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Abstract

Logistics research and development (R&D) often receives relatively little attention or resources from the R&D community. The production engineer faces much the same problem when given a prototype to produce. This presentation will highlight some of the key factors which contribute to this problem, the need to integrate logistics and R&D activities and concepts, the approach developed by the United States Air Force (USAF) to improve the situation, and an outline of critical factors necessary for a successful program. The results of the USAF program demonstrates that any agency with a logistics role can improve its technical capabilities and operational methods through proper management attention and cooperation between the logistics and R&D communities.

I. Introduction

A key element to the success of any activity is the amount of preplanning and preparation based upon established goals and objectives. Logistics is no exception, and research and development in support of logistics is a critical and needed factor in the equation for success. Unfortunately, in many circles, logistics is considered an unnecessary and unrealistic constraint to creative R&D. This phenomena is not at all different from the chill we all feel when approached by the life insurance agent. We are disinclined to recognize the need and do not relish the idea of applying scarce resources to an unappealing requirement when no short term return on investment is evident. In fact, nothing could be further from the truth. Unbridled R&D allows for creativity to flourish; however, there is a point where specific applications come into view and R&D efforts must come to grip with the realities of production, supportability, maintainability, and manpower issues. Here is where logistics should begin to play a major role in the development.

II. What is Logistics Research?

Often the first question asked is "what is logistics research?" Our answer is that it is

Research aimed at improvements in any of the varied logistics functional areas with the end result of improved supportability, readiness, and life cycle cost. It includes efforts in both the physical and management science areas.

This frequently creates further confusion among R&D people because they seldom have a good understanding of the meaning of "logistics." A brief, workable definition is offered here. For

the purpose of this paper, "logistics functional areas" shall be considered all activities necessary to support the acquisition, deployment and operation of a system. This includes areas such as maintenance (both field and depot), the supply system, transportation, asset and inventory management, training, planning, technical data management, management information systems, and a host of other areas necessary to support operation of the system. All of these logistics functional areas can be grouped under a broad discipline called "logistics." It follows then that logistics R&D could be research ranging from development of a new algorithm for use in a spares requirements model to influencing equipment design to ensure a specified reliability or facilitate desired maintenance concepts.

III. Why Logistics Research?

The next question usually is "why?" This can best be answered by an example and a few statistics. One of the classic examples of ignoring the fatal nature of logistics demands occurred during the German thrust into Russia in WWII. Apart from the Western European mind set on geographical proximity that ignored the vast distances involved in operating in the Russian heartland, there was absolutely no consideration given to lubricants that operated in the bitter cold temperatures of a Russian Winter. From a statistical viewpoint, today's logistics activities consume over 40 percent of the USAF budget.⁽¹⁾ It has been estimated that over 60 percent of the total life cycle cost of systems today is spent on logistics (Figure 1).

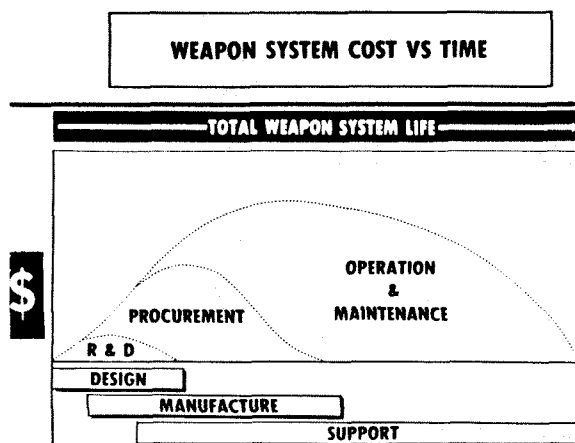
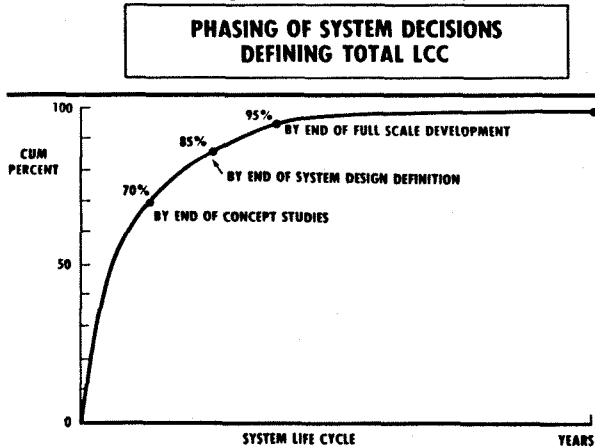


Figure 1.

In order for us to maintain the quality and quantities of systems we believe necessary, resources must be used in an efficient manner. To impact the resources, logistics considerations must be employed at the earliest

possible stage of development. Studies on USAF systems have shown that of the decisions which ultimately define the systems life cycle cost, 70 percent have been made by the end of concept studies, 85 percent by the end of system design definition and 95 percent by the end of full scale development (Figure 2). This means that if logistics was not considered throughout the entire development process, only 5 percent of the total life cycle cost is available to be impacted by logistics considerations and decisions following full scale development. (2)



More recognition of the problem is not its own solution. Once an agency decides that this arena deserves attention, it still faces numerous obstacles including real or imagined organizational barriers (funding, physical, etc); people with conflicting backgrounds, languages, and goals; the non glamorous aspect of logistics research; and the long-term payoff nature of the results. As a result of these obstacles, agencies frequently experience poor interaction between their logistics and R&D communities. This leads to relatively little attention or resources application from the R&D community thus low levels of logistics R&D. In the end, the benefits to the logistics community are minimal or even counterproductive.

But how does the R&D function incorporate logistics objectives? The R&D community of any agency can be characterized as an activity which develops its programs based upon a set of requirements (generated both internally and externally) which it then uses as justification to obtain resources. In the end, the results of the R&D will generate some new technology or concept. In the USAF as with many agencies, requirements were being driven primarily by development of new weapon systems and the demand to improve performance. While this is indeed a valid and necessary part of the requirements for R&D, it is not the only requirement. It is now recognized in the USAF that there are many needs which should drive the requirements for R&D, a major one being logistics. It is with this thought in mind that the USAF developed a program to make logistics a driver in our R&D programs.

IV. The USAF Logistics Research and Studies Program

In the USAF, our logistics and R&D communities are separated by organizational structure, funding structure, and physical location. To make an active and manageable interface work, the Air Force Coordinating Office for Logistics Research (AFCOLR) was established within the logistics community to act as a focal point for action. Since its initiation in September 1980, the logistics R&D posture of the USAF has improved considerably. The concept may seem simple but there are many critical elements which work together to make this a successful program. Foremost among these is a commitment from top to bottom of the logistics and R&D communities to make it work and second is the establishment of a structured process to work through. This may sound bureaucratic, but it is necessary to allow the concept to function in a large and complex agency such as the USAF.

Using the USAF program as an example, an examination of the major actions will highlight how a successful program for any agency could be developed. As mentioned in the beginning, planning is necessary to ensure that resources are directed at accomplishment of recognized goals. This is accomplished by senior logisticians in the USAF who evaluate world trends, current and emerging technologies, and a host of other factors which may hold clues to what we can expect in the future. Based upon these evaluations, long-range logistics plans and requirements are established which allow all echelons of the USAF to establish programs which support and lead toward these goals.

Responsibilities for logistics functions are scattered throughout the USAF. Each of these functional areas is responsible for generating requirements necessary to accomplish the specific mission. It is important that these individual requirements be linked to the overall long-range logistics planning and requirements established for the USAF. At this point, the AFCOLR is responsible to collect and consolidate these requirements into a formal package which can be submitted to the R&D community via high management levels. The requirements then represent the recognized logistics R&D requirements of the USAF. This reaffirms the high level commitment to the concept and ensures that the requirements receive attention and resources. Within the R&D community the requirements are evaluated by the various laboratories and research centers which then establish programs to satisfy the requirements. During this entire process, an active interface is on-going at the working level to analyze future requirements, conduct the R&D programs and transition the resulting technologies or concepts. It is this last area where the benefit is ultimately achieved. The transition of technology is a challenging task and often the weak link in the entire process. Many of the obstacles mentioned earlier will resurface if proper planning is not accomplished.

One final aspect to the program is the interaction with industry. The independent R&D

performed by industry offers another avenue for potential R&D in support of logistics. To ensure that industry is aware of our logistics R&D needs, copies of our requirements, along with supporting background information, are distributed widely throughout American industries.⁽³⁾ Our desire is that industry will devote an appropriate share of its R&D activities toward logistics.

V. Conclusion

Although the USAF example has been shown here, the basic concepts should apply to a wide range of agencies. Suggestions on how to initiate such a program in another agency would include the formation of a team of the key players involved, establishment of goals, mapping a strategy, and then following through on the strategy. The results of the USAF program demonstrates that any agency with a logistics role can improve its technical capabilities and operational methods through proper management attention and cooperation between the logistics and R&D communities.

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