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Solutions for Excercise sheet 2

Exercise 1 – Cost Estimation

i The resulting amount should be $30h * 6 = 180h$ per person, and with $1PM = 20 * 8 = 160h$ it amounts to 6.75 PMs or with five persons to 5.625 PMs.

ii

round	estimations ($KLOC_{pars}$)
0	10, 15, 14, 15
1	12, 13, 12, 10
2	12

Surprisingly, our estimates did not differ that much in the first round. By giving opinions for the lowest and the highest values, such as low experience leading to redundancy in the code, or that the use of a framework could reduce the amount of code, we came to the conclusion that the project should have about 12 $KLOC_{pars}$.

iii We decided for small size, greater innovation, medium deadlines and stable development environment. Because of this we chose a medium project with $a = 3.0$ and $b = 1.12$.

iv

Required software reliability: nominal
If the system fails, the user can loose all points achieved in the game, but the points can be achieved again in not a very long time.

Size of application database: none
It is very low, we do not need a database.

Complexity of the product: nominal
It is nominal because: only standart math will be used; mostly simple nesting; some divice-dependent operations, like error prosessing, but no operations at the physical I/O level; only simple structural changes and simple edits.

Run-time performance constraints: nominal
Because the software is processor-intensive.

Memory constraints: nominal
Because the group has only little experience, and we assume the program will be not very effective.

Volatility of the virtual machine env.: very low
Because there are no changes of the working environment.

Computer turnaround time: low
Because the game is (or should be) interactive.

Analyst capability: low
Because of too little experience.

Applications experience: low
Because the students do not have a lot of working experience.

Software engineer capability: nominal
The developers should have some experience in teamwork.

Virtual machine experience: high
Because the software(game) developing do not require very high virtual machine experience.

Programming language experience: very low
Because the students have almost no experience in C# or F#.

Use of modern programming practices: low
The group the group is only starting to use such practices.

Use of software tools: nominal
Some useful software tools will be used.

Required development schedule: nominal
Because a fixed deadline is set.

	parameter	chosen value
	Required software reliability	1
	Size of application database	-
	Complexity of the product	1
	Run-time performance constraints	1
	Memory constraints	1
	Volatility of the virtual machine env.	-
	Computer turnaround time	0.87
v	Analyst capability	1.19
	Applications experience	1.13
	Software engineer capability	1
	Virtual machine experience	0.9
	Programming language experience	1.14
	Use of modern programming practices	1.1
	Use of software tools	1
	Required development schedule	1

The resulting project size in PM is (with $a = 3$ and $b = 1.12$):

$$3 \cdot (12)^{1.12} \cdot (1 \cdot 1 \cdot 1 \cdot 1 \cdot 0.87 \cdot 1.19 \cdot 1.13 \cdot 1 \cdot 0.9 \cdot 1.14 \cdot 1.1 \cdot 1 \cdot 1) \approx 64$$

The two values differ drastically, the first is nearly a tenth of the second. This might be due to the way higher expectations of Code Quality or Project length, as well as the larger growth of smaller projects.

Exercise 2 – Process Modeling

i Process model:

ii (Might be on next page)

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	Half Person-Months

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Maria																	
Create Spec																	
Herbert																	
SW Module Dev																	
SW Module QA																	
Module Integration																	
System QA																	
Create Test Spec																	
Karin																	
Submit for cert Test																	
Documentation																	
Jane																	
Deliver																	
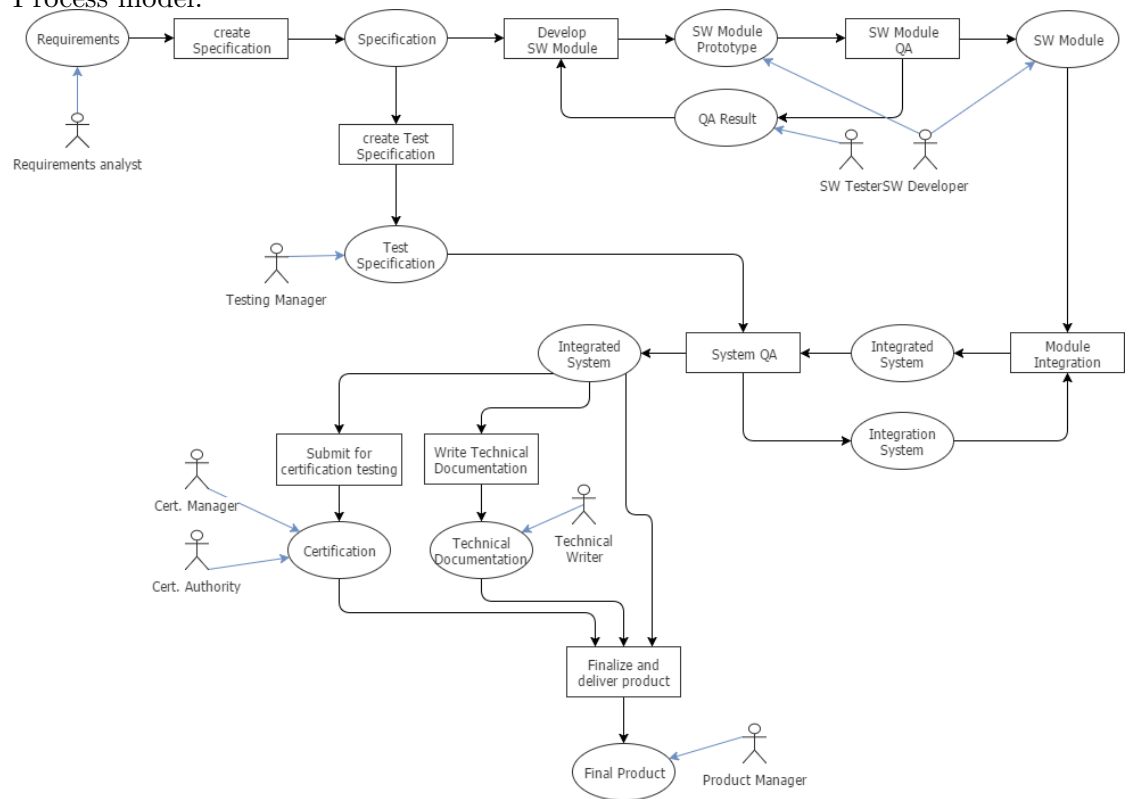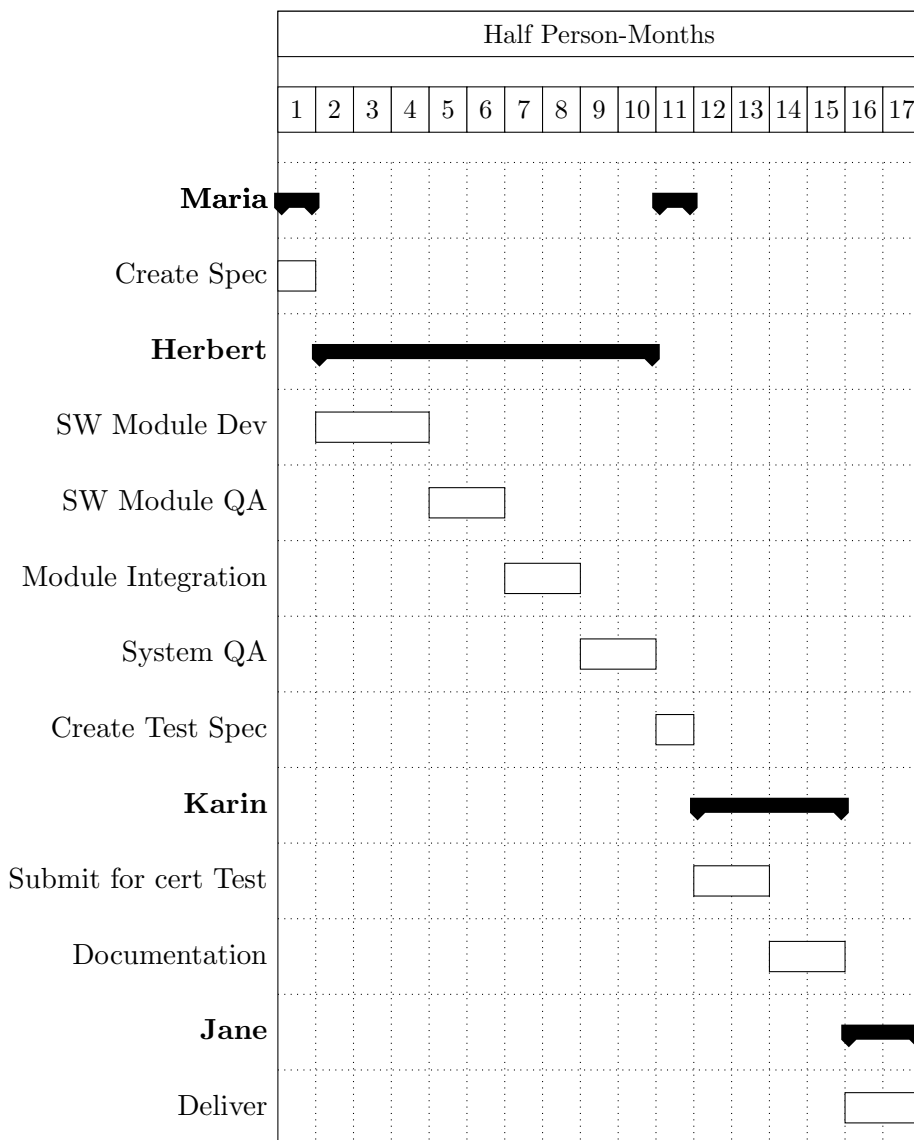
I'm afraid to say that we were not capable of numbering through correctly (in half PM's) or to correctly LATEXquarter-PM's. The used package seems to be not capable of doing so.

Effort: 5.5 PM

minimum excpected duration: 6,25 M

iii Process model with fire detector
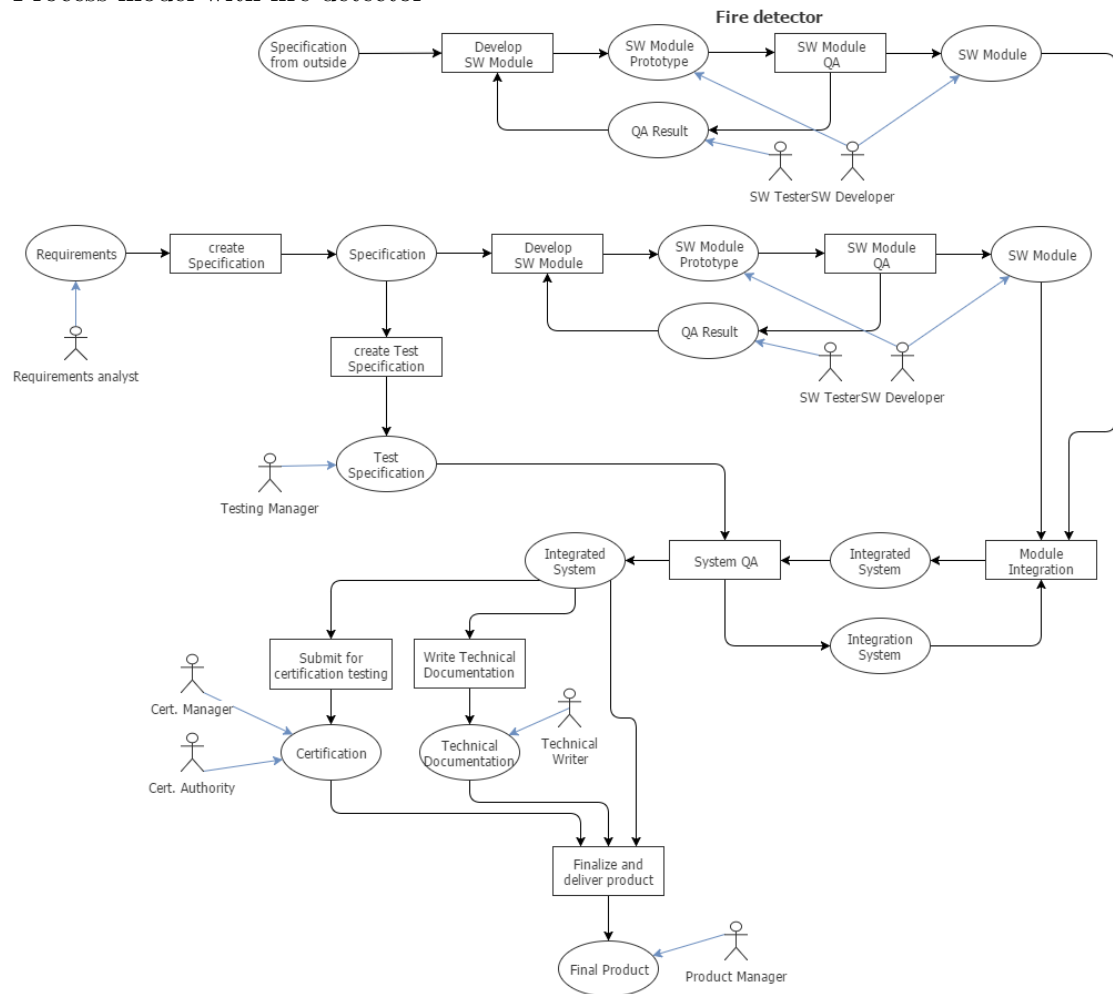
Fire detector

```
Specification
from outside → Develop → SW Module → SW Module → SW Module
              SW Module   Prototype     QA
                              ↑          ↑
                          QA Result ←
                              ↑   ↑
                         SW TesterSW Developer
```

```
Requirements → create → Specification → Develop → SW Module → SW Module → SW Module
              Specification              SW Module   Prototype     QA
                   ↑                                     ↑          ↑
            Requirements analyst                     QA Result ←
                                                         ↑   ↑
                   create Test                      SW TesterSW Developer
                   Specification
                        ↓
                      Test
                   Specification
                   Testing Manager
```

```
Integrated → System QA ← Integrated ← Module
System                    System      Integration
   ↓ ↓                                    ↑
Submit for    Write Technical        Integration
certification  Documentation          System
testing
Cert. Manager
             Technical      Technical
Certification Documentation  Writer
Cert. Authority
             ↓ ↓
          Finalize and
          deliver product
                ↓
          Final Product   Product Manager
```

iv Effort: 7.5 PM, minimum excpeted duration: 7.5 M