SySe

Technische Hochschule Rosenheim

Exercise Sheet 1 Systems Engineering

Exercise 1.1

Visit the following link and watch the video: https://youtu.be/vp8v2Udd_PM

1. Extract the key properties of complex systems. Find at least 5 key characteristics.

2. Transfer your found key properties of a complex system to a complex technical system.

3. Visualize: what is complicated what is complex? This can be done on an abstract scenario where you call your system as system, the parts of the system elements, etc. You can also do this based on a concrete example, i.e. a refrigerator, a car, etc.

Exercise 1.2

Identify a complex technical system of your choice (as guidance: there were many examples in the lecture).

a) Why is your system of choice a complex technical system? Do your key characteristics of Exercise 1.1 apply?
b) Transfer theoretical system characteristics (see lecture slides) into the context of your system of choice. To achieve this you should think of the operational environment it is embedded into, what are the (sub)- systems involved, how are these systems connected, what is the emerging behavior of the complex technical system, and is there a possible scenario where the system adapts to its environment?
c) What engineering areas and expertise fields are needed for developing, optimizing, operating such a system?
d) Identify your expertise as system engineer within the development life cycle of your system of choice. This can contain technical expertise, soft skill expertise, any computer science specialty of yourself.
e) Be ready to present your results. List the name of your system, maybe an image of your system. Describe the main functionality of your system: why does this system exist? Describe a use case of how the system is used and finally summarize your answers of Exercise 1.2 a) to d).

Exercise 1.3 System or SW Engineer?

1. Is software engineering part of systems engineering or vice versa?

2. Is software architecture more than systems engineering?

3. Is systems engineering more than requirements engineering?

Find 3-5 reasons for and against.

Exercise 1.4 Identifying Problems

We consider the following book: Bits and Bugs: A Scientific and Historical Review of Software Failures in Computational Science. Thomas Huckle, Tobias Neckel, 2019, SIAM

1. Read one chapter of the book or some information on https://books.google.de/books?id=viWPDwAAQBAJ&printsec=frontcover&redir_esc=y#v=onepage&q&f=false

2. Describe the problem.

3. As a systems engineer: What do you have to do to prevent this kind of problem?

Be prepared to discuss your results with the group.