A1: Initial Business Case - Documentation

|  |  |
| --- | --- |
| Project Title | OnkoDICOM |
| Group Members | Long Yin Felicina Chau  Chai Anthony Forest  Joshua Thomas  Shengjie Yu  Melinda Vay  Li Hao (Peter) Qian |
| Client | Ashley Maher  Andrew Miller |
| Supervisor | Dr Jie (Jack) Yang |
| Initial Problem Description | OnkoDICOM was created with Radiation Oncologists to allow Radiation Oncologists to do research on standard datasets (DICOM-RT, CT, MRI, PET) used in Radiation Oncology. It uses open-source technologies (pydicom, PyQt, dicompyler-core, PIL, matplotlib).  This year the software’s functionality will be greatly expanded to include enhancements to the viewing of DICOM images, enable image fusion, and expand the manipulation of Regions of Interest, and will also include the creation of plug-ins for Machine Learning functionality for the processing of acquired data. |
| Meeting Details | One hour meeting face to face per week. |

# Initial Project Scope

The project manager, Ashley Maher and product owner, Andrew Miller has outlined that the scope of this project is to further expand the functionalities of the current OnkoDICOM software. The outcomes of the scope is:

* Open all DICOM files at once
* Enable image fusion of DICOM-RT, CT, MRI, PET into one data set
* Expand the current manipulation of Regions of Interests
* Allow a plug-ins for machine learning algorithms, for processing of the acquired data

# Scope Management

For this project, the scope management will be defined by the Work Breakdown Structure (WBS) and WBS dictionary. The WBS will be used to identify the deliverables and the timeline of the project. The scope management plan will be as followed:

1. Requirements
2. Scope Statement
3. Work Breakdown Structure (WBS)
4. WBS Dictionary
5. Roles and responsibilities
6. Deliverables
7. Scope validation
8. Scope Control

In the event of the scope changing throughout the project, a scope change document will be compiled. The document will be presented to the project manager and key stakeholders for approval before any changes will be made.

# Project Need

The current situation of the nature is Radiation Oncologists have limited resources and tools to analyze and assess medical images. This is due to current software available are catered for Medical Physicists, due to extensive understanding of file manipulation. Therefore, requires medical imaging software to be usable by Radiation Oncologists. Medical Imaging Software available on the market are expensive, which limits access for medical experts. OnkoDICOM is an open-source software, which allows medical experts more accessibility to easy-to-use imaging software. Currently, OnkoDICOM requires more sophisticated functionality that suits to the needs of medical experts in radiation oncology.

# Market Analysis

*What are the current systems/products in the market?*

**RadiAnt**

A PACS (Picture Archiving and Communication System) DICOM viewer that supports the display and manipulation of a wide range of different imaging modalities with the option of purchasing a CD/DVD autorun package. RadiAnt allows for both basic manipulation and advanced manipulations including Multiplanar reconstructions, 3D volume rendering, PET-CT image fusion.

Pricing:

* Subscriptions ranging from $51.20 to $62.40 AUD a year per device depending on quantity of subscriptions purchased.
* One-time purchases ranging from $166.39 to $206.39 AUD per device depending on quantity purchased.
* CD/DVD autorun ranging from $510.38 to $638.38 AUD per device depending on quantity purchased.

Compatibility:

* Windows 10
* Windows 8.1
* Windows 8
* Windows 7
* Windows Vista
* Windows XP SP3

**MicroDicom**

A free for non-commercial use DICOM viewer that supports basic manipulation (zooming, panning, measurements, brightness/contrast control etc.) and handling of DICOM imaging modalities.

Pricing:

* Free for non-commercial use
* One-time purchase for commercial use ranging from $103.43 to $129.62 AUD per device depending on quantity purchased.
* One-time purchase for DICOM viewer CD/DVD/USB ranging from $320.76 to $458.24 AUD per device depending on quantity purchased.

Compatibility:

* Windows 10
* Windows 8.1
* Windows 8
* Windows 7
* Windows Vista
* Windows XP

**OsiriX**

The most widely used DICOM viewer in the world utilized in over 20,000 institutes, supports the display of all medical images produced from medical equipment and is certified as FDA & CE medical device software, class II, for diagnostic imaging. OsiriX MD also includes a large variety of manipulations for viewing and post-processing of DICOM files, utilization of a PACS server that allows for an unlimited number of simultaneous clients, anonymization options for research and teaching as well as CD/DVD burning.

Pricing:

* Monthly subscription of $104.99 AUD per device.
* License with 1-year free updates ranging from $953 to $1192 AUD per device.
* License with 2-year free updates ranging from $1453 to $1817 AUD per device.
* License with 3-year free updates ranging from $1953 to $2442 AUD per device.
* License with 5-year free updates ranging from $2954 to $3693 AUD per device.

Compatibility:

* Any Mac computer, running from OS X 10.11 to macOS 11.0

**Mango**

Mango or Multi-image Analysis GUI is a medical image viewer that allows for analysis, manipulation and navigation of multiple image formats including DICOM, Analyze, NEMA-DES, MINC, NIFTI and NIFTI2. Mango is a free software that is only available for educational and scientific purposes and not for commercial use.

Pricing:

* Free

Compatibility:

* Desktop: Mac, Linux, Windows
* Browser (Papaya): Firefox, Chrome, Safari and IE
* Mobile (iMango): Apple iPad

*Are there any products under development that have similar features?*

There are 504 repositories on github alone that implement various functionalities associated with DICOM. The large majority of these repositories are of limited scope or are updates on already released products, “DVH Analytics” and “Aliza MS” are products in development that feature DICOM viewing and analytical capabilities respectively that share similarities to the OnkoDICOM project.

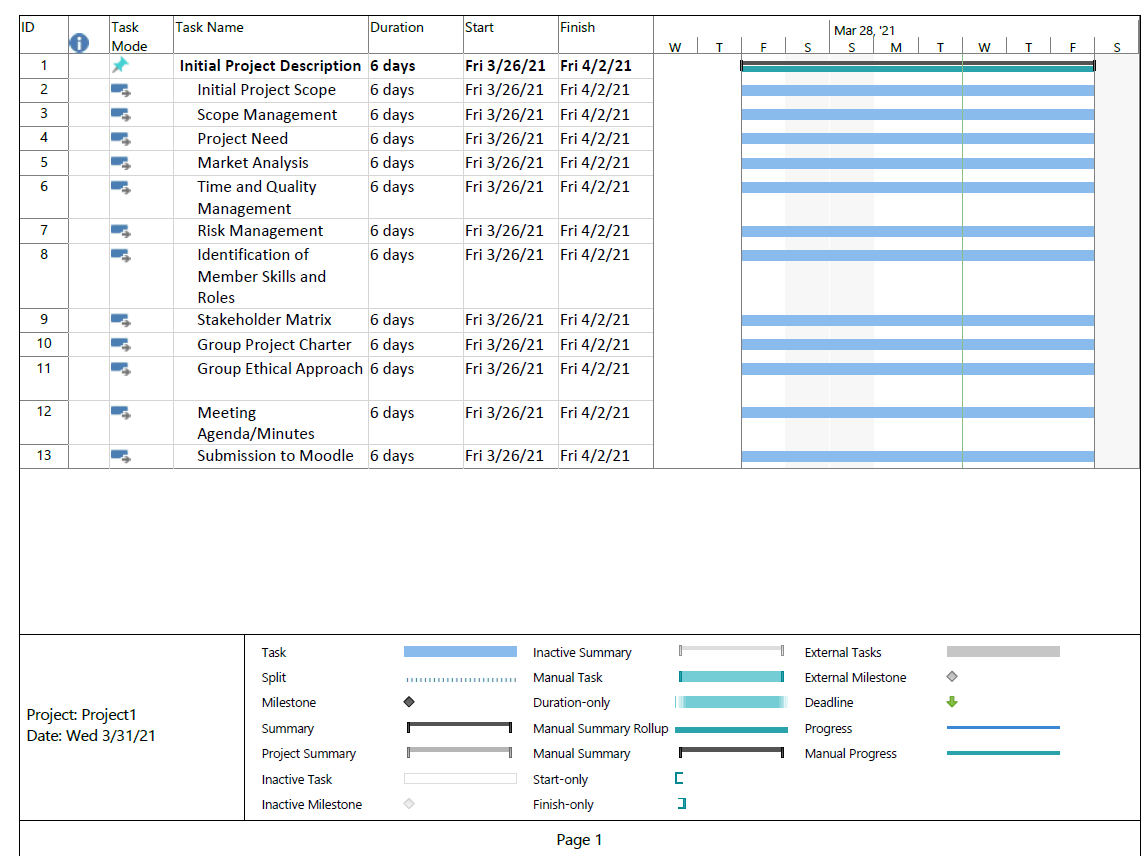
*What will differentiate your system/project?*

The OnkoDICOM project provides a platform for DICOM viewing and manipulation while incorporating radiomic functionality. OnkoDICOM is an open-source project that features cross-platform compatibility and has a functional model that promotes continuous adaption and progression by continuous injection of new team members with fresh ideas to maintain the longevity of the project. OnkoDICOM differentiates itself from current systems by providing more comprehensive functionality than other current open-source systems through the incorporation of radiomics for further analysis of DICOM files.

# Time Management Plan / Quality Management Plan

Good project time and quality management play a critical role to meeting or exceeding the stakeholders’ needs and expectations using the allocated resources within a timely manner. The project’s success is ultimately dependent on the primary customer’s satisfaction. Thus, to achieve stakeholder satisfaction, it is necessary to develop a good understanding of the stakeholders’ definition of quality and identify the relevant quality requirements and standards in a quality management plan.

The project will follow an agile approach using the Scrum methodology. Weekly meetings involving the product owner and development team will be facilitated by the ScrumMaster. Tasks assigned to the team from the product and sprint backlogs shall be completed and made ready for review in sprints of one to two weeks with the allowance of slack. To ensure the timely completion of the project, a project schedule will be developed by analysing activity sequences and activity resource and duration estimates. The project manager and ScrumMaster will be responsible for controlling the schedule and allocating sprints, which will all be posted and documented via a website called Redmine. This will maintain transparency throughout the system’s development life cycle and ensure regular commitment from the team. Schedule performance will be tracked by the project manager and ScrumMaster based on the team’s performance in each sprint review. A predictive Gantt chart for the project will also help the development team visualise milestones leading up to the set project completion date on 29th October 2021.

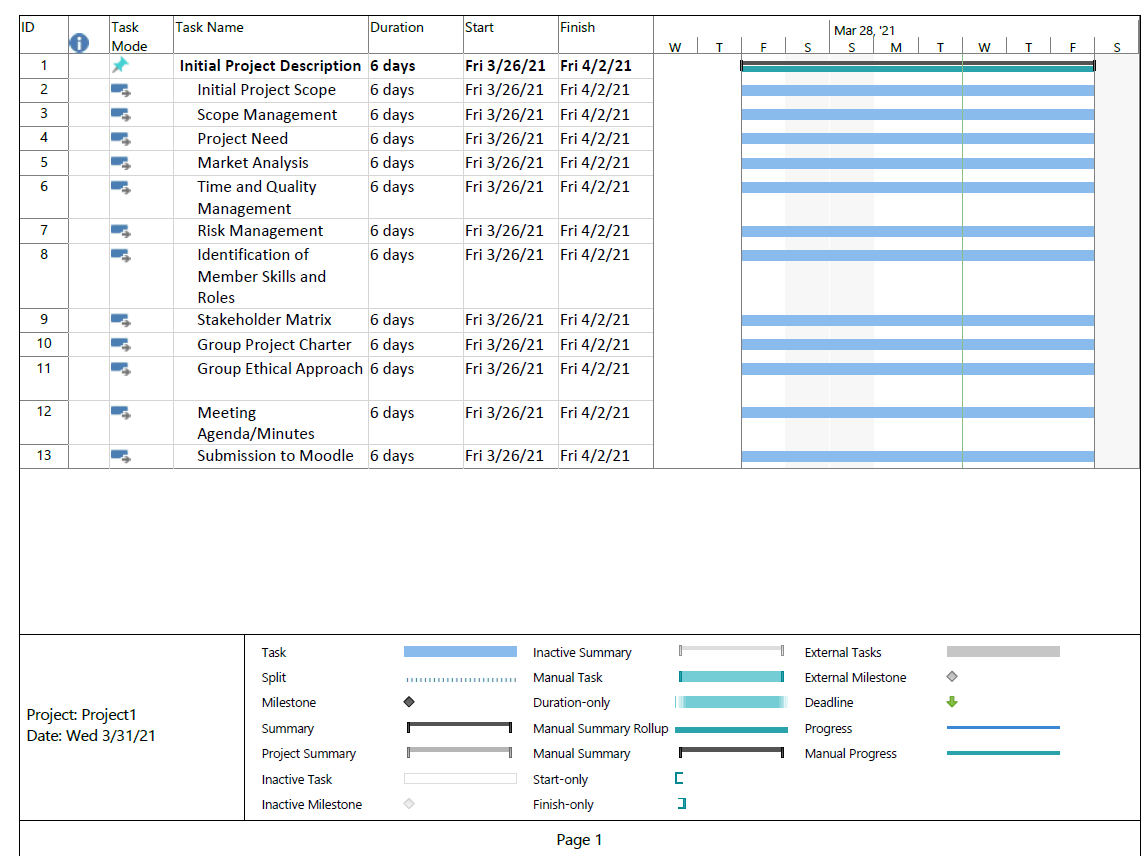


To ensure the successful completion of the project, the most critical quality needs of the project’s primary customer must be defined and communicated to the development team. With consideration to the cost, scope, time and quality dimensions, the project’s success criteria based on this quadruple constraint is outlined below:

Project Success Criteria

|  |  |
| --- | --- |
| Success Criterion | Questions |
| Scope | Is the scope clearly defined? Are all mandatory requirements met? Are the sponsor’s technical standards met? |
| Time | Is the project completed on schedule? Is the schedule realistic? Was the project manager alerted of issues that may affect the schedule in a timely manner? |
| Quality | **Functionality & Features:** To what extent is the system performing its intended function? Is the system performing its mandatory (written) functions and features?    **System outputs:** Will the system’s outputs be easily interpreted by users? Will the users receive all of the documentation they need in a suitable format?  **Performance:** How well does the system perform the customer’s intended use?    **Reliability:** How well does it perform under normal conditions?    **Maintainability:** How easy is it to maintain the system? |
| Risk | Were all risks mitigated? Were all risks overcome? |
| Stakeholder Satisfaction | Is there a good relationship established with the stakeholder? Is there regular engagement with the primary stakeholders? Is the system approved by the product owner, OnkoDICOM expert and ScrumMaster? |

## Gantt Chart



# Risk Management

Due to the ongoing nature of the project, prior development teams have identified the internal and external risks associated to the project. With this, the current stage of the project will identify the risks associated to only this stage and assess these risks. Risks will involve hardware, software, and technical skills. When identifying and developing risks, contingency plans will be proposed to optimize the risks impact and/or eliminate risk altogether.

Project risk management involves understanding potential problems that might occur on the project and how they might impede project success. Identification of risks will outline potential events and classify the type of risks, the characteristic of the risk. This will allow the project members to analyze the risk, determine how much it will affect the project and to mitigate or reduce the impact of the risk.

There are several methods that will be employed to identify risks. These methods are as followed:

**Brainstorming –** this technique involves the group generating ideas or solutions for a specific problem by collaborating ideas together. This will allow each member to contribute their ideas and build of other ideas.

**Interviewing -** this technique involves face-to-face meetings, email and instant-messaging discussions with members who have similar experience.

**Checklists -** is the technique involving in ensuring that the team has avoided mistakes that are common within the past.

**Initial risks:**

Preliminary risks are evident due to the nature of the project continuing from one development team to another team. These risks are outlined as:

* Transitioning from the old development team to the new team, will introduce inconsistencies between documentation and work culture. Also, time management will differ between the two teams due to the availabilities of each member.
* Learning pre-existing software, since there’s functionalities are already implemented into the project, the team will need to understand how the existing functionalities work and how they will differ for functionalities to be implemented.
* Learning to develop the software in a new platform. This may be due to members unfamiliar with the framework and environment the current software has been developed in.
* Learning the procedures to the SCRUM framework on Redmine
* Confidential data associated with patient cases can be present on DICOM images even through redaction and anonymization of patient information.
* Team miscommunication may happen when certain discussions or tasks are unclear to individuals.

Under the circumstances of COVID-19 restrictions, productivity may differ with ‘working from home’ and ‘working on site’, which may impact the work productivity. There is currently no information when restrictions will be lifted. For the time being, the current communication tools will be used for meetings Zoom and Slack. These are currently used to minimize the impact of negative risks with the current situation.

For Risk Analysis, it can fall under two categories:

**Qualitative Risk**: involves in assessing the chances and impact of identified risks to determine their magnitude and priority.

Tools used to calculate risk factors can include:

* Probability/Impact Risk matrix
* Top Ten Risking item Tracking
* Expert judgement

**Quantitative Risk**: is a similar process to qualitative risk, thus can be processed together with qualitative or separately. These risks can be evaluated with metrics.

Tools used to calculate the risk factors for quantitative risks include:

* Decision Trees
* Simulation
* Sensitivity Trees:

The main risk analysis employed will be a probability/impact matrix for its ability to prioritize risks and evaluate their impacts on the system. Other risks have been identified from the following methodologies and will be documented into a risk register. A risk register will be constructed to record the risk, classify and evaluate the impact.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **ID** | **Impact Rank** | **Probability** | **Name** | **Description** | **Category** | **Cause** | **Response** |
| 1 | Medium | Medium | Transition from old team to new team | Transition from old and new team will impact the development of the system as the new team will need to develop an understanding of the system in its current state. The new team will need to understand the system in order to introduce new features or continue to enhance pre-existing features. | Time-risk | The new team will have a different work ethics and productivity will differ.  There is also a difference in skill sets. | Team will develop the necessary skills to collaborate as a team to work with the project manager.  Team will also develop their skillsets to provide benefits to the system. |
| 2 | High | High | Learning OnkoDICOM | The new team will be required to understand the system functionalities and the source code. | Technical | Team does not have knowledge of the system | Team will study the system’s functionalities. |
| 3 | High | High | Learning the system’s framework | The team will need to learn the current framework the system has been developed in. The current software is built on Qt GUI framework. | Technical | Team does not have knowledge of the framework the system has been written on. | Team will study the framework the system has been built on |
| 4 | Medium | High | Application of Agile methodology on Redmine platform. | The Redmine platform will be used as SCRUM framework for communication and organization between the SCRUM master/project manager and the rest of the team | Time | New SCRUM platform that may be unfamiliar to the team.  Proprietary system used for documentation of OnkoDICOM | The team will be required to understand how the platform can be used. |
| 5 | Low | High | Team  miscommunication | Due to the current circumstances od COVID-19, the team communication methods have been impacted. This reduces face-to-face meetings. Online communications methods such as Zoom and Slack have been employed. | Communication | COVID-19 | Developers will adapt their communication habits to the circumstances. |
| 6 | High | Medium | Patient data may be visible | Patient data may be present even after processing | Technical | The patient data may be exposed to the development team. | Team will remain confidentiality |

**Probability and impact matrix**:

A probability/impact matrix will be used to list the probability of a risk occurring and the relative impact that risk has on the project.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Probability/ Impact Matrix | | | | |
| Probability | High | Team miscommunication | Application of Agile methodology on Redmine | Learning OnkoDICOM  Learning the system’s framework |
| Medium |  | Transition from old team to new team | Patient data may be visible |
| Low |  |  |  |
|  | Low | Medium | High |
|  |  | Impact | | |

# Initial Identification of Skills

## Potential Project skills Needed

The technical skills required for this project is outlined below:

Development Language: Python

Development Tools:

* PyDICOM
* Dicomplyer-core
* PyQt5
* PIL
* MatplotLib
* Pyodide

## Student skills and Responsibilities

|  |  |
| --- | --- |
| **Student name** | **Skills** |
| Peter Qian | Programming Languages: C++, C, Java, JavaScript, Python, MySQL |
| Joshua Thomas | Programming Languages: C++, Python, Java, MySQL, MongoDB |
| Chai Anthony Forest | Programming Languages: C++, Java, Python, MySQL, JavaScript |
| Peter Yu | Programming Languages: C++, Java, Python, JavaScript, SQL |
| Melinda Vay | Programming Languages: HTML, JavaScript, PHP, SQL, Java |
| Felicina Chau | Programming Languages: Java, JavaScript, Python, PHP, SQL, HTML |

**Experiences**

**Peter Qian –** Has experience in documentation, project management and back-end development. Experience in Object-Orientated Programming using C++ and Java. Developed mini game projects in unity using C#. Experienced in using Data Structures and Algorithms.

**Joshua Thomas –** Has experience in programming, documentation and minor experience in project management. Has experience in algorithms and data structures as well as linear and non-linear optimization problems. Also has experience in cybersecurity, database systems and front-end web development. Languages: C++, Python, Java, SQL, MongoDB

**Chai Anthony Forest –** Has experience in documentation, project management and back-end development. Experience in Object-Orientated Programming using C++ and Java.

**Peter Yu –** Has experience in documentation, project management and back-end development. Experience in Object-Orientated Programming using C++ and Java.

**Melinda Vay –** Has experience in documentation, project management and front-end development. Experience in Object-Orientated Programming using Java.

**Felicina Chau –** Has experience in documentation, project management and front-end development. Experience in Object-Orientated Programming using Java.

Improvements will be made for each member’s knowledge of Python for the project. This will be done through self-studying and training sessions for each member.

A brief work-breakdown structure for the Initial Project Description has been made to illustrate the distribution of tasks amongst team members. As future tasks get assigned to the team by the project manager and ScrumMaster, the WBS will be updated and all associated entities including Gantt chart and responsibility matrix will be updated accordingly.

**WBS**

1. A1 – Initial Project Description
   1. Initial Project Scope
   2. Scope Management
   3. Project Need
   4. Market Analysis
   5. Time and Quality Management
   6. Risk Management
   7. Identification of Member Skills and Roles
   8. Stakeholder Matrix
   9. Group Project Charter
   10. Group Ethical Approach
   11. Meeting Agenda/ Minutes
   12. Submission to Moodle

**Responsibility Assignment Matrix**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Member/  Task | Peter Qian | Chai Forest | Melinda Vay | Joshua Thomas | Peter Yu | Felicina Chau |
| 1.1 | R P |  |  |  |  |  |
| 1.2 | R P |  |  |  |  |  |
| 1.3 | R P |  |  |  |  |  |
| 1.4 |  | R P |  |  |  |  |
| 1.5 |  |  |  |  |  | R P |
| 1.6 | R P |  |  |  |  |  |
| 1.7 |  |  |  |  |  |  |
| 1.8 |  |  |  | R P |  |  |
| 1.9 |  |  |  |  | R P |  |
| 1.10 |  |  | R P |  |  |  |
| 1.11 | R |  |  |  |  | R P |
| 1.12 |  |  |  |  |  |  |

R = Responsible Organizational Unit P = Performing Organizational Unit

# Appendix Documents

## Stakeholders Analysis Matrix

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Stakeholder | Point of Contact  *Email, Phone, Website* | Power  *(Overall influence on project requirements)* | Interest  *(Overall interest in project development)* | What is important to the stakeholder? | How can the stakeholder contribute to OnkoDICOM? | How can the stakeholder impede OnkoDICOM’s development? | How can we engage the stakeholder? |
| Product Owner | Andrew Miller  [andrew.miller@health.nsw.gov.au](mailto:andrew.miller@health.nsw.gov.au) | High | High | To further develop and improve OnkoDICOM by presenting increased functionality for users, specifically Radiation Oncologists | Providing requirements for implementation and providing feedback on development | Introduce requirements which are infeasible and change requirements | Conduct weekly meetings, provide progress updates, present sprints and project backlog |
| Project Manager | Ashley Maher  [amaher@uow.edu.au](mailto:amaher@uow.edu.au) | High | High | OnkoDICOM is developed to the product owners’ standards and the project team completes all tasks set by the project manager | Work with the project team directly to implement requirements and organise project sprints | Create project sprints which are infeasible for the project team to complete | Conduct weekly meetings, provide progress updates, present sprints and project backlog |
| Previous Development Team | Matthew Archer  [ma674@uowmail.edu.au](mailto:ma674@uowmail.edu.au) | Low | Medium-High | OnkoDICOM’s development continues unimpeded by the transition from the previous team to the current teams | Assist current project team by providing insights and first-hand knowledge of OnkoDICOM’s systems, including past experiences with development and personal tips / tricks | Provide limited or irrelevant information about OnkoDICOM’s prior development | Communicate changes to OnkoDICOM and how they are implemented |
| Expert | Stuart Swerdloff  <https://www.linkedin.com/in/stuart-swerdloff-900a592/> | Low | High | OnkoDICOM’s use of oncological data is proper and not misleading and can be used by users to conduct insightful analysis | Provide expert knowledge on the field of oncology for the project team to interpret and understand for OnkoDICOM’s development | Provide expert information in a way in which the project team cannot comprehend or lack of expert information | Communicate implementation of expert knowledge into OnkoDICOM |
| University | Jie (Jack) Yang  [jiey@uow.edu.au](mailto:jiey@uow.edu.au) | Medium-Low | Low | The student’s work professionally to provide quality work and represent the university | Provide support to students through guidance and mentorship | Indicates the development of the OnkoDICOM project is out of the subject scope of CSIT321 | Conduct weekly meetings, provide progress updates, present assignments |
| Project Team (Students) | Peter Qian  [lhq036@uowmail.edu.au](mailto:lhq036@uowmail.edu.au) | Medium | High | Fulfilling the requirements set by other stakeholders to present a finished, high quality product | Work with other stakeholders to complete the project | Unable to complete project goals or fulfill requirements due to time, communication, or lack of dedication | Weekly meetings, permanent and open communication platforms (i.e. Slack, Zoom) |
| User Group | Andrew Miller  [andrew.miller@health.nsw.gov.au](mailto:andrew.miller@health.nsw.gov.au) | High | High | OnkoDICOM’s functions as a tool to aid in analysing medical images | Provide feedback on implementation and refine requirements | Provide limited feedback on project implementation, change requirements so they are infeasible without major changes to development | Implementing the requirements as specified and engaging with user feedback. |

CSIT312: Project  
Group Charter

## **DIRECTIONS**

Groups work better when members have a common understanding of the group’s goals and the ground rules for group activities. The purpose of this exercise is to help your group set some ground rules and goals.

Each member of your group will have some idea how the group should operate. This is the opportunity to share your thoughts so “simple misunderstandings” are less likely to arise in the future.

## **PROJECT NAME**

OnkoDICOM

## **GROUP MEMBERS**

Long Yin Felicina Chau

Chai Anthony Forest

Joshua Thomas

Shengjie Yu

Melinda Vay

Li Hao (Peter) Qian

## **OUR GROUND RULES**

* **Other than potentially during computer labs, when will we attempt to meet (what time, how often)?**

Weekly virtual meeting with clients/supervisors and additional group meeting will be scheduled if needed.

* **Technologies used for meetings?**

Communication tools such as email, messenger, slack and discord.

* **On average, how long should our meetings be?**

Minimum one hour.

* **When is it OK to miss a meeting?**

If there is a critical situation related to health or compassion.

* **How do we inform each other when we can’t be in attendance?**

Via email to the group or by leaving a note in official chat channel on slack.

* **How will we deal with lateness to meetings/missed meetings?**

Identify the behavior of constantly being late and come up with an action plan to eliminate it as soon as possible.

* **How do we deal with members who don’t participate enough, participate too much or distract the group from its task?**

Discuss this issue as a group, and clearly outline the consequences and solve the problems as a team.

* **How are we going to make decisions?**

All group members can voice their opinions, but project manager will make the final decision in consideration of all stakeholders.

* **What will we do if a group member’s work doesn’t meet our standards?**

Engage actively with the individual and help them improve their work up to the group’s standard.

## **OUR GOALS**

* What is our group trying to accomplish?

To make improvements on OnkoDICOM software and further enhance its functionality to server better as a tool in the field of radiation oncology.

* What is the overall mark that our group is trying to accomplish?

HD

## Group Ethical Approach

Values

* It is expected that each member will conduct themselves in a professional manner and show respect to their team, supervisors, and anyone that will be in contact with the team.
* The team members will take ownership of any errors that occur during the process of this project and will communicate between each other to establish a plan and address the error quickly.

Team-Player

* Each member is expected to complete their assigned work and be open to other work that arises which may not be a part of their role or interest.
* Members should be ready to help each other and give guidance to those that may have met an issue.

Responsibility

* Each member is expected to show up to meetings on time with an idea of what the meeting will be about, and or, communicate to other members their absence ahead of time.
* Individual tasks should be completed by the determined deadlines, and if an issue arises, the member should communicate the issue to the team ahead of the deadline.

Communication

* Multiple platforms will be available for members to communicate when ethical behaviour is in question, i.e., slack, discord, email, messenger, etc.
* Everyone will contribute to the discussions and be responsive to messages.
* Each member is expected to communicate their ideas openly to avoid confrontation between the team. A supervisor will be on hand to manage any serious issues between the members.
* Constructive criticism will be given, and it is expected that each member takes it with an open mind.

Decision Making

* Team members are to avoid any bias that may affect the decisions when discussing with each other about the project direction.
* All opinions made by the members will be taken into consideration when making any decisions.
* All the evidence and data should be carefully analysed by the team members before a decision is made.

Fun

* Assigned work should be taken seriously, however, do remember to **have fun** while learning new things and maintain a positive attitude even when things get difficult.
* WE CAN DO THIS!

## Meeting Agendas and Minutes

### Meeting Minutes – Week 2

|  |  |  |  |
| --- | --- | --- | --- |
| **Project name and/or description: OnkoDICOM** | | | |
| **Meeting Date:** 9th March 2021, 1:15 pm – 2:30 pm | | | |
| **Meeting Location: Online (Zoom)** | | | |
| **Chair: Peter Qian** | | **Minute Taker: Felicina** | |
| **Agenda Items:** **Part A – Project** A1 Group member introductions and exchange of contact details  A2 Creation of team roles  A3 Discussion on projects of interest  A4 Development of clarification questions to ask the client during Week 2 presentations. **Part B – Other Business** B1 Upload minutes  B2 Upload clarification questions  B3 Next Meeting [date] | | | |
| **Meeting Notes:**  A1 – complete. Online meetings moving forward shall be done in platforms including Zoom, Discord and Slack. Documentation files shall be shared online via OneDrive.  A2 – Peter Qian: Team Leader  Chai Anthony Forest: Programmer  Joshua Thomas: Programmer  Long Yin Felicina Chau: Documentation  Shengjie (Peter) Yu: Programmer  Melinda Vay: Documentation  The above roles have been determined based on each student’s skills and experience.  A3 + A4: completed in a separate file and shared in OneDrive. | | | |
| **Action Item** | **Assigned To** | | **Due Date** |
| B1 – Upload minutes | Felicina | | 17th March 2021 |
| B2 – Upload clarification questions | Peter Q | | 17th March 2021 |
|  |  | |  |
|  |  | |  |
| **Date and time of next meeting:** 17th March 2021, 12.30pm | | **Location of next meeting:** Online (Discord) | |
| **Attendance sign-off:** Chai Forest (5810589), Felicina Chau (4716619), Joshua Thomas (5759742), Peter Qian (5137202), Peter Yu(6284711), Melinda Vay (6096712) | | | |

### Meeting Minutes – Week 3

|  |  |  |  |
| --- | --- | --- | --- |
| **Project name and/or description: OnkoDICOM** | | | |
| **Meeting Date:** 17th March 2021, 12:30 pm – 1:30 pm | | | |
| **Meeting Location: Online (Discord)** | | | |
| **Chair: Peter Qian** | | **Minute Taker: Felicina** | |
| **Agenda Items:** **Part A – Project** A1 Further discussion on existing and new projects of interest  A2 Final selection of top 3 projects **Part B – Other Business** B1 Upload minutes  B2 Complete and submit project nomination form  B3 Email Ashley Maher team members’ skills and experience  B4 Next Meeting [date] | | | |
| **Meeting Notes:**  A1 – Virtual Assistant for Programmers: discarded.  Sunly: seems interesting and has good motivation  Liverpool: good motivation however we question the innovativeness of its purpose as there are already auto-reminders sent directly to patients’ phones for appointments.  A2 – Top 3 projects(in order from left to right): OnkoDICOM, Sunly, IMB | | | |
| **Action Item** | **Assigned To** | | **Due Date** |
| B1 – Upload minutes | Felicina | | 18th March 2021 |
| B2 – Complete and submit project nomination form | Peter Q | | 18th March 2021 |
| B3 – Email and members’ skills and experience | Everyone, Peter Q | | 17th March 2021 |
|  |  | |  |
| **Date and time of next meeting:** 17th March 2021, 12.30pm | | **Location of next meeting:** Online (Discord) | |
| **Attendance sign-off:** Chai Forest (5810589), Felicina Chau (4716619), Joshua Thomas (5759742), Peter Qian (5137202), Peter Yu(6284711), Melinda Vay (6096712) | | | |

### Meeting Minutes – Week 4

|  |  |  |  |
| --- | --- | --- | --- |
| **Project name and/or description: OnkoDICOM** | | | |
| **Meeting Date:** 23rd March 2021, 9:30 am – 10:30 am | | | |
| **Meeting Location: Online (Zoom)** | | | |
| **Chair: Ashley Maher** | | **Minute Taker: Peter Qian** | |
| **Agenda Items:** **Part A – Project** A1 Initial Business Case  A2 Create Redmine logins **Part B – Other Business** B1 Set up Slack workspace  B2 Upload minutes  B3 Next Meeting [date] | | | |
| **Meeting Notes:**  A1 – Introduction to OnkoDICOM   * Managed in GitHub * Creating ticket for weekly sprint, writing pyqt for a feature * Tickets, as we open up, 10 tickets may sit underneath * 10 tickets closed but 1 ticket open à Andrew will know * Otherwise, if all tickets open à Andrew won’t be able to spend much time * Preferable: 1 ticket and 10 subitems * Writing down a task that should be structured how the work should come together * Tree of tasks – structured and organized tasks * Commit hash goes into ticket – so anyone can find the commit * Container that may or may not contain files: MRI, Ultrasound, PET scan * Potential risk: patient data * Scrum platform   A2 – completed by Ashley. | | | |
| **Action Item** | **Assigned To** | | **Due Date** |
| B1 – Set up Slack Workspace | Everyone | | 26th March 2021 |
| B2 – Upload minutes | Peter Q | | 26th March 2021 |
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| **Date and time of next meeting:** 31st March 2021, 3.30pm | | **Location of next meeting:** Online (Zoom) | |
| **Attendance sign-off:** Chai Forest (5810589), Felicina Chau (4716619), Joshua Thomas (5759742), Peter Qian (5137202), Peter Yu(6284711), Melinda Vay (6096712) | | | |

### Meeting Minutes – Week 4

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| **Project name and/or description: OnkoDICOM** | | | |
| **Meeting Date:** 26th March 2021, 4:00 pm – 5:00 pm | | | |
| **Meeting Location: Online (Discord)** | | | |
| **Chair: Peter Qian** | | **Minute Taker: Peter Qian** | |
| **Agenda Items:** **Part A – Project** A1 Initial project description **Part B – Other Business** B1 Upload Minutes  B2 Upload minutes  B3 Next Meeting [date] | | | |
| **Meeting Notes:**  A1 –   * Initial Scope Management: Peter Qian * Project Need: Peter Qian * Market Analysis: Chai Forest * Time Management / Quality Management: Felicina Chau * Risk Management: Peter Qian * Meeting agenda and minutes: Felicina Chau * Group Project Charter: Peter Yu * Group Ethics: Melinda Vay * Stakeholder Matrix: Joshua Thomas | | | |
| **Action Item** | **Assigned To** | | **Due Date** |
| Initial Scope Management  Scope Management  Project Need  Risk Management | Peter Qian | | 31/03/2021 - 2:30pm |
| Market Analysis | Chai Forest | | As above |
| Time/ Quality Management | Felicina Chau | | As above |
| Meeting Agenda + Minutes | Felicina Chau | | As above |
| Group Project Charter | Peter Yu | | As above |
| Group Ethics | Melinda Vay | | As above |
| Stakeholder Matrix | Joshua Thomas | | As above |
| **Date and time of next meeting:** 31st March 2021 | | **Location of next meeting:** Zoom | |
| **Attendance sign-off:** Chai Forest (5810589), Felicina Chau (4716619), Joshua Thomas (5759742), Peter Qian (5137202), Peter Yu(6284711), Melinda Vay (6096712) | | | |

### Meeting Minutes – Week 5

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| **Project name and/or description: OnkoDICOM** | | | |
| **Meeting Date:** 31st March 2021, 3:30 pm – 5:00 pm | | | |
| **Meeting Location: Online (Zoom)** | | | |
| **Chair: Ashley Maher, Stuart Swerdloff** | | **Minute Taker: Felicina Chau** | |
| **Agenda Items:** **Part A – Project** A1 Intro to DICOM  A2 Overview of DICOM Objects used in Treatment Planning **Part B – Other Business** B1 Upload Minutes  B2 Initial project submission  B3 Sprint 1  B4 Next Meeting [date] | | | |
| **Meeting Notes:**  **A1 – Intro to DICOM**   * Stuart Swerdloff – work for Elekta, volunteer, domain expert * Intro to DICOM:   Issue – incompatibility across medical scanners, clinicians hated that  DICOM: Digital Imaging and Communications in Medicine  File format – contains header, metadata, we are dealing with both types of data  DICOM-RT: Radiation Therapy, added concepts not part of diagnostic imaging  More than just a data format, communication protocol  AE = Application entity, an application that does DICOM and when it’s trying to communicate it considers itself an entity and identifies information  IOD = information object definition eg CT has its own IOD  VR = value representation  UID = Unique identifier, the way different DICOM objects point to different DICOM objects is by UID, doesn’t mean it’s different for everything, sufficient to identify something uniquely even if that something is shared/ similar to other things (eg. A bunch of CT scans will be called a CT series)   * DICOM Association:   AE Title and IP address – should be unique  List of Transfer Syntaxes – byte ordering  Supported SOP classes (including the role the AE will play) – service object pair, for a particular object definition that you would do the transport for that and if they both agree then you will have an SOP   * Default DICOM port number is 104? * DICOM service classes:   Verification – echo  Storage – getting an object to cross  Query – find out what is available   * Information object definitions:   CT  MR  RT   * DICOM File Format:   Header and pixel data  Elements have a tag which is a 32-bit value, separated into 16-bit values, each one element will have a value representation associated with it eg. Various data types such as string, integer, float, need to consider value multiplicity. The group part if it’s even then that tends to be public elements, if odd then it’s private.   * DICOM-RT:   RT image – image that has information on the equipment, treatment plan, DRR  RT -Structure set – contours and position on the CT, around the organs and tumour  RT Plan – where you define how you treat the patient  RT Dose – a 3d volume containing voxels with does values, the sum of the does from the beams in the RT Plan, can contain different info but the 3d volume representing the entire course of the therapy is the starting point  Spatial Registration (SRO) – object in which you encode the information to register – align different coordinate systems from different imaging systems like CT, 4 x 4 matrix   * CT à RT structure set à RT Plan, radiographers will generate an RT object?, something about image fusion * RT Ion Plan – used different particles for treatment eg. Rather than photons, use ions * Interoperability – when you get data from other systems there are sometimes issues where the data doesn’t seem to work * In DICOM not everything is mandatory * Type – In DICOM elements, Type 1 means it’s mandatory, Type 2 means you have to encode the element even if you don’t know the value, Type 3 is optional à raises interoperability issues? * IHE – dealing with radiation oncology issues, even though the types may be optional in DICOM, it is mandatory in IHE, if you’re going to adhere to the profile/ if you’re creating the DICOM object you must populate these objects?   **A2 – Overview of DICOM Objects**   * Radiomics – examining the texture, statistical analysis of the image data rather than just looking at the grade scale * Machine Learning – application of non linear algorithms to get something for organizational/ prediction services * Fractionation – * Patient setup – getting patients to the right place * Frame of reference – UID is Frame of Reference UID * First set of numbers is group, second set is elements, then name of elements, then content of the elements * Most DICOM items will have common info include patient demographics, patient ID – unique within a facility but it is not a UI, birth date, birth time, patient sex (M, F, O), ^ symbol is separator * SOP Class – maps to a particular DICOM object * RT dose:   A single object that contains an entire volume, number of frames, rows and columns, pixel spacing, dose summation type – not adding doses of different types together, grid frame offset vector – spacing between the vector slices? References: referenced RT plan sequence   * Plan specific top-level elements:   Plan descriptors  Dose reference  Fractionation  Setup  Beams – Does anyone remember what he said about beams?  Reference RT structure set – how you identify which contours were used, important as RT plan does not point directly to the CT   * Once the object has an UID, it is immutable – cannot alter object without changing UID * RT Structure Set elements:   References to the images (CT) – contour sequence items à contours are drawn on this image  ROI Identifier  ROI Contours  ROI Observations   * RTSS Contour Sequence:   .1.2 ending à CT  Each contour sequence item references an image (slice).  Know which contour geometric type you are using.  OPEN\_PLANAR  CLOSED\_PLANAR   * CT:   Study/series for organizing, typically a single series maps to a single volume  Image Position Patient (Identifying the coordinate system) and Image Orientation Patient (going from the patient’s right to left or some other direction?) define the location within the volume that the CT slice occupies. Slice Location is deprecated and should never be relied on. Patient Position in CT may not match Patient Position during Treatment.  Rescale Slope and Intercept define the grayscale map (to Hounsfield units)  KVP, Filter Type etc etc – exposure parameters affect image quality and potentially affect the radiomics   * Additional DICOM objects for a treatment plan   Digitally Reconstructed Radiograph  Typically, one per treatment beam for a “Beams eye view” - If I was the beam, what would I see  Sometimes in orthogonal pairs for use in the patient Setup  Not volumetric, have information in them with respect to the plan, make sure the RT image is associated with the right plan  MR and PET  Movement from RT structure set created on CT scan  Radiomics – need to define a region of interest, when you match up a CT and MRI and PET scan, we can look at the radiomics of the PET defined by the region from the CT and interpret them vice versa  List from Stuart or Andrew  Learn how to get specific clarification from the product owner, there can on occasion require input from the DICOM expert, as a clinician Andrew may want something from Stuart’s expertise.  To look up more information on DICOM:  <https://dicom.innolitics.com/ciods>  <https://www.dicomstandard.org/>  <https://www.dicom.nema.org/medical/current/output/pdf/>  C for composites,  Standard unit for DICOM is mm. | | | |
| **Action Item** | **Assigned To** | | **Due Date** |
| Sprint 1 | Everyone | | 9th April 2021 |
| Submit Initial Project Description | Peter Qian | | 2nd April 2021 |
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| **Date and time of next meeting:** 2nd April 2021, 4pm | | **Location of next meeting:** Discord | |
| **Attendance sign-off:** Chai Forest (5810589), Felicina Chau (4716619), Joshua Thomas (5759742), Peter Qian (5137202), Peter Yu(6284711), Melinda Vay (6096712) | | | |

### Meeting minutes – Week 5

**Note: Group 19 was formally introduced to the standard meeting minutes template of DICOM on 1st April 2021. From this week onwards, all meeting minutes shall follow this standard.**

**Meeting/Project Name:** Onko  
**Date of Meeting:** 01/04/2021  
**Start time:** 9:00am  
**End time:** 9:50am  
**Location:** Ashley’s Office/ Zoom  
**Chair:** Ashley Maher  
**Minute taker:** Felicina Chau

**Agenda Items**

*SCRUM framework overview and ticketing tutorial*

**Agenda, Decisions, Issues**

*Discussion led by: All students*

*Discussion led by: Andrew Miller*

*Discussion led by: Ashley Maher*

*Demonstration of ticketing to all students, to be completed in a spreadsheet.  
Unit Testing - What is the probability of this failing? What is the effect of it failing? Test minimum 60% of code but aim for 75%.*

**Action Items**

1. *Sprint 1 (Chai Forest, Felicina Chau, Joshua Thomas, Peter Qian, Peter Yu, Melinda Vay)*
2. *Scrum Daily Standup - make comment in Slack (Chai Forest, Felicina Chau, Joshua Thomas, Peter Qian, Peter Yu, Melinda Vay)*

**Objectives**

1. *Discuss about the progress of the week.*

**Next Meeting**

*Date: 08/04/2021  
Time: 9:00am  
Location: Ashley’s office/ Zoom*