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**SYSE 5110**

**HW1**

**p 98: 1, 6, 14, 15, 21**

1. In accomplishing a needs analysis in response to a given deficiency, what type of information would you include? Describe the process that you would use in developing the necessary information.

The information I would include in the needs analysis would be the customer requirements described as functions or what the must the system do. The information would include: what is functionally required of the system, the functions that the system must perform, the primary functions, the secondary functions, what must be done to eliminate the deficiency, when it has to be accomplished, where it has to be accomplished, and how many times it must be accomplished. The process I would use in developing this information would utilize a team including the customer, the prime producer, and primary suppliers. I would emphasize that effective communications must be continued between everyone participating in the process. The customer must be able to detail their requirements and give feedback to the team during this analysis so that it can be completed effectively and on schedule.

6. Why is it important to define specific mission scenarios (or operational profiles) within the context of the system operational requirements?

It is important to define specific mission scenarios because it is necessary to ensure that the mission or alternate missions are considered early in the system life cycle where they have the most impact on design. If these mission scenarios are not considered until later in the design process it can increase the expense of development or schedule delays because the efforts could be wasted on designing the wrong system. Defining the mission should include the development of one or several operational profiles that include what the system is to accomplish, how it will accomplish its objectives, and how the operating conditions will change. These mission scenarios lead to the definition of the system operational requirements. pg61

14. In developing the maintenance concept, it is essential that all levels of maintenance be considered on an integrated basis. Why?

When developing a maintenance concept, all levels of maintenance must be considered on an integrated basis because an entire network will exist to support the operation of the system which must be planned and designed. The system’s ability to perform the mission objectives relies on this support infrastructure. To ensure the system design will meet operational requirements, the levels of maintenance should be considered. The criteria for determining the level of maintenance is the where, by whom, and the type of work to be accomplished as well as the organizational intermediate. This includes the frequency, the complexity of the maintenance, the skill-level of the personnel, whether a special facility is needed, and supply chain considerations. If a frequent maintenance item (e.g. oil change every 500 hours of operation) can only be performed at the manufacturing site by highly skilled personnel, then it is likely that the maintenance concept is lacking or the design needs to be changed because it interferes with efficient operation of the system. Pg76 78

15. Why is the development of technical performance measures (TPMs) important?

The development of technical performance measures is important because it guides the system design process towards incorporating the correct characteristics and attributes. This will ensure the system produced will meet customer requirements. The operational requirements ultimately leads to the qualitative and quantitative design-to criteria that will be used to develop the system. TPMs are a qunatitave design-to criteria and they measure design-dependent parameters. It is important that the these performance measures are relevant to achieving the system design goals. Some measures may contradict each other so it is sometimes necessary to seek customer guidance in how to prioritize the various system attributes. Once a set of performance measures are determined and the priority of the design objectives is decided, the system development can proceed towards selecting the configuration that best accomplishes the customer requirements.

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21. What is the purpose of allocation? To what depth in the system hierarchical structure should allocation be accomplished? How does it impact system design (if at all)? How can allocation be applied for a SOS configuration (if at all)?

In the functional analysis, the functional requirements are allocated to specific components and resources. The purpose of functional allocation is to decompose the system down into components by partitioning then assemble the components into packages that share closely related functions or that utilize a common resource. The allocation of functions starts at the system level, continues to the subsystems, and then finally the component or element level. Functional allocation impacts the system design is several ways. The elements can be grouped by location, environment, or types that have similar functions. The design can group packages so that they are as independent as possible with minimal interference with other packages. This makes replacing packages easier. The design should also minimize the interactions between subsystems which decreases system complexity. While the packages themselves may be extremely complex, the interfaces and communication between them should not be to the greatest extent practicable. The allocation can utilize common modules and standard interfaces to allow modifications while maintaining system functionality. Allocation can be applied to a SOS configuration by utilizing common functional elements for multiple systems. These common functions that must be performed on two or more systems can share a single resource.