A critical examination of the Technological evolution shows that the prominence of technology is rapidly growing in every aspect of our life. Technology has become the backbone for the economic and military strength of any country, that determines the role played by any country in the world scenario. An examination of the evolution of war weaponry shows that during the early part of our history, the war was mainly fought based on the human and animal strength. During the 20th century, world war-I and world war-II brought in the use of tanks, warships, war planes, submarines, torpedoes, mines and finally towards the end of the world war-II, the guided missiles and the nuclear bombs entered the scene. This has shifted the focus from human and animal strength to the weapon strength and numerical superiority.

Dramatic developments have taken place after world war-II and this has resulted in the advent of hundreds of types of missiles, conventional, nuclear, biological and chemical warheads, large aircraft carriers, nuclear submarines, high performance fighter aircrafts, satellite based surveillance and communication, anti-ballistic missile defence and electronic warfare. Today the war scenario is dominated by the technology and intelligence.

Similarly in the area of economic development also technology has become a key competitive strategy and every country is gearing up to protect its technology with the help of some kind of control regimes, intellectual property rights and patents. Hence, more than any other time, today the need for the development of technology has become paramount and thus R&D is rapidly becoming the major thrust area in the global economic policy.

If we examine the growth of high technology in India, we can see that during the last four decades our country made excellent progress in various pockets of science and technology. Dr Swaminathan's green revolution made our country self sufficient in food and Dr Kurian's operation flood brought growth in dairy products. In the field of communications India made excellent progress and moving towards a target of 20 million direct exchange lines by 2000 A.D. We are already enjoying the benefits of mobile communication facilities in many of our major cities. Not long ago, the super computer CRAY was refused to us, today we have already realised 1 GFLOP supercomputer which is many times faster
than CRAY and aiming for 20 GFLOP supercomputer by 2000 A.D. Our peaceful nuclear test in 1974 enabled us to master the nuclear energy and we are already producing nuclear power and moving towards development of fast breeder reactors. Our progress in the areas of aquaculture, exploration of natural resources such as the minerals, oil and natural gas as well as the exploitation of unconventional sources of energy is appreciable.

Our greatest accomplishment has been in the area of aerospace technology. In the field of aeronautics indigenous systems such as the HAL's Advanced Light Helicopter (ALH) and NAL's civil transporter HANSA have already entered the scene and the DRDO's Light Combat Aircraft (LCA) is going to dominate the Indian sky very soon. The guided missiles Agni & Prithvi have already put our country far ahead of our adversaries. Our indigenous satellite series INSAT and IRS are helping us not only in the mass communication but also in the management of our natural resources, weather forecast, study of forest cover, crop patterns, etc., and rendering a helping hand during calamities. With the successful development of SLV, ASLV and PSLV, we have attained the launch vehicle capability for orbiting satellites in low earth orbit and polar orbits and GSLV is going to give us the capability to place satellites directly into the Geo-stationary orbit. Further progress in these areas will lead us to realise revolutionary new systems such as the single stage to orbit vehicle HYPERPLANE.

It can be seen that of all the above developments the aerospace programmes, particularly the space and missile projects stand out distinctly in terms of their importance as well as their contribution to the Nation. This is mainly due to the systematic approach used for the formulation and execution of the projects and management innovations that resulted in the development of various tools and techniques suiting the particular requirements.

Prior to this most of the new technologies and management techniques have sprung from large Defence and Aerospace projects from USA and erstwhile USSR in their quest to establish a competitive edge in superpower leadership. While there was a race for the technology supremacy between the two world super-powers, we could see a distinct difference in their management systems evolved for the advanced projects. The management techniques used by USA were more visible and became available for use by other countries in the world. One such technique is the Programme Evaluation and Review Technique (PERT) which came into
existence in 1957 through Polaris missile programme. This tool has now become an absolute necessity for any well managed project.

In the Indian scenario, Space activities provided the initial leadership in this direction during 1970s, with most of the network techniques and management systems based on those used by National Astronautical & Space Administration (NASA) and European Space Agency (ESA). But in 1980s, when the Indian Guided Missile Programme came into existence, there was a spurt of new techniques in management, which were vital to the evolution of advanced technologies and systems required for the missile programme, especially with the background of M.T.C.R. Many of these techniques have been successfully put to use in the programme. Some of the concepts are completely new and these techniques will find place in the future projects.

The Emergence of Home-grown Management Techniques was mainly due to the outstanding leadership given by Dr APJ Abdul Kalam, who was the Project Director, SLV-3, and later became the Chief Executive of the Missile Programme. The Researcher had the opportunity to closely work with Dr Vikram Sarabhai, Prof Satish Dhawan and Dr APJ Abdul Kalam who were the pioneers for the space and missile programmes of our country. Working under the guidance of such great personalities provided a learning ground for the researcher, which made him to get acquainted with new styles of management, project formulation, evaluation and approval system, etc.

In 1983, a multi-project management system for Guided Missiles emerged with new organisation structure, concurrent engineering, technology empowering, monitoring of critical milestones, performance based budget, cost control methodology, risk analysis, failure management, review system and quality assurance. Each one of these being a model in itself, there was a System Analysis Team headed by the researcher, which integrated these models through their analysis and helped in decision making on all the critical issues.

From our above experiences in the Space and Missile Projects, we could gain valuable insight into the varied nature of R&D projects during their life-cycle, needing dynamic planning, monitoring, review, analysis and decision support. As the execution of the projects involves multiple institutions with their varied organisational cultures, it is necessary to adopt the techniques suitable to each institution to build a long lasting
partnership and collaboration. We have learnt that real-life problems cannot be solved with isolated management techniques, but requires an integrated approach. Experiences gained during the actual projects need to be translated into a working model and made available for use by the future projects.

As an answer to these problems, the various models which have been generated and used during the missile programme can be integrated with the other existing models within the framework of a Decision Support System. This was the driving force for the present study which necessitated the evolution of an Integrated Model.