



# UNIVERSIDAD DE GUADALAJARA

## CENTRO UNIVERSITARIO DE LOS VALLES

### **Project Change Requests Control**

---

### **System for the Inspection of a Photovoltaic Park with Aerial Images in High Definition and Thermal**

---

**Professor: Phd. Omar Ali Zatarain Durán**

**Author: Raúl Rubén Romero López**

**CRC-SIPaF-V1.1**

September 20, 2022

Ameca, Jalisco

---

## Proposed Change Requests

---

Change Request ID	Requestor	Date	Status
CR-01	Omar Ali Zatarain Durán	09/09/2022	Analyzed
CR-02	Omar Ali Zatarain Durán	07/10/2022	Analyzed
CR-03	Omar Ali Zatarain Durán	07/10/2022	Analyzed
CR-04	Omar Ali Zatarain Durán	07/10/2022	Analyzed

---

## Authorized Change Requests

---

Change Request ID	Owner	Date	Status

## About this document

This document has all the requested changes of this project, as well as the policies for the implementation of a change request. Whether they have been approved or not, with the analysis and decision form. Here is where we can see why the project was approved or rejected. Each change request will have their change request ID, who requested it, the change request items, the description of the impact on every area with a SWOT table and the final decision explained.

## Policies

All system application changes regarding the baseline of the project should meet the next policies to ensure a correct control process for the changes proposed. They must be reviewed, authorized, tested, implemented and released base on the software configuration management plan.

1. The current baseline configuration of the system and its components shall be developed, documented and up to date.
2. Changes to the baseline should be authorized, documented and controlled by the use of a formal change control procedure.
3. The format for the proposed change request must be a detailed document explaining the change to the system, the reason for such change and who is asking for it.
4. The project owner must acknowledge the change request and document it in the change request document.
5. The project owner should share with all the members of the committee change board the change request.
6. The sum of the change request must not exceed 4 weeks of extra time for the project.
7. Every person on the committee board members should expose
8. Project owner should briefly present the CR at the beginning of the meeting with the committee board.
9. The members should make their own analysis, on a SWOT matrix based on their expertise and recommendations.
10. Only two people (1 researcher and a 1 developer) can be incorporated on the project.
11. The committee will vote about their approval or disapproval position regarding the CR, in case there is a tie in the votes, only the CEO can take the final decision.
12. The CEO must provide the rationale for the approval and disapproval of the CR.
13. The project owner should implement only the approved CRs.
14. If the require budget to implement a CR is greater than 10%, the client should pay the CR charge in order to fully approve the CR.
15. The CR must have a final decision in a maximum of no more than 3 days.

## CR Priorities Manifest

This is the part in which a standard for choosing the CRs that must be prioritized is going to be detailed. There would be a table created to determine which CRs can be implemented by getting the better scores.

- A. The CRs with less risks are going to be prioritized first.
- B. The CRs with more strengths are going to be prioritized first.
- C. CRs with more strengths than risks are going to be prioritized first.
- D. CRs without strengths or opportunities should be ranked after those who contain strengths and opportunities.
- E. For the qualitative part, a number of importance for the total of the strengths and opportunities should be given between 1 and 3 to have a normalized factor and the number should be considered as negative.
- F. For the qualitative part, a number of importance for the total of the weaknesses and threats should be given between 1 and 3 to have a normalized factor.
- G. The CR that implies using less of the budget money; the normalized factor number should be the budget percentage times 3.
- H. The CR that has less days of implementation.
- I. Beneficial factor added to the software in order to give a product with more capabilities to the client than the one already designed from minus 1 to minus 10 with minus 10 representing a beneficial change and to normalized it should be multiplied by 3.
- J. The number of persons needed; this would be multiplied by 5 to normalize the factor.
- K. The CR priority score with the lowest number should be considered as a priority.

## Change Request-01

Change Request ID	CR-01	Requestor	Omar Ali Zatarain Durán
Date	09/09/2022	Project Manager	Raúl Rubén Romero López

### Describe the Requested Change

Make the system analyze by sets the information gathered to have several orthomosaics and then perform a whole orthomosaic.

### Describe the Reason for the Request

Sometimes there would not be enough time or necessity to make the whole analysis in the photovoltaic plant, but whenever an orthomosaic is made, it should be able to merge with another orthomosaic created that is located in the same place.

INTERNAL FACTORS	
STRENGTHS (+)	WEAKNESSES (-)
<ol style="list-style-type: none"> <li>1. A clearer overview for the user over each section.</li> <li>2. Help separate the area of interest by sectors and display the information obtained.</li> <li>3. Make a faster process since different CPUs can make develop the process.</li> </ol>	<ol style="list-style-type: none"> <li>1. The software will take more time to perform a whole project.</li> <li>2. Have more parameters into consideration to perform the process.</li> <li>3. The machine should have more power consumption.</li> </ol>
EXTERNAL FACTORS	
OPPORTUNITIES (+)	THREATS (-)
<ol style="list-style-type: none"> <li>1. Have a software that can perform the analysis in different days and have a final product at the end that can be more attractive.</li> <li>2. Give a preview of a sector in less time that it will take to perform the whole orthomosaic.</li> <li>3. Include a template for a project in each area.</li> </ol>	<ol style="list-style-type: none"> <li>1. The maintenance of the code will be harder to modify.</li> <li>2. Tests will take more time to complete to assure quality, so we will need a 10% of the budget (\$35,000.00).</li> <li>3. Time required is expensive the rule we should not exceed 1 month.</li> <li>4. One more person should be hired because the team already has their own tasks assigned and will not have time to address the CR.</li> </ol>

### Risk Identification/Analysis

There are very good strengths added to the project that will make a more commercial and faster product. There are also great opportunities that will position the application as one with some specialized skills. As in weaknesses, there would be some extra time and expertise needed to learn how to use in full potential the software with the new CR. Also, the point that the maintenance, the tests, the money needed and another person needed to attend this request must put in the limit the risk of failure and should it be implemented, there must be a good control on this request.

Impact Analysis	
Configuration Items to be Modified (Impact)	Version Number
1. Code (Medium)	V 1.0
2. SRS document (Low)	V 1.2
3. Tests (High)	V 0.3
4. Schedule (Medium)	N/A
5. Budget (Medium)	N/A
Describe the impact of the suggested change to work that is already complete.	

CR Priority Score							
Budget %	CI Items	Days required	Strengths & Opportunities	Weaknesses & threads	Beneficial factor	Extra Personal	Priority Score
10*(3)	5*(2)	21	6*(-2)	7*(3)	7*(-3)	1*(5)	54
The numbers between parentheses are the ones considered as factors to normalize the parameters. The priority score indicates a number of priority for the CR. The CR with the highest level of priority is the one with the <b>smallest priority score</b> .							

Budget Impact			
New Deliverables Description	Pay description	Cost of New Deliverable	Percentage of budget
1. Make smaller orthomosaics.	Pay programmers.	\$20000	%5.7
2. Modify the tests made.	Redo tests.	\$15000	%4.3
Total cost is <b>\$35,000</b> , represents a <b>10%</b> of the budget.			

Decision
<input type="checkbox"/> Approved <input type="checkbox"/> Rejected <input type="checkbox"/> Approved with modifications
Comments

\_\_\_\_\_  
Approver's Printed Name

\_\_\_\_\_  
Date

\_\_\_\_\_  
Title

\_\_\_\_\_  
Signature

## Change Request-02

Change Request ID	CR-02	Requestor	Omar Ali Zatarain Durán
Date	07/10/2022	Project Manager	Raúl Rubén Romero López

### Describe the Requested Change

The client asks for a change regarding to manage several locations with solar panels and having more than 1 drone for servicing the locations. For this purpose, a drone should be programmed with different areas per flight. The flight schedule should be optimized based on:

- Drone battery usage
- Reduced time to cover a route
- Number of solar cells to be checked

### Describe the Reason for the Request

It is likely that the client wants to use different drones in an area to cover all the solar panels there. The change is to be able with the system to make a route taking in consideration there are different drones to cover all the area and it should be optimized depending on the battery of each drone, in an efficient flight and covering all the possible cells.

### INTERNAL FACTORS

#### STRENGTHS (+)

1. The system will help the client to make more efficient and faster flights using more than one drone.

#### WEAKNESSES (-)

1. The system would be more complex in order to make a complete analysis to make the routes for each drone.
2. The system can be made only for a specific brand of drone.

### EXTERNAL FACTORS

#### OPPORTUNITIES (+)

1. This will open the market to make systems that can make routes using different drones.

#### THREATS (-)

1. Each drone has its own battery life and commands in case they run low of battery.
2. The time to make learn about how to make the routes for each drone safely would be high.
3. The budget needed to make an investigation would be high and a person expert in that area would be need to be hired or paid to give us feedback.

### Risk Identification/Analysis

This has a high risk of failure and it is no too beneficial for the software. He can make different flights efficiently, but to coordinate different drones with different specifications would be too risky. Hiring a new person or paying someone to give us feedback is something to take into consideration. The time expend to learn and then implement this task plus the tests needed to say this system would perform in an appropriate way is also risky. Besides the budget is over the limit.



Impact Analysis	
Configuration Items to be Modified (Impact)	Version Number
1. Code (Too High)	V 1.0
2. SRS document (Medium)	V 1.2
3. Tests (Too High)	V 0.3
4. Schedule (High)	N/A
5. Budget (High)	N/A
Describe the impact of the suggested change to work that is already complete.	

CR Priority Score							
Budget %	CI Items	Days required	Strengths & Opportunities	Weaknesses & threads	Beneficial factor	Extra Personal	Priority Score
20*(3)	5*(2)	44	2*(-2)	5*(3)	6*(-3)	1*(5)	<b>112</b>
The numbers between parentheses are the ones considered as factors to normalize the parameters. The priority score indicates a number of priority for the CR. The CR with the highest level of priority is the one with the <b>smallest priority score</b> .							

Budget Impact			
New Deliverables Description	Pay description	Cost of New Deliverable	Percentage of budget
Make routes for more than one drone.	Pay programmers and experts.	\$50,000	14%
Assure the quality of the product.	Pay testers.	\$20,000	6%
Total cost is <b>\$70,000</b> , which represents a <b>20%</b> of all the budget.			

Decision	
<input type="checkbox"/> Approved	<input type="checkbox"/> Rejected
<input type="checkbox"/> Approved with modifications	
Comments	

\_\_\_\_\_  
Approver's Printed Name

\_\_\_\_\_  
Date

\_\_\_\_\_  
Title

\_\_\_\_\_  
Signature

## Change Request-03

Change Request ID	CR-03	Requestor	Omar Ali Zatarain Durán
Date	07/10/2022	Project Manager	Raúl Rubén Romero López

Describe the Requested Change
<p>The client informs to the project manager about a new mandatory law that requires that a report of drone use is submitted monthly, the report must contain:</p> <ul style="list-style-type: none"> <li>• Total flight hours</li> <li>• Places where the drone flighted</li> <li>• Purpose of the flights</li> </ul>

Describe the Reason for the Request
<p>There is a law that the client needs to give a report about the flying hours of the drone, places where the drone flew and the purposes of each flight. They must fulfill this requirement in order to be able to fly the drone.</p>

INTERNAL FACTORS	
STRENGTHS (+)	WEAKNESSES (-)
<ol style="list-style-type: none"> <li>1. Give feedback to the client about how much their drones were used.</li> </ol>	<ol style="list-style-type: none"> <li>1. Add another functionality to the system to save the flight hours, places and purpose of each flight.</li> </ol>
EXTERNAL FACTORS	
OPPORTUNITIES (+)	THREATS (-)
<ol style="list-style-type: none"> <li>1. Fulfill with a law.</li> <li>2. Help the client to generate the report automatically.</li> </ol>	<ol style="list-style-type: none"> <li>1. Not making it could impact the usefulness or harm the client if they don't make the report.</li> </ol>

Risk Identification/Analysis
<p>Based on what the client is asking and the analysis made, we can see there is a need to implement it and there is not much to do on each CI identified for this CR. The most important is that the budget is not compromised and the schedule is in time. The weight of the strengths is much more than the negative parts.</p>

Impact Analysis	
Configuration Items to be Modified	Version Number
1. Code (Low)	V 1.0
2. SRS document (Low)	V 1.2
3. Tests (Low)	V 0.3
4. Schedule (Low)	N/A
5. Budget (Low)	N/A
Describe the impact of the suggested change to work that is already complete.	

CR Priority Score							
Budget %	CI Items	Days required	Strengths & Opportunities	Weaknesses & threads	Beneficial factor	Extra Personal	Priority Score
1.5*(3)	5*(2)	5	3*(-3)	2*(1)	7*(-3)	0	<b>-8.5</b>
The numbers between parentheses are the ones considered as factors to normalize the parameters. The priority score indicates a number of priority for the CR. The CR with the highest level of priority is the one with the <b>smallest priority score</b> .							

Budget Impact			
New Deliverables Description	Pay description	Cost of New Deliverable	Percentage of budget
Monthly report with specifications of the drone.	Pay programmers extra hours to implement this CR and modified the CIs.	\$5,000	1.5%
The total cost is <b>\$5,000</b> , and the percentage of the budget is <b>1.5%</b> .			

Decision	
<input type="checkbox"/> Approved	<input type="checkbox"/> Rejected
<input type="checkbox"/> Approved with modifications	
Comments	

\_\_\_\_\_  
Approver's Printed Name

\_\_\_\_\_  
Date

\_\_\_\_\_  
Title

\_\_\_\_\_  
Signature

## Change Request-04

Change Request ID	CR-04	Requestor	Omar Ali Zatarain Durán
Date	07/10/2022	Project Manager	Raúl Rubén Romero López

Describe the Requested Change
The client requests that he desires a new feature that describes automatically the damage of a solar cell by a kind of imagery technique that tells if the solar cell should be replaced or it can be fixed instead.

Describe the Reason for the Request
The client wants to know what should they do base on the system analysis about the cells the system detects as damaged cells.

INTERNAL FACTORS	
STRENGTHS (+)	WEAKNESSES (-)
<ol style="list-style-type: none"> <li>1. The system will not only say which cell is damaged, but also it needs to describe how the cell is affecting the system.</li> <li>2. It will also be able to check if the system is affected.</li> </ol>	<ol style="list-style-type: none"> <li>1. The system should be interacting with the monitoring system to be able to make a correct decision.</li> <li>2. In order to give a correct solution, the electrical model should be taken into consideration.</li> <li>3. The system won't be flexible.</li> </ol>

EXTERNAL FACTORS	
OPPORTUNITIES (+)	THREATS (-)
<ol style="list-style-type: none"> <li>1. The system would be able to interact and get information from the electrical monitoring system.</li> <li>2. It would reduce the pay made to a person to check the panels' status and decide what to do.</li> <li>3. It will make the maintenance process faster for the client.</li> </ol>	<ol style="list-style-type: none"> <li>1. Maybe there is not a complete dataset to train the model.</li> <li>2. An expert should work in the project to be able to interact with the system.</li> <li>3. The time to add this can go up to 60 days more of work.</li> <li>4. The budget need would be of \$100,000.</li> <li>5. The tests to make the CR work would be expensive and time consuming.</li> <li>6. Another developer should be hired to be able to fulfill this CR.</li> </ol>

Risk Identification/Analysis
Based on the CIs and the impact this have against the strengths the CR would give the project, I vote against it. Time for the project goes well beyond budget and investigate if we can guarantee the client what they should do with each cell can be a very tough task. Besides, the money to implement it goes well beyond the budget contemplated. Another thing against is that we would need 2 more persons to accomplish this goal and finding the expert and have him available could cost some time.

Impact Analysis	
Configuration Items to be Modified	Version Number
1. Code (Medium)	V 1.0
2. SRS document (Medium)	V 1.2
3. Tests (Medium)	V 0.3
4. Schedule (Too High)	N/A
5. Budget (Too High)	N/A
Describe the impact of the suggested change to work that is already complete.	

CR Priority Score							
Budget %	CI Items	Days required	Strengths & Opportunities	Weaknesses & threads	Beneficial factor	Extra Personal	Priority Score
28*(3)	5*(2)	60	5*(-3)	8*(3)	10*(-3)	2*(5)	143
The numbers between parentheses are the ones considered as factors to normalize the parameters. The priority score indicates a number of priority for the CR. The CR with the highest level of priority is the one with the <b>smallest priority score</b> .							

Budget Impact			
New Deliverables Description	Pay description	Cost of New Deliverable	Percentage of budget
A description of what the client must do with each cell.	Add a developer, pay an expert for assistance with the other system,	\$70,000	20%
Give a quality product.	Pay the testers to develop more tests and validate them with the expert.	\$30,000	8%
The total cost is a \$100,000, that is a 28% of the total budget.			

Decision	
<input type="checkbox"/> Approved	<input type="checkbox"/> Rejected
<input type="checkbox"/> Approved with modifications	
Comments	

\_\_\_\_\_  
Approver's Printed Name

\_\_\_\_\_  
Date

\_\_\_\_\_  
Title

\_\_\_\_\_  
Signature

Change Request Form