

# Risk Assessment & Mitigation

## Risk Rating

To determine the overall damage to the project that a risk may have, we applied the likelihood and impact of the risks via a risk matrix to abstract a 'risk rating', ranking them from Low, Medium, High and Critical. These risk ratings are selected using the 5x5 matrix below that divides impact and likelihood into 5 levels. For our project a 5-level rating scheme is more suitable than a standard 3-level rating (low-medium-high) because it allows a more refined assessment of risks. A higher level ranking, e.g. a 9-level rating, could've been chosen but given the nature of the project, a game - not a critical system, this would have been too detailed. The impact and likelihood definitions are listed below. The number associated with impact and likelihood is summed together to determine the overall rating for a particular risk; 2-4 is low, 5-6 is medium, 7-8 is high, 9-10 is critical.

| Likelihood         | Impact        |          |             |          |           |
|--------------------|---------------|----------|-------------|----------|-----------|
|                    | Negligible(1) | Minor(2) | Moderate(3) | Major(4) | Severe(5) |
| Very Likely(5)     | Medium        | High     | High        | Critical | Critical  |
| Likely(4)          | Medium        | Medium   | High        | High     | Critical  |
| Somewhat Likely(3) | Low           | Medium   | Medium      | High     | High      |
| Unlikely(2)        | Low           | Low      | Medium      | Medium   | High      |
| Very Unlikely(1)   | Low           | Low      | Low         | Medium   | Medium    |

### Impact Definitions

- Negligible - The impact of the risk will only delay the project by a small number of hours
- Minor - The impact of the risk will delay the project by 1-2 days
- Moderate - The impact of the risk will delay the project by 3-5 days
- Major - The impact of the risk will delay the project by 1-2 weeks
- Severe - The impact of the risk will delay the project by 2 or more weeks

### Likelihood definitions

- Very Likely - Occurs once a week
- Likely - Occurs once in two weeks
- Somewhat Likely - Occurs once in three weeks
- Unlikely - Occurs once a month
- Very Unlikely - May occur once during the project completion time

## Risk format justification

The risks have been formatted into a table consisting of 5 columns; Risk Number, Risk Category, Risk name and description, Mitigation, and Overall Risk. The rows are sorted into descending order of overall risk rating so risks that would have the biggest impact are clearly visible. Risks are ranked by evaluating negative impact to project and likelihood of possibility. The table suggests mitigation strategies, that would help effectively solve potential problems. Risk Category shows which aspect of a project the risk

is covering. The categories consist of; requirements, project complexity, planning and control, team, and organisational environment [1]. They show the spread of risks across all areas of the project and assists with assignment of risk ownership. Team leader owns risks related to organisational tasks of functioning of a group. Scrum master, that is assigned for a duration of each sprint, is responsible for handling all risks related to software development work. Some of the risks need to be handled individually by each team member.

## Risks

| Nr | Risk category        | Risk   | Mitigation  | Overall Risk          | Risk Ownership |
|----|----------------------|--|---|-----------------------|----------------|
| 1  | Planning and control | Ineffective communication between group members  | GitHub and Slack allows effective communicate between group members. Failure to communicate will have a reason. Schedule a special meeting with an elected mediator to allow poor communicators to explain their issue(s) and re-integrate with the team. | Likely/Severe         | Teamleader     |
| 2  | Requirements         | Project team misunderstood requirements          | Following Scrum methodology frequent team meetings are held and requirements are often reviewed. Team maintains consistent communication via Slack and through face-to-face means.  | Likely/Severe         | Scrum master   |
| 3  | Planning and control | Team members missing important team meetings     | Communicating via Slack, ZenHub. Team members are provided with all necessary information that they missed. If that person is still missing team meetings, the problem will be reported to lecturers to be solved via official channels.                  | Likely/Major          | Teamleader     |
| 4  | Requirements         | Inadequate architecture, performance and quality | Simulation created and benchmarking results are evaluated. Prototype is created to allow tuning of some required details.   | Unlikely/Severe       | Scrum master   |
| 5  | Planning and control | Poor project planning                            | Gantt charts alongside our agile development model (Organised by ZenHub for GitHub) allow us to establish a clear overview of bottlenecks in the project and then refactor the plan as we go.   | Somewhat Likely/Major | Scrum master   |
| 6  | Team                 | Deletion of project code                         | GitHub minimises the likelihood of complete loss of code, regular backup via forking to personal repositories increases redundancy and cloning of the repository to an offline location before major changes further reduces                              | Very Unlikely/Severe  | Other          |

|    |                            |  |   |                                 |              |
|----|----------------------------|--|---|---------------------------------|--------------|
|    |                            |  | risk.   |                                 |              |
| 7  | Team                       | Certain team members lack of specialized skill required by the project | Inexperienced team members should find time and resources to improve needed skills. Work plan is rearranged so it includes some time to gain required skills. Different tasks should be allocated to team members that have skills to accomplish it.    | Likely/Moderate                 | Teamleader   |
| 8  | Planning and control       | Poor productivity  | ZenHub for GitHub is used. It shows visual display of effort that people put in. It indicates team members that don't contribute enough. Therefore it allows to locate and solve an issue fast.   | Somewhat Likely/Moderate        | Scrum master |
| 9  | Team                       | Member of team is sick and can't participate in further work           | Program code is submitted in GitHub therefore the rest of the team can continue working. No member will ever have a 100% share in a mission critical task. Frequent commits and clear comments will allow members to compensate for illness or absence. | Unlikely/Moderate               | Teamleader   |
| 10 | Team                       | Team member is underperforming   | Team is rearranging workload and providing any help if it is necessary, possibly through mediation meetings   | Unlikely/Moderate               | Teamleader   |
| 11 | Planning and control       | Lack of effective project management                                   | Agile software development technique is going to be used to manage product development  | Unlikely/Moderate               | Teamleader   |
| 12 | Planning and control       | Project progress not monitored closely enough                          | Frequent team meeting are held to review progress. Gantt and burn-down charts are used to give a close view of project progress   | Unlikely/Major                  | Teamleader   |
| 13 | Planning and control       | Project milestones not clearly defined                                 | Milestones analysed within the planned scrum meetings, milestones can be re-arranged and definitions updated within a week of issues arising.   | Somewhat Likely/Moderate Impact | Teamleader   |
| 14 | Organizational environment | Inexperienced project managers   | If needed different project leader is elected by the team members   | Unlikely/Major                  | Teamleader   |
| 15 | Requirements               | The wrong software functions are developed                             | Customer requirements are analysed. User survey reviewed. Prototype tested. Discuss and resolve software issues in meetings.  | Somewhat Likely/Moderate        | Scrum master |

|    |                      |   |   |                          |              |
|----|----------------------|---|---|--------------------------|--------------|
| 16 | Requirements         | Continually changing requirements                               | Changes are accepted as a fact of software projects. Prioritisation sessions are scheduled that allow changes to proceed.   | Very Likely/Minor        | Teamleader   |
| 17 | Requirements         | Incorrect system requirements                                   | Task descriptions are reviewed frequently. Note that while our requirements are correct in the context of our current concept, that concept may change in the future.   | Very Likely/Minor        | Scrum master |
| 18 | Planning and control | Gold plating (added features are not useful)                    | Requirements are frequently reviewed and tasks are worked on in order of priority. Prototype is created and tested.   | Unlikely/Moderate        | Scrum master |
| 19 | Project complexity   | Functionality is complex to implement                           | Team meeting is held to discuss the problem and find solution. Research is done on programming techniques or available software that would allow to solve the problem.  | Somewhat Likely/Moderate | Scrum master |
| 20 | Project complexity   | Problems to integrate separate pieces of code                   | The GitHub pull request system combined with a potential sit down meeting with all developers affected by the conflict in question will likely ensure a smooth development process.   | Somewhat Likely/Moderate | Scrum master |
| 21 | Project complexity   | Overriding each other's work                                    | Over-writing other's work should only occur after proper code review enforced by the pull request system. This review process allows us to ensure any changes removing or changing others' work to be intended and functional.                      | Unlikely/Major           | Scrum master |
| 22 | Planning and control | Internet access is compromised for a prolonged period of time   | Whenever a pull request is approved, all team members should clone the repository's master branch so that they can work on the game without requiring internet access. 4G data-plans can be activated if necessary to acquire internet connections. | Very Unlikely/Severe     | Other        |
| 23 | Planning and control | Another user gains unauthorised access to the GitHub repository | Take care to avoid sharing login credentials for any of the university/GitHub accounts that can access the project's resources.   | Very Unlikely/Severe     | Other        |
| 24 | Team                 | Team member's local copies of project files are                 | Submit commits immediately after each task is completed so that all completed work is backed up frequently. Use Google Drive to write up documentation and automatically save   | Unlikely/Major           | Other        |

|    |                      |  |  |                   |              |
|----|----------------------|--|--|-------------------|--------------|
|    |                      | compromised after having been worked on heavily (prior to committal) | it on Google's servers.  |                   |              |
| 25 | Planning and control | Created software code has a bug                                      | Software code is saved on GitHub. It allows to access previous version of code and locate where the bug was introduced. A possible integration of Travis CI will allow immediate testing and debugging of code.  | Very Likely/Minor | Scrum master |
| 26 | Planning and control | Something is not working as planned in sprint plan                   | Team is having regular sprint meetings, during which arisen issues will be discussed. Team members will split additional workload in order to resolve problem and to not fall behind with current plan. If it is necessary additional time is allocated and sprint plan is changed | Very Likely/Minor | Scrum master |
| 27 | Requirements         | User interfaces do not fit needs                                     | Prototype is created, scenarios are development. Customer description reviewed.  | Likely/Negligible | Scrum master |
| 28 | Planning and control | Inadequate estimation of required resources                          | Frequent meetings are held. If needed additional resources can be allocated. Tasks can be divided between more group members if the velocity of one member is dropping due to tackling a large task alone.   | Unlikely/Minor    | Scrum master |

## References

[1] Tharwon Arnuphaptrairong "Top Ten Lists of Software Project Risks : Evidence from the Literature Survey" International MultiConference of Engineering and Computer Scientists 2011 Vol 1, IMECS 2011, March 16 - 18, 2011, Hong Kong. [Online]. Available: [http://www.iaeng.org/publication/IMECS2011/IMECS2011\\_pp732-737.pdf](http://www.iaeng.org/publication/IMECS2011/IMECS2011_pp732-737.pdf)