Systems Engineering Fundamentals Assignments

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Abstract

All assignments of the course Systems Engineering Fundamentals.

August 16, 2025
status: planned
version: 0

logo
TBD

Case

Propose a Non-Lethal Urban Crowd Controller

Discuss the Case

Sketch the **system-of-interest**

Sketch some of the **environment** the system will be operating in

Sketch some of the **system internals**

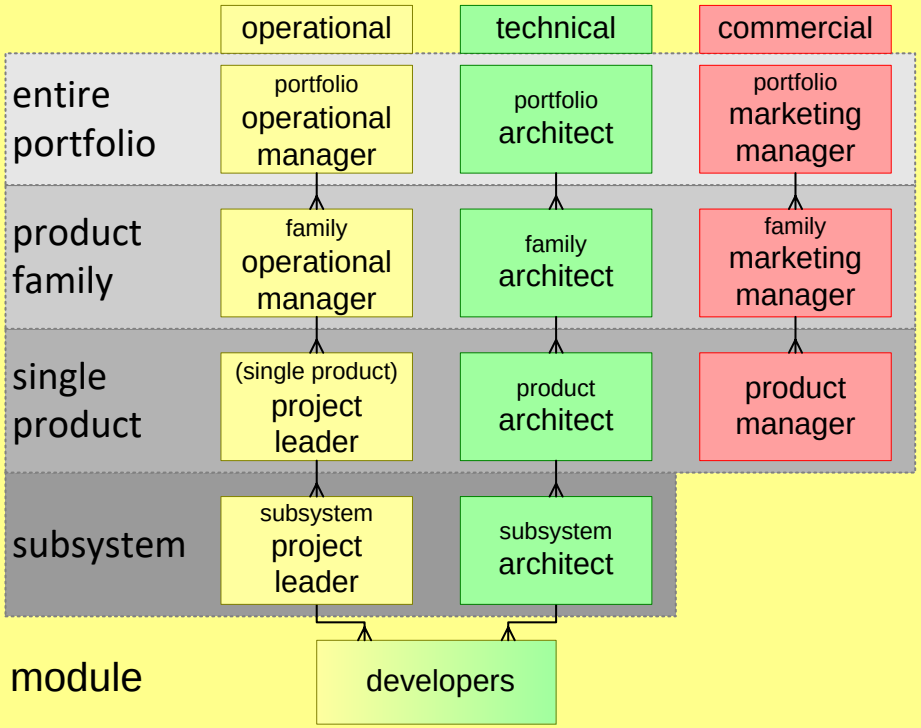
Draw the **system boundary**

Map the Operational Organization

Make a map with names of individuals in the **operational organization** of one project and its context

Identify the **relationships** of the **project core team**:

- **geographical**
- **organizational**
- **psychological**



Sketch Mission and Scenario

Sketch

a ***typical mission***

and a specific ***scenario.***

The scenario needs to be highly specific:

- numbers (how much, how far, how accurate)
- names (where, who)
- circumstances (when, where)
- actions (what, how)

Identify Stakeholders and Concerns

Brainstorm ***stakeholders***

Brainstorm for each stakeholder the ***concerns***

Elaborate concerns in 5 to 10 words, make them more specific

Use the **mission** and **scenario** for inspiration

Sketch the System Life Cycle

Sketch the system ***life cycle***

from idea until decommissioning and recycling.

Identify **stakeholders** per phase or activity

Identify Needs and Capabilities

Identify ***stakeholder needs***

in terms of ***capabilities.***

Capabilities typically are ***functions***

with ***quantifiable characteristics***

Use the mission, scenario, and stakeholder analysis for inspiration

Determine Key Performance Parameters and Use Case

Determine 5 to 10 ***Key Performance Parameters*** (KPP) of the System

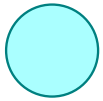
Quantify these KPPs

Define the KPPs roughly, using a ***Use Case***

Perform a Concept Selection

Make a **decision matrix** for one of the **concept selections**.

- define at least 3 concepts
- define 7 to 10 criteria for selection
- score the concepts against the criteria, for example using a scale from 1 to 5: 1 = very poor, 5 = very good
- recommend a concept with a rationale

	concept 1 	concept 2 	concept 3 
criterion 1	vulnerable MTTR 1	robust 30 hours 3	robust access 5
criterion n	reusing platform 4	reusing platform 4	resource shortage 2
			best, because ...

Show Dynamic Behavior

Model the Dynamic Behavior of the System.

Focus on the Dynamic Behavior that relates to the KPP.

Visualize the Dynamic Behavior with various sketches, diagrams, or graphs (see Visualizing Dynamic Behavior for inspiration).

Make a System and Work Breakdown

Make a ***system breakdown***

in subsystems and subsubsystems

and a ***work breakdown structure***

to assist in organizing the project

Sketch the Goods Flow

sketch the ***goods flow***

from (sub) ***suppliers***

via ***assembly*** and ***test***

to ***customer site***,

deployment,

and ***maintenance***

Assess Risks

Assess ***risks***

- ***feasibility*** of achieving ***KPPs***
- ***fitness for purpose*** in customer context
- ***integration configurations*** and ***testware***
- ***supplier*** and ***logistics*** status
- ***technology readiness***
- ***development*** and ***resource*** status

Determine ***probability*** and ***severity*** per risk

Determine an Incremental Integration Sequence

Determine an incremental ***integration sequence*** to build confidence in the KPP ASAP.

Strive for about 6 main increments.

Reason starting at the end result and then backward in time.

For each increment determine its prerequisites in terms of parts, interfaces, functions, and performance levels.

Transform Sequence into a PERT Plan

Transform the integration sequence and the planning from the other perspectives into a ***PERT-plan***.

A PERT-plan focuses on ***activities*** and their mutual ***relations***; the logic of the plan. Time and resources are secondary information.

Sketch an Installation and Commissioning

Sketch an ***installation***

and ***commissioning***