ESD.34 System Architecture

Opportunity Set #4

Deliverables due:

Part A - 1/23
Part B - 1/26
Part C - 1/30

Learning Objective
- To develop your synthesized approaches to analyzing form, function, concept (e.g. architecture)
- To develop an initial capability to analyze goals, dynamic operations and operator interaction
- To apply these approaches to systems of "medium" complexity

Part A (read the whole instructions carefully before beginning!)
1. Choose two of the "medium" complexity systems from the posted listing (try to pick two different ones, do not pick both the glider and sailboat, see part 2 for further constraints). These will be used for all parts of Opportunity Set 4. Identify the solution neutral statement of the function of the device. What is the concept (the specialized operand, process and instrument)? What are one or two possible alternative concepts? How do they differ from the given concept (in specialization of process or object)?
2. If the system you chose has a provided parts list posted, begin with that. For at least one of the two systems, develop your own "level 2" decompositional model so that it contains no more than 30-50 level 2 elements. Identify reasonable choices for a simplified level 2 model with 20-30 parts. Show the structural connectivity for the simplified level 2 elements for each of the two systems.
3. For each of the two systems, identify the expansion of the process to multi-functional sub-processes, if possible. Develop a model of the internal value related processes and the flow of value through the intermediate operands. Map the form objects onto these internal processes. Develop either a matrix or graphical (OPM) representation of the mapping of objects to processes. How did the knowledge of level 2 structure inform your choice of mapping? Identify elements of form that would map to not yet identified: interfaces, other value processes, or supporting processes.

<u>Deliverables</u>
1. Question 1: 2-4 charts
2. Question 2: 4-6 charts
3. Question 3: 4-6 charts

Bring hard copies to class. Submit electronically to the class server.

<u>Part B</u>
4. For the same two systems as part A, identify the level 2 rationalized elements that contribute to: other value processes, supporting processes and interfacing processes. What processes do they contribute to? Can you identify "layers?" in the architecture of processes and objects, such as primary value delivery, support, etc?
5. Suggest a level 1 modularization of the system. How was it informed by the structure and internal function function(s)? What internal interfaces would you have to define if you used this modularization (do not characterize all of them, just list them).
6. Identify the important steps in operation (dynamics) of the product system, versus the static function. Develop an OPM with temporal meaning or a separate time line representation. Are there elements that support stand alone, emergency or contingency operations apparent? Are elements used for commissioning, decomposition, and maintenance evident?
7. Identify the external interfaces. For several of the important external interfaces, define the elements of the interfaces, their associated processes and their operation.

<u>Deliverables</u>
4. 2-4pp
5. 2-4 pp
6. 4-6
7. 2-4

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<u>Part C</u>
8. For each of the systems, identify the principal beneficiary, and the needs that they have that are addressed for the system. Are there other important beneficiaries that can be identified, along with theie needs. Review the statement of the solution neutral externally developed function from question 1. Is it a good statement of functional intent? How

might you make it more precise? Are any other intents on process or objects evident (don't spend too much time on this, as it is tricky to do)?

9. For one of the two systems, develop a object only or process only representation at level 1. How did you suppress or represent the things that you did not show?

10. For one of the two systems of part A2, deliver the "deliverables of an architect" that are appropriate for analysis in the reverse engineering mode in which we have been working. You may incorporate and/or modify some of your previous charts, and fill in the additional aspects. Your goal is to produce as complete as possible set of deliverables. However not all deliverable will be possible to complete, as you have incomplete information. Take educated guesses, but don't speculate wildly just to fill things in.

Deliverables
8. 2-4pp
9. 1-2 pp
10. whatever it takes

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