

0.7

Wault Finance Process Quality Review

Score: 37%

Overview

This is a Process Quality Review of [Wault Finance](#) completed on May 13th 2021. It was performed using the Process Review process (version 0.7) and is documented [here](#). The review was performed by Nic of DeFiSafety. Check out our [Telegram](#).

The final score of the review is 37%, a Fail. The breakdown of the scoring is in [Scoring Appendix](#). For our purposes, a pass is 70%.

Summary of the Process

Very simply, the review looks for the following declarations from the developer's site. With these declarations, it is reasonable to trust the smart contracts.

- **Here are my smart contracts on the blockchain**
- **Here is the documentation that explains what my smart contracts do**
- **Here are the tests I ran to verify my smart contract**
- **Here are the audit(s) performed on my code by third party experts**
- **Here are the admin controls and strategies**

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Chain

This section indicates the blockchain used by this protocol.

 **Chain: Binance Smart Chain**

Guidance:
Ethereum
Binance

Code and Team

This section looks at the code deployed on the Mainnet that gets reviewed and its corresponding software repository. The document explaining these questions is [here](#). This review will answer the questions;

- 1) Are the executing code addresses readily available? (%)
- 2) Is the code actively being used? (%)
- 3) Is there a public software repository? (Y/N)
- 4) Is there a development history visible? (%)
- 5) Is the team public (not anonymous)? (Y/N)

1) Are the executing code addresses readily available? (%)

 Answer: 100%

They are available at website <https://docs.wault.finance/resources/transparency> as indicated in the [Appendix](#).

Guidance:

- | | |
|------|--|
| 100% | Clearly labelled and on website, docs or repo, quick to find |
| 70% | Clearly labelled and on website, docs or repo but takes a bit of looking |
| 40% | Addresses in mainnet.json, in discord or sub graph, etc |
| 20% | Address found but labelling not clear or easy to find |
| 0% | Executing addresses could not be found |

2) Is the code actively being used? (%)



Answer: 100%

Activity is around 90,000 transactions a day on contract *WexMaster.sol*, as indicated in the [Appendix](#).

Percentage Score Guidance

- | | |
|------|-----------------------------------|
| 100% | More than 10 transactions a day |
| 70% | More than 10 transactions a week |
| 40% | More than 10 transactions a month |
| 10% | Less than 10 transactions a month |
| 0% | No activity |

3) Is there a public software repository? (Y/N)



Answer: Yes

GitHub: <https://github.com/WaultFinance/WAULT>

Is there a public software repository with the code at a minimum, but normally test and scripts also (Y/N). Even if the repo was created just to hold the files and has just 1 transaction, it gets a Yes. For teams with private repos, this answer is No.

4) Is there a development history visible? (%)



Answer: 0%

With 10 commits and 1 branch, this is not a healthy repository.

This checks if the software repository demonstrates a strong steady history. This is normally demonstrated by commits, branches and releases in a software repository. A healthy history demonstrates a history of more than a month (at a minimum).

Guidance:

- | | |
|------|--|
| 100% | Any one of 100+ commits, 10+branches |
| 70% | Any one of 70+ commits, 7+branches |
| 50% | Any one of 50+ commits, 5+branches |
| 30% | Any one of 30+ commits, 3+branches |
| 0% | Less than 2 branches or less than 10 commits |

How to improve this score

Continue to test and perform other verification activities after deployment, including routine maintenance

updating to new releases of testing and deployment tools. A public development history indicates clearly to the public the level of continued investment and activity by the developers on the application. This gives a level of security and faith in the application.

5) Is the team public (not anonymous)? (Y/N)

 Answer: No

The team is not evidently public.

For a yes in this question the real names of some team members must be public on the website or other documentation. If the team is anonymous and then this question is a No.

Documentation

This section looks at the software documentation. The document explaining these questions is [here](#).

Required questions are;

- 6) Is there a whitepaper? (Y/N)
- 7) Are the basic software functions documented? (Y/N)
- 8) Does the software function documentation fully (100%) cover the deployed contracts? (%)
- 9) Are there sufficiently detailed comments for all functions within the deployed contract code (%)
- 10) Is it possible to trace from software documentation to the implementation in code (%)

6) Is there a whitepaper? (Y/N)

 Answer: Yes

Location: <https://docs.wault.finance/>

7) Are the basic software functions documented? (Y/N)

 Answer: No

There is no software function documentation evident.

How to improve this score

Write the document based on the deployed code. For guidance, refer to the [SecurEth System Description](#)

Document.

8) Does the software function documentation fully (100%) cover the deployed contracts? (%)

 Answer: 0%

There is no smart contract function documentation evident.

Guidance:

- 100% All contracts and functions documented
- 80% Only the major functions documented
- 79-1% Estimate of the level of software documentation
- 0% No software documentation

How to improve this score

This score can improve by adding content to the requirements document such that it comprehensively covers the requirements. For guidance, refer to the [SecurEth System Description Document](#). Using tools that aid traceability detection will help.

9) Are there sufficiently detailed comments for all functions within the deployed contract code (%)

 Answer: 100%

Code examples are in the [Appendix](#). As per the [SLOC](#), there is 101% commenting to code (CtC).

The Comments to Code (CtC) ratio is the primary metric for this score.

Guidance:

- 100% CtC > 100 Useful comments consistently on all code
- 90-70% CtC > 70 Useful comment on most code
- 60-20% CtC > 20 Some useful commenting
- 0% CtC < 20 No useful commenting

How to improve this score

This score can improve by adding comments to the deployed code such that it comprehensively covers the code. For guidance, refer to the [SecurEth Software Requirements](#).

10) Is it possible to trace from software documentation to the implementation in code (%)

 Answer: 0%

There is no evident software function documentation.

Guidance:

- 100% Clear explicit traceability between code and documentation at a requirement level for all code
- 60% Clear association between code and documents via non explicit traceability
- 40% Documentation lists all the functions and describes their functions
- 0% No connection between documentation and code

How to improve this score

This score can improve by adding traceability from requirements to code such that it is clear where each requirement is coded. For reference, check the SecurEth guidelines on [traceability](#).

Testing

This section looks at the software testing available. It is explained in this [document](#). This section answers the following questions;

- 11) Full test suite (Covers all the deployed code) (%)
- 12) Code coverage (Covers all the deployed lines of code, or explains misses) (%)
- 13) Scripts and instructions to run the tests (Y/N)
- 14) Report of the results (%)
- 15) Formal Verification test done (%)
- 16) Stress Testing environment (%)

11) Is there a Full test suite? (%)

 Answer: 0%

No testing suite in the software repository.

This score is guided by the Test to Code ratio (TtC). Generally a good test to code ratio is over 100%. However the reviewers best judgement is the final deciding factor.

Guidance:

- 100% TtC > 120% Both unit and system test visible
- 80% TtC > 80% Both unit and system test visible
- 40% TtC < 80% Some tests visible
- 0% No tests obvious

How to improve this score

This score can improve by adding tests to fully cover the code. Document what is covered by traceability or test results in the software repository.

12) Code coverage (Covers all the deployed lines of code, or explains misses) (%)

 Answer: 0%

There is no evident test for coverage available.

Guidance:

- 100% Documented full coverage
- 99-51% Value of test coverage from documented results
- 50% No indication of code coverage but clearly there is a reasonably complete set of tests
- 30% Some tests evident but not complete
- 0% No test for coverage seen

How to improve this score

This score can improve by adding tests achieving full code coverage. A clear report and scripts in the software repository will guarantee a high score.

13) Scripts and instructions to run the tests (Y/N)

 Answer: Yes

Instructions available at <https://github.com/WaultFinance/WAULT>

How to improve this score

Add the scripts to the repository and ensure they work. Ask an outsider to create the environment and run the tests. Improve the scripts and docs based on their feedback.

14) Report of the results (%)

 Answer: 0%

No test report was found.

Guidance:

- 100% Detailed test report as described below
- 70% GitHub Code coverage report visible
- 0% No test report evident

How to improve this score

Add a report with the results. The test scripts should generate the report or elements of it.

15) Formal Verification test done (%)

 Answer: 0%

No formal verification results appeared in web searches.

16) Stress Testing environment (%)

 Answer: 0%

No stress testing smart contract addresses were found.

Security

This section looks at the 3rd party software audits done. It is explained in this [document](#). This section answers the following questions:

- 17) Did 3rd Party audits take place? (%)
- 18) Is the bounty value acceptably high?

17) Did 3rd Party audits take place? (%)

 Answer: 70%

[Multiple audits were performed on Wault Finance](#). All were done post-launch. The overall quality of the audits is consistently low. This is a complex financial protocol. At no time is the finance eco-system that this protocol works in considered. No words on security from actual attack vectors (except re-entrancy)

Wault Finance was launched Feb. 2nd 2021.

Guidance:

- 100% Multiple Audits performed before deployment and results public and implemented or not required
- 90% Single audit performed before deployment and results public and implemented or not required
- 70% Audit(s) performed after deployment and no changes required. Audit report is public
- 20% No audit performed

- 0% Audit Performed after deployment, existence is public, report is not public and no improvements deployed OR smart contract address' not found, question

18) Is the bounty value acceptably high (%)

 Answer: 20%

There is a bug bounty program at: <https://vaultfinance.medium.com/bug-bounty-program-d52418b524d8>

Guidance:

- 100% Bounty is 10% TVL or at least \$1M AND active program (see below)
- 90% Bounty is 5% TVL or at least 500k AND active program
- 80% Bounty is 5% TVL or at least 500k
- 70% Bounty is 100k or over AND active program
- 50% Bounty is 100k or over
- 40% Bounty is 50k or over
- 20% Bug bounty program bounty is less than 50k
- 0% No bug bounty program offered

Active program means a third party actively driving hackers to the site. Inactive program would be static mention on the docs.

Access Controls

This section covers the documentation of special access controls for a DeFi protocol. The admin access controls are the contracts that allow updating contracts or coefficients in the protocol. Since these contracts can allow the protocol admins to "change the rules", complete disclosure of capabilities is vital for user's transparency. It is explained in this [document](#). The questions this section asks are as follow;

- 19) Can a user clearly and quickly find the status of the admin controls?
- 20) Is the information clear and complete?
- 21) Is the information in non-technical terms that pertain to the investments?
- 22) Is there Pause Control documentation including records of tests?

19) Can a user clearly and quickly find the status of the admin controls (%)

 Answer: 0%

There is no evident admin controls explained anywhere in their documentation.

Guidance:

- 100% Clearly labelled and on website, docs or repo, quick to find
- 70% Clearly labelled and on website, docs or repo but takes a bit of looking

- 40% Access control docs in multiple places and not well labelled
- 20% Access control docs in multiple places and not labelled
- 0% Admin Control information could not be found

20) Is the information clear and complete (%)

 Answer: 0%

There is no evident admin control information explained anywhere in their documentation

Guidance:

All the contracts are immutable -- 100% OR

All contracts are clearly labelled as upgradeable (or not) -- 30% AND

The type of ownership is clearly indicated (OnlyOwner / MultiSig / Defined Roles) -- 30% AND

The capabilities for change in the contracts are described -- 30%

How to improve this score

Create a document that covers the items described above. An [example](#) is enclosed.

21) Is the information in non-technical terms that pertain to the investments (%)

 Answer: 0%

Guidance:

100% All the contracts are immutable

90% Description relates to investments safety and updates in clear, complete non-software I language

30% Description all in software specific language

0% No admin control information could not be found

How to improve this score

Create a document that covers the items described above in plain language that investors can understand. An [example](#) is enclosed.

22) Is there Pause Control documentation including records of tests (%)

 Answer: 0%

Guidance:

100% All the contracts are immutable or no pause control needed and this is explained OR

- | | |
|------|---|
| 100% | Pause control(s) are clearly documented and there is records of at least one test within 3 months |
| 80% | Pause control(s) explained clearly but no evidence of regular tests |
| 40% | Pause controls mentioned with no detail on capability or tests |
| 0% | Pause control not documented or explained |

How to improve this score

Create a document that covers the items described above in plain language that investors can understand. An [example](#) is enclosed.

Appendices

Author Details

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I started with Ethereum just before the DAO and that was a wonderful education. It showed the importance of code quality. The second Parity hack also showed the importance of good process. Here my aviation background offers some value. Aerospace knows how to make reliable code using quality processes.

I was coaxed to go to EthDenver 2018 and there I started [SecuEth.org](#) with Bryant and Roman. We created guidelines on good processes for blockchain code development. We got [EthFoundation funding](#) to assist in their development.

Process Quality Reviews are an extension of the SecurEth guidelines that will further increase the quality processes in Solidity and Vyper development.

DeFiSafety is my full time gig and we are working on funding vehicles for a permanent staff.

Scoring Appendix

PQ Audit Scoring Matrix (v0.7)	Total	Vault Finance	
	Points	Answer	Points
Code and Team	Total	260	96
1) Are the executing code addresses readily available? (%)	20	100%	20
2) Is the code actively being used? (%)	5	100%	5
3) Is there a public software repository? (Y/N)	5	y	5
4) Is there a development history visible? (%)	5	0%	0
5) Is the team public (not anonymous)? (Y/N)	15	N	0
Code Documentation			
6) Is there a whitepaper? (Y/N)	5	y	5
7) Are the basic software functions documented? (Y/N)	10	N	0
8) Does the software function documentation fully (100%) cover the deployed contracts? (%)	15	0%	0
9) Are there sufficiently detailed comments for all functions within the deployed contract code (%)	5	100%	5
10) Is it possible to trace from software documentation to the implementation in code (%)	10	0%	0
Testing			
11) Full test suite (Covers all the deployed code) (%)	20	0%	0

12) Code coverage (Covers all the deployed lines of code, or explains misses) (%)	5	0%	0
13) Scripts and instructions to run the tests? (Y/N)	5	Y	5
14) Report of the results (%)	10	0%	0
15) Formal Verification test done (%)	5	0%	0
16) Stress Testing environment (%)	5	0%	0
Security			
17) Did 3rd Party audits take place? (%)	70	70%	49
18) Is the bug bounty acceptable high? (%)	10	20%	2
Access Controls			
19) Can a user clearly and quickly find the status of the admin controls	5	0%	0
20) Is the information clear and complete	10	0%	0
21) Is the information in non-technical terms	10	0%	0
22) Is there Pause Control documentation including records of tests	10	0%	0
Section Scoring			
Code and Team	50	60%	
Documentation	45	22%	
Testing	50	10%	
Security	80	64%	
Access Controls	35	0%	
Audit Number		107	
Date		18-May-21	
Private Repo		N	
Version		0.5	

Executing Code Appendix

WEX Token: <https://bscscan.com/address/0xa9c41a46a6b3531d28d5c32f6633dd2ff05dfb90>

WEX Master: <https://bscscan.com/address/0x22fB2663C7ca71Adc2cc99481C77Aaf21E152e2D>

WAULTx Token: <https://bscscan.com/address/0xb64e638e60d154b43f660a6bf8fd8a3b249a6a21>

WAULTx Staking: <https://bscscan.com/address/0x06747f6501611bae9dd054ccc37ad076e9ea2465>

Locker V1: <https://bscscan.com/address/0xf0638da3da171afe58d8b201c6cf204ed8e30bd8#code>

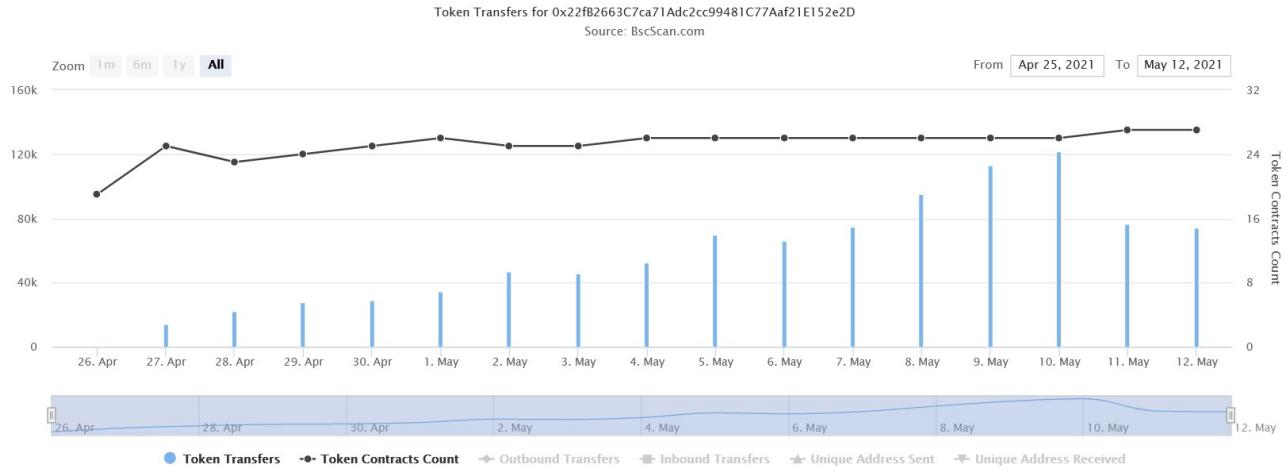
Locker V2: <https://bscscan.com/address/0xFf45135267Bb266F93eb55b1215353b7f6EfA94E>

LaunchPad: <https://bscscan.com/address/0x5c87186232abe591fa6536b436b5620083c2c12d>

Cake Vault: <https://bscscan.com/address/0x171a5efefd1af5f56bb2d6854cc63063d04b3f63>

Cake Vault Strategy: <https://bscscan.com/address/0xe2e400df93f313ff7c5b21da4a9c4dcf88431139#code>

Code Used Appendix



Example Code Appendix

```

1 // SPDX-License-Identifier: MIT
2
3 pragma solidity >=0.6.0 <0.8.0;
4
5 /*
6  * @dev Provides information about the current execution context, including the
7  * sender of the transaction and its data. While these are generally available
8  * via msg.sender and msg.data, they should not be accessed in such a direct
9  * manner, since when dealing with GSN meta-transactions the account sending and
10 * paying for execution may not be the actual sender (as far as an application
11 * is concerned).
12 *
13 * This contract is only required for intermediate, library-like contracts.
14 */
15 abstract contract Context {
16     function _msgSender() internal view virtual returns (address payable) {
17         return msg.sender;
18     }
19
20     function _msgData() internal view virtual returns (bytes memory) {
21         this; // silence state mutability warning without generating bytecode - see https://
22         return msg.data;
23     }
24 }
25
26 /**
27 * @dev Interface of the ERC20 standard as defined in the EIP.
28 */
29 interface IERC20 {
30     /**
31      * @dev Returns the amount of tokens in existence.
32      */
33     function totalSupply() external view returns (uint256);
34 }
```

```

35  /**
36   * @dev Returns the amount of tokens owned by `account`.
37   */
38  function balanceOf(address account) external view returns (uint256);
39
40  /**
41   * @dev Moves `amount` tokens from the caller's account to `recipient`.
42   *
43   * Returns a boolean value indicating whether the operation succeeded.
44   *
45   * Emits a {Transfer} event.
46   */
47  function transfer(address recipient, uint256 amount) external returns (bool);
48
49  /**
50   * @dev Returns the remaining number of tokens that `spender` will be
51   * allowed to spend on behalf of `owner` through {transferFrom}. This is
52   * zero by default.
53   *
54   * This value changes when {approve} or {transferFrom} are called.
55   */
56  function allowance(address owner, address spender) external view returns (uint256);
57

```

SLOC Appendix

Solidity Contracts

Language	Files	Lines	Blanks	Comments	Code	Complex
Solidity	10	5300	568	2379	2353	262

Comments to Code 2379/2353 = 101%