Validation Report - Vultus
Group A2 inspection of group A3

This validation report mentions some defects in Vultus R2 System Requirements report. The validation methods that has been used are validation checklist, CRUD check, and Ad Hoc reading. The prioritization is done in the checklist, the CRUD-matrix is prioritized in the checklist as well. The comments from the Ad Hoc reading are not as critical as the Checklist and CRUD-matrix and are therefore not prioritized.

Validation Checklist

The prioritization is done on a scale from 1-5 (1: Little importance, 5: High importance, 0: No notes).

Prioritization	Project areas	Comments
	Is content for the following subjects satisfying?	
3	Customer and sponsor (stakeholders)	The following comments are related to the introduction text of the stakeholder section. What the following text are supposed to be about. Customer: is the believe in why the analysis is good relevant?, FMS: good, Copernicus: good, Investors & product owner: talks more about cost and risk than their relations to the product. Other: doesn't really talk about stakeholder. it's more about relevant areas where the product could be used. Good examples but change it to stakeholder focus in text.
1	Background	Good short introduction. Gives the reader a good idéa of the product. The example on farming problems (nitrogen waste) that is presented is good but not explained. How can this product effect this problem? Clarifying it would give an even better picture of what the product is and does.
4	Supplier Type	Missing part.
5	Business Goals	Good goals, but is it really business goals? More like Product or System goals? Number the goals. The third seems to be a business goal. Hard to match requirement to business goals. Would recommend you to mention business goals in the introduction shortly and have product/system goals instead.
4	Trace goals → Requirements	First two goals can be found in requirements. No clear requirement for third.
	Have we covered the subjects related to data for the following topics	
4	Needed Data	Good cover which data is needed from the satellite and

		vultus engine. However, it is hard to understand what the requirement is in the Data Requirements section. Also, there is no data requirement for how the history of anomalies are going to be stored.
3	Input/Output formats	Good, says which data is inputted and has mockup of the anomalies. Is it everything though, sign in system?
4	States	Missing, need to define different types of severities.
	Does the functional requirements cover the following topics sufficiently	
3	Limits and interfaces	An interface of the data visualization has been given which is clear and easy to understand. Some limits have been stated in the quality requirements, but more limits needs to be added to cover all cases.
0	Domain events per Interface	How users should interact with and interpret the interface has been sufficiently stated.
5	Domain-level requirements eg task-support	The work areas cover all the relationships from/to stakeholders within the inner domain of the context diagram, but not between the FMS and the User. If this is intentional, it could be mentioned in this section of the report that it will not be considered. Also, there is a double arrow (two-way communication) between the FMS and the Vulture Engine but no task supports Vultus Engine → FMS. Also, a good thing would be to split up the description test into sub-tasks for easier reading and to facilitate variants. User login is set as a precondition to one of the tasks but there is no task specifying how a user logs in.
2	Product-level events and functions	There is no functionality for logging in and for logging out.
0	Design-level requirements	Good, the requirements are clear and verifiable.
	Are the following special cases covered	
3	Powe failure/Hardware failure	Missing.
0	False postivies/False negatives	This is specified by requirement 6.5.2.1.
	Are the following quality requirements covered sufficiently	
3	Performance	New satellite imageTraining an AI could demand a lot of CPU. Maybe you should define how much performance req regarding this issue. Unclear if the AI always should train or only on demand. Maybe define how many images/users the system can handle concurrently? PR 6.5.5.2: This req could be formulated in a clearer way. PR 6.5.5.3: Sent to the user or who? Make it clearer.
3	Capacity	Is there a limit for how long the data could be stored? How many farmers can use the system concurrently? How much storage should the database be able to handle?

4	Usability	UR 6.5.4.1- 6.5.4.2: These requirements could be further developed to make it easier to verify them. For example, 9/10 should think it is easy to use the system.
	Safty and security	The security requirements are too diffused and not verifiable. For example, in the first requirement it should state how it's going to be protected or for which attacks. By example using encrypted communication e.g. TLS.
0	Reliability	Good.
0	Availability	Good.
3	Fault Tolerance	Missing.
0	Maintainability	Good. Suggestion is to add a requirement for the support of the system.
0	Portability	Missing (intended by you).
0	Reusability	Good.
0	Interoperability	Good.
0	Installability	Good.
4	Other	**Correctness:** "item 1" in the Quality Grid is vague and the false and positive values should be explained further. AR 6.5.2.2: This requirment is vague. Who is the data delivered to? What areas? Missing req for accuracy of the severity classification, precision of the farm areas, i.e. accuracy of req 2.2.2-2.2.3 could be specified here. QUPER model in the report should be explained/motivated further. Suggestion: Add a QR that complements req 3.2.2 - Is there a limit for how long time the data is saved/the user could view history?
	Does the requirements cover these other delivirables	
1	Documantation	Missing.
1	Training	Missing.
2	Installation	There is only a requirement that the product should be easy to install. This is not verifiable. Nothing on how the installation is performed.
3	Data conversion	Converts the severity level of an anomaly to a color, however no requirement of what constitutes different severities.
2	System operation	There is a description on who is going to use the system but nothing on how they are going to operate the system.
4	Support & Maintanance & Feedback	Contains two requirements about maintenance but could be extended to evolve e.g. support and repair.
	Is the glossary sufficient for the following	
4	Domain and product terms	Might need to define anomalies, it is an unusual word included 67 times in a report, might want to describe what kinds of anomalies you talk about.

2	Other comment	Nasa is not really needed here, and if it is I think ESA deserves a spot just as well.
	Is the document structure up to standards for the following topics	
4	Id for each requirement	Missing ID: goals, farm data, data dictionary. In "analyzed data" are the numbers for the requirements 6.1.2.1 , 6.1.2.2 & 6.1.2.3 ? Clarify this.
3	Verifiable requirements	Req 2.1.2 "earliest possible point" - change it to something exakt, like maximum time after installation or when X, X & X are in place. 6.5.1.1-4 Not verifiable. 6.5.7.1 - what inputs? 6.5.10.1 - "easy to install". hard to verify. for instance, change to a specific time or that any person with or without technical experience should be able to install.
4	Purpose of each requirement	Missing in some parts. Exists in Functional Requirements, Design req, exists kind of in Quality Req & Data req (Need clarification).
3	Examples of ways to meet requirement	Missing in almost all. Exists in Functional Requirements & parts of data req.
3	Text explanation of diagrams	Exists to context diagram. Missing: Both Sequence Diagrams & quper model (only short figure text, clarify by explaining the figure in text as well)
4	Importance and priorities	Missing.
0	No duplication of information	No major or specific duplication.
	Are the following subjects covered sufficiently	
5	CRUD	See CRUD matrix.
4	All events handled by task or function	Yes, but no task for specifically history viewing but it exists as a requirement.
0	Task data specified	Yes. Purpose, Trigger/Precondition, Frequency & Example Solution to all tasks.
	Does the SRS contain reviews for the following topics	
1	Reviewed by developer and customer	Missing.
2	Goals and critical issues covered	No critical issues but system goals labeled business goals are included and looks great.
4	Requirements justified	Yeah somewhat using the tasks.
3	Risk assessment	Missing.
2	High-risk areas improved	Missing.
	Does the SRS discuss these tests	
3	Prototype test	There is no test of the prototype, there is one screen however in the task section and gives a good picture of the system.

CRUD check

Task: \ **Entity:** \	Farmer	Field coordinates	Crop data	Crop health model	Severity classification	Area owned by user
Task 1.1 Receive satellite data				U		
Task 2.1 Analyse data and train AI		U				
Task 2.2 Anomaly Classification					U	
Task 3.1 Alert the farmer of anomaly						
Task 3.2 Data visualization to the user				R	R	R
Task 4.1 Deliver Farmer Data to Vultus Engine	R	R	R			
Missing?	C U D	C D	C U D	C D	C D	C U D

Figure 1: CRUD-matrix.

As can be seen in Figure 1, the CRUD matrix reveals a lot of missing operations in the system. There is nowhere stated how any data is going to be created and deleted. Also for some of them, it is not stated how they are going to be updated.

Conclusion: Many functionalities for the entities are missing which means that there are a lot of basic tasks that should be added in order to have a complete specification. Or, if this is intended because it has been deprioritized or because it is considered to be out of scope, that should be specified somewhere. Without addressing these problems, the developers that are going to implement the requirement specification can’t know the precise intention of the writer and can therefore make a product that does not conform to what should have been produced.

Ad Hoc reading

During the reading, some additional suggestions for improvement came up. These are listed below:

- 3.2 Scope of Requirements Specification - put the main goal earlier in the section, to make it easier for the reader to understand the context.
- Task 2.2 Anomaly Classification:
  An anomaly should be able to be classified in 2 ways. Firstly, it should be able to tell if a part of the farmland has en anomaly. Secondly, it should also be able to determine the severity of the anomaly.
  Isn't the size of the anomaly a parameter for the severity?
- Tips: Use *shall i*nstead of *should* in the requirements.
- Should there maybe be some requirements that covers the functionality to send text messages and emails?
- Task 3.2 Data visualization to the user, Purpose: Do you mean severity when writing properties?
- 3.2.1 - Cross-reference here to 3.2.1.
- Task 4.1 Deliver Farmer Data to Vultus Engine, Purpose: *Deliver Farmer Related Data.*
  Replace Farmer related data to Farm Data.
  The FMS has information about each specific farmer. This can be used to increase the AI's accuracy
  Farmer or Farm? Can the farmer's user data impact the AI model for anomaly?
- 6.3.1 Farmer Checks Anomaly History, Event Flow:
  (b) No data for the given time frame is available.
  Shall the system send a message to the user?
- There are some minor mistakes in the text that you surely will see, when reading through it.
- Comment in quality grid "Nice to have" could be changed to something more formal.

Note that these improvement suggestions are not as critical as the ones in the checklist and CRUD matrix.