Risks management in software development capstone projects

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CompSysTech'18, Ruse, 09.09.2018

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RISK (event)

- *"An uncertain event or condition that, if it occurs, has a positive or negative effect on a project's objectives."*

  Project Management Body of Knowledge

Propability 0.08%

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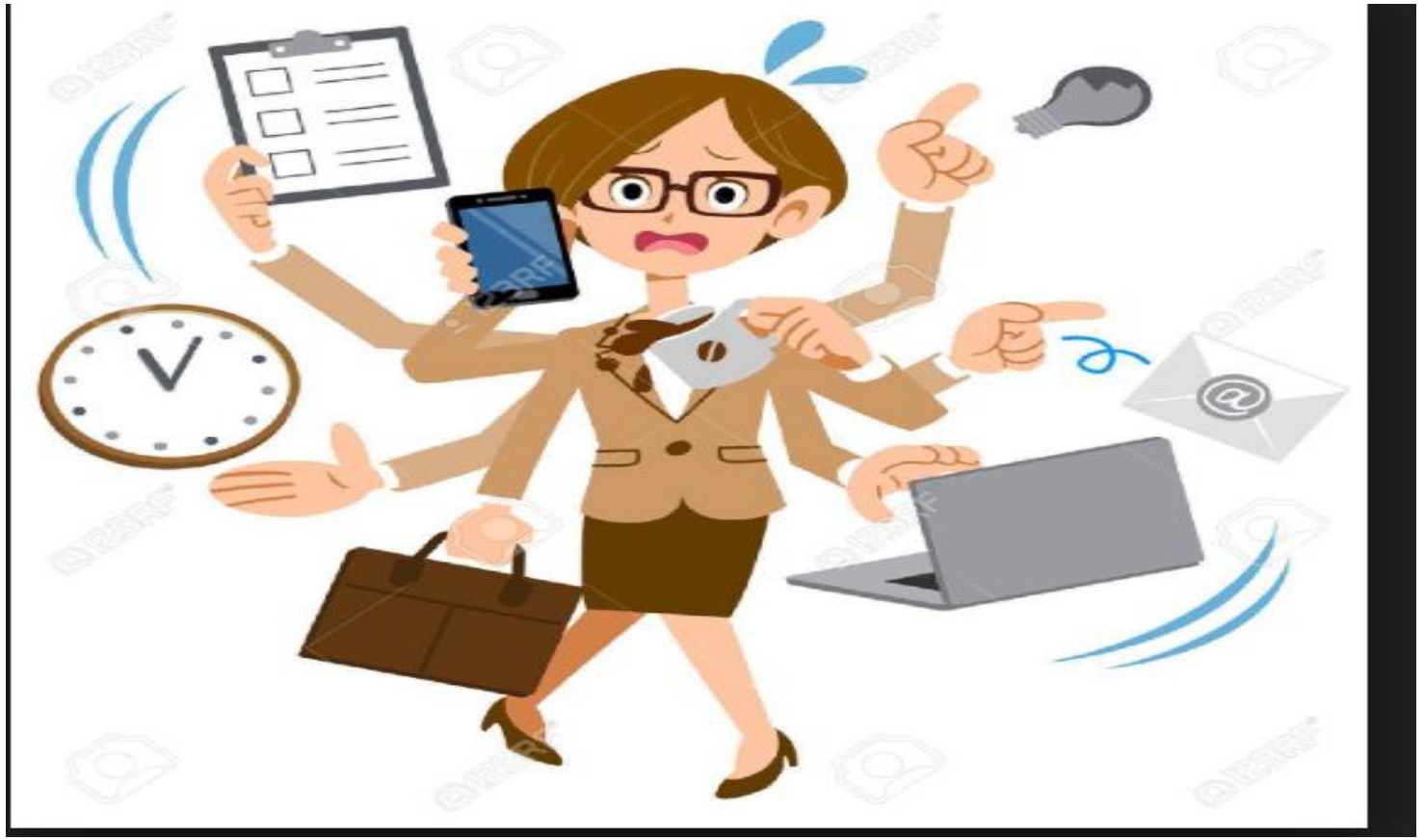
Risk factor



Cause

Risk factor 2

Risk impact 1

Money lost,
time lost

Severity of the risks

Risk impact 2

Health

Severity of the risks

Risk migitation – decreasing the propability

Risk migitation – reducing the impact

Plan B (and c ?)

How to go on, if the risk realizes

Accepting the risk

Low propability

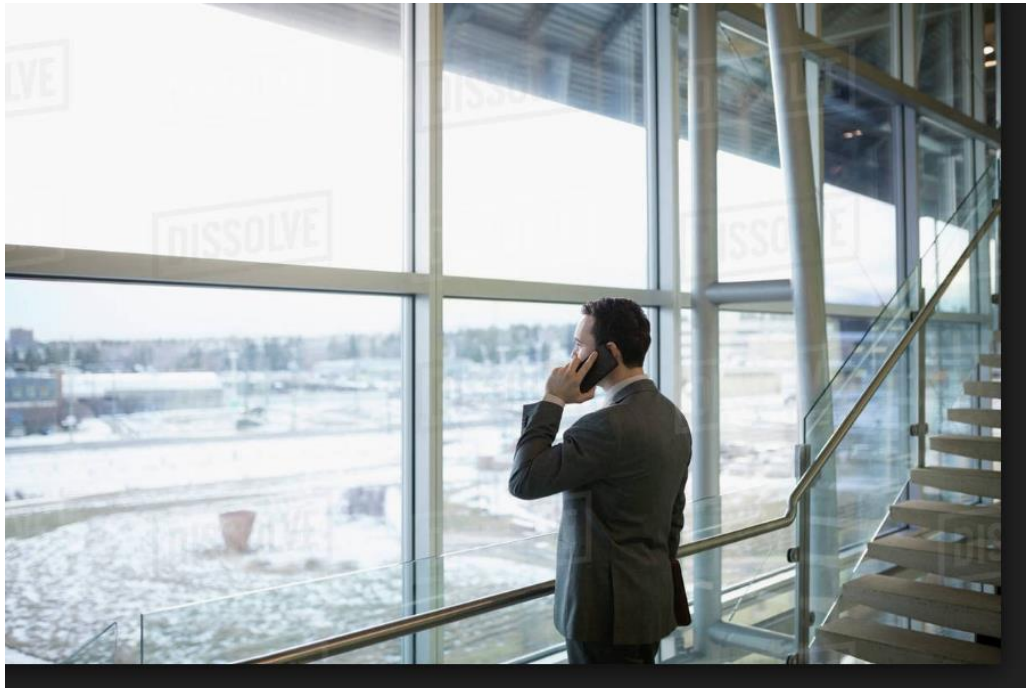
Difficult to mitigate

Low severity

Just have to do!

Risk management process

- risk identification



Risk management process

- risk analysis

Risk management process

- risk planning

Risk management process

- risk monitoring

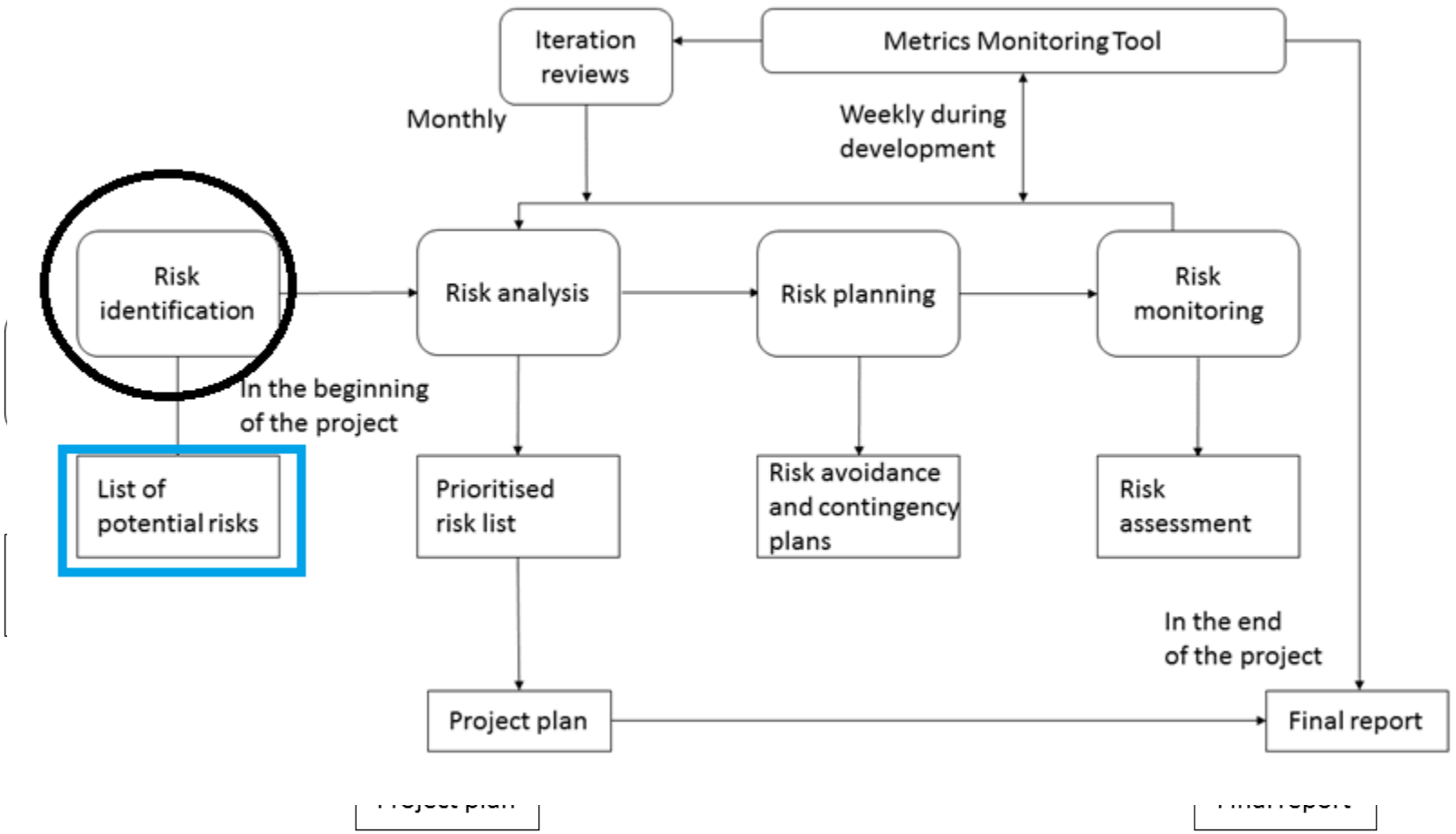
Research questions

- **<u>Student's capstone projects</u>**
- **i)** How did the teams identify and monitor risks?
- **ii)** What kind of risks teams met during the project and which risks were foreseen and which were unforeseen?
- **iii)** How risks were mitigated and what were the team's reactions after a risk was realized?

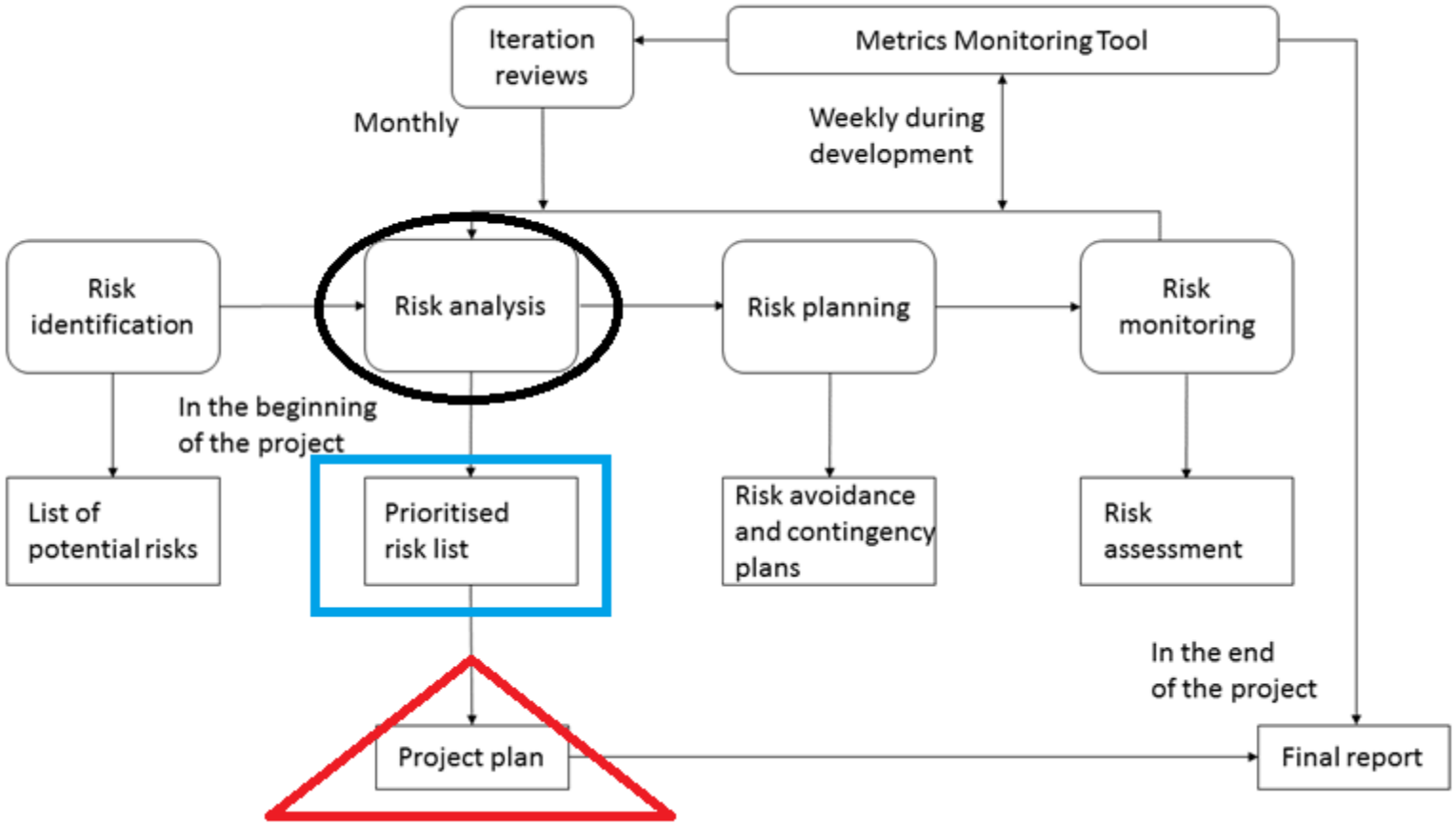
Data gathering

- Seven student projects, during one semester
- ~1000 person working hours each
- Project plan
- Weekly reports (Metrics monitoring tool)
- Two Moodle questionnaires
- Final report

Data gathering



Data gathering



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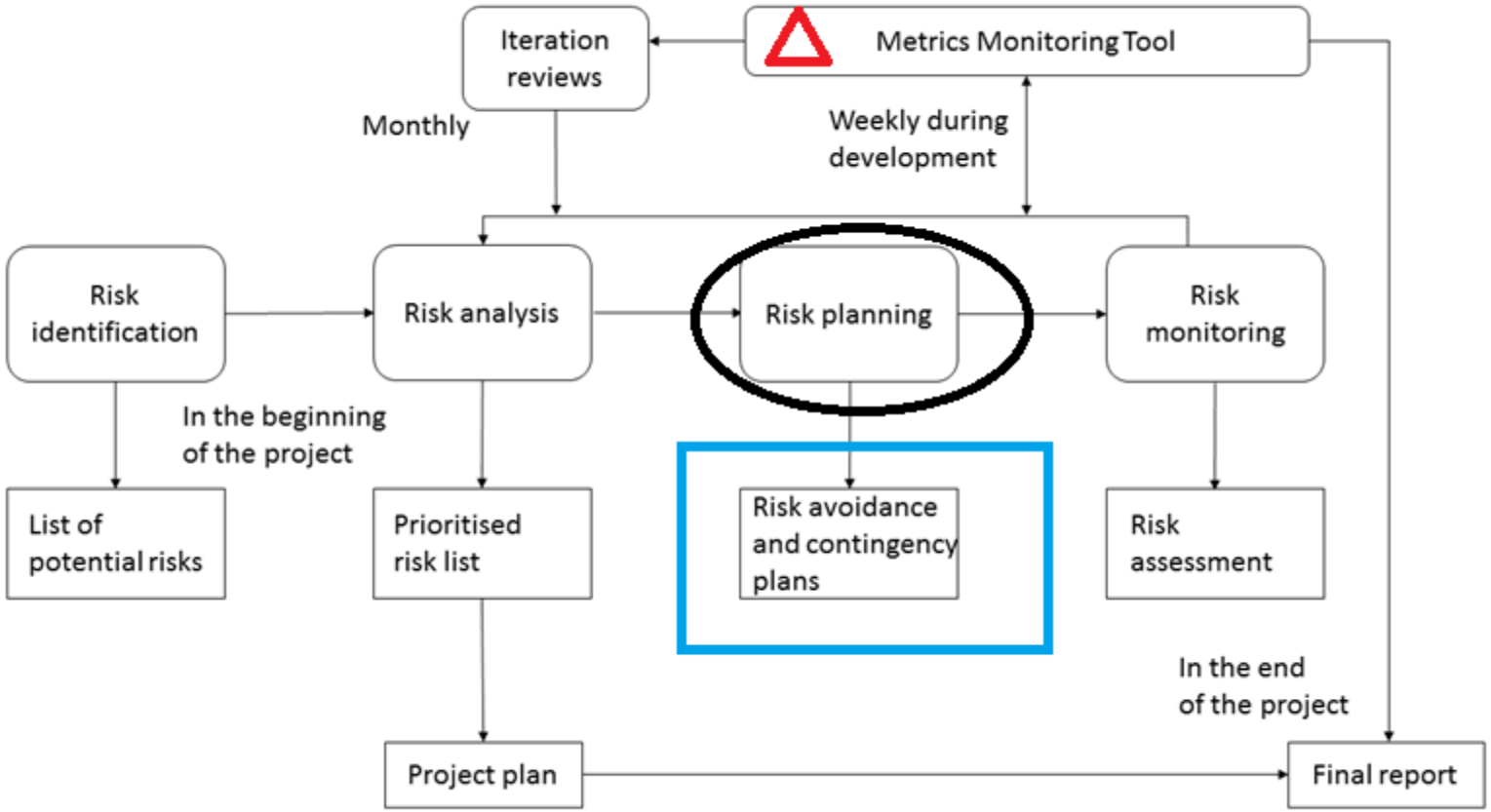

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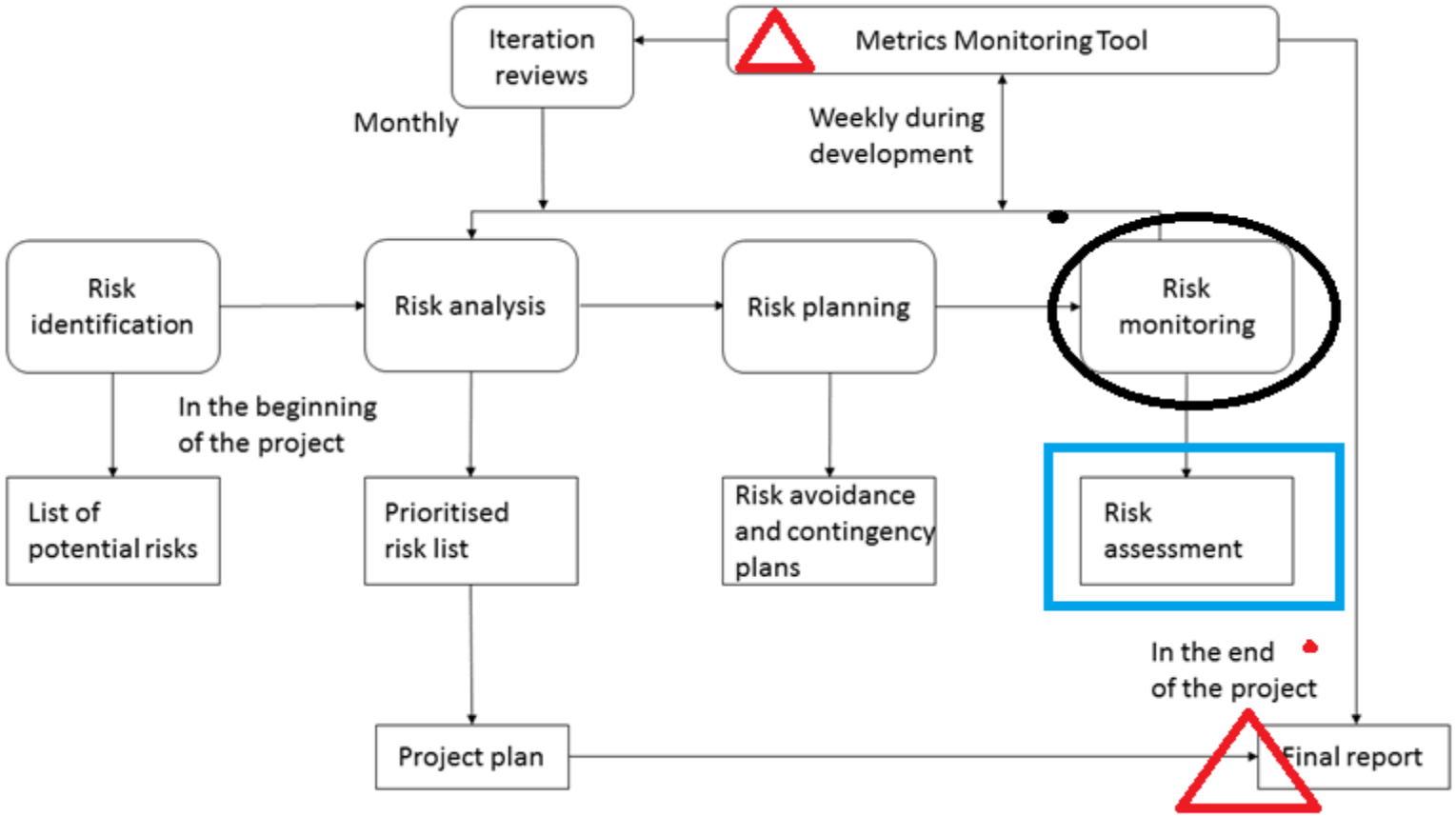

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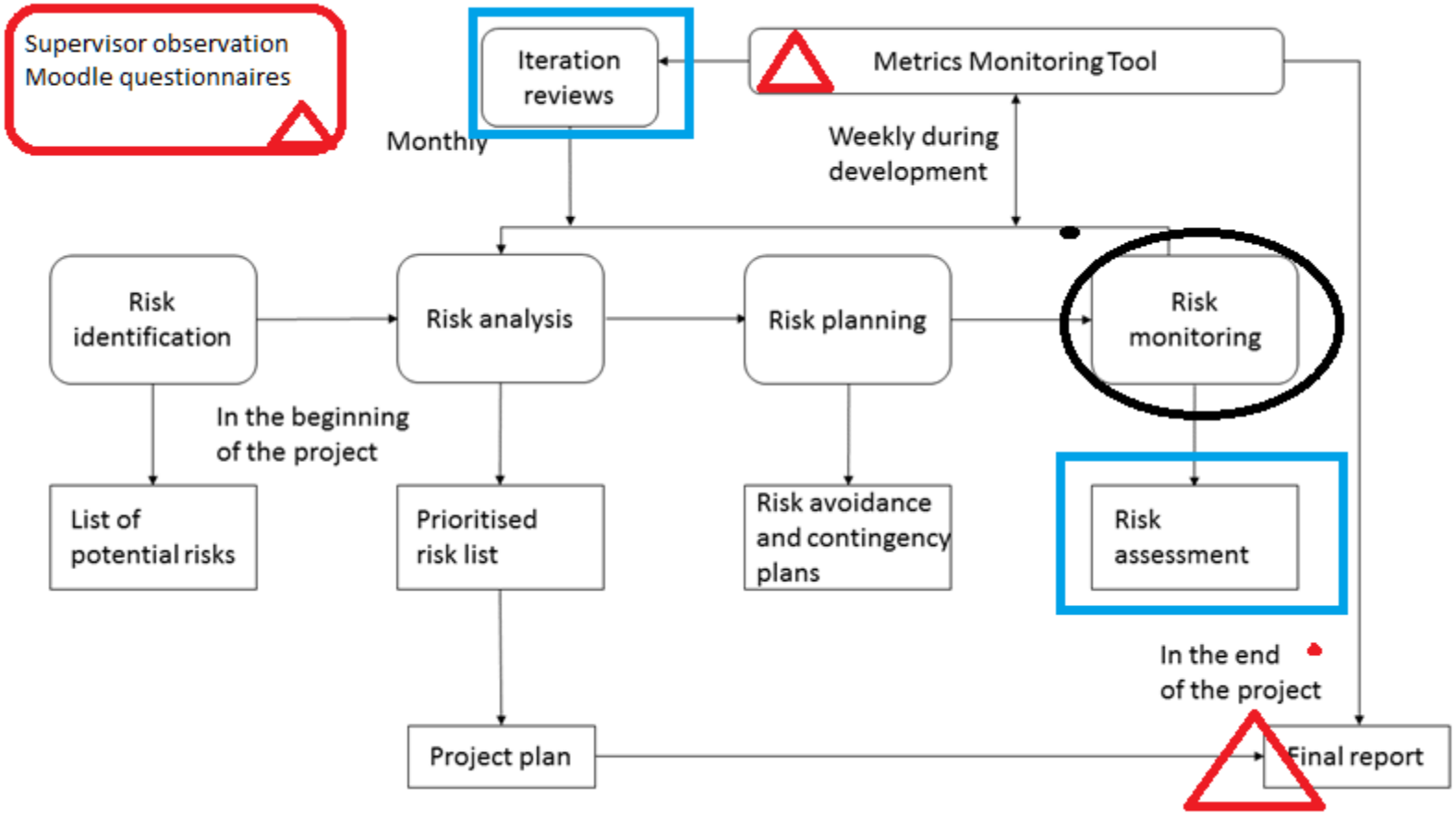
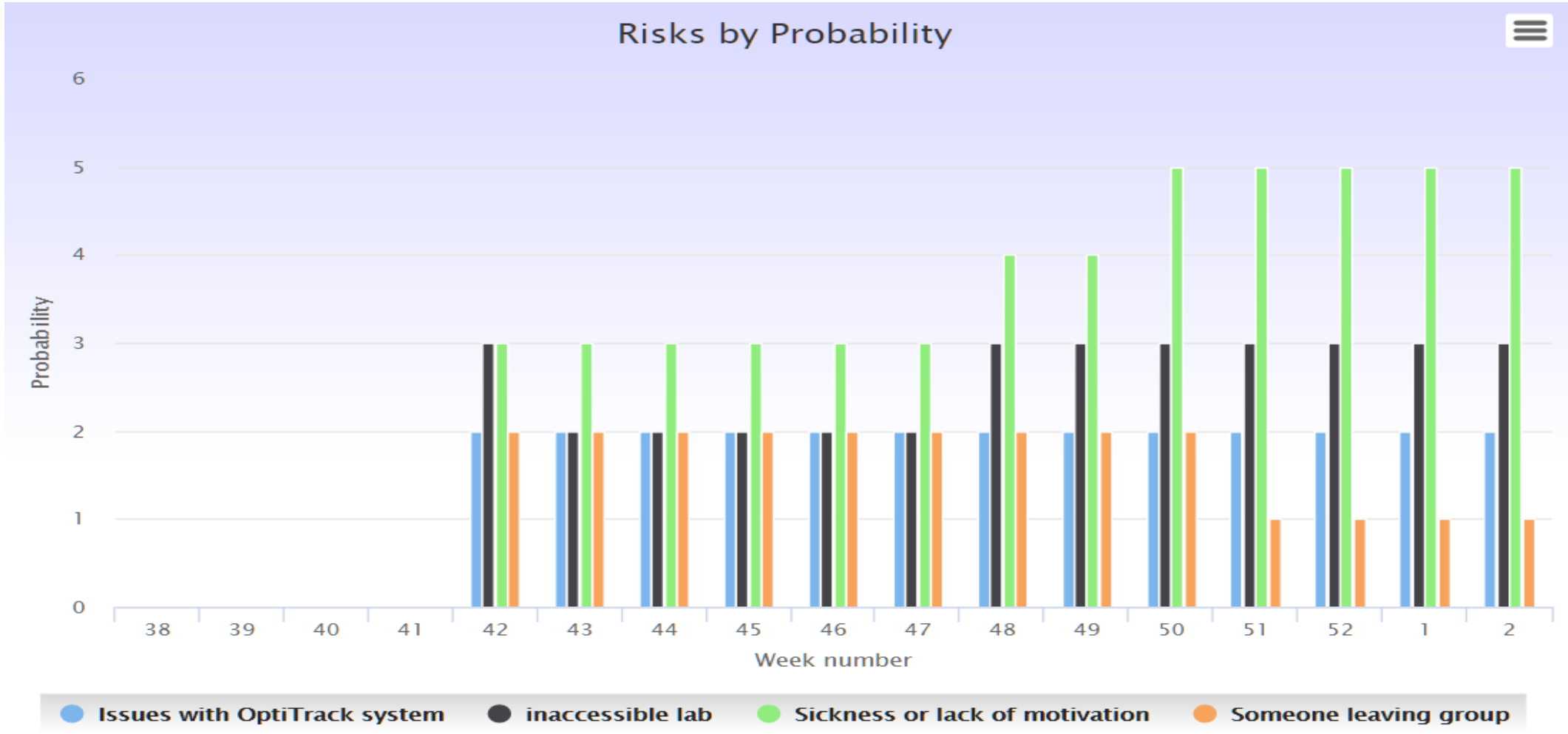


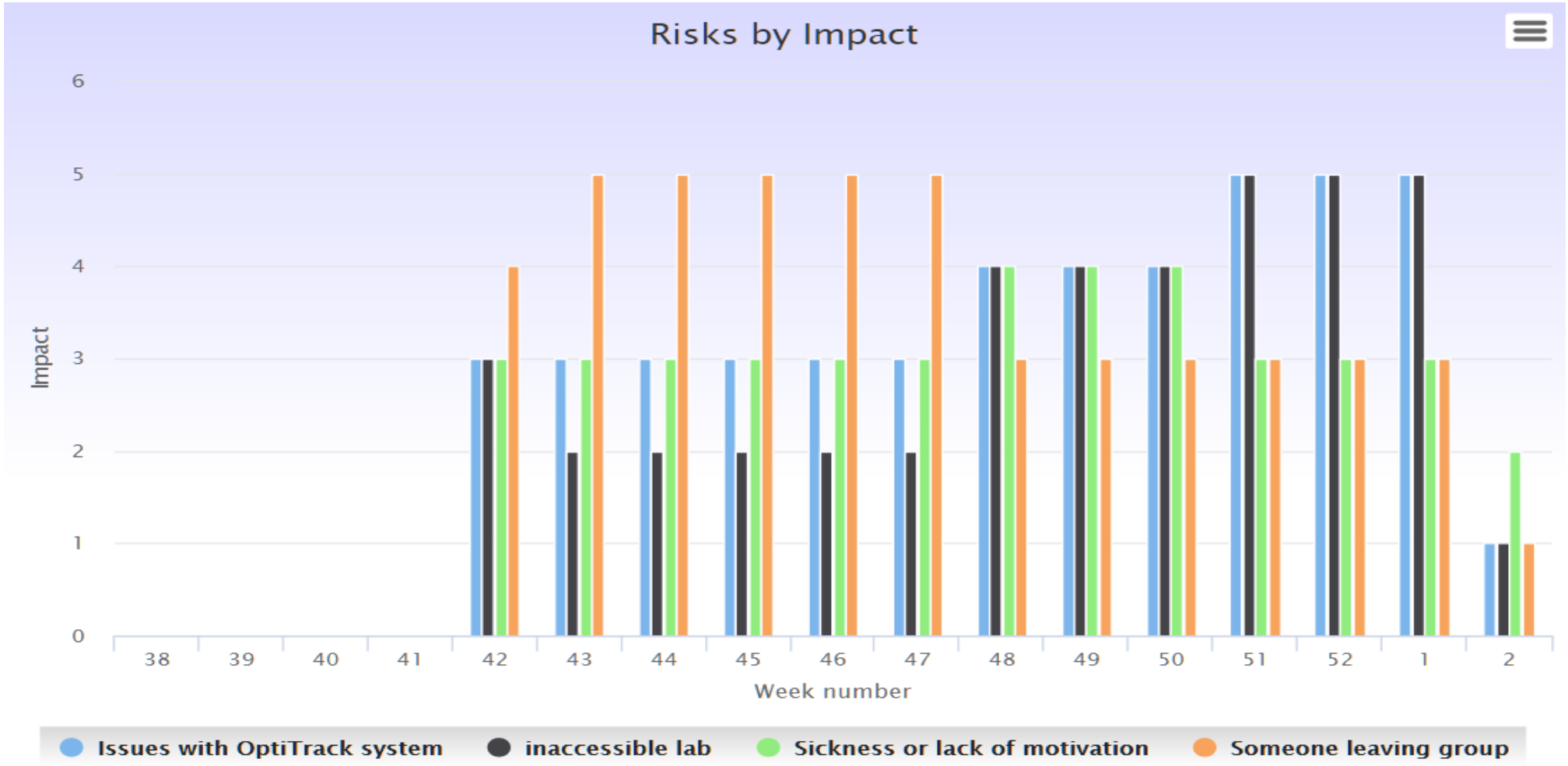
A sample project

- Project #5
- The project manager left the team during the project as he got a job from Silicon valley
  - Negative risk for the team
  - Positive risk for the PM
- The whole team participated in risk management process

A sample project – project #5



A sample project - project #5



Data

Proj-ect num.	Identifying risks	Monitoring	Mitigation	Reaction after the realization of a risk
1	PM's proposal	Risks were monitored by every member of the team.	Documentation, version control, open communication	Rescheduling
2	Team discussion	Team discussed on risks them in weekly meetings.	Documentation, version control, backups, decreasing the scope, keeping up good spirit	
3	Team discussion, client's comments.	Team reported having no formal process for monitoring.	More time asked, skipping other courses, chosen familiar technologies	Rescheduling
4	Team discussion	Risks are evaluated in weekly meetings by the project manager	Reporting honestly, rescheduling, dividing task equally, helping others	Rescheduling
5	Team discussion, proposals from the client and the supervisor	Group discussions: both in Slack and face-to-face meetings.		A member took left project manager's duties
6	PM's proposal adjusted by the project members	PM checked the situation weekly.	Studying	
7	Team discussion and client proposal. Project manager fine tuned.	PM monitored and edited the risks.	Regular meetings, coding sessions, working closely.	Speeding up

Data

Proj-ect num.	Risks in the project plan	Realized risks not foreseen	Realized risks foreseen
1	Project team breaks up, single member leaves the project, project is too hard	Illness of a project member	
2	Interruption in the use of systems needed in development, project member's short sickness, longer sickness/Injury, losing documentation or source code, scope of the project increasing too much, burnout, dropout of a member	Unavailability of a member, communication problem: piece of information did not reach a group member	
3	A team member quits, client is not available to provide required support, team members could not work or are not available as expected, lack of skills, expertise or experience, a requirement feature is too complicated, some features are technically difficult to implement		Team members could not work as expected
4	Requirements set too high, falling behind the schedule, miscommunication, team member quits, time resources of a team member, technical capabilities	Lack of information from the client's partner prevented some visualizations	Time resources of a team member
5	Issues with OptiTrack system, Inaccessible lab, Sickness, Lack of motivation	Problems with time management, someone leaving group	
6	Project members are busy, inexperience in development, accidents, cases of illness	Not enough time to finish all the features.	Project members are busy, cases of illness
7	Accidents and illness, Lack of motivation, Group size changes	Problems with time management	

Table 1. Identified, foreseen and unforeseen risks

Analysis of data

- RQ1) How did the teams identify and monitor the risks
- **Mostly teams identified the risks together**
- **One team left the identifying to the project manager**

Analysis of data

- **Monitoring just by a project manager (3/7)**
- **Two teams discussed on risks at weekly meetings**
- **Two teams just reported the risks to MMT**

Analysis of data

- RQ2) What kind of risks teams met during the project and which risks were foreseen and which were unforeseen?
- **The total number of the identified (foreseen) risks was 34 on which realized 4**
- **The total number of unforeseen risks was 8**

Analysis of data

- Four out of the seven groups identified risks related to a **single member's health**, like accidents or getting ill
- The same number of groups (4/7) identified risks related to **single member leaving the project** and to too **difficult or wide requirements**
- The other risks were found in three or less of the projects

Analysis of data

- RQ3) How risks were mitigated and what were the team's reactions after a risk was realized?
- **34 foreseen risks**
- actions against **14 risks for decreasing the probability** and actions against **10 risks to decrease the impact**
- **On 7 risks** there were actions **both** for decreasing the probability **and** for decreasing the impact

Analysis of data

- Most reported **mitigation**: **documenting**, **version control** and **backups**
- both decreased the probability and decreased the impact (for example losing data)

Conclusions and further work

- There were eight unforeseen risks
- Three foreseen risks realized
- Risk identification was mainly done by the whole team
- Most common realized risks were related to time management

Conclusions and further work

- The main mitigation techniques
  - good documentation
  - version control usage
  - open communication
- Teams reacted to risks by rescheduling or speeding up

Conclusions and further work

- Teaching practices can be improved by emphasizing
  - the usefulness of risk checklists
  - regular monitoring of risks in team

- Main weakness of this paper is the small number of observed teams
  - It could also be analyzed **when** the risks realized in the projects.

Thank you!
Any questions?

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