Homework 4

1. Which are the main differences of the two branches of the Vee Life cycle model?
2. In the Vee Life cycle model when the building stage starts?
3. Which are the differences of Alpha and Beta Testing?
4. In the Spiral Lifecycle model when do you start working with the Industrial Production Department?
5. When is CDR or Critical Design Review done?
6. The retirement is done ..... when, where, by whom?
7. Which are the differences between the Prototype and the pre-production unit?
8. How can be related the cost and influence of each phase of the life cycle?
9. Explain, using a diagram, the Requirements discovery process?
10. Can you give details about what Systems engineering is not?
11. Why can you say that Systems engineering is like a fractal process?
12. Can you explain the Principles of good design:

    - Use models to design systems
    - Use hierarchical, top-down design
    - Work on high-risk entities first
    - Prioritize
    - Control the level of interacting entities
    - Design the interfaces
    - Produce satisfying designs
    - Do not optimize early
    - Maintain an updated model of the system
    - Develop stable intermediates
    - Use evolutionary development
    - Understand your enterprise
    - List functional requirements in the use cases
    - Allocate each function to only one component
    - Do not allow undocumented functions
    - Provide observable states
    - Rapid prototyping
    - Develop iteratively and test immediately
    - Create modules
    - Create libraries of reusable entities
    - Use open standards
    - Identify things that are likely to change
    - Write extension points
13. Which are the advantages of using the Principles of good?
14. What is meant by the term “modularity”? What characteristics does a modular system possess? Give a specific example of a modular system and identify the modules.
15. The Orientation of Technical Professionals uses three components to describe this characteristic: science, mathematics, and engineering. Using this model, describe what you think your orientation is in terms of x % science, y % mathematics, and z % engineering. Note that your “orientation” does not measure your knowledge or expertise, but rather your interest and method of thought. Consider your relative interest in discovering new truths, finding new relationships, or building new things and making

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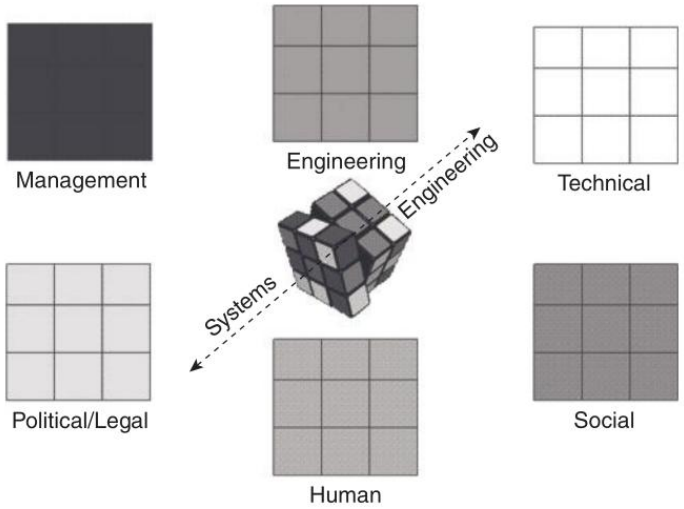
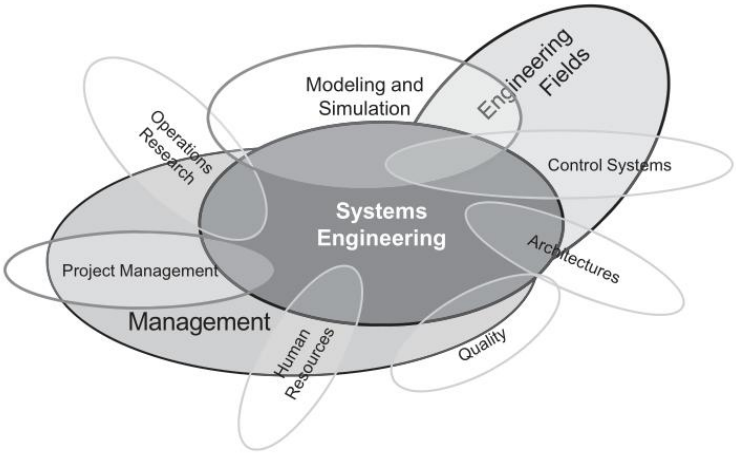
them work. Also, try to remember what your orientation was when you graduated from college, and explain how and why it has changed.

16. Write a paragraph explaining what is meant by the statement "Systems engineering is focused on the system as a whole". State what characteristics of a system you think this statement implies and how they apply to systems engineering.
17. Discuss the difference between engineered complex systems and complex systems that are not engineered. Give three examples of the latter. Can you think of systems engineering principles that can also be applied to non-engineered complex systems?
18. Explain how can be related the management, technical, social, human, political/legal and engineering faces with System Engineering?



19. Explain this picture about examples of systems engineering fields.



20. Explain this diagram

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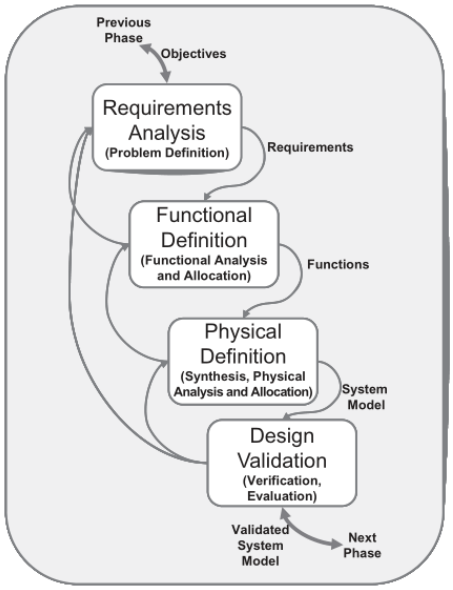

21. Describe this Life cycle systems engineering view.

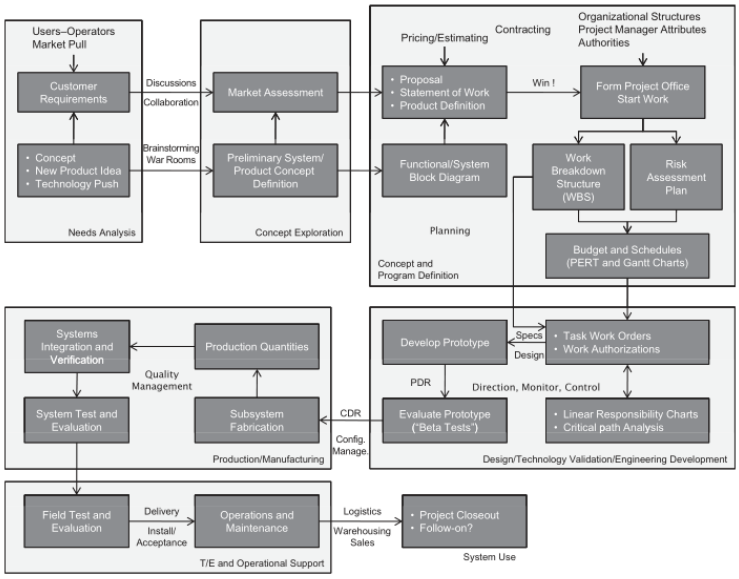

Figure 2.7. Life cycle systems engineering view. PERT, Program Evaluation and Review Technique; PDR, Preliminary Design Review; CDR, Critical Design Review.

References:

- Class slides.
- SYSTEMS ENGINEERING PRINCIPLES AND PRACTICE 2nd ED. Alexander Kossiakoff. Wiley

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