

Roadmap: TruCol

A decentralised collaboration protocol for test-driven development

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1 Introduction

This document presents the roadmap for the TruCol company as well as the estimated costs of the accompanying human labour and other posts. The objective of this document is to provide some basic insight into the order of magnitude of the costs of developing a sustainable variant of the TruCol company such that it is able to generate returns for its potential investors.

Section B specifies the assumptions, section 2.1 describes how the costs are estimated, section 3 presents the projected basic planning and briefly details what each activity in the Gantt chart represents. A summary of the estimated total investment costs is given in ???. Section 6 provides some nuance on the accuracy of the estimates, and section 7 summarises the body of information in this document.

2 Cost Model

This section describes the expected costs to bring the TruCol company to an operational break-even. These costs are described in the form of a cost model, that is described in section 2.1 and the model parameters are given in section 2.2. The mathematical model specification and assumptions are located in the appendices at section A and section B respectively.

2.1 Description

The total costs are computed based on the following 4 factors:

- The cumulative amount of human labour hours that are planned to be executed, multiplied with their respective hourly wage costs.
- Bounty subsidisation to attract new users.
- Buffer costs to generate wide-spread adoption of the TruCol protocol.
- Daily operational costs, e.g. electricity, company phone usage, travel etc.

For the mathematical specification of this model, see section A. For the Python code of this model, one can check: <https://github.com/TruCol/Roadmap/tree/main/src>.

2.2 Model Parameters

Table 1: Cost Model Parameters in €(/hr or absolute, unless specified otherwise)

Parameter	Value
blockchain dev	76
front end dev	41
human resources	36
bounty subsidising	100000
buffer	100000
daily operational costs	200
days to operational break-even	270
labour costs	479600
total cost	733600
non labour costs	254000

For a motivation for these values, see section B

3 Planning

This section visually presents the planning in the form of a Gantt chart in fig. 1. The description of this Gantt chart is included in section 3.1.

3.1 Gantt Chart Description

The description of the activities in fig. 1 can be given as:

3.2 Decentralised Technology Development

- **Develop protocol** - The programming work and documentation work that is required to render the TruCol protocol to a mature and robust state.
- **On-chain: Solidity+VRF** - Finalisation of the Solidity to Solidity implementation of the TruCol protocol implementation that leverages Chainlinks Verifiable Random function (VRF).
- **Git integration: Tellor** - Providing a lower-cost option to the users whilst allowing the user to apply the TruCol protocol in practically any programming language using Tellor oracles that query Git repository content and (build) status.
- **Git integration: Chainlink** - Same as the Tellor option, except using Chainlinks oracles.
- **Alternative Chains** - Implementing the TruCol protocol in alternative chains to facilitate easy use for the users whilst possibly lowering costs and/or modulating the desired levels of decentralisation
- **(Decentralised) Continuous Integration** - Realizing a mature implementation in which the oracles can verify the build status (whether the tests in the smart contract actually passed or not) in a robust fashion. Ideally implementing support for decentralised CIs.
- **Security & Robustness** - A security audit of the TruCol protocol implementations.

3.3 Platform Development

- **Platform & Ecosystem** - Development of the online platform that provides a convenient place for users to use-, discuss- and learn about the TruCol protocol and its various implementations.
- **Website** - Completion of the company website.
- **API** - Application programming interface that allows users to submit contracts using the command line interface (CLI).
- **GUI** - Graphical user interface, that makes it easy and intuitive for new users to start using the TruCol protocol for their applications.
- **Forum** - Environment a-la stack-overflow that cultivates a knowledge base around the use of the TruCol protocol.
- **Marketing platform** - Development of the approach to realise wide-spread adoption of the TruCol ecosystem.
- **Subsidize bounties** - Subsidisation of bounties to attract new users to the platform.
- **Platform Planning Buffer** - A buffer accounting for unknown unknowns/unexpected delays.

3.4 Business Development

- **Launch company** - The administrative and non-technical aspects of growing the TruCol company.
- **Qualitative partner research** - An analysis to identify relevant partners in the growth of our company.
- **Establish Organisation** - organisational aspects of growing the company, with "Auditing, Hiring, Administration, Legal & Financial tasks as its respective subset".
- **Marketing** - Development of the approach to realise wide-spread adoption of the TruCol protocol whilst realising a steady stream of new customers.
- **Organisation Planning Buffer** - A buffer accounting for unknown unknowns/unexpected delays.

3.5 Gantt

Figure 1 contains the Gantt chart that is generated to plan the development of the TruCol company. One can observe that several of the development-activities can be performed in parallel, these are accordingly stacked vertically. Dependencies of outputs of activities imply a "stairway" pattern in the Gantt chart.

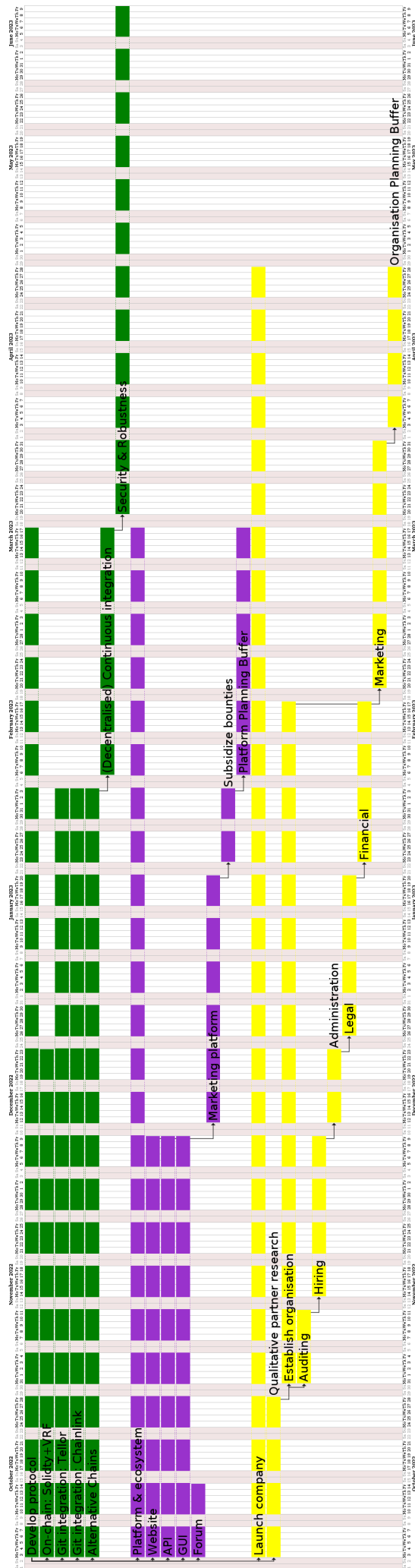


Figure 1: Gantt chart that is generated to plan the development of the TruCol company. (Source code in appendices, and on [github.com/trucol](https://github.com/trucol/trucol)/Roadmap).

4 Total Cost Estimate

After multiplying the amount of labour hours with their respective hourly labour costs, a total estimated labour costs of €733600, – is generated.

Table 2: Total Expected Investment Costs

Description	Cost [€]
Develop protocol	255360
Platform & ecosystem	114800
Launch company	109440
Bounty Subsidising	100000
Buffer	100000
Operational Costs	54000

5 Sensitivity Analysis & Monte Carlo Simulation

Omitted due to time constraints.

6 Discussion

The hourly wage estimates for the senior decentralised technology development, platform development and business estimates could be refined by using databases of competitive salaries for the respective tasks/work. Furthermore, a refinement of the duration estimates is proposed at the moment the tasks are started, as we expect more relevant information will be available at those times. In addition, external resources should be addressed to check whether any (critical) components are omitted in this Gantt planning.

7 Conclusion

This document presents the planning to develop the healthy TruCol company within the timeframe of roughly 9 months, and documents the assumptions and methods used to generate this planning. The main tasks in this planning are composed of decentralised technology development, TruCol platform development and business development. A total labour cost of roughly €479600 is estimated, and another €254000 is estimated for bounty subsidisation and as a buffer.

At the end of this planning, the TruCol company is expected to sustainably operate, generating ROI. Our aim is to gradually increase the cultivation of the diversification potential of the TruCol protocol at this point, whilst starting to develop a strategy to develop our own in-house automation/AI-engine based on the dataset that we continuously grow.

A Cost Model Specification

The costs until TruCol is expected to be operationally break-even (OBE) are estimated using eq. (1):

$$costs_{OBE} = labour + bounty\ subsidisation + buffer \quad (1)$$

The 3 right hand terms are specified in section A.1 to section A.3.

A.1 Labour Cost Specification

The labour costs are mathematically described in Equation (2) and computed automatically in the Gantt chart creation using Python. They are specified as the sum of the labour costs of all workers i . The labour costs of a worker i is defined as the amount of hours worked by worker i , multiplied with the labour costs of the worker i :

$$labour = \sum_{day=1}^{day=OBE} \sum_{worker=1}^{worker=n(day)} hrs(worker, day) \cdot wage(worker) \quad (2)$$

With:

- $labour[€]$: The total expected labour cost to reach operational break-even (OBE).
- $worker[-]$: The index representing a TruCol employee.
- $n(day)[workers]$: The number of workers at TruCol on day day .
- $OBE[day]$: The index of the day on which TruCol reaches operational break-even (OBE).
- $hrs(worker, day)[hours]$: The number of hours that TruCol employee $worker$ has worked on day day .
- $wage(worker)[€]$: The hourly labour costs of a specific TruCol employee $worker$. For simplicity, the hourly labour costs of a TruCol employee are taken as the average hourly cost of that worker, over a time of 1 year.

A.2 Bounty Subsidisation Cost Specification

The bounty subsidisation costs up to OBE, are estimated as:

$$bounty\ subsidisation = €100.000 \quad (3)$$

This cost is estimated with the aim of subsidising 2 to 20 companies. This range has 1 order of magnitude as range to accomodate different strategies. Either one can focus on 1 or 2 leading companies and motivate them to try the TruCol protocol. After these companies have used the protocol, work can be performed to ensure the rest of the market follows, based on the competitive advantages experiences by these 2 leading companies. Otherwise, multiple smaller companies may be motivated to use the TruCol protocol to generate a larger degree of interaction and engagement with the protocol.

A.3 Buffer Cost Specification

The buffer costs up to OBE, are estimated as:

$$buffer = €100.000 \quad (4)$$

This is to overcome known unknowns and possibly unknown unknown occurrences.

B Assumptions

B.1 Decentralisation Developer Wages

The hourly wage of the developers working on decentralised technology is based on a mixture of ± 3 junior developers working at €100.000,- per year, and 2 senior developers working at €200.000,- per year. This yields an average developer cost of

$$\frac{3 \cdot 50 + 2 \cdot 100}{5} = \frac{350}{5} = €70, - \quad (5)$$

The datapoints used to come to this estimate are the promoted starting wages for Junior Developers/Engineers at Optiver in Amsterdam, Think-cell in Berlin, and a third Zurich company, which all ranged between 80 to 120k at the time of inspection (Around March 2021). No proper datapoint is used to estimate the salary of the senior developers. Previous experience in co-working with senior developers led to an estimate that their hourly contributions are at least twice as valuable as that of a junior developer. Another indicator for the doubling in wage between junior and senior dev may be the hear-say high demand in solidity/decentralisation developers.

The 70,- hourly wage is interpreted as €76, - per hour to be on the conservative side of estimates.

B.2 Website/Platform Wages

The website+API+GUI development is estimated at €41 per hour. This estimate is based on a reduced hourly wage of the junior decentralised technology developers (from €50, – to €40, –). Some of the development costs for these activities may be performed at a lower hourly cost price. However, the platform development work also contains UX design. And excellent UX design is quite costly, hence the average hourly wage for this estimate is kept at €41, –.

B.3 Business wages

The hourly wages for the business development side of our company is estimated at €36, – per hour. This estimate is based on a reduced hourly wage of the junior platform developers (from €40, – to €35, –).

B.4 Activity durations

The estimates for the durations of the activities for both decentralised technology development as well as ecosystem development are extrapolations of our experience in developing in these disciplines. The business development activities durations are based roughly on estimating what those activities entail and how long it would take to complete them.