Exercise 1 – Process Modeling (8/10 Points)

Assume you are the manager of a company that develops radio communication technology for fire alarms. You are hired by an external client to develop the software of a new radio module for fire detectors. Once developed, the module needs to be certified to comply with its corresponding industry standard, and you are also required to provide technical documentation.

(i) Consider the activities, together with their respective artefacts and responsibilities, in Figure 1. Those are the established activities in your company.

Provide a graphical process model for delivering a finished radio module by using those building blocks. (3)

(ii) Your company has the following staff available, with their corresponding qualifications for roles:

- Kim: Requirements analyst, Test manager
- Angela: Product manager
- Ulli: Certification manager, Technical writer
- Herbert: Software developer, Software tester, System tester

All of them have full-time availability (1 PM per calendar month), except for Ulli, who works only part-time (0.5 PM per month).

Consider the effort estimates indicated in Figure 1 and analyze the expected total effort of the project and its expected minimum duration in months by assigning the staff to each of the roles required and considering their availability. The project is supposed to start on 2020-07-13.

Present your analysis using a Gantt chart. (2)

(iii) To evaluate (and, if needed, adjust) the process model, the project leader keeps track of notable events during the actual project. The notes may look as follows:

July 13: requirements available, project start
July 27: specification completed

... 

Make up a continuation of the notes up to completion of the radio module prototype, assuming that exactly one issue is detected by activity ‘module QA’, such that the process does follow the prescribed process model. (1)

Convince your readers of your claim that your made-up process does follow the process model.

1See https://en.wikipedia.org/wiki/Gantt_chart.
Now assume that your customer is experiencing delays due to under staffing. The customer extends your contract to also develop the software for the sensor module of the fire detectors. You are still responsible for quality assurance, certification, and documentation.

(iv) Extend your graphical process model from Task (i) to include the development of the new module. Clearly indicate which parts you have added. 

(v) In addition to the staff availability as in Task (ii), assume you are also allowed to use an intern, with the same capabilities as Herbert, but who is available part-time (0.5 PM per month).

Analyze the expected total effort and the minimum duration of the expanded project. 

Exercise 2 – Risk Analysis (2/10 Points)

Having identified main artefacts, activities, and roles related to the radio module project allows us to conduct a somewhat systematic risk-assessment. For this exercise, assume that you in your role of company manager want to re-assess the risks related the certification (cf. building block (1e) in Figure 1), because, e.g., your company did not need this kind of certification for some time.

For one artefact, activity, and role, describe one risk each (i.e., one risk for your artefact of choice, one risk for your role of choice, etc.) that could threaten the main goals (cf. VL 11 (aka. 2018.04), Slide 8) for the success of this activity. Briefly discuss the severity of these risks (aka. risk value), and outline possible countermeasures.
(a) Create specification. (0.5 PM)

(b) Develop software module. (1.5 PM)

(c) Module integration. (0.5 PM per module)

(d) Software module quality assurance. (0.5 PM)

(e) Submit for certification testing. (0.5 PM)

(f) Write technical documentation. (0.5 PM)

(g) Finalize and deliver product. (0.75 PM)

(h) System quality assurance. (0.5 PM)

(i) Create test specification. (0.25 PM)

Figure 1: Activities, artefacts, and responsibilities of your company.