

G5

PROJECT DOCUMENTATION



Elaboration Status Assessment

Aerial Imagery Initiative

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Summary

Documentation Workload Breakdown

(Not weighted, uniform importance)

Percentages of document / section workload in fractional form.

NOTE: Workload breakdown is approximate and is based on iteration planning

Document	Pat	Adam	Andrew	Darren	Cam
Requirement Model (revised)	0	1	0	0	0
Final Architecture	1	0	0	0	0
Project Vision (Revised)	0	0	1	0	0
Risk List (Updated)	0.2	0.2	0.2	0.2	0.2
Project Plan (Revised)	0	0	0	0	1
Master Test Plain (Revised)	0	0	0	1	0
Elaboration Phase Status Assessment	0	0	0	1	0
Executable Architecture	0.1	0.6	0.3	0	0
Evidence of Testing	0	1	0	0	0
Contribution	1.3	2.8	1.5	2.2	1.2

Note above workload does not include other project work completed such as image annotations, and experimentation of image processing.

Completed Goals

The primary goals that have been completed in the elaboration phase of the unified process are below.

- LCAM Document Updates as detailed above
- Vision, Requirements and scope defined.
- Core architecture implemented and highest risk addressed - ability to identify flood zones within aerial imagery.
- Recommended System Architecture validated as fit for purpose.

Risks Identified and Resolved

A key Risk resolved during this phase was the final member of the team passing the AWS Cloud Practitioner Certification. This risk was critical in ensuring all team members were able to contribute to the project.

Ongoing risks of AWS cost blowout are being mitigated by ensuring that notebook instances are stopped after being used, cheaper AWS resources used, and that data access and transfer is kept to a minimum where possible.

DCS Requirements have now been realised, thanks to Leanne from DCS. The delay in details of the project being provided by DCS has been mitigated by the team working hard to meet the project deadlines. The requirement to detect flood areas on various maps introduces technical risks and challenges of the variations between maps including cloud cover, colour inconsistency and artifacts such as trees in flood water which could cause inaccuracies in detection.

The **Risk List** spreadsheet showcases a range of risks and their resolutions, refer to this document regarding risks throughout the LCAM documentation period.

Progression

The team agrees that the project overall is currently 30% complete. Much of the groundwork has been completed in terms of documentation, familiarisation of the

technology involved, and research and development of the core solution to meet the requirements.

During the Elaboration Phase, documents from the previous stage have been updated in addition to new documents being created, such as the Technical Demonstrator which includes a video to show our solution, and a Test result report which demonstrates our most critical, core, risky, difficult (CCRD) use case. The test results were positive based on testing of this use case which provides confidence in the solution.

The whole team now has access to the AWS Infrastructure due to completing their exams, and have ironed out any technical hurdles with technical assistance from Simon at DCS. This has enabled the students to become familiar with the environment and learn the multiple technologies involved including Jupyter Notebooks, OpenCV, SciKit-Image, and the Amazon Simple Storage Service.

The weekly meetings with Nik from Intellify, Simon from DCS, David from CSU and the team are seen as productive in that incremental improvements have been made on a weekly basis with guidance and support provided by Nik and David. During the Elaboration Phase During the Elaboration Phase the team was directed to focus their research on using Image Processing rather than Machine Learning to detect the flood extent. Using the OpenCV and SciKit-Image libraries the team have explored contours, K-Means, DB-SCAN and GMM clustering, Gaussian Mixture Model and a combination of approaches to attempt to identify the flood area. In addition to this different colour modes and amplification of particular colours was experimented with in an attempt to gain the best results.

GMM Clustering in combination with contouring proved the best solution especially in the case where there were small artifacts outside the flood area with a similar colour. Other techniques had issues with noise appearing away from the contour area, or some techniques not being able to reliably detect a flood area.

Nik from Intellify has now asked the students to complete image annotation of a range of images which the team is annotating approximately 40 each to train a machine learning model in identifying parts of an image to eventually be able to not only identify a flood extent, but other items within a given map.

Future Iteration Planning

To consider

The construction phase of the Unified Process will come next following the core risk solution being proven, the other elements of the project will be scheduled and developed to cater for the requirements set out by DCS.

The Construction Phase will complete the work started in the Elaboration Phase including:

- The completion of dataset labelling through the VGG image Annotator.
- Fine tuning of the image segmentation algorithm
- Testing the solution against a range of maps
- Documentation of the solution ready for Transition phase and other users.

Deliverables

Document	Status	Comments	Assigned
Requirement Model (revised)	Completed	Updated information based on developments, removed references to Lambda Functions.	Adam
Final Architecture	Completed	Updated information surrounding Image Annotations and ML Lifecycle.	Pat
Project Vision (Revised)	Completed	Updated information based on developments.	Andrew
Risk List (Updated)	Completed		All

Project Plan (Revised)	Completed	Added further planning information complete with Gantt Chart.	Cam
Master Test Plain (Revised)	Completed	Updated information surrounding Image Annotations.	Darren
Elaboration Phase Status Assessment	Completed	Complete new document for this Phase.	Darren
Executable Architecture	Completed	Video created (Adam) with Supporting Document (Pat)	Pat / Adam
Evidence of Testing	Completed		Adam

References

Title page cover photo.

Rosalie flooded. (2011). Retrieved from

<https://www.abc.net.au/news/2011-06-03/brisbane-floods3a-before-and-after-article/2742794?nw=0>

