

4. Is this Project mentioned in X\textsuperscript{th} Plan? : Yes / No
   (If no, please justify the need to take up the project)

5. Is it a Multi-labs Project? : Yes / No
   (If yes, please specify the Nodal lab/estt.) : ________________________

6. Category of the Project : ________________________
   (Please tick in appropriate box)
   (   ) Mission Mode (MM)
   (   ) Technology Development (TD)
   (   ) Science & Technology (S&T)
   (   ) Infra-structure Facilities (IF)

7. Duration (in months) : ________________________

8. Please specify the User(s) : ________________________
   (Army/Air Force/Navy/Inter-services/DRDO)
   (Please attach a list of the salient points of the QR for MM Projects)

9. Estimated Cost (Rs. in lakhs) : IC : ________________________
   FE : ________________________
   Total : ________________________

10. Breakup of Cost (Rs. in lakhs) :
   (a) Revenue (Cost has to be kept minimum)

<table>
<thead>
<tr>
<th>Budget Head</th>
<th>Item</th>
<th>IC</th>
<th>FE</th>
<th>Total</th>
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<tbody>
<tr>
<td>105</td>
<td>Transportation</td>
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<td></td>
<td>- Movement of Personnel (Domestic)</td>
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<td>- Movement of Personnel (International)</td>
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<td></td>
<td>- Move of Stores</td>
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<tr>
<td>110</td>
<td>Stores (Small value items/consumables)</td>
<td></td>
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<tr>
<td>111</td>
<td>Minor Works</td>
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<tr>
<td>003</td>
<td>Training</td>
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<tr>
<td>004</td>
<td>Research/R&amp;D</td>
<td></td>
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<tr>
<td>800</td>
<td>Other Exp (CARS, Consultancy, Sub-project)</td>
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</table>

Note of major equipment/stores must be given at the end of proposal.
(b) Capital

(Equipment/stores/sub-assembly forming part of major deliverable system, having life of 7 years or more)

<table>
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<tr>
<th>Item</th>
<th>IC</th>
<th>FE</th>
<th>Total</th>
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<tr>
<td>Stores (including Vehicles)</td>
<td>-</td>
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<tr>
<td>Capital Works</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<tr>
<td>Machinery &amp; Equipment</td>
<td>-</td>
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</table>

11. Additional requirement of mechanical transport vehicles specific to the project, for equipment/developed systems and stores (with justifications):

12. Proposed year-wise financial commitments/cash out flow (Rs in lakhs):

<table>
<thead>
<tr>
<th>Year</th>
<th>IC</th>
<th>FE</th>
<th>Total</th>
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13. Proposed project deliverables:

(a) No of prototypes for testing __________

(b) No of (type approved/qualified) deliverables __________

14. Any other information: ________________________________

____________________________________________________

____________________________________________________

15. List of enclosures:

1. ________________________________________________

2. ________________________________________________

3. ________________________________________________

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Part – II

1. **Brief technical appreciation** (This should include objective, scope, relevance of the project to the charter of the Laboratory/Establishment and Mission of I – 1 to 2 pages only – in 18 points space).
   - Competence level/preliminary work done to acquire the same.
   - Brief of DATE analysis (including assumptions made).
   - Peer Review recommendations (please enclose copy).
   - PERT/CPM Charts.
   - Critical factors/technology involved.
   - High development risk areas & remedial actions proposed.
   - Plan of action for prototype development/execution plan.
   - Production agencies proposed.

2. **Is a separate project for TOT proposed** : Yes / No
   - Cost benefit analysis/pin off benefits.
   - Project management & monitoring structure proposed.
   - If the project is to be executed by a multiple laboratories, please outline the agreed work-packages between the various labs/estts.

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Nature of Work/Sub project</th>
<th>Lab/Estt</th>
<th>Cost (Rs in lakhs)</th>
<th>PDC (in months)</th>
<th>Remarks</th>
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3. **List of major additional facilities (capital) required for the project**
   (Please highlight status of similar facilities existing with laboratory)

   1. ________________________________________________________________
   2. ________________________________________________________________

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43
4. **Major training requirements**

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<tr>
<th>Sl. No</th>
<th>Discipline/area for training</th>
<th>Agency contacted</th>
<th>No of Personnel proposed to be trained</th>
<th>Duration</th>
<th>Cost</th>
<th>Remarks</th>
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5. **Details of consultancy requirements**

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<tr>
<th>Sl. No</th>
<th>Discipline/area</th>
<th>Agency</th>
<th>Cost</th>
<th>Confidence level of the agency</th>
<th>Remarks</th>
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6. **Any other information** (Important for the project but not covered above).

_________________________________________________________________
_________________________________________________________________
_________________________________________________________________

7. **Comments of Project/Technology Director with signature and date**

_________________________________________________________________
_________________________________________________________________
_________________________________________________________________

8. **Recommendations of Lab Director with signature and date.**

_________________________________________________________________
_________________________________________________________________

**Note:** All project reviews should be with respect to execution plan or revised execution plan in case of PDC extension.
Appendix ‘B’

PROJECT EXECUTION PLAN
(Project Costing < Rs. 2 cr)

Objective : ____________________________________________________
Scope : ________________________________________________________
Priority : _______________________________________________________
Responsible Officer : ____________________________________________

Output(s)/deliverable : (What will be delivered at the end of the project?).

How will the success of the project be measured : (Describe the measure(s), which will indicate that the project will be successfully completed.).

Resources : (What human resources, and other resources (if applicable) will be required for the project?).

Key stakeholders : ______________________________________________

Minimizing the risks : (What are the barriers to achieving project success (ie the major risks)? What are the consequences if the project is not undertaken? What steps will be undertaken to Organize these major risks to the success of the project?).

Guidelines/Standards : (What guidelines, standards or methodologies will be applied to the work undertaken in the project including sub project packages).

Governance : (Describe any special management arrangements that will be put in place to govern the project).

Partners : ____________________________________________________

Project milestones : ____________________________________________

(List the major milestones, scheduled start, scheduled finish and who has been assigned accountability. PERT chart depicting all the major activities. There should be at least 3 reviews for each Project: PDR, CDR & Final Review. (There should be a Project/Project Review Management). PRC Chairman could be a scientist within the laboratory from the Peers, a scientist from any other laboratory or a Specialist from an academic institution & members having some cross functional specialization, a Finance & Materials Management Member/Planning specialist from the laboratory).

Endorsement

Project Director / Officer Responsible: ________________________________

Signatures, Name and Designation
PROJECT EXECUTION PLAN
(Project Costing > Rs. 2 cr)

Introduction

The Project Execution Plan (PEP) is the operational document for the project. It is owned, maintained and summarized by the Project Manager and Project Team to support the delivery of the agreed project outputs. Depending on the size and complexity of the project, the need for multiple Project Execution Plans (PEPs) for the Project may arise.

The PEP is the road of the project and it is the responsibility of the Project Manager. It enables its effective day-to-day (operational) management and control.

Project Outputs

Describe specifically the project’s outputs, which have been envisaged at the start of the project.

Scope of Work

Briefly summarize the scope of the work involved in the project as defined in the Project Plan.

Stake Holders

Management Plan

Management

This section may be covered by a reference to the Project’s governance structure, i.e. management roles, functions and responsibilities that are defined in the plan. Which person will manage the project or who is the Project Manager? The Project Manager is responsible to the sponsor for the delivery of the agreed project outputs.

Sub-project Management

Define the operational management of the sub-projects if many subprojects given to multiple agencies.

Reference Groups

Detail any specific reference groups (i.e. function, objectives, membership etc) that are required.
**Consultants**

Detail any consultancies (i.e. function, time frame, objectives, management, reporting etc) that are required.

**Working Parties**

Detail any specific working parties (i.e. function, responsibilities, time frame, objectives, membership etc) that are required.

**Status Reporting**

Describe the provision of project reporting requirements (e.g. content, frequency, audience etc) for the following:

- Project Manager
- Reference Groups
- Consultants
- Working Parties
- Quality Consultants.

**Cross-reference the above reporting requirements with status reporting**

Clearly define the purpose, content and frequency of project status reports as mentioned in the project monitoring and review mechanism on the following broad outlines. The status of the project, which includes monitoring of milestones and budget:

- For the last reporting period;
- For the next reporting period;
- For the remaining period of the project.

An issues report (including areas of concern, specific problems, and any action that needs to be taken); and

A risk management report, which will specify any changes to the risks identified and the strategies put in place to manage them.

**Risk Management**

Risk assessment and management strategy working documents may be attached as an appendix.

**Risk Assessment**

The Project Manager is responsible for:

- Scheduling and performing risk assessment and developing strategies to manage those risks for each phase of the project as identified within the Project Plan.
Providing a risk review within status reports to the Steering Committee, which will specify any changes to the risks identified during each phase of the project and the strategies adopted to manage them. It provides details of the following:

- Where the results of each risk assessment will be retained;
- The frequency of risk assessment;
- Who will be involved in the risk assessment;
- How the risk assessments will be conducted;
- What will trigger the implementation of the risk mitigation strategies;
- How the effectiveness of risk mitigation strategies will be monitored; and
- The approval mechanism for risk mitigation strategies e.g. Steering Committee approval.

**Failure to Deliver**

In the event of the project suffering slippage of greater than six months then the Project Sponsor and the Project Manager shall review schedule and outputs to be delivered. The Project Manager shall inform the Monitoring Committee of the situation and recommend the course of action to be followed. Agreement on how to proceed shall be negotiated by the Project Manager and Steering Committee.

**Acceptance and Review Periods**

If any agreed review period is not met and in the opinion of the Project Manager, the project is unable to make planned progress, the schedule shall be reviewed immediately. The Project Manager should negotiate any adjustments for the time lost with all affected parties.

**Issues**

When issues arise, which must be resolved between the users and the Project Manager then the issue shall be advised in writing between the Project Manager and the users. The recipient of the issue shall be responsible for ensuring it is resolved. On receipt of the issue, recipient should intimate the project manager the time frame in which it is likely to be resolved and communicate the resolution in writing to the initiator.

**Non-availability of Resources**

If any agreed resource is not made available as scheduled in the Project Plan and, in the opinion of the Project Manager, the Project cannot proceed the schedule shall be revised. The Project Manager should negotiate any adjustments for the time lost with all the affected parties.

**Provision of Facilities and Equipment**

Describe facilities are required by the Project Team (e.g. accommodation, office support, equipment etc) and any specific maintenance requirements. Document the project’s environment baseline.
**Skills and Resources**

The project resource requirements for entire period or specific phases:

- Project Manager;
- Independent Quality Officer and/or Quality Review Consultant;
- Representatives of the user; and
- An external project auditor.

Describe any specific knowledge and skills required to undertake processes designed to achieve the project outputs.

- Managerial skills and knowledge;
- Strategic and conceptual skills;
- Sound communication, negotiation and consulting skills;
- Capacity to develop innovative solutions;
- Understanding of project and quality management principles and practices; etc.

The following aspects need to be addressed:

- The impact of resources being off-line on projects;
- How these resources will be released to the project; and
- From the project when no longer required.

**Training**

What training requirements are there based upon the required skills and resources listed above? How is the training to be provided and conducted?

**Configuration Management**

Configuration management is a term often applied to change control procedures (e.g. change requests, problem reporting, issues management etc) undertaken at the project/implementation team level to control change and reduce its impact on the overall project.

**Change Control**

The Project Manager in accordance with methodology/process shall use change control. This process provides the means for:

- Facilitating the introduction of specific project change;
- Allowing the impact of the change to be assessed;
- Providing a method of summarizing change; and
- Providing an audit trail of change.
Approval of changes is by the Monitoring Committee

Describe the process that will be used to raise, record, review and resolve change requests.

Problem Reporting and Resolution

Problem reporting is used to record a problem that has been identified in a project. Describe the process that will be used to raise, record, and review and resolve problem reports.

Issues Management

It is anticipated that the Project Manager and Team will solve most of the issues raised within the development phase. However, issues arising, which must be resolved between the users and the Project Manager, are referred to the Project Sponsor for resolution. Describe the process that will be used to raise, record, review and resolve issues.

Confidentiality

All project members, agents, contractors and subcontractors shall respect the confidentiality of each other’s business and technology and shall not reveal any information concerning the other party without the written permission of the other party. All agreements and contracts entered into require inclusion of a confidentiality clause.

Output Review and Acceptance

Describe the process that will be used for the review and acceptance of each output and documentation product, including who is responsible for scheduling the reviews, who will be involved, what will be generated for each accepted output or documentation product.

Updating this Plan

This plan shall be updated at least at the end of each phase or phases. The updated plan shall be reviewed in accordance with the Development Plan and accepted and issued. The update process includes acceptance by the Project Sponsor. This shall be a new release in accordance with Output management. Any changes to standards and procedures and other information specifically documented in this plan shall result in a new release of the plan being prepared and issued. Day to day project plans shall be maintained outside of this plan to reduce the frequency of change. For the project, this document contains only the broad phase plans.

Quality Plan

Methodologies and Standards

Describe the methodologies and standards that will be followed and for what purpose namely:

- Quality Management
- Output Development
Define any variations to standards. Describe what will happen if a new version of a methodology or standard is released before the project is complete. How changes to the methodologies and standards will be initiated and implemented, and what will happen to superseded standards and procedures.

**Development Environment**

Detail, or summarise the development environment that the project is working within. This effectively defines the project’s environment baseline. Describe the process that will be used to record and change the development environment.

**Inspection, Measuring and Test Equipment**

Describe if any special tools, techniques, inspection, measuring and test equipment, which needs to be acquired or developed for verifying the project outputs, or the process of developing those outputs. How will the equipment be verified?

**Outputs to be Developed**

All outputs and components of outputs shall be managed.

**Project Evaluation**

The measurement of the success of a project provides valuable input into the continuous improvement for the following phases of a project, or for the subsequent projects. This evaluation forms an important part of the Project’s Quality Plan. Improvements may be identified in the areas of the planning process, the development process, the summarizing process, or to the project management processes in general.

**Record Keeping**

Determine what records will be generated by the project team and retained by the Project Manager, and where they will be retained. The following is a list of the non-exhaustive records that will necessarily be generated. The project monitoring/steering committee may add to the list to facilitate the ultimate objective of the project.

- Project Management Records
  - Project Proposal
  - Feasibility Report
  - Project Execution Strategy
  - Environment Baseline
  - Project Execution Plan.

- Incident problem/accident Report Register /Logbook

- Change Request Register
Open Issue Register
Output Distribution List
Managed Output Identification
Quality Assurance records and reliability data.

Records Required by the User
Which of the records created within the project, if any, does the user require access to? How and when will they access them? How long will they retain them and for what purpose? The Project Sponsor and Steering Committee will be provided with copies of any records the user request access to.

Purchasing Plan

Purchasing Specification
The objective is to ensure purchased goods or services conform to documented requirements.

- What has to be purchased?
- Does this include subcontracted development?
- What is the procedure and processes to be followed for purchases, including approval and summarizing in requirements?
- What guidelines or procedures currently exist that must be adhered to
- What records are required
- Are there any potential occupational health and safety issues due to the proposed purchases?

Sub-contractor Management
The objective is to ensure subcontractors are managed appropriately. Consider the following:

- What methods are to be used for managing and monitoring subcontractors
- What are their reporting requirements?
- What documents, if any, will the subcontractor provide (eg project schedule, quality plan etc)?
- Consider confidentiality, intellectual property and training issues.

Inspection and Testing of Purchased Goods & Services
The objective is to ensure goods and services are inspected or tested/assessed upon receipt to ensure conformance with the purchase specification.

Include the following (non-exhaustive) details:

- Where are the verification requirements to be documented (eg. purchase order, PEP, agreement etc)?
Where will verification occur, and by whom?
What inspection and testing is to be performed?
What is to be the method of release?
Is the performance of the supplier to be rated and documented?

**Records Required**

Records to include:

- Purchase orders, agreements/contracts, supplier selection and performance documents, Requests for Information/Tender/Quotation, subcontractor records/documents etc.
- Project records required may be addressed in one section of this PEP or within individual sections/plans. The approach will depend on the demands of the project.

**Development Plan**

Describe the process to be undertaken in the design and development of the project’s outputs, as defined in the Quality Plan.

Consider the approach for this section, either by describing the design and development activities for each output, or summarizing the minimum activities required.

**Design and Development Activities**

Describe the process that will be used to design, develop, review, accept, distribute and change outputs. Will all outputs delivered by the project follow the same process? Describe by exceptions.

Example documentation products include Functional Requirements Specification, Design Specifications, Test Specifications, User documentation, Maintenance documentation and Training material. Other outputs may include developed software/systems.

**Organisation and Staffing**

If not already addressed within this document (PEP), ensure the following:

- That the skills required for design activities are identified;
- That the resources (eg. staff) are identified and allocated for design activities; and
- That appropriate management of staff, clients and providers and other stakeholders of the project is defined (this may have been addressed in the Project Business Plan under Stakeholder Management Plan.

**Design Methodology**

Describe the design methodology that activities will conform or give reference to, if not already addressed in the Quality Plan. Design and development activities to be performed are to be listed in the project plan.
**Design Input**

Describe any design input that will be used. Ensure input is reviewed for applicability before commencing any design or development. Be aware that the development of an output may be input into the design of another output. Design validation through alternate sources like wind tunnel testing, simulation exercises is an essential tool to pinpoint design weaknesses and accuracies in advance.

**Design Output**

Describe any specific design output requirements eg an iterative process will occur to produce a sequence of design specifications.

**Inspection and Review**

Describe the responsibilities and processes required. Following to be included:

- Reviewing outputs, ensuring conformance to methodologies and standards.
- Review/inspect for content and completeness.
- Process for identification defects, deficiencies, related issues, etc.
- If applicable, programming reviews strategy – linkage to Test Plan.
- Documentation requirements.

**Approval and Acceptance**

Describe the responsibilities and processes required. Following to be included:

- Approval of output, and acceptance.
- Documentation requirements.

**Authorisation and Distribution**

- Describe the responsibilities and processes required. Following to be included:
- Authorisation (of output release) and distribution of output.
- Output management and maintenance requirements post-acceptance.
- Documentation requirements.

**Updating and Changing**

Describe the responsibilities and processes required. Following to be included:

- Updating the output (eg. future releases following project milestones).
- Changing the output (eg. user change in functional requirements).
- Requesting change and method of re-release.
- Documentation requirements.
**Test Plan (Project Outputs)**

All testing shall show the version of the output being tested, the version of the test specifications being used and, for acceptance testing, the version of the design specification being tested against.

**Unit Testing**

List the individual sub systems subjected for testing individually along with testing stages and tests to be carried out.

**System and Integration Testing**

Approach: System and Integration testing shall be performed using the system test specifications and each test specification shall be annotated with the results of the test. Where the output fails to pass testing a Problem Report shall be raised. Incident Reports may be used to identify individual failures for later consolidation under a single Problem Report.

Review: When the tests have been successfully completed the results of testing shall be reviewed generally as defined in the Development Plan.

**Acceptance Testing**

This is done when development work is over and user evaluates the deliverable for its operational effectiveness operational suitability. User trials to be conducted are enumerated.

*Approach:* The user shall nominate a team to apply the acceptance test specifications to the system. Describe processes, resourcing and responsibility for developing and approving the acceptance-testing plan.

The nominated acceptance test specifications shall be applied to the nominated version of the system to test that the system conforms to the nominated version of the design specification.

Each test specification shall be annotated with the result of the test.

Where the output fails to pass testing then a Problem Report shall be raised. Incident Reports may be used to identify individual failures for later consolidation under a single Problem Report for evaluation of reliability data or meantime between failure (MTBF.)

*Review:* When the tests have been successfully completed the results of testing shall be reviewed generally as defined in the Development Plan.

**Implementation and Delivery Plan**

**Implementation**

What documentation will be required from the Project Team and user perspective for management of the implementation.
Who is responsible for implementation activities and where will the functions, roles and responsibilities be defined?

Does the role of the Project Team, and therefore this document (PEP) cease upon the delivery of the project’s outputs?

What other specific resources will be required for implementation activities?

**Maintenance Plan**

Describe responsibilities and processes for maintenance once the user has accepted project outputs. Describe how modifications, enhancements, defects and/or deficiencies shall be notified.

**Project Evaluation Review(s)**

Definition for the following to be included:

- The timing for any reviews, which may be conducted at the end of a phase or each and every phase, and/or after all outputs have been delivered prior to the project being closed.
- The issue to be addressed in each review(s) to cover, for example:
  - A technical review of the outputs from the project; or
  - A review of the success of the project; or
  - A review of the processes used to produce the outputs; or
  - A combination of the above.

Who will perform the review(s)?

Who is responsible for the post implementation review process?

Who will the report(s) be delivered to?

Will all relevant stakeholders be included within the review process?

What action will be taken once the report(s) have been received?

**Appendices**

The following documents and forms should be attached to the Project Execution Plan as appendices to enhance or meet specific project requirements.

- Templates that become working documents in their own right, as they will be updated and managed during the life of the project (e.g. project plan); or
- Additional information provided to support the summary content within the Project Execution Plan (e.g. project development methodology).
DATE is a decision support tool for technology evaluation of R&D Projects. It facilitates systematic analysis of a project for its technology content and evaluation of feasibility in the context of technological expertise and facilities available in the country.

The proposed methodology enables the project team to access the importance of different technologies for each of the subsystems of the system, the team’s confidence in exploiting the national technological resources and finally determine the potential for successful completion of the project. The methodology also helps the project team/laboratory to identify and quantify possible technology gaps affecting successful system development.

System Reliability Index (SRI) is a measure of the feasibility of successful completion of a system development project within the given timeframe and resources. SRI can take a value between 0 and 10 (i.e. $0 \leq SRI \leq 10$). Projects yielding an index above, say, 8 should normally not require any R&D. Development/supply of the sub-systems, or even the whole system, may as well be left to the industry, with DRDO providing consultancy as needed. A SRI value between 4 and 8 would imply reasonable chance of success for the project from technology point of view. SRI value below 4 would suggest need for further analysis to determine possible technology gaps coming in the way of project success.
GUIDELINES FOR PROJECT REVIEWS

Executive Summary

Background
Describe the background to the Project Review & Evaluation.

Terms of Reference
Describe the terms of reference for the Project Review & Evaluation, particularly what was included, and what was not included.

Highlights and Innovations
Describe the highlights of the project and any innovations used or developed by the project.

Summary of Findings
Briefly describe the main findings presented in the Report.

Recommendations
List the recommendations that appear in the Report. For ease of reference, each recommendation should be uniquely numbered and a reference provided to the relevant section within the Report.

For a review of a large and complex project where there is a large number of recommendations, these can be broken down into major recommendations and others.

Introduction

Background to the Project
Briefly describe the background to the project under review to provide the contextual framework within which the project was undertaken.

Project Review Methodology
Briefly describe the methodology used for the Project Review & Evaluation, including mechanisms such as examination of documentation, surveys, face-to-face interviews, group sessions etc.

Objectives, Outcomes and Outputs

Objectives
Describe the objective for the project and where it was documented.

Critical Success Factors
Describe the critical success factors for the project and where they were documented.
Outcomes and Target Outcomes (Deliverables)
Describe the outcomes and target outcomes for the project and where they were documented.

Outputs
Describe the outputs for the project and where they were documented.

Development Methodologies
Describe the methodology used to develop the deliverables.

Project Management Plans

Project Proposal/Brief
Identify the Project Proposal/Brief and the endorsement received. Identify any omissions in the contents or any issues that arose as a result of the documentation.

Project Execution Plan
Describe the development of the Project Execution Plan throughout the project.

Outcome/Benefits Realisation Plan(s)
Describe the development of the Outcome/Benefits Realisation Plan(s) throughout the project.

Maintenance of Project Records
Describe the processes used to control and maintain the project records. Identify any problems that occurred due to the adopted approach, or any suggestions for improvement.

Project Management

Planning and Scope
Describe the method used to plan and scope the project, and where the results of the planning were documented. Identify any issues that occurred due to the adopted approach, or any suggestions for improvement.

Governance
Describe the key players in the project under review based on the governance diagram and where the governance structure was documented. Identify any issues that occurred due to the adopted structure. For ex., Steering Committee composition was inappropriate – too many members, too few members, lack of external representation etc.

Organisational Change Management
Describe the process adopted for Organizational change management and where the process was documented e.g. Outcome/Benefits Realisation Plan. Identify any issues that occurred due to the adopted approach, or any suggestions for improvement.
Stakeholder Management
Identify any issues that occurred with the user due to the adopted approach, or any suggestions for improvement.

Risk Management
Describe the process adopted for risk management, including when the initial risk analysis was undertaken, who was involved and how ongoing reviews were performed.
Identify any issues that occurred due to the adopted approach, or any suggestions for improvement.

Issues Management
Describe the process adopted for issues management, including the tool used to capture and track the progress of issues.
Identify any issues that occurred due to the adopted approach, or any suggestions for improvement.

Resource Management

Budget
Describe the funding arrangements for the project, any approved changes to the initially approved Project Budget and where it was documented. Identify any issues that arose as a result of the documentation or the funding arrangements.

Human Resources
Describe the initial allocation of human resources (including the skills mix), ongoing management processes adopted for the project and where they were documented. Identify any issues that arose as a result of the skills mix, processes or documentation.

Physical
Describe the physical arrangements for the project team, including any equipment requirements. Identify any issues that arose as a result of these arrangements.

Information
Describe the information management arrangements adopted for the project e.g. document control, storage, security and backup of hard copy and soft (electronic) copy records and documents, level of documentation maintained.
Describe any information being supplied to the project e.g. legal opinion, and how it was managed. Identify any issues that arose as a result of the information management arrangements.

Quality Management
Describe the approach adopted for Quality Management in the project, including a summary of key facets documented in the Quality Plan.
Identify any issues that occurred due to the adopted approach, or any suggestions for improvement.
**Status Reporting**
Describe the status reporting mechanisms for the project. Identify any issues that occurred due to the adopted approach or any suggested improvements.
Describe the tools used for tracking performance for the project. Identify any issues that occurred due to the adopted approach or any suggested improvements.

**Evaluation**
Describe the approach used to monitor and review the project and where it was documented. Identify any issues that occurred due to the adopted approach or any suggested improvements.

**Closure**
This section is only relevant if project closure has occurred.
Describe the process that was used to formally close the project and where it was documented. Identify any issues that occurred or may occur due to the adopted approach or any suggested improvements.

**Project Performance**

**Performance against Objectives and Outcomes**
Describe the actual performance of the project against planned in relation to the achievement of objectives, outcomes and target outcomes.

**Performance against Critical Success Factors**
Describe the actual performance of the project against planned in relation to the critical success factors.

**Performance against Outputs**
Describe the actual performance of the project against planned in relation to the delivery of outputs.

**Performance against Budget**
Describe the actual performance of the project against planned in relation to the project budget.

**Performance against Schedule**
Describe the actual performance of the project against planned in relation to the project schedule.

**Lessons Learned**

**What worked Well?**
Describe the project management and quality management processes that were perceived to be appropriate and/or effective for the project, as reflected by the stakeholders and the project records/documentation.

**What could be Improved?**
Describe the project management and quality management processes that were perceived to be inappropriate and/or ineffective for the project, as reflected by the stakeholders and the project records/documentation.
Conclusions

Provide a summary of the conclusions drawn throughout the Report.

Summary of Recommendations

List the recommendations that appear in the Report.

For a review of a large and complex project where there is a lot of recommendations, these can be broken down into a few key/major recommendations, followed by the remainder grouped under their relevant heading within the Report.

Appendices

Where necessary, appendices can be attached to provide any relevant supporting information, such as:

- A glossary listing key terms and abbreviations used in the Report;
- A list of stakeholders surveyed or interviewed;
- A copy of the survey questions;
- A summary of individual stakeholders comments gathered through the investigative process;
- A list of project documents examined during the review; and/or
- Examples of tools or templates referred to within the Report.
### Appendix ‘F’

**PROFORMA FOR ANNUAL PROJECT REPORT**

1. **Project No.**
   : ____________________________

2. **Project Name**
   : ____________________________

3. **Sub-projects:**
   : ____________________________

4. **GSQR/ ASR/ NSR No. & Date**
   : ____________________________
   *(for MM projects only)*

5. **Scope/Objective of the Project and technologies involved**
   : ____________________________

6. **Date of Sanction**
   : ____________________________

7. **Probable Date of Completion (PDC)**
   - **Original**
     : ____________________________
     *(As per Sanction Letter)*
   - **Revised**
     : ____________________________
     *(Give details of all revisions to date along with reasons for delay separately for each revision)*

8. **Project Cost Details :-**
   - **Original** *(As per Sanction Letter):*
     - **Total cost** Rs. -------------- (FE) --------------
     - **Under Revenue Head** Rs. -------------- (FE) --------------
     - **Under Capital Head** Rs. -------------- (FE) --------------
   - **Revised** *(Give following details for all revisions):*
     - **First Revision (Reasons thereof):**
       - **Total Cost** Rs. -------------- (FE) --------------
       - **Under Revenue Head** Rs. -------------- (FE) --------------
       - **Under Capital Head** Rs. -------------- (FE) --------------
     *(Similarly for later revisions if any)*

   **Cumulative Project Expenditure :**
   - **Total cost** Rs. -------------- (FE) --------------
   - **Revenue** Rs. -------------- (FE) --------------
   - **Capital** Rs. -------------- (FE) --------------

1. **Total during the year :**
   - **Revenue** Rs. -------------- (FE) --------------
   - **Capital** Rs. -------------- (FE) --------------

2. **Commitments :**
   - **Total Cost** Rs. -------------- (FE) --------------
   - **Revenue** Rs. -------------- (FE) --------------
   - **Capital** Rs. -------------- (FE) --------------
9. Reviewing / monitoring structure, periodicity of reviews and date of last review: 

10. Details of interaction with academia and industries (main development partners): 

11. Technological bottlenecks (if any) and action proposed to overcome the same: 

12. Production agencies and likely production values and quantities: 

13. Work done prior to the year under report: 

14. Progress/achievements made during the year under report highlighting the major milestones achieved: 

15. Plan of action for the next year: 

16. Likely spin-offs including applications for civil use, if any: 

Guidelines for Annual Project Report

Following guidelines may be followed for preparation of the Annual Project Report: -

1. A-4 size paper be used in the “Portrait” orientation.
2. Optimum security classification be given. Care may be taken to ensure that the document is not over classified.
3. The year means financial year.
4. All costs may be given in lakhs of Rupees.
5. All time periods including PDC be given in months.
6. The document be brought out latest by 30 April every year giving the status as on 31st March.
7. Abbreviations should not be used unless explained in the text.

Abbreviations used in the format

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASR</td>
<td>Air Staff Requirements</td>
</tr>
<tr>
<td>FE</td>
<td>Foreign Exchange</td>
</tr>
<tr>
<td>GSQR</td>
<td>General Staff Qualitative Requirements</td>
</tr>
<tr>
<td>IC</td>
<td>Indian Currency</td>
</tr>
<tr>
<td>IF</td>
<td>Infrastructure Facilities</td>
</tr>
<tr>
<td>MM</td>
<td>Mission Mode</td>
</tr>
<tr>
<td>NSR</td>
<td>Naval Staff Requirements</td>
</tr>
<tr>
<td>ST</td>
<td>Science and Technology</td>
</tr>
<tr>
<td>TD</td>
<td>Technology Development</td>
</tr>
</tbody>
</table>
## STATEMENT OF CASE FOR PDC EXTENSION

1. **Project No** : ____________________________
2. **Name of Lab** : ____________________________
3. **Sponsoring Agency** : ____________________________
4. **Sanction Cost** : ____________________________
5. **Date of Initiation** : ____________________________
6. **Amount spent so far** : ____________________________
7. **PDC original given and Subsequent, if any** : ____________________________
8. **Revised PDC proposed with financial or any other implementations** : ____________________________
9. **Whether approval of Fund Sought/obtained for revision of PDC** : ____________________________
10. **Details of Additional funds required** : ____________________________
11. **Reasons why the original PDC could not be maintained** : ____________________________
12. **Work done so far with revised milestones achieved** : ____________________________
13. **Work to be carried out with milestones** : ____________________________
14. **New Monitoring mechanism proposed** : ____________________________
   to avoid further PDC slippage

**Recommended/Not Recommended**

(Laboratory Director)
STATEMENT OF CASE FOR DROPPING/ PREMATURE CLOSURE OF PROJECT

1. Project No :______________________________

2. Project Nomenclature :______________________________

3. Sponsoring Agency and QR No. :______________________________

4. Date of initiation :______________________________

5. Sanctioned Cost :______________________________

6. Present Status :______________________________
   (Here give details of the work done so far and the stage to which project has been progressed)

7. Detailed reasons/considerations for :______________________________
   dropping/premature closure of the project.

8. Statement of Accounts
   : Expenditure incurred Rs.:___________
     FE : __________
     Total : Rs. __________

(Accounts Officer)

(Project Director)

Recommended/Not Recommended

(Laboratory Director)
Appendix ‘I’

ADMINISTRATIVE PROJECT CLOSURE FORMAT
(CONTENTS)

1. Project Nomenclature with Number: __________________________

2. Aim & Objectives : ______________________________

3. Cost in Rs / FE (original & revised) : ______________________________

<table>
<thead>
<tr>
<th></th>
<th>Original</th>
<th>Revised</th>
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<tbody>
<tr>
<td>IC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FE</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. Expenditure: IC ( FE ) : ______________________________

5. Category (MM/TD/S&T/IF) : ______________________________

6. Date of Sanction : ______________________________

7. PDC (in month) : ______________________________

<table>
<thead>
<tr>
<th></th>
<th>Original</th>
<th>Revised</th>
<th>No of Revisions</th>
</tr>
</thead>
<tbody>
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</tbody>
</table>

8. User Services : ______________________________

9. No of Prototype (type approved/qualified) deliverables: ______________________________

10. Achievements (based on aim & objectives) : ______________________________

11. Recommendation of last Management & Monitoring Committee Meeting

12. List of sub-projects

<table>
<thead>
<tr>
<th>Sl No</th>
<th>Sub Projects, Name &amp; No.</th>
<th>Agency</th>
<th>Cost</th>
<th>Status</th>
<th>Achievement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>
13. **Facilities Generated** (as proposed in the program) __________________________

14. **Consultancies**

<table>
<thead>
<tr>
<th>Sl No</th>
<th>Aim</th>
<th>Agency</th>
<th>Amount</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
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</tbody>
</table>

15. **Trial Results** (In brief) - Attach copies of final trial reports by users

**Statement of Accounts (Expenditure)**

16. It is certified that the project “ __________________________________________
     __________________________________________” No. __________________________
    has incurred the expenditure of Rs. __________ including F.E. __________
    against the sanctioned cost of Rs. ______________ including F.E.__________.
    All the stores/eqpt undertake the project have been accounted for.

    (Accounts Officer)

    All objectives set for the project have been met.

    (Project Director)

**Audit Authorities**

**Recommended/Not Recommended**

(Laboratory Director)

**Distributions of Technical report**

- Peer Labs, User Services, Tech Dtes, Concerned CCR&D, Dir P&C

*Note:* Closure report need not wait in case the report from audit authorities is not available
GUIDELINES FOR
TECHNO-MANAGERIAL PROJECT CLOSURE REPORT

Executive Summary

Background
Briefly describe the background of the project.

Reason for Closing the Project
State the reason why this project is being closed. This usually is because the outputs have been delivered, the closing date has been reached and/or the budget has been expended. A project may be closed for other reasons, for example a change in policy or agency priorities, a loss of funding or a deadline date reached.

Summary of Recommendations
List the recommendations that appear in this Report. One of the recommendations should be for the Project Steering Committee to agree that the project can be deemed closed. The project has fulfilled all of the requirements as documented in the relevant Project Plan, or the Steering Committee is satisfied that all outstanding items have been satisfactorily addressed or there is some other reason to close the project.

Closure Activities
Various activities required closing the project.

Project Staff
Describe what steps are being taken to manage the movement of project staff from the project to other roles, including the timing of their move, the capture of their project knowledge and handover of that knowledge to the labs/estts.

Issues Management
Identify any outstanding issues and who will continue to progress the issues.

Risk Management
Identify any risks which will transfer to an operational area and who has responsibility for monitoring them.

Financial Management
Identify any outstanding financial issues, and how they will be handled.

Asset Management
Describe any assets which were acquired for the project, and who will take ownership of them upon completion of the project.


**Records Management**

Identify what arrangements have been put in place for the storage, security and backup of hard copy and soft copy (electronic) records and project documents. Identify who is responsible for these activities.

**Post Project Responsibilities**

List any matters that are outstanding, what actions are required to address them and who is responsible. This should include things that are outstanding or have not been formally agreed prior to this stage such as outcomes yet to be achieved, outputs not yet delivered, maintenance of the outputs or other operational matters such as meeting future training requirements.

**Recommendations**

Recommendations include such things as the transfer of responsibility for the outcomes to the user, how outstanding outputs and issues should be addressed, any recommendations for the continued operation by the users.

**Highlights and Innovations**

Describe the highlights of the project and any innovations used or developed by the project.

**Project Performance**

Summarize the actual performance of the project against the planned performance. All projects vary to some extent from the original plan, these variations should be identified and the reasons for the variance described.

**Performance against Objectives (Deliverables)**

Describe the actual performance of the project in relation to the achievement of the planned project objectives.

**Performance against Outcomes (Infrastructure & Competence Building)**

Describe the actual performance of the project in relation to the achievement of targeted outcomes. Were all planned targeted outcomes achieved, to what degree? Some outcomes may not be achieved at this point in time. In this case details should be given as to when the outcomes are anticipated to be achieved and who is responsible for their ongoing measurement and reporting of progress towards their achievement.

**Performance against Outputs**

Describe the actual performance of the project in relation to the delivery of the outputs. Were all planned outputs delivered, to what degree? Were they all accepted? Did the quality of the outputs meet expectations?)

**Performance against Schedule**

Describe the actual performance of the project against the project schedule.
**Performance against Budget**
Describe the actual performance of the project against the project budget.

**Recommendations**
List the recommendations that arise from this section of the Report.

**Potential Applications**
Describe potential other applications of the product developed under the project.

**Lessons Learnt**
You may wish to briefly describe the methodology used to collect the lessons learnt.

**What worked Well?**
Describe the project management and quality management processes that were perceived to be appropriate and/or effective for the project, as reflected by the users and the project records/documentation.

**What could be Improved?**
Describe the project management and quality management processes that were perceived to be inappropriate and/or ineffective for the project, as reflected by the users and the project records/documentation.

**Recommendations**
List the recommendations that arise from this section.

**Appendices**
Appendices can be attached to provide any relevant supporting information, such as:

- A copy of the signed declaration of acceptance by the relevant users for each of the deliverables
- A copy of any project reviews undertaken e.g. Project Review and Evaluation Report or Post Implementation Review.

**Distribution List**
Report(s) to be submitted to the following:

- Technical Director
- Concerned Chief Controller
- Director Planning & Coordination
- Peer laboratory.
Introduction

Monitoring Committee under the chairmanship of Dr R Krishnan, Director GTRE, has suggested that Detailed Feasibility Report (DFR) should precede sanction of Defence R&D Projects costing over Rs 1 crore to identify and enable selection of mature projects which can be successfully accomplished within the estimated cost & time and promote self-reliance in critical Defence Technology. The purposes of detailed feasibility are:

- To realistically assess the probability of success of the project taking into account the internal and environmental factors;
- To identify the critical elements contributing to the low success probability and to facilitate initiation of necessary project work to soften the criticality;
- To identify Projects which may not be undertaken by DRDO in the existing environment;
- To carry out adequate pre-project work culminating in design, design review and simulation to enable commencement of hardware task soon after the project is sanctioned;
- To utilize past technological data and managerial experience for gainful exploitation in the execution of the present project; and
- To access the contribution and support required from external agencies, not directly under the control of DRDO and prepare suitable interaction and communication system to ensure their synergistic contribution during all phases of the Project, i.e. design, developmental trials, productionisation and induction.

With the above in view, guidelines for different activities constituting the feasibility study are enumerated in the following paragraphs. These guidelines are indicative and not exhaustive. The labs may augment the guidelines based on the specific needs of the project to have a better insight into all foreseeable problems.

Goal

For focusing the attention on the project, it is necessary to define the technological goal which is sought to be achieved through the present project. Invariably, it should include:

- Unique objectives;
- Quantitatively measurable outputs;
Acceptable performance zones; and
Abnormal factors leading to under performance,
Goal should be normally derived through:
  - Detailed analysis & evaluation of user requirement wherever applicable, and
  - Study of technological options and their evaluation leading to final selection.

While defining the goal, it will be useful to indicate its linkage with previous projects & the incremental scientific effort needed to achieve the designated goal.

**Linkage of Project Goal with thrust Area and the Current Five Year Plan**

Relationship of the project goal to the thrust area of the laboratory is required to be clearly brought out. In case, part of the goal is within the thrust area of the lab and the rest cover the activities of other labs, collaborative mechanism with other labs should be clearly indicated. The list of agencies including external agencies collaborating in the project, the extent of contribution and their willingness to participate may also be indicated. Any past collaborative experience, if applicable may be indicated. Relationship of the present project with the lab/DRDO’s Five Year Plan should be clearly stated. Reason of variance, if any, may be given.

**State-of-the-Art Analysis**

In all high-tech areas, it is necessary to bring out the relationship between the project goal and the state-of-the-art technological accomplishment in the global scenario. From a survey and analysis of national S&T achievement, the state-of-the-art accomplished at the national level may also be brought out. This study should include the work which is currently in progress in different institutions in the country with probable dates and the expected results. It will also be appropriate to bring out the infra-structure required such as design tools, test and evaluation equipments, sub-systems and materials which may form as vital inputs to the project. The work initiated for self-reliance in these areas by different agencies, may also be indicated. The bottlenecks and difficulties experienced by other agencies in carrying out similar development work due to similar embargo or import restrictions, if known, may also be mentioned.

With successful achievement of the present project, it is quite possible that certain technological gaps may still umbrage in relation to global state-of-the-art scenario. In that case, the necessity or otherwise of supplementing the efforts to neutralize the gap, provided it is considered necessary from the overall national objective of self-reliance should be clearly brought out. An assessment of incremental knowledge, experience and infrastructure needed to accomplish the above may also be brought out.

**Pre-Feasibility Study Work**

To enable proper appreciation of strengths and limitations of the lab, it may be useful to provide a reference of all the work which has been done having a direct bearing to the present project. This may cover the following details:
Title of the Project;
Designated Goals;
Goals Achieved;
Deviation in accomplishments;
Causes of deviations;
Factors which contributed to the successful completion of the Project within the cost and time;
The building blocks of previous Projects which are directly proposed to be used in the present project;
Details of the accepted patents;
Number of research & review papers published;
Names of Scientists associated with these Projects, their availability for the present project; and
Broad specifications of facilities and infrastructure created for the earlier Projects and their utilisation for this project.

Design Phase

Success or failure of the project primarily tests on robustness of design. To enable successful completion of the project, it is essential to pay highest attention to this aspect by trying to examine what all can go wrong in the design. Before embarking upon a design, an analysis should be made on the various design approaches, which will enable us to achieve the goal. It is useful to carry out preliminary design through all the known approaches. Once the design is completed, it can be verified through modeling and simulation studies. The simulation should not only cover the detailed testing of the system design but should also seek to carry out sensitivity analysis of variations in system parameters. Criterion for selecting a design approach among several competing candidates may include availability of extra margin, ratio of special non-standard parts and components to standard parts/components, ease of fabrication, relative cost of per unit during quantity production, safety/production management cost, relative energy consumption, reliability and relative ease of maintenance. Alternative chosen may be stated with reasons highlighting the critical elements. The causes of the criticality, criticality solutions and confidence level may also be stated. While carrying out the design, emphasis should be to use as far as possible proven blocks developed in the past. The robustness or otherwise of these elements should be clearly indicated. Reports of these building blocks may be provided as reference documents for the DFR.

The emphasis during this stage of DFR would be to conceptualise the problem and carry out detailed software work involving mathematical modeling and simulation, thereby generating a number of solution sets. Such detailed analysis alone will enable selection of the optimal solution. Efforts should be made to utilize assets generated during earlier R&D activities.
Confidence Level in Accomplishing the Project through Chosen Design Approach

For a comprehensive appreciation of the project complexity, it would be necessary to provide an assessment of confidence in accomplishing the said goal with qualifying assumptions. The confidence level both for optimistic specification and pessimistic specification may also be given. The confidence level assessment may also be furnished for activities to be executed by the external collaborators together with Lab’s critical evaluation of the estimates. The requirement of additional know-how, expertise, consultancy and infra-structural facilities, which is likely to improve the confidence level also be indicated.

Resource Assessment

As a prelude to the assessment of the resources required for the Project, following activities may be undertaken:

- Generation of work break-down structure from frozen design to the final accomplishment of the goal. This will vary depending upon the scope of the project (R&D, demonstration, trial and productionisation).
- Assessment of infrastructural facilities, experienced manpower etc created during previous R&D work in the laboratory relevant to the project.
- Generate minimum set of work packages required to be completed for accomplishing the project goal. In the critical areas, if parallel technological routes are contemplated, they may be included as additional work packages.
- Assessment of incremental resources in terms of facilities, components, material, manpower required for executing each of the work packages.
- Assessment of incremental resources in terms of facilities, components, material, manpower required for executing each of the work packages.
- Identification of critical work packages.
- Identification of special know-how and facilities required to soften criticality.
- Preparation of optimal design & resource deployment plan for each work package and the integrating system.

The assessment of resources for work packages to be executed by external agencies should be done primarily by the participating agency and reviewed by the laboratory for arriving at a mutually agreed estimate. The compatibility of the agreed work package with the overall system requirement should be clearly brought out. After estimating the incremental resource for all work packages, it should be converted into financial terms indicating the base year price level. Details are required for all elements costing over Rs 1 lakh. This analysis should lead to generation of yearly cash flow in respect of rupee currency and foreign exchange, including the commitment required to be made each year for progressing the project at the pre-assigned rate.
Effect of Constraints

In spite of the best efforts to provide adequate resource for progressing the Project at an acceptable pace, it may so happen that the resource provided is lower than the required minimum. The effect of such input constraint on the rate of progress of the Project for different input rates may be worked out and given in a tabular form. At times other constraints, such as import embargo, FE crunch, lack of expertise may also arise. Contingency plans may, therefore be formulated and included in the DFR. Components/materials may be imported in the development phase of the project to achieve faster results in progressing the design. The thrust and plans required for generating self-reliance in respect of such components and materials at the productionisation phase with their cost and resource implication may also be analysed and reported. Due to unforeseen reasons, certain agency may not be able to fulfill the level of support which they assured at the planning stage of the project. Method to overcome such bottlenecks, if applicable, may be indicated as a part of the contingency plan. Identification of such activities in the DFR will lead to proper appreciation of project problems.

Project Execution Plan

The aim of execution plan is to ensure achievement of the designated technological goals of the project within a pre-determined cost & time frame. Plan must be robust and flexible enough to absorb even enforceable problems and bottlenecks. With this aim in view, the lab should prepare a detailed project execution plan covering all activities from the date of sanction till the date of accomplishment of final goal. Details must include mustering of adequate resources in time, decision making methodology for critical items, handling of unexpected failures, conflict resolution, prioritization, reporting & communication system, periodic assessment of miles yet to go and residual resource available etc, for smooth and timely accomplishment of goals.

Management Plan

Based on the experience gained in executing Projects earlier by the lab/sister-labs and the assessment of special needs of the current Project, especially in terms of criticality and uncertainty factors which are likely to arise during the execution phase, a tailor made management structure may be needed for certain Projects. This requirement should basically emanate from Project necessitates and not dependent on cost alone. The requirement of additional decision making authority (technological, financial and administrative) be indicated with reasons. Consequences of not providing such a delegation may also be indicated.

The methods of review and monitoring system adopted by the lab for executing earlier Projects with the results may be brought out. Based on the past experience, special review & monitoring techniques for timely accomplishment of Project goals within the prescribed cost may be indicated for different phases of the project. The review norms and the elements of review may be clearly indicated to facilitate focusing attention on critical areas. Experts from national/international institutions, who can contribute during the review may also be mentioned.
The review method should also indicate the methodology for closure options. The inputs for this may be the time to compete, cost of completion and the time beyond which results of the Project may not be useful for projected linked activities. Any other feature, which will have a bearing on this issue may also be indicated.

The need-based management structure being proposed for the Project should be able to steer the participating work centers and motivate them to complete their allotted tasks within the assigned time frame. The project management should pay special attention to promote total commitment among participating work centers in accomplishing the Project goal consistent with the overall Project schedule within the sanctioned cost.

**Cost Benefit Analysis**

Often question arises, whether it is economical to import a few pieces of equipments to meet the urgent Service requirement, even though competence is available for developing and feeding the equipment. In the case of purchase of the equipment, the costs involved are the procurement price and maintenance-cost during its life cycle. Again this cost, the benefit is quick availability of the equipment to meet immediately needs. This, however, does not guarantee un-interrupted supply for meeting the future needs. In addition, it makes the nation dependent upon foreign supplier for supply of spares which is not consistent with the security needs.

On the other hand, the cost of supply of equipment through indigenous development will include the development and technology transfer costs. Inclusion of these two elements of cost may lead to apparently non-competitive per unit cost. However, the advantages gained through the development process are:

- Self-reliance in view technology,
- Short reaction time for upgradation,
- Assurance of uninterrupted supply of spares and expertise for maintenance, and
- Design and fabrication of the equipment to meet all specifications which may not be possible in case of import.