TRUSTS
Trusted Secure Data Sharing Space

D5.11 "Performance evaluation and lessons learnt report II"

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TRUSTS

Trusted Secure Data Sharing Space

D5.11 “Performance evaluation and lessons learnt Report II”

Document Summary Information

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Glossary of terms and abbreviations used

Abbreviation / Term	Description
AI	Artificial Intelligence
AML	Anti-Money Laundering
EU	European Union
FR(s)	Functional Requirement(s)
GA	Grant Agreement (GA)
GDPR	General Data Protection Regulation
H2020	Horizon 2020
KPI(s)	Key Performance Indicator(s)
MVP	Minimum Viable Product
PSI	Private Set Intersection
SC	Scenario
TRM	AML Transaction Monitoring
TRUSTS	Trusted Secure Data Sharing Space
UAT	User Acceptance Test
UC(s)	Use Case(s)
UI	User Interface
UX	User Experience
WP	Work Package

Executive Summary

The purpose of this deliverable is to report on the lessons learnt from the TRUSTS trials executed during the TRUSTS Cycle 2 trials between February – September 2022.

D5.11 ‘Performance evaluation and lessons learnt report II’, includes an analysis and validation of each Use Case (UC) scenarios and Test Cases, as well as the end-users’ evaluation and findings.

The three TRUSTS business-oriented UCs during the second demonstration cycle validated the TRUSTS MVP v.2, v.3, v.4, while during the first demonstration cycle evaluated the MVP v.0 and MVP v.1:

- UC1: “Smart big data sharing and analytics for AML compliance”
- UC2: “Agile Marketing through Data Correlation”
- UC3: “The data acquisition to improve customer support services”

This deliverable is the second report per demonstration phase, containing a critical evaluation and findings from the pilots, lessons learnt, the degree the KPIs have been met and suggestions for improvements. D5.11 received input from the deliverables D5.5, D5.7 and D5.9, which provide:

- The description of the cycle 2 trials on the MVP v.2, MVP v.3 and MVP v.4 of the TRUSTS platform.
- Trials’ outcome and stakeholders’ evaluation.

The TRUSTS Cycle 2 lessons learnt arise by aggregating the lessons learnt of all UCs, providing valuable input to the TRUSTS platform development tasks. The outcomes of the Trials of all three UCs are also utilised to validate the Functional Requirements (FRs), analysed in deliverable D2.3.

Finally, the TRUSTS trials outcomes and the lessons learnt that are being reported in this document, were also reported in the third project annual report in deliverable D1.4.

1 Introduction

TRUSTS WP5 focused on demonstrating and validating the TRUSTS Platform through executing actual trials. The project goal was to create a trusted and secure platform, as well as privacy-aware analytics methods for sharing secure data or providing the ability to collaborate over private and sensitive data, while preserving the data privacy. TRUSTS also laid the groundwork for an ecosystem that enables the federation of independent data marketplaces.

The TRUSTS cycle 2 Trials were performed between February and September 2022 by the three TRUSTS business-oriented UCs. The deliverables D5.5, D5.7 and D5.9 reported on the trials of each UC respectively. They all referred to the trials’ methodology, the objectives of the trials, as well as the definition of the Test Cases for each UC. They also provided records of the Test Case results and demonstration material (e.g., screenshots, video) extracted from the trials.

D5.11 addresses the work done under WP5 and Task 5.3 ‘Performance evaluation and lessons learnt’. This information gathered from all three UCs is also analysed in the current report. Such analysis leads to a consolidated list of lessons learnt. The TRUSTS platform MVPs (MVPv.2, MVPv.3, MVPv.4) were evaluated for usability, functionality, performance, and business perspectives during the trials.

The main outcome of D5.11 is to provide recommendations for corrections and fine-tuning of both functional and non-functional capabilities of the TRUSTS platform as it moves towards its final version. It also provides input to D1.4 towards reporting the work done under WP5 and the outcome of TRUSTS trials during the last year of the project implementation.

1.1 Mapping Projects’ Outputs

The purpose of this section is to map TRUSTS Grant Agreement (GA) commitments, both within the formal Deliverable and Task description, against the project’s respective outputs and work performed.

Table 1: Adherence to TRUSTS GA Deliverable & Tasks Descriptions

TRUSTS Task		**Respective Document Chapter(s)**	**Justification**
T5.3 Performance evaluation and lessons learnt	*The purpose of this task, led by NOVA, can be briefly described from the following two aspects. First, the performance of each use case will be evaluated, particularly from the KPI perspective to illustrate how the TRUSTS platform capabilities can be leveraged for different applications in each use case. Secondly, according to the results received from each use case in every agile-based iteration, the task will provide requirements and suggestions to further improve both functional and non-functional capabilities of TRUSTS. This task will also provide and establish systematic*	*Section 2*	*In Section 2 the Trials deployment methodology is stated.*
		Section 3	*In Section 3 the performance during the Cycle 2 Trials of UC1, UC2 and UC3 is evaluated, by consolidating information from the Trials documentation (Test Case Forms and Stakeholders Questionnaires).*
		Section 4	*In section 4 the lessons learnt from the UCs results on the tested functionalities of the*

	feedback loops to WP3 and WP4 for continuous refinement. Results will be analysed both quantitatively and quantifiably. Conclusions and recommendations will be drawn including recommendations for further trial validations.		*TRUSTS platform are stated, with recommendations for the platform’s correction and fine-tuning*
		Section 5	*Section 5 presents the recommendations that arise from the lessons learnt in* order for the *TRUSTS platform to become an operational data asset marketplace*
TRUSTS Deliverable			
D5.11 ‘Performance evaluation and lessons learnt report II’ [M35] *Second report per demonstration phase, containing a critical evaluation and findings from the pilots, lessons learnt, the degree the KPIs have been met and suggestions for improvements.*			

1.2 Deliverable Overview and Report Structure

The aim of this deliverable is to report on the evaluation of the Cycle 2 field trials of the three TRUSTS UCs.

Section 2 outlines the methodology for such evaluation.

Section 3 contains the analysis of the results of each of the three TRUSTS UCs.

Section 4 compiles the results from the three UCs and presents the lessons learnt on the TRUSTS platform and the business evaluation, providing recommendations towards fine-tuning the platform’s performance, usability, and business sustainability.

Section 5 sums up the outcomes and the added value that each UC have come up with after the completion of the TRUSTS trials, highlighting whether the initial goals or KPIs of each UC have been met or not.

Finally, Section 6 states concluding remarks of the deliverable, while the ANNEX section shows a sample of the User Acceptance Tests (UAT) from the trials for the corresponding UC1, UC2 and UC3, respectively.

2 Trials deployment methodology

This section presents a consistent methodology that was defined to achieve comparability of the trials results and ease the lessons learnt analysis. The trials deployment methodology remained the same for cycle 2 of TRUSTS trials, as it was for cycle 1, as all UCs adopted this methodology which is highlighted below:

Step 1: Trials deployment announcement

- An official announcement of the TRUSTS platform availability is provided.
- Each UC should appoint a leader.

Step 2: Detailed UC infrastructure description

- Each UC describes the respective deployment structure.

Step 3: UC trial stakeholders’ definition

- Each UC defines the stakeholders that participate in the trials.
- All stakeholders prior to each trial sign a respective Inform & Consent form.
- Signed forms will be kept by the UC leader.

Step 4: Trials implementation

- The UC leader appoints a leader for each trial.
- The trial leader defines the Test Cases executed in each trial.
- The trial leader fills the trials registry.
- The trial leader safeguards that all necessary stakeholders participate in the trial, and they sign the Inform & Consent form.
- The trial leader fills the Test Case forms and uploads them to the respective folder.
- Evidence is provided for the performance of the trial e.g., video recording, photos, screenshots, etc. This evidence accompanies the Test Case forms.
- Following each trial, a Questionnaire is filled by each trial participant.

Thus, the results from each trial are included in the following documentation:

- The Test Case forms filled by the trial leader.
- The Questionnaire filled by each trial stakeholder.
- The supporting trials material e.g., photos, videos, etc.

The above information is analysed per UC and is reported in a consolidated manner for the whole project.

3 Cycle 2 trials results and evaluation

In the following section, the trials process, and trials results of the TRUSTS cycle 2 per TRUSTS UC is analysed.

TRUSTS cycle 2 trials:

- TRUSTS_UC1_Trials on MVP v2 duration: 16 February - 6 May 2022
- TRUSTS_UC1_Trials on MVP v3 duration: 16 June- 15 July 2022
- TRUSTS_UC1_Trials on MVP v4[1] duration: 18 July - 30 September 2022

3.1 UC1 Cycle 2 trials results

This section presents the findings of the evaluation, which are characterised by first discussing UC1's projected plan, as detailed in D5.3[2] submitted in parallel in November 2022, then discussing the overlaps of the test think-aloud, and finally summarising the experiences and lessons learnt by stakeholders in conducting the second cycle of UC1 trials using TRUSTS MVP v.2, v3 and v4.

Under the second cycle of the TRUSTS trials, which started in February 2022 and lasted until September 2022, UC1 conducted twenty-nine (29) trial sessions with the participation of fifty-seven (57) stakeholders. The trial sessions ended with the completion of sixty-six (66) questionnaires containing various suggestions for improvement of the project from a business and technical perspective. All trial sessions were screenshotted and are further explained and illustrated in the UC1 Deliverable 5.5[3] submitted in October 2022.

The key information on the executed UC1 trials is summarised in Table 2 below.

Table 2: TRUSTS Cycle 2 trials of UC1

UC1 trial sessions	UC1 stakeholders	UC1 participants	UC1 questionnaires
MVP v2			
09-03-2022	2	3	2
15-03-2022	2	3	3
21-03-2022	1	1	1
22-03-2022	3	4	3
30-03-2022	2	2	2
06-04-2022	3	2	3

[1] *MVP v4 was the final product handed over to WP5 for demonstration and evaluation.*
[2] *D5.3 ‘Pilot planning and operational management report III’’ submitted in November 2022: https://www.trusts-data.eu/wp-content/uploads/2022/12/TRUSTS_D5.3_Pilot-planning-and-operational-management-report-III_EBOS_301122_v1.0.pdf*
[3] *D5.5 ‘Actual field trials of Use Case 1 v2’ submitted in October 2022.*

UC1 trial sessions	UC1 stakeholders	UC1 participants	UC1 questionnaires
27-04-2022	2	2	2
27-04-2022	3	3	3
02-05-2022	3	2	3
MVP v3			
28-06-2022	1	1	1
05-07-2022	1	1	1
08-07-2022	2	2	2
13-07-2022	2	2	2
MVP v4			
26-07-2022	2	2	2
27-07-2022	2	2	3
29-07-2022	3	3	3
02-08-2022	2	2	3
03-08-2022	2	2	2
05-08-2022	1	1	1
08-08-2022	2	2	2
12-08-2022	2	2	3
17-08-2022	2	3	3
23-08-2022	2	2	2
23-08-2022	2	3	3
24-08-2022	1	2	2
26-08-2022	2	3	3
30-08-2022	2	3	2
31-08-2022	2	2	2
26-09-2022	1	2	2
Total:	**57**	**64**	**66**

3.1.1 High Level UC1 description

Following the conclusion of the first cycle of the TRUSTS trials, the UC1 scenarios were revised and adjusted to the platform's implementation advancement as well as the FRs finalised under WP2. The UC1 scenarios executed during the second cycle of the TRUSTS trials were categorised as:

UC1 platform-oriented scenarios:

1. Companies’ subscriptions.
2. Providers assets (applications/service/datasets) onboarding.
3. Assets (applications/service/datasets) search on catalogue.
4. End-user’s purchase of the adequate UC1 assets (Contract fulfilment).
5. End-users’ dataset onboarding/announcement.
6. Federation.

UC1 assets scenarios:

7. AML Screening service execution.
8. AML RiSC application execution.
9. AML Transaction Monitoring execution.

Nevertheless, following the results and progress of the previous trial cycle, UC1 focused on having a more populous platform to demonstrate the use of a platform by multiple participants. The need to demonstrate the ability of TRUSTS 's platforms to deal with data assets, collaborate and meet rigorous business requirements in a unified environment was a key objective for the second cycle of UC1 testing. This clearly assessed and demonstrated the operational platform's ability to support use efficiently and confidently by multiple parties to create a federated data ecosystem.

Therefore, during the second Cycle of the TRUSTS trials, UC1 evaluated the following:

- Companies’ subscription,
- Enrolment process,
- Assets (*two applications, two datasets, one service*) upload and catalogue search,
- Recommendation system,
- Contract fulfilment and billing,
- User Experience testing,
- Functional Testing (t*o ensure that users can use features and functionality without any issues*),
- System testing and unit testing,
- Performance and security testing,
- Device and platform testing (*able to handle the load and perform well even when usage spikes*),
- Federation,
- UC1 Assets (two applications and one service) usage/execution,

As with UC1, a more complex process like the commercial use of TRUSTS was conducted with a more populated platform with transactions between multiple parties for more accurate searches and transactions to demonstrate multi-party operation. Additionally, a commonly decided by the Consortium, continuous integration and continuous delivery approach was followed, considering the platform's development under WP3.

3.1.2 UC1 trials Test Cases results analysis

As mentioned above, at the time when this report was written, the TRUSTS platform implementation allowed all nine (9) UC1 scenarios to be tested and evaluated. For each scenario, several Test Cases

(Table 3: Number of UC1 Test Cases executed per scenario per trial session) were implemented, again with the restriction of the platform implementation. There was a total of twenty-nine (29) sessions of the Cycle 2 UC1 trials during this period and for each session, the number of Test Cases executed per Scenario are also shown in the following Table 3, concluding to a total number of a hundred and sixty (160) Test Cases executed under UC1 trails during the Second cycle of TRUSTS demonstration. The UC1 Test Cases acted as the starting point for the test execution and were followed during the execution of the TRUSTS trials. Annex V offers the UC1 Test Cases template followed.

Table 3: Number of UC1 Test Cases executed per scenario per trial session

Date of Trials	Number of Scenarios and Test Cases tested									
	SC1	SC2	SC3	SC4	SC5	SC6	SC7	SC8	SC9	**Total:**
26-07-2022	2	3	-	-	-	-	-	-	-	5
27-07-2022	2	2	1	2	-	-	-	-	-	7
29-07-2022	3	3	1	1	-	-	-	-	-	8
02-08-2022	1	5	-	-	-	-	-	-	-	6
03-08-2022	2	1	-	-	-	-	-	-	-	3
05-08-2022	1	13	-	-	-	-	-	-	-	14
08-08-2022	2	3	3	8	-	-	-	-	-	16
12-08-2022	2	3	3	3	-	-	1	1	1	14
17-08-2022	2	10	3	-	-	-	-	-	-	15
23-08-2022	1	1	1	-	-	-	-	-	-	3
23-08-2022	2	6	1	4	-	-	1	1	1	16
24-08-2022	1	2	1	2	-	-	1	1	-	8
26-08-2022	2	3	1	2	-	-	1	-	1	10
30-08-2022	1	2	2	2	-	-	1	1	1	10
31-08-2022	2	5	2	5	2	-	1	1	1	19
26-09-2022	1	1	-	-	-	1	1	1	1	5
Total:	**27**	**63**	**19**	**29**	**2**	**1**	**7**	**6**	**6**	**160**

The overall business and technical conclusions of the second cycle of UC1 Test Cases are listed in below Table 4.

Table 4: Business and Technical results of the Cycle 2 of UC1 Test Cases

Scenario	Title	Business results	Technical results
SC1	**Companies’ subscriptions.**	The overall design is attractive.	Straightforward onboarding process but quality and security checks are missing.
SC2	**Providers assets (applications/service/data sets) onboarding.**	Create awareness and inspire consumers to buy.	You can get a host of information in a single click, for a search of interested asset that lists all the information that you need

SC3	**Assets (applications/service/data sets) search on catalogue.**	A list of assets being offered for sale.	Recommendation showing both the owned assets and the possible interested ones. Should be tailored to each node.
SC4	**End-user’s purchase of the adequate UC1 assets (Contract fulfilment).**	The business scenario was impressive allowing two different companies from different sectors to exchange data in a privacy-preserving way.	Although more informative details might be coherent. An automated process would be preferable.
SC5	**End-users’ dataset onboarding/ announcement.**		Recommendation showing both the owned assets and the possible interested ones. Should be tailored to each node.
SC6	**Federation.**	Great ability and impressive scenario, of one marketplace to send data to another one.	Essential, the ability of different systems, devices, applications, or products to connect and communicate in a coordinated way, without effort from the end user.
SC7	**AML Screening service execution.**	Interested parties would be glad to have purchased this application. The tab ‘Download Main Files’ can be used to download the model, the training data, and some metadata. This information can be sold through the TRUSTS platform, and it is very beneficial.	Seamless application onboarding and consuming - Easy to follow steps. Well-structured UI and forms. Easy and comprehensive.
SC8	**AML RiSC application execution.**	Interested parties would be glad to have purchased this application.	Seamless application onboarding and consuming - Easy to follow steps. Well-structured UI and forms. Easy and comprehensive.
SC9	**AML Transaction Monitoring execution.**	Interested parties would be glad to have purchased this application.	Seamless application onboarding and consuming - Easy to follow steps

3.1.3 UC1 Stakeholders feedback questionnaires analysis

In addition to the Test Cases above, the UC1 trials participants were required to complete a feedback questionnaire (as described in D5.5) after each trial’s session to give feedback to the UC leader as well as to the TRUSTS project and the implementation team.

During the second cycle of trials for the demonstration of TRUSTS data marketplace platform, an updated, more UX specific feedback questionnaire was used to record the trials participant’s feedback. The questionnaire was stored online in the official repository of the TRUSTS project, and can be found here. A template of the TRUSTS Stakeholder Feedback Questionnaire used during the Second cycle of the TRUSTS trials can also be found in Annex IV.

The Questionnaire was structured to obtain from the users:

1. Consent;
2. Date of the trial;
3. Name of the organisation;
4. Sector specification;
5. Their role;
6. User interface evaluation;
7. Usability evaluation;
8. Overall feedback;
9. What did you like more;
10. What would you change;
11. If you would recommend this platform to friends/colleagues.

Screenshots of the Stakeholders Feedback Questionnaires are shown in the below Figure 1-Figure 7. Additionally, few of the overall comments were:

- The UI is nice and colourful, eye catchy and pleasant.
- The UI is good but needs fine-tuning.
- Some UI sections are not fully functional.
- The concept and the UI are the key attractive aspects of this platform, although there is room for improvement.
- It is easy to navigate.
- The options to add a service/dataset/application is quick and easy.
- It is much appreciated to be able to try and get a hand on experience with the TRUSTS platform.
- A wide array of data asset options between datasets, applications (on-premises installation), and services (direct access);
- The ensemble model developed for the UC1 assets looks promising.
- A bit complex, the flow is not easy, missing functionalities, non-functional pages, or section still under development, still not fully operational, i guess.
- Not an operational marketplace. Development-wise not ready yet. It needs attention. several errors appear and disrupting the flow and the Test Case goals were not met since not all scenarios of the trials could be executed. It is also slow and time consuming.

I understand what the study is about and my questions so far have been answered. I agree to take part in this trial

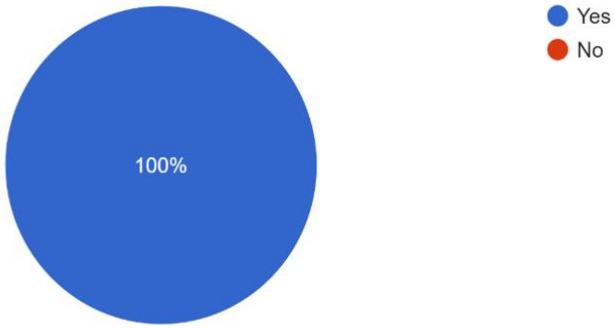


Figure 1: UC1 Stakeholders feedback questionnaire: Consent

Please specify your sector

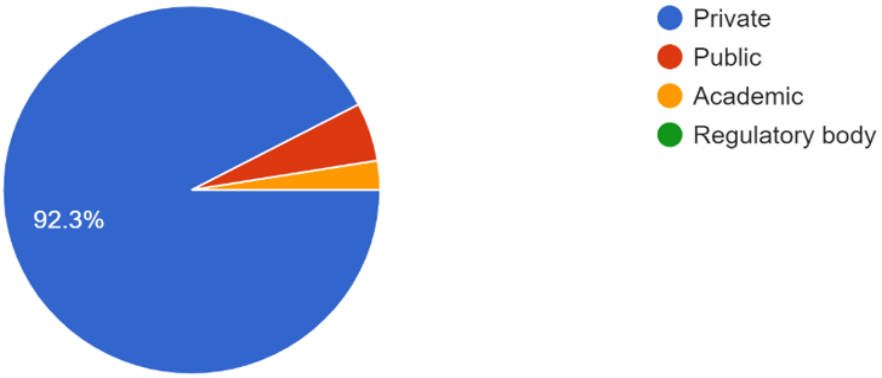


Figure 2: UC1 Stakeholders feedback questionnaire: Sector specification

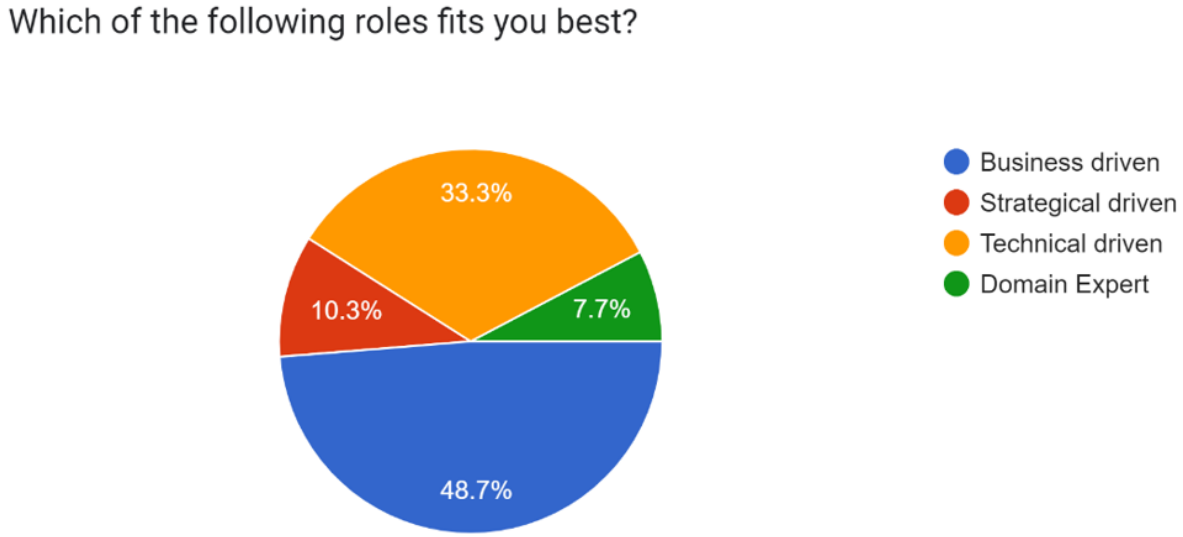


Figure 3: UC1 Stakeholders feedback questionnaire: Stakeholders role

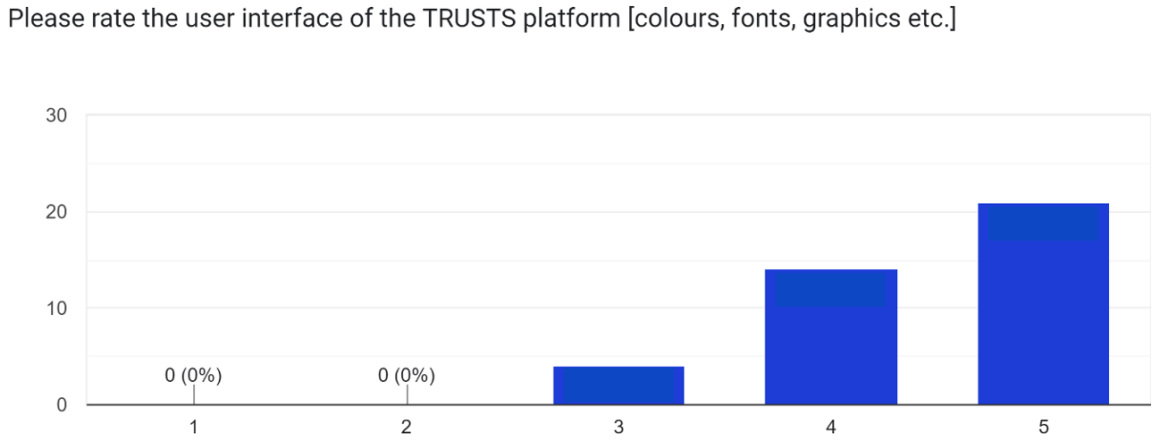


Figure 4: UC1 Stakeholders feedback questionnaire: UI evaluation

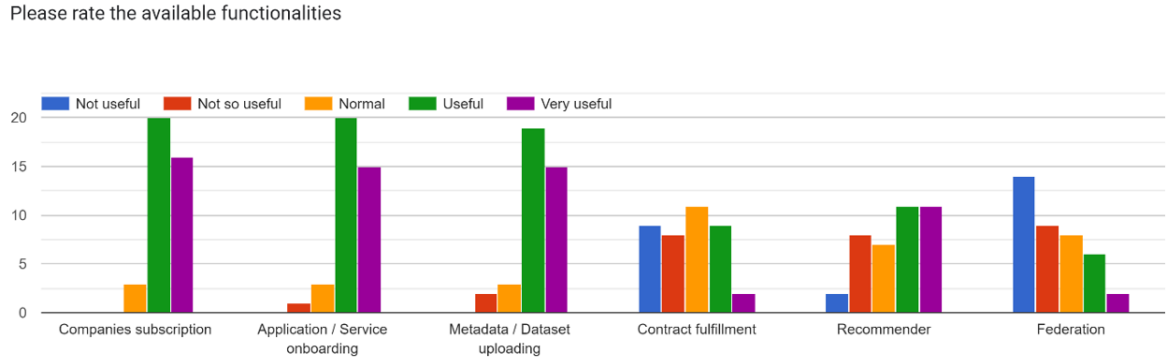


Figure 5: UC1 Stakeholders feedback questionnaire: Functionalities rating

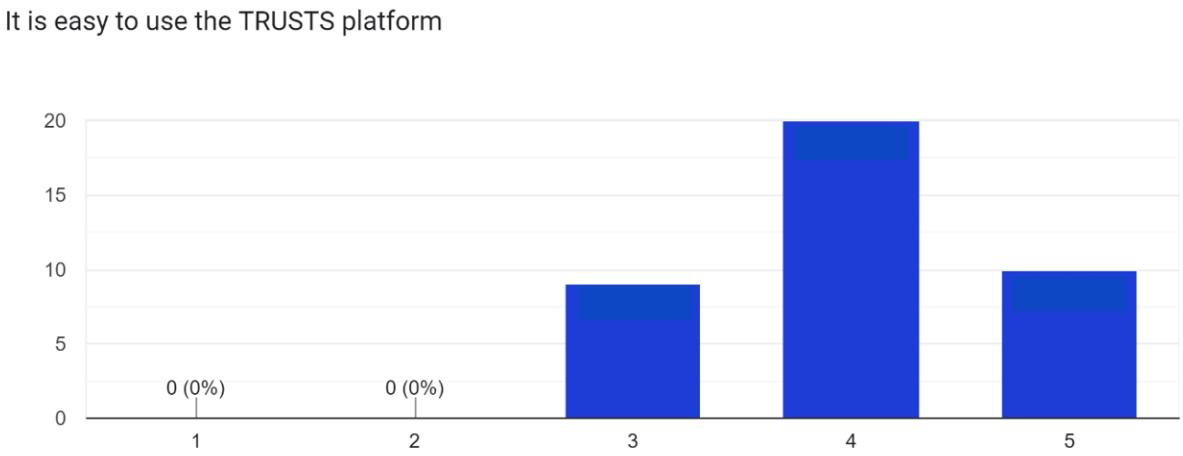


Figure 6: UC1 Stakeholders feedback questionnaire: easy to use TRUSTS platform

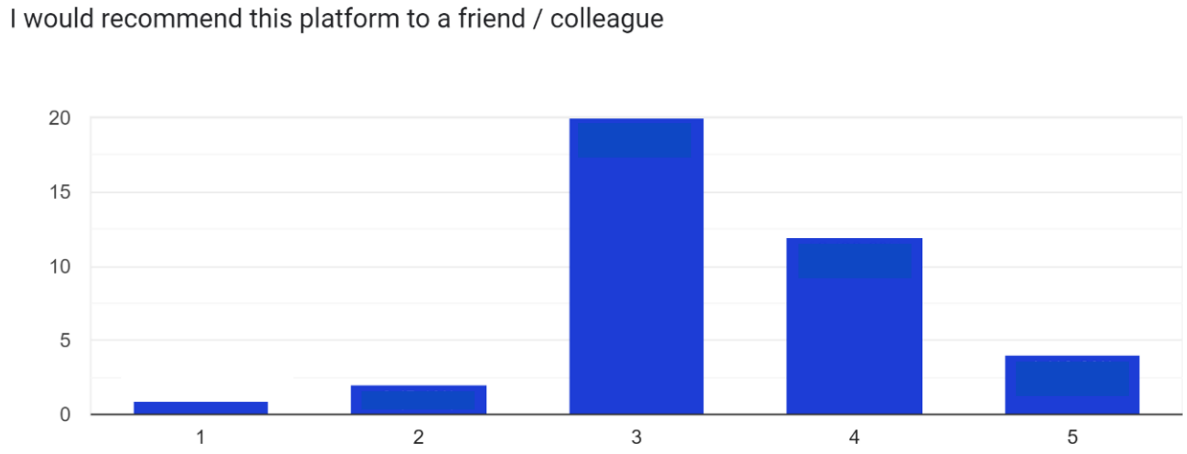


Figure 7: UC1 Stakeholders feedback questionnaire: Friend recommendation of the platform

3.1.4 UC1 KPIs validation

This section and Table 5 list the revised and updated high level KPIs defined in the GA and documented in D2.4 and D5.1 concerning UC1. This revised version demonstrated how effectively the UC1 achieved the key objectives and outcomes established following the maturity of the project and the respective. They focus on the overall performance of the UC measured by the success against a set of targets and objectives.

As the KPIs were defined, the process to meet them is also outlined, along with the baseline and target value for M36 evaluation while performing adequate number of trials as reported in D5.5 “Actual field trials of Use Case 1 v.2” submitted in October 2022. A fifth column was computed (KPIs score) and it is presented below, while being further explained.

Table 5: TRUSTS UC1 long-term business KPIs

KPI	Baseline Value	Target Value (M36)	Process to meet the target KPIs	KPIs score
Detection accuracy.	Detection accuracy.	>90%	Predefined Scenarios before and after AI were executed to validate these values.	PASS
Number of false positives.	The number of false positives flagged.	<30%	Predefined Scenarios before and after AI were executed to validate these values.	PASS
Number of false negatives.	The number of false negatives flagged.	<30%	Predefined Scenarios before and after AI were executed to validate these values.	PASS
F1 score (accuracy metric)	0-1	>/= 0.5	Predefined Scenarios before and after AI were executed to validate these values along by a mathematical process.	PASS
Number of data providers interacting with the Platform.	Two data providers at the start of the UC.	Minimum 10 by M36 (+400%)	Two data providers for the start of the UC1 trials (RDC & EBOS). To meet this target by M36 the project needs to involve additional data providers using dissemination activities.	PASS
Number of end-users interacting with the Platform.	One end-user at the start of the UC.	Minimum 10 by M36 (+400%)	NOVA & InBestMe at the start of the UC1 trials. To meet this target by M36 the project needs to involve additional end-users using dissemination activities.	PASS
Ensure GDPR and other regulations compliance.	GDPR compliance by design.	GDPR compliance by design.	TRUSTS admin operation and respective technical support (e.g., logs maintenance and analysis ensure compliance and quality). Perform adequate number of trials.	PASS

KPIs evaluation for AML Risk Assessment Application and AML Transaction Monitoring

Based on the deliverable D5.2, the revised KPIs that are relevant for the AML Risk Assessment (RiSC) and the AML Transaction Monitoring (TRM) applications are the following:

- Detection Accuracy >90%

- Number of False Positive Rate <30%
- Number of False Negative Rate <30%
- F1-score > 0.5

The AML RiSC application is used by customers to perform AML checks with the aim to provide accurate risk scores and categorise entities as Low, Medium, or High risk, using a risk-based approach. To this end, it was developed with two different approaches:

1. a traditional rule-based system that is based on a set of deterministic rules,
2. a data-driven approach that is based on AI and ML algorithms that can better capture relationships from historical data.

The new Artificial Intelligence (AI) / Machine Learning (ML) based approach leverages the potential of the TRUSTS platform, by securely sharing data between organisations, and be benchmarked against the rule-based system. Both approaches provide a risk score and the respective risk category conditional on responses of a Money Laundering and Terrorist Funding questionnaire. The AI/ML algorithm behind the AML RiSC application consists of a multi-class classification problem, where risk categories exhibit an order; “Low”, “Medium”, “High”.

The AML TRM application is used by customers to perform AML checks with the aim to provide suspicious transactions for money laundering purposes. Therefore, the end user can observe on the screen only the suspicious transactions, however if they download the data the end-user is able to observe the non-suspicious transactions too. The AI/ML algorithm behind the TRM application consists of a binary classification problem that flags suspicious transactions.

For evaluating the performance of the machine learning classification, it is useful to construct the “Confusion Matrix”, that gives a comparison between the actual and predicted values. For a binary classification model, the confusion matrix can be visualised as shown in the Figure 8.

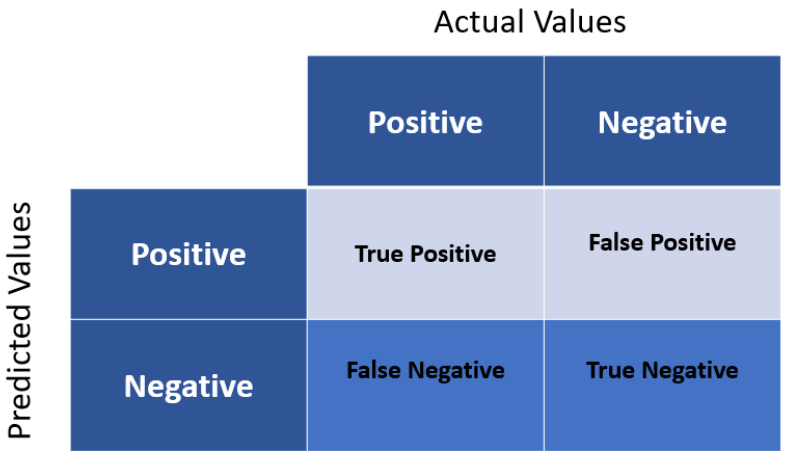


Figure 8: TRUSTS UC1 Machine Learning Confusion Matrix

From the confusion matrix the following metrics are calculated:

- **Accuracy**: Percentage of observations that were correctly predicted;
- **Balanced Accuracy**: Percentage of observations that were correctly predicted, considering the imbalance in the number of the observations that belong to each class;
- **True Positives (T.P.)**: Outcomes that the model correctly predicts the positive class;
- **True Negatives (T.N.)**: Outcomes that the model correctly predicts the negative class;
- **False Positives (F.P.)**: Outcomes that the model incorrectly predicts the positive class;

- **False Negatives (F.N.)**: Outcomes that the model incorrectly predicts the negative class;
- **False Positive Rate:** The probability of falsely classify as true a negative observation;
- **False Negative Rate:** The probability that a true positive will be missed;
- **F-1 score:** The harmonic mean of precision and recall calculated as $\frac{TP}{TP+0.5(FP+FN)}$.

In the case of the AML RiSC application, where 3 classes are available, the confusion matrix and the metrics can be extended for a multi-class classification.

For the evaluation of the KPIs, the available datasets for each application were used. Since the number of observations available for evaluating the performance were small, especially for the AML RiSC application, a cross-validation was used for calculating the required metrics. For comparisons in the performance of the models, the default models available in the application and the models after being trained to the available data were used.

The metrics for the AML RiSC application are given in Table 6. In addition to the cross-validation results, the results of the default model, before being trained to the dataset for comparison are provided. Also, in the Figure 9 and Figure 10, the confusion matrix for cross-validation and from the default model are provided.

Table 6: TRUSTS UC1 AML RiSC application metrics

Metric	Cross-Validation	Default Model
Accuracy	83%	60%
Balanced Accuracy - High	85%	50%
Balanced Accuracy – Medium	83%	50%
Balanced Accuracy - Low	82%	50%
F.P. Rate - High	5%	-
F.P. Rate - Medium	24%	100%
F.P. Rate - Low	5%	-
F.N. Rate - High	8%	30%
F.N. Rate – Medium	16%	-
F.N. Rate - Low	6%	20%

F-1 Score - High	77%	-
F-1 Score - Medium	87%	75%
F-1 Score - Low	70%	-

Figure 9: TRUSTS UC1 AML RiSC Cross validation confusion matrix

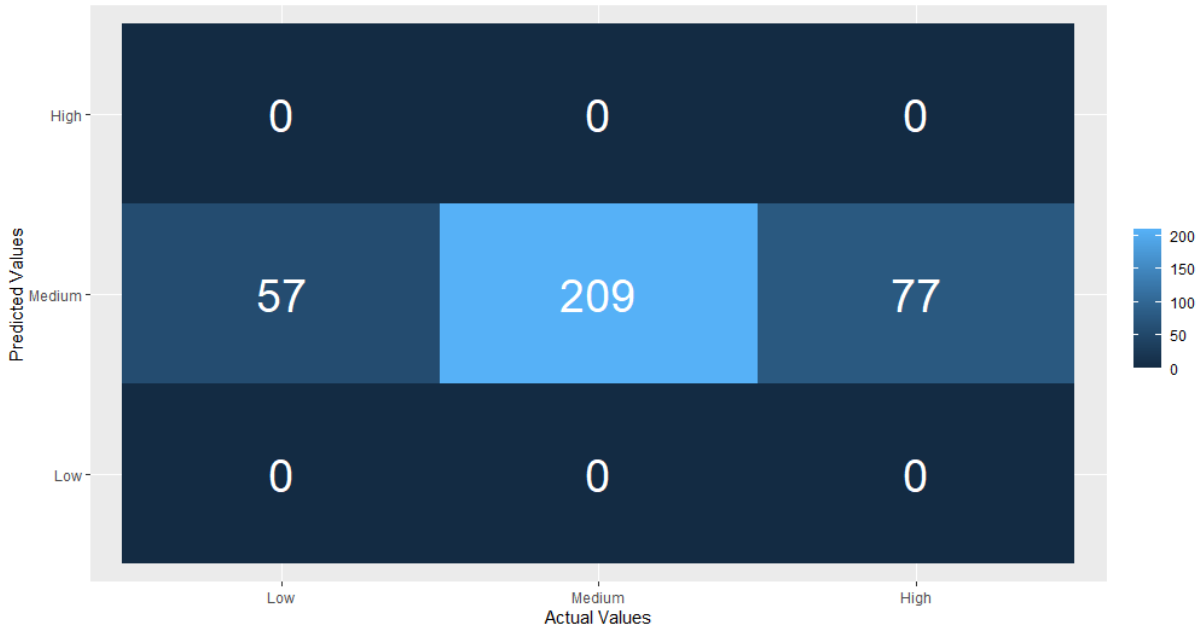


Figure 10: TRUSTS UC1 AML RiSC Default model confusion matrix

Additionally, the metrics for the AML TRM application are given in the Table 7. Also, the confusion matrix for cross-validation is provided in the.

Table 7: TRUSTS UC1 AML TRM application metrics

Metric	Cross-Validation
Accuracy	97%
Balanced Accuracy	78%
F.P. Rate	0.6%
F.N. Rate	43%
F-1 Score	66%

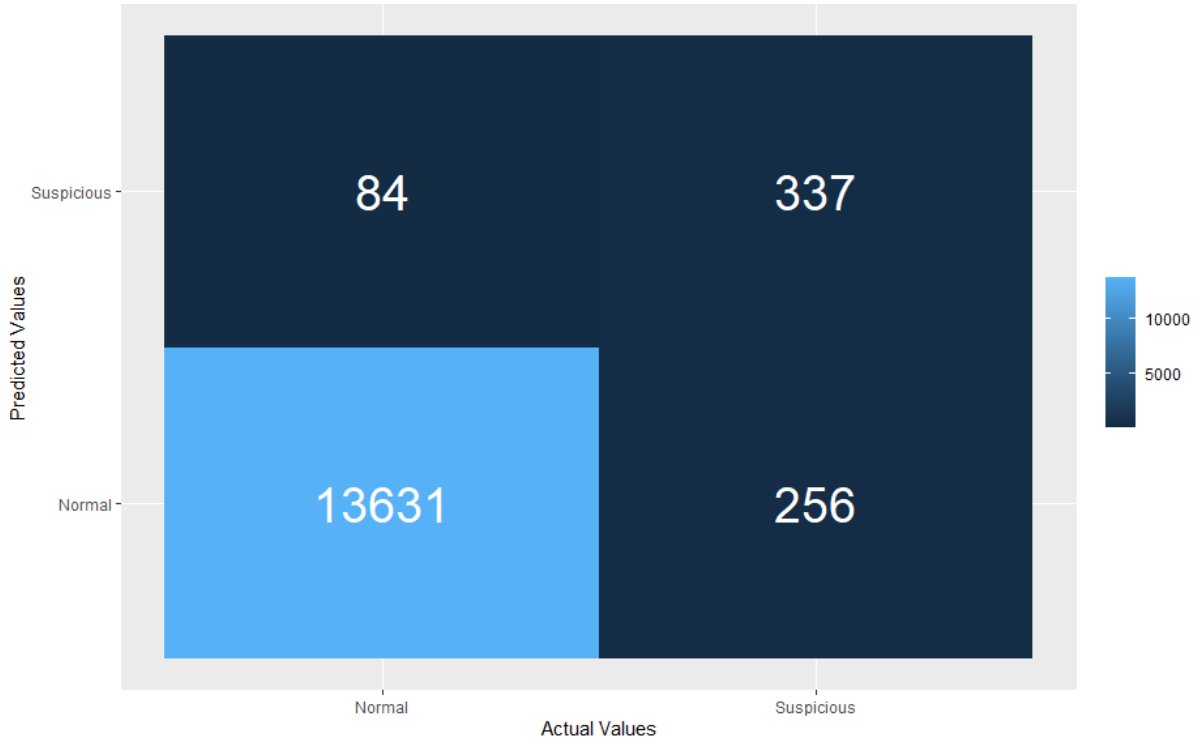


Figure 11: TRUSTS UC1 AML TRM Cross-Validation confusion matrix

3.2 UC2 Cycle 2 trials results

This section presents the results of TRUSTS Cycle 2 trials as well as the findings of the evaluation, summarising the experiences and lessons learnt by stakeholders in conducting the second cycle of UC2 trials using TRUSTS MVP v.2, v3 and v4.

Under the second cycle of the TRUSTS trials, which started in February 2022 and lasted until September 2022, UC2 conducted eighteen (18) trial sessions with the participation of fifty-three (53) stakeholders. The trial sessions ended with the completion of seventy-nine (79) questionnaires containing various suggestions for improvement of the project from a business and technical perspective. All trial sessions

were screenshotted and are further explained and illustrated in the UC2 Deliverable 5.7[4] submitted in October 2022.

The key information on the executed UC2 trials is summarised in Table 8 below:

Table 8: TRUSTS Cycle 2 trials of UC2

UC2 trial sessions	UC2 stakeholders	UC2 participants	UC2 questionnaires
MVP v2			
24-03-2022	4	5	5
31-03-2022	3	4	4
04-04-2022	1	2	2
08-04-2022	4	6	6
11-04-2022	5	7	7
28-04-2022	3	4	4
MVP v3			
19-07-2022	4	7	7
21-07-2022	3	5	5
22-07-2022	3	6	6
MVP v4			
26-07-2022	3	8	8
28-07-2022	3	4	4
29-07-2022	4	7	7
03-08-2022	1	1	1
04-08-2022	4	4	4
05-08-2022	4	4	4
25-08-2022	4	4	4
29-08-2022	3	5	5
31-08-2022	4	5	5
Total:	**53**	**79**	**79**

[4] *D5.7 ‘Actual field trials of Use Case 2 v2’ submitted in October 2022.*

3.2.1 High Level UC2 description

Right before the second cycle of TRUSTS trials, the UC2 scenarios were revised and a few additions were made, to test more efficiently the platform's implementation advancements as well as the FRs finalised under WP2. The UC2 scenarios executed during the second cycle of the TRUSTS trials were categorised as:

UC2 platform-oriented scenarios:

- Scenario 1: Application onboarding.
- Scenario 2: Companies subscription.
- Scenario 3: Metadata uploading/announcement.
- Scenario 4: Service catalogue usage.
- Scenario 5: Contract fulfilment, service performance tracking, quality evaluation.
- Scenario 6: Federation.
- Scenario 7: Dataset announcement, recommendation, and matching.

UC2 applications scenarios:

- Scenario 8: PSI application usage.
- Scenario 9: Banking application usage.
- Scenario 10: Deanonymization/Anonymization application usage.

Following the results and progress of the previous trial cycle, UC2 focused on evaluating the following:

- Companies’ subscription,
- User enrolment process,
- Assets upload and catalogue search,
- Recommendation system,
- Contract fulfilment and billing,
- User Experience testing,
- Functional Testing (to ensure that users can use features and functionality without any issues),
- Performance and security testing,
- Device and platform testing (able to handle the load and perform well even when usage spikes),
- Federation,
- UC2 applications usage/execution.

In general, a more complex process like the commercial use of TRUSTS was conducted with a more populated platform with transactions between multiple parties for more accurate searches and transactions to demonstrate multi-party operation.

3.2.2 UC2 trials Test Cases results analysis

The TRUSTS platform implementation allowed nine (9) out of ten (10) UC2 scenarios to be tested and evaluated. By the time this report was written there was not available functionality for scenario 5 of UC2. There was a total of 18 sessions of the Cycle 2 UC2 trials during this period and for each session, the number of Test Cases executed per Scenario are also shown in Table 9. These Test Cases acted as the base for the test execution and were followed during the execution of the TRUSTS trials. Annex VI offers the UC1 Test Cases template followed.

Table 9: Number of Test Cases executed per scenario per trial session

Date of Trials	Number of Test Cases Tested										
	SC1	SC2	SC3	SC4	SC5	SC6	SC7	SC8	SC9	SC10	Total
24-03-2022	3	4	2	2	-	-	-	-	-	-	11
31-03-2022	3	4	2	2	-	-	-	-	1	1	13
04-04-2022	3	1	1	1	-	-	-	-	-	-	6
08-04-2022	2	4	2	2	-	-	-	-	1	-	11
11-04-2022	3	5	2	2	-	-	-	-	-	1	13
28-04-2022	3	3	2	2	-	-	-	2	-	-	12
19-07-2022	1	5	2	2	-	-	1	2	-	-	13
21-07-2022	2	4	2	2	-	-	1	2	1	-	14
22-07-2022	3	4	2	2		-	1	-	-	1	13
26-07-2022	3	5	2	2	-	-	1	2	1	1	17
28-07-2022	3	4	2	2	-	-	1	-	-	-	12
29-07-2022	3	4	2	2	-	-	1	2	1	1	16
03-08-2022	-	1	1	1	-	-	1	-	-	-	4
04-08-2022	3	4	2	2	-	-	1	-	-	-	12
05-08-2022	3	4	2	2	-	-	1	-	-	-	12
25-08-2022	3	4	2	2	-	-	1	-	-	-	12
29-08-2022	3	4	2	2	-	-	1	-	-	1	13
31-08-2022	3	4	2	2	-	-	1	1	1	1	15
07-09-2022	3	2	2	2	-	1	1	-	-	-	11
Total:	**50**	**70**	**36**	**36**	**0**	**1**	**13**	**11**	**6**	**7**	**230**

The results reported in the forms for each Test Case are summarized in the following Table 10.

Table 10: Consolidated Business and Technical results of the first cycle of UC2 Test Case

Scenario	Test Case	Title	Business results	Technical results
SC1	TC1	PSI application onboarding	Possibility to onboard any application. A business model was not available to trial thoroughly.	Straightforward onboarding process but quality check and security checks are missing.
	TC2	Deanonymization application onboarding		
	TC3	Banking application onboarding		
SC2	TC1	NOVA subscription	User enrolment was successful, but no business model was available to trial	Enrolment of users are disjunct from the company enrolment. Correlation is done later. This process needs to be validated for a business perspective as well.
	TC2	PB subscription		
	TC3	LST subscription		
	TC4	FORTH subscription		
	TC5	REL subscription		
	TC6	RSA subscription		
	TC1	NOVA Metadata uploading	Metadata upload was achieved but there was no	Straightforward process

SC3	TC2	PB Metadata uploading	business model to verify against	
SC4	TC1	NOVA and PB Metadata search on the catalogue	Needs focusing on GDPR	Needs improvement on the reliability
SC5	TC1	Contract fulfilment, service performance tracking, quality evaluation	-	-
SC6	TC1	Federation	The business scenario was impressive, allowing two different data marketplaces to exchange data in a privacy-preserving way.	An automated process would be preferable
SC7	TC1	Dataset announcement, recommendation, and matching	The recommendations refer to other datasets with relevant tags which a user can see and consume.	Recommendation showing both the owned assets and the possible interested ones. Should be tailored to each node.
SC8	TC1	PSI application usage	Seamless application onboarding and consuming - A graphical interface would be mostly welcome for non-technical users	Seamless application onboarding and consuming - Easy to follow steps towards PSI.
SC9	TC1	Banking application usage	Easy to use. Easy to follow steps until consuming the banking app. PSI needs testing as well.	Well-structured UI and forms. Easy and comprehensive
SC10	TC1	Deanonymization/Anonymization risk analysis application usage	Seamless flow of actions to consume and start the D/A application	Some UI improvements can be made to make the risk analysis application more intuitive

3.2.3 UC2 Stakeholders’ questionnaires analysis

As it was also aforementioned in the case of UC1, for the second cycle of UC2 trials, an updated, more UX specific online feedback questionnaire was used to record the trials participant’s feedback. The questionnaire for UC2 can also be found in the official repository of the TRUSTS project, here.

The following figures (Figure 12 - Figure 18) project the outcome of the UC2 Stakeholders Feedback Questionnaire:

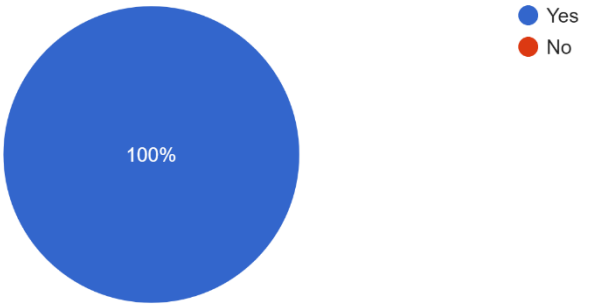


Figure 12: UC2 Stakeholders feedback questionnaire: Consent

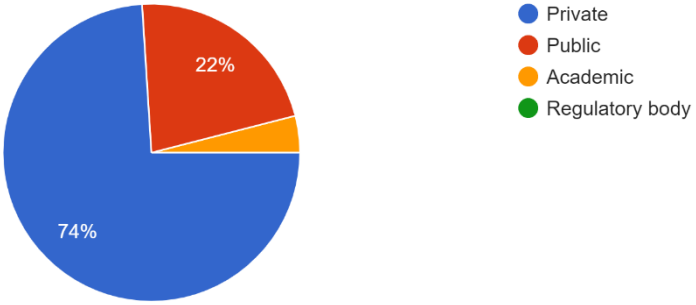


Figure 13: UC2 Stakeholders feedback questionnaire: Sector specification

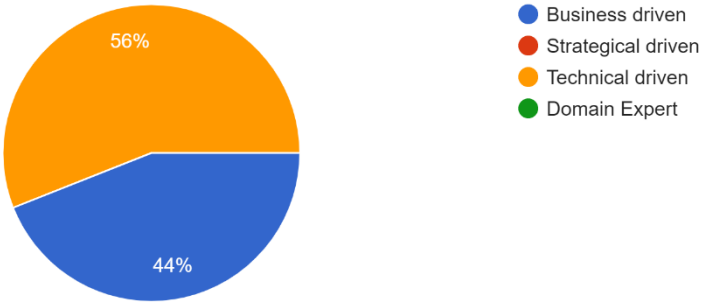


Figure 14: UC2 Stakeholders feedback questionnaire: Stakeholders role

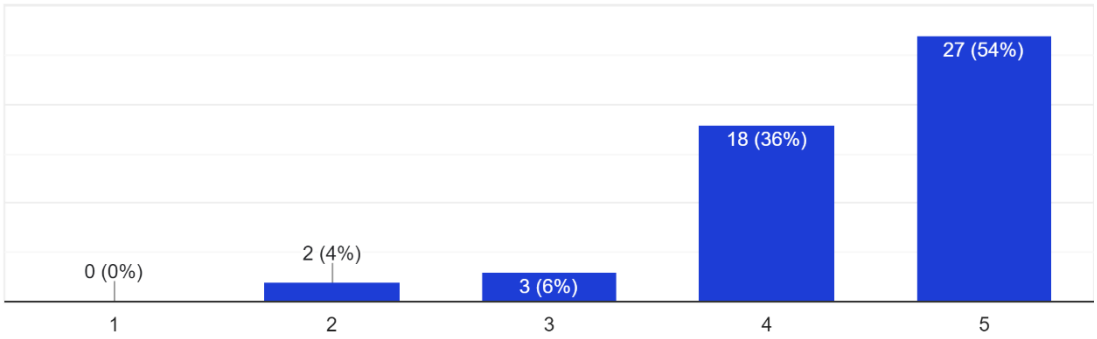


Figure 15: UC2 Stakeholders feedback questionnaire: UI evaluation (0 = Bad → 5 = Very Good)

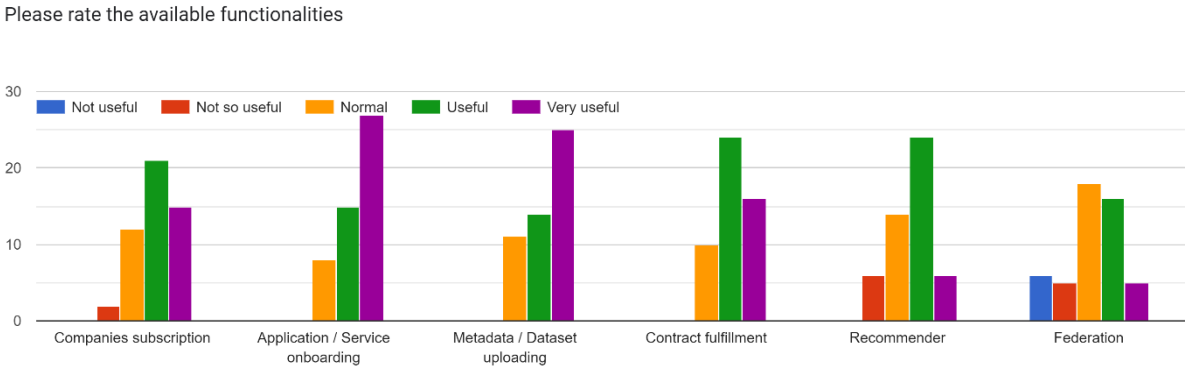


Figure 16: UC2 Stakeholders feedback questionnaire: Functionalities rating

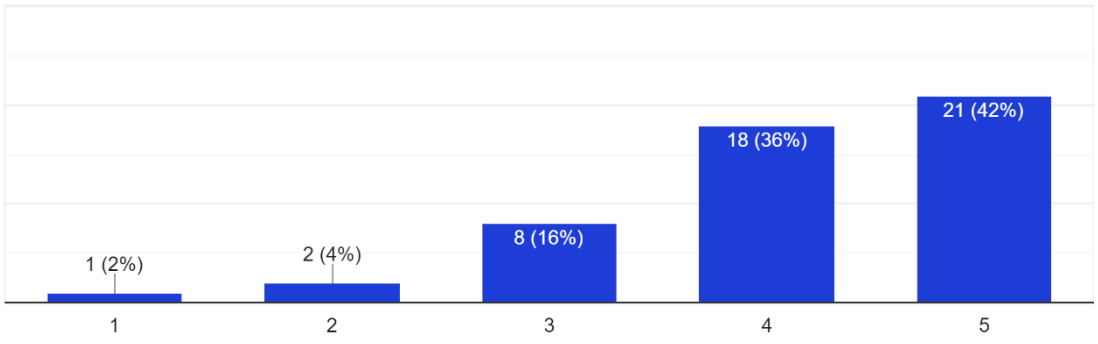


Figure 17: UC2 Stakeholders feedback questionnaire: It is easy to use TRUSTS platform (0 = Disagree → 5 = Agree)

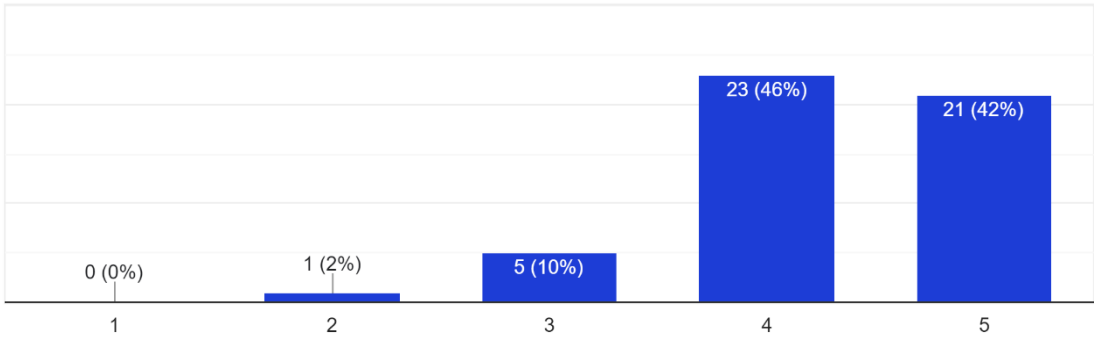


Figure 18: UC2 Stakeholders feedback questionnaire: Possibility of recommending platform to a friend or colleague (0 = Possible → 5 = Possible)

3.2.4 UC2 KPIs validation

This section and Table 11 list the revised and updated high level KPIs defined in the GA and documented in D2.4 and D5.1 concerning UC2. This revised version demonstrated how effectively the UC2 achieved the key objectives and outcomes established following the maturity of the project and the respective. They focus on the overall performance of the UC measured by the success against a set of targets and objectives.

As the KPIs were defined, the process to meet them is also outlined, along with the baseline and target value for M36 evaluation while performing adequate number of trials as reported in D5.7 “Actual field trials of Use Case 2 v.2” submitted in October 2022.

Table 11: TRUSTS UC2 long-term business KPIs

Key performance Indicator	Baseline value	Target value (M36)	Process to meet the target KPIs	KPIs score
Number of target marketing analysis	2 per month	>10 per month	Perform adequate number of trials	PASS
Data readiness for correlation	Low (1 week for data to become ready)	High (1 day for data to become ready)	UC data providers should provide adequate datasets for the trials	PASS
Data valuations	2 per month	>10 per month	Perform adequate number of trials	PASS
Data anonymization/ deanonymization	<1 per month	>10 per month	UC data providers should provide adequate datasets for the trials	PASS
Number of data providers interacting with the Platform	2	>10	To achieve this the project needs to involve additional data providers using dissemination activities	PASS

Number of end-users interacting with the Platform	2	>10	To achieve this the project needs to involve additional data providers using dissemination activities	PASS

3.3 UC3 Cycle 2 trials results

This section presents the results of TRUSTS Cycle 2 trials as well as the findings of the evaluation, summarising the experiences and lessons learnt by stakeholders in conducting the second cycle of UC3 trials using TRUSTS MVP v.2, v3 and v4.

Under the second cycle of the TRUSTS trials, which initiated in February 2022 and extended until September 2022, UC3 conducted thirteen (13) trial sessions with the participation of sixty-five (65) participants from twenty-six (26) stakeholders. The trial sessions ended with the completion of thirteen (13) questionnaires containing various suggestions for improvement of the project from a business and technical perspective. All trial sessions were screenshotted and are further explained and illustrated in the UC3 Deliverable 5.9[5] submitted in October 2022.

The key information on the executed UC3 trials is summarised in Table 12 below:

Table 12: TRUSTS trials cycle 2 of UC3 trial sessions

UC3 trial sessions	UC3 stakeholders	UC3 participants	UC3 questionnaires
MVP v2			
11-04-2022	**2**	**5**	**1**
18-04-2022	**2**	**5**	**1**
29-04-2022	**2**	**5**	**1**
03-05-2022	**2**	**5**	**1**
05-05-2022	**2**	**5**	**2**
MVP v3			
05-06-2022	**2**	**5**	**0**
15-06-2022	**2**	**5**	**0**
09-07-2022	**2**	**5**	**0**
MVP v4			
02-08-2022	2	5	1
10-08-2020	2	5	1

[5] *D5.9 ‘Actual field trials of Use Case 3 v2’ submitted in October 2022.*

29-08-2022	2	5	1
30-08-2022	2	5	2
31-08-2022	2	5	2
Total	**26**	**65**	**13**

3.3.1 High Level UC3 description

The UC3 “The data acquisition to improve customer support service”, to be specific, focuses on REL’s aim to test its pertinent services between REL NODE and BANK NODE, so as to increase their digital transformation and respective entrepreneurship activities as pioneers in their appropriate fields of work. During the UC3 trials, a variety of next-generation processes were used to test the platform’s user-friendliness, completeness, and business effectiveness. Accordingly, TRUSTS federated infrastructure is tested on providing the required components to enable this safe exchange of data, with the main goal being to protect the private information under the wing of a technical and legal area, but also maintain the ability to send reliable results and insights. This will end up in an overall ranking of the platform regarding the search of data and services of the overall marketplace.

Five (5) scenarios were defined, as listed in D5.3, to support the UC3 tests and deployment to verify the functionality of the TRUSTS platform.

Scenario 1: Actors Onboarding and maintenance. Service Provider onboarding to TRUSTS platform, in our case BANK (Customer) and REL (Service Provider), connect to the TRUSTS UI, make new accounts and each user gets the appropriate rights/roles.

Scenario 2: Services onboarding and maintenance. The REL user connects to the UI to create a service, define the description for the service, upload packages and send metadata to the broker. Notifications to the service consumer are not yet implemented.

Scenario 3: Catalogue search for data and services. The BANK user can connect to the CENTRAL NODE and search for a service, a service can be selected, and the user can choose to sign a contract with the partner to buy their services. Contract payment is not yet implemented.

Scenario 4: Download/Consume data. REL provides a service. BANK requests from the service provider the result of the service. BANK receives the processed result from the service provider (REL).

Scenario 5: REL launches the service on a specific date and the TRUSTS platform records all transactions between the BANK and REL. The BANK requests the transaction information, and after authorising the request the TRUSTS platform sends the requested information. The BANK stores the received information and proceeds to send the payment information to TRUSTS and REL, as requested by REL. Afterwards, REL receives a notification about the transaction and continues to provide the service until the expiration date.

3.3.2 UC3 trials Test Cases results analysis

The information of the number of Scenarios and Test Cases that were executed during the UC3 trials are summarized in Table 13 below.

Table 13: Number of Test Cases executed per scenario per trial session

Date of Trials	Number of Test Cases Tested	

	SC1	SC2	SC3	SC4	SC5	Total
01-09-2021	3	3	3	3	3	15
03-09-2021	3	3	3	3	3	15
06-09-2021	3	3	3	3	3	15
27-09-2021	3	3	3	3	3	15
28-09-2021	3	3	3	3	3	15
29-09-2021	3	3	3	3	3	15
11-04-2022	1	1	1	1	1	5
18-04-2022	1	1	1	1	1	5
29-04-2022	1	1	1	1	1	5
03-05-2022	1	1	1	1	1	5
05-05-2022	2	2	2	2	2	10
05-06-2022	1	1	1	1	1	5
15-06-2022	1	1	1	1	1	5
09-07-2022	1	1	1	1	1	5
02-08-2022	1	1	1	1	1	5
10-08-2020	1	1	1	1	1	5
29-08-2022	1	1	1	1	1	5
30-08-2022	1	1	1	1	1	5
31-08-2022	1	1	1	1	1	5
Total:	**32**	**32**	**32**	**32**	**32**	**160**

3.3.3 UC3 Stakeholders’ questionnaires analysis

As it was also aforementioned in case of UC1 and UC2, for the second cycle of UC3 trials an updated, more UX specific online feedback questionnaire was used to record the trials participant’s feedback. The questionnaire for UC3 can also be found in the official repository of the TRUSTS project.

The following figures (Figure 19 - Figure 24) project the outcome of the UC3 Stakeholders Feedback Questionnaire:

Figure 19: UC3 Stakeholders feedback questionnaire: Consent

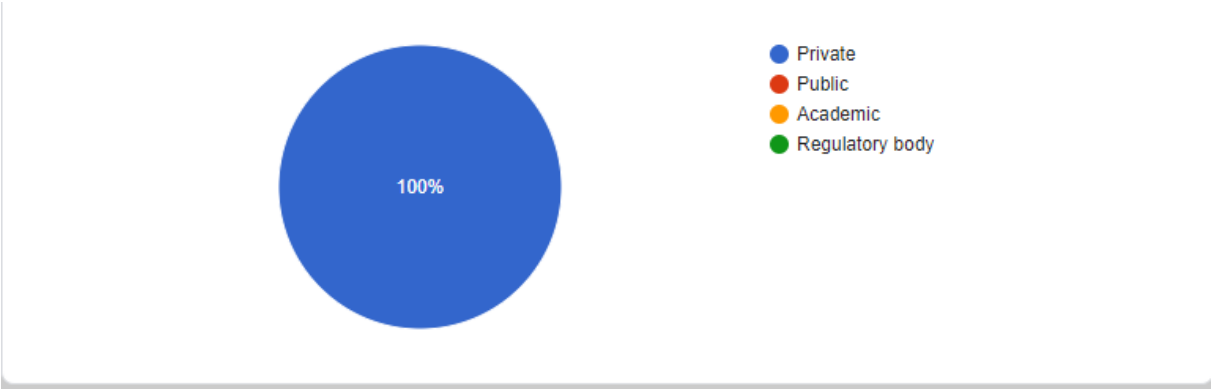


Figure 20: UC3 Stakeholders feedback questionnaire: Sector specification

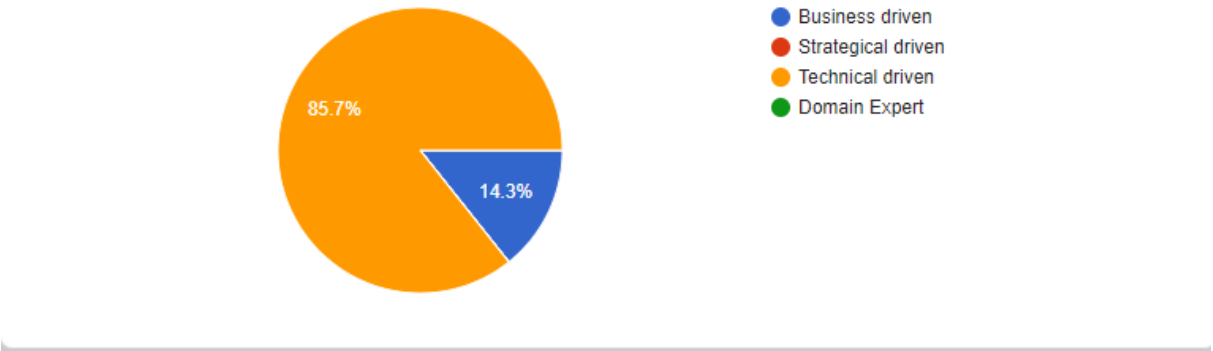


Figure 21: UC3 Stakeholders feedback questionnaire: Stakeholders role

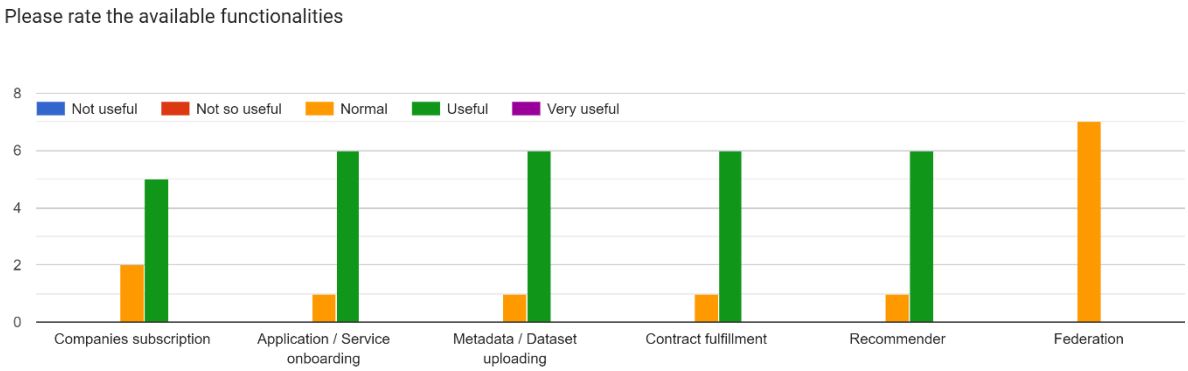


Figure 22: UC3 Stakeholders feedback questionnaire: Functionalities rating

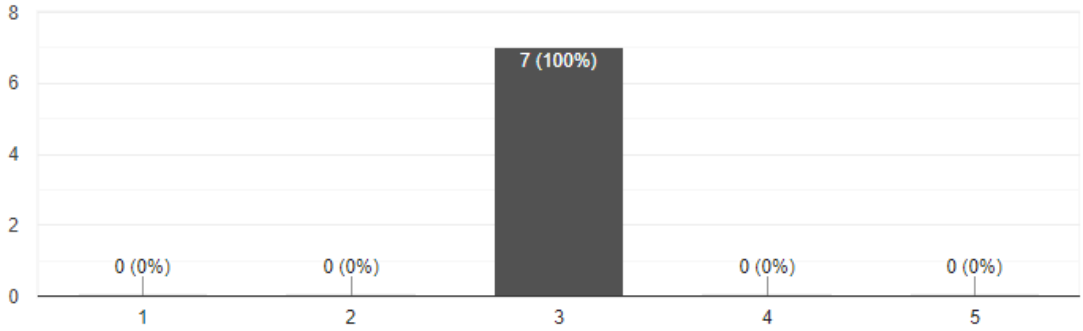


Figure 23: UC3 Stakeholders feedback questionnaire: It is easy to use TRUSTS platform (0 = Disagree → 5 = Agree)

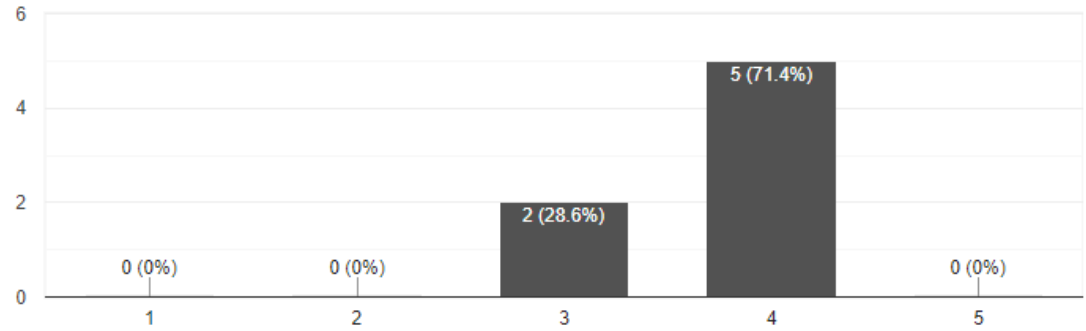


Figure 24: UC3 Stakeholders feedback questionnaire: Possibility of recommending platform to a friend or colleague (0 = Possible → 5 = Possible)

3.3.4 UC3 KPIs validation

This section and Table 14 list the revised and updated high level KPIs defined in the GA and documented in D2.4 and D5.1 concerning UC3. This revised version demonstrated how effectively the UC3 achieved the key objectives and outcomes established following the maturity of the project and the respective. They focus on the overall performance of the UC measured by the success against a set of targets and objectives.

As the KPIs were defined, the process to meet them is also outlined, along with the baseline and target value for M36 evaluation while performing adequate number of trials as reported in D5.9 “Actual field trials of Use Case 3 v.2” submitted in October 2022.

Table 14: TRUSTS UC3 long-term business KPIs

KPI	Baseline Value	Target Value (M36)	Process to meet the target KPIs	KPIs score

Ability of TRUSTS to create a federated data marketplace ecosystem.	None	Federation ability of the platform with external marketplaces. Business models building on federation potential.	Perform adequate number of trials.	PASS
Ensure GDPR and other regulations compliance.	GDPR compliance by design	GDPR compliance by design	TRUSTS admin operation and respective technological support (e.g., logs maintenance and analysis ensure compliance and quality. Perform adequate number of trials.	PASS
Number of data providers interacting with the Platform.	2	>10	To achieve this the project needs to involve additional data providers using dissemination activities.	PASS
Number of end-users interacting with the Platform.	2	>10	To achieve this the project needs to involve additional data providers using dissemination activities.	PASS

3.4 UCs common Trials Results and evaluation

This section describes the TRUSTS common trials executed to validate the TRUSTS platform during the second demonstration cycle.

Beyond the trials that each UC performed on its own, all three UCs performed five common trials to imitate real life transactions testing among other scenarios, scalability, and federation. Multiple corporate nodes were created, and each node uploaded several assets to populate the platform.

The MVP versions made available for the second evaluation period of the TRUSTS UCs should have some, if not all the required functionalities defined and required so far.

An initial idea was expected to be able to:

- Test the fundamental business hypothesis.
- Meet the needs of early adopters (TRUSTS UCs).
- Allow the product/UC services/apps to be deployed.
- Allow to test the platform initial functionalities.
- Bring added value to the UCs concepts.
- Collect the maximum amount of validated learning about the UCs.
- Allow for early adopters (i.e., the three TRUSTS UCs to provide feedback).

The following table (Table 15) shows the common trials executed during the TRUSTS Cycle 2 period.

Table 15: TRUSTS UC common trial sessions for Cycle 2

Common UCs trial sessions	Common UCs stakeholders	Common UCs participants	Common UCs questionnaires
MVP v2			
07-04-2022	6	7	2
14-04-2022	6	8	4
21-04-2022	6	6	2
28-04-2022	6	6	2
MVP v4			
14-10-2022	3	3	3
Total:	**27**	**30**	**13**

3.4.1 Common trial scenarios description

All three TRUSTS UCs simultaneously followed six communal evaluation scenarios, in terms of testing and evaluating the TRUSTS platform for:

- **Common Scenario 1: Scalability:** To determine the user limit for the TRUSTS platform and ensure end user experience, under a high load, and being able to efficiently handle more and more requests per minute (RPM). Deploy a large number of corporate nodes, onboard large numbers of assets.
- **Common Scenario 2: Security and compliance assessment.** To test TRUSTS security preparedness, including checks for vulnerabilities in the systems and business processes, security controls identifying exploitable flaws in the security architecture, detective controls, and preventative controls. Ensure compliance and operational quality.
- **Common Scenario 3: Platforms administrator’s/operator’s view.** Ensure compliance and operational quality from the operator’s point of view.
- **Common Scenario 4: Federation.** Ensure that federation is achieved with neighbouring marketplaces in terms of metadata/service/ subscriber’s catalogue, smart contract, privacy policies.
- **Common Scenario 5: Open access.** Ensure that everyday users can be benefited seamlessly from the TRUSTS services.
- **Common Scenario 6: Service quality evaluation.** Collect users’ evaluation and if needed to improve operations.

3.4.2 Common trial Stakeholders’ questionnaires analysis

Common trials participants were required to complete a feedback questionnaire after each trial’s session to give feedback to the three UCs as well as to the TRUSTS project and the implementation team.

The Questionnaire was structured to obtain the users:

1. Consent;
2. Date of the trial;
3. Name of the organisation;
4. Sector specification
5. Their role;
6. Test Case goal achievement evaluation;
7. Testbed performance evaluation;
8. Interface Usability evaluation;
9. What did you like more;
10. What would you change;
11. If you would recommend this platform to friends/colleagues.

Some of the most important overall comments were:

- Good UI, good flow and easy to follow and no misunderstanding regarding the paths to do what.
- Users should be able to access and consume all available to TRUSTS assets/apps/dataset etc.
- Functionally, the platform needs improvement as it seems to be unstable with bugs arising throughout the Test procedure.
- Clear directions to the user are needed as far as what he/she should do in order to achieve his/her goals.
- Explanations (contracts/steps etc) should be given to the user as well as directions.
- Business users should be able to use the platform without technical support.

4 Use Cases Lessons Learnt and recommendations

This section offers the lessons learnt, and the recommendations extracted from the second cycle of TRUSTS trials. The initial version of this deliverable D5.10 “Performance evaluation and lessons learnt Report I” submitted November 2021, focused on the lessons learnt extracted from the first cycle of TRUSTS trials.

4.1 Lessons learnt from UC1 trials and recommendations

UC1 established and validated how data shared via TRUSTS fed into an existing AML solution (two applications) enhanced with big data analytics. Moreover, this enriched data was securely traded via TRUSTS to interested customers who need to perform AML checks, such as financial institutions, internal corporate audit departments, fiduciaries, and corporate service providers but also tax advisors, automotive dealers and estate agents. Faster and more accurate detection of financial crime and money laundering was achieved.

Several recommendations for improving the testing of the TRUSTS platform in general were also derived from the stakeholder participation and the completed feedback questionnaire. One conclusion from the tests carried out is that improvements are still needed, and that further developments and test functions are missing. The project development team will duly consider this conclusion for the final product.

The TRUSTS platform is being developed to create a fully operational and GDPR-compliant European Data Marketplace for personal and non-personal related data. Towards this goal, a systematic process was followed to collect requirements and FRs from a wide set of sources (electronic surveys, interviews, literature search, regulatory framework, analysis of past deliverables, etc.). The resulting FRs are listed in D2.2 and became the basis for the detailed definition of the UC scenarios and the subsequent Trials.

UC1 lessons learnt concluded that the feedback was positive regarding the steps followed and the flow, although the current stage of the TRUSTS marketplace environment development is still non-operational as an integrated platform. This led to being unable to get a complete picture of the platform as a fully operational product. More decentralised and clear processes should be considered for the final product.

Overall, the business applications that were demonstrated met their KPIs with notable success and were improved compared to the first cycle of the trials. The UC1 applications UI and performance was most liked. Their flow and process were well structured and performed and the UC aim was established.

Data sharing and trading platforms such as the TRUSTS Platform, represent an opportunity to securely share and trade data for AML purposes and thus to maximise operational effectiveness whilst maintaining or reducing costs. The lack of a consolidated and widely viable data marketplace, secure and GDPR compliant adequate to benefit various business collaborations in the framework of AML services enhanced with AI, is a necessity to the data market. Such marketplace collaboration could be a benefit for the whole economy since innovative procedures and productions with added value will be inaugurated into the market. Financial institutions, corporate audit departments, tax advisors and many more, need to regularly perform AML checks.

4.2 Lessons learnt from UC2 trials and recommendations

UC2 demonstrated the capabilities of the TRUSTS Platform as a “Trusted Secure Data Sharing Space” for advanced marketing activities through correlating anonymized banking and telecommunications data. The feedback for improving was derived from the stakeholder participation and the completed feedback questionnaire.

UC2 tested TRUSTS data marketplace platform data assets’ exchange mechanism in terms of security, reliability, consistency, and the speed of upload/download. The general outcome was that the operation is performed successfully and quite smoothly. Innovations like the smart contracts and the recommendation mechanism were integrated into TRUSTS platform, providing the TRUSTS platform users with extra functionality. Regarding its scalability, TRUSTS platform seemed to be scalable at least to a certain level (Consortiums with several organizations exchanging data assets).

Another aspect that was tested, is TRUSTS platform ability to interoperate with external open-data libraries and external federated marketplaces which was a functional operation, but still needs to be improved in terms of being automated. Finally, the business applications that were developed within the context of UC2 were also liked, as those applications gave added value to the TRUSTS platform, providing functionality that for instance was essential for the preservation of security (Deanonymization/Anonymization application).

Regarding possible suggestions for improvement, platform stability and reliability needs to be improved to achieve better response time and eliminate some down-time issues that were faced during the tests. Another aspect of the platform that needs further assessment is the platform’s security and GDPR compliance. TRUSTS aims to become a federated and trusted data marketplace; thus, it should be ensured that there are no security gaps within the platform. The last two points of recommendation for improvements are referring to the UI and the usability, in terms of making the platform as simple-user friendly as possible in terms of diminishing the need of technical background for the platform users.

UC2 lessons learnt concluded that in general the feedback was positive regarding the steps followed and the flow, although improvements are still needed, and that further developments should be carried out. The project development team should consider this conclusion for the final product.

The aim of UC2 was to establish and validate how big data analytics techniques applied on data shared in a secure and effective manner can provide timely and meaningful information towards targeting profitable customers at a local level. TRUSTS provided UC2 stakeholders with exactly that; a sustainable and GDPR compliant manner to be able to demonstrate and validate sharing anonymized up-to-date data and conduct targeted marketing actions to specific local areas or even individuals.

4.3 Lessons learnt from UC3 trials and recommendations

UC3 was able to test and demonstrate the capabilities of TRUSTS platform and provide information and feedback based on the trials performed. UC3 tested “The data acquisition to improve customer support services” with the general outcome being that the result achieved meets the expectations of the project.

During all trials it proved necessary that the participants were guided by the technical observers, because otherwise they could became confused and uncertain as to what they needed to do in order to complete the trial sessions.

Regarding possible suggestions for improvement, platform reliability and stability among with possible performance improvement where the ones noted during the trials. Regardless that, further assessment at platforms security and GDPR compliance is needed.

UC3 lessons learnt concluded to positive feedback regarding the steps followed and the flow, despite all the issues, ultimately the platform managed to deliver the services required for the successful completion of the UC3 trials, albeit a bit rough around the edges.

4.4 Technical Validation

The final Technical Validation was performed between January 2022 (M25) to September 2022 (M33), allowing the validation of the Marketplace and the provided services during the second set of the UC trials by utilizing the defined test procedures and the reporting structure, and validation of results regarding technology. This validation was aligned with the milestone’s timeline since it was initiated right after Milestone 4 “End of second period” (M24) and was performed by the UC participants during the second set of the UCs trial period, allowing them to check and validate the outcome of the technical implementation through predefined scenarios and document the results using the templates that can be found in Annexes I, II and III(each one refers to the respective UC). This last round of technical validation also evaluated the complete environment from a technical, performance, expandability (e.g., federation etc.) point of view and defined the quality of the implementation.

5 Towards an operational Marketplace of data assets

As it was highlighted in the previous version of this document, the key TRUSTS business strategy focus was:

a) to become a fully operational European Data Marketplace, providing Intellectual Property management for personal and non-personal related data,
b) act as a platform Federator, laying the groundwork for an ecosystem that will enable federation of independent data marketplaces,
c) create framework conditions to facilitate the emergence of an ecosystem of an ever-increasing number of companies around TRUSTS.

The TRUSTS Cycle 2 Trials for the UCs followed the MVPv2, MVPv3 and MVPv4 of TRUSTS platform. During this period the TRUSTS platform was continuously improved, with the prospect to be fully operational as an integrated platform during the post project phase. TRUSTS platform was improved in many ways, in aspects such as:

- its UI design,
- responsiveness,
- workflow,
- stability,
- user management,
- advanced search and recommendation mechanisms
- federation with external data sources (external marketplaces, open-data libraries etc.),
- admin analytics dashboard.

User subscription mechanisms were also implemented, allowing external parties to onboard into TRUSTS. Additionally, through the common trials that were executed during this period (Cycle 2), TRUSTS platform proved to be a scalable platform, at least within the requirements of the project. Further investigation of its scalability should be done, in case the platform is to be commercialized in the future.

Additionally, there is still a room for improvement in various aspects:

- The security of the platform should be evaluated in a larger scale; extensive penetration testing should take place to reassure that the anonymized data that will be traded through the TRUSTS platform is not going to be exposed.
- The UI of the platform could be improved, with an extensive user documentation in order for the platform to be usable, even for users with zero technical background.
- Additionally, the ‘Help’ functionality could be implemented.
- TRUSTS still needs to follow a one-stop-shop concept, for coherently mapping the market’s needs on data transactions.
- Smart contracts mechanism should be optimized with data usage and data management policies.
- Billing functionality should be optimized, purchasing and invoicing should be implemented.
- Another aspect of the platform that needs further assessment is the platform’s security and GDPR compliance. TRUSTS aims to become a federated and trusted data marketplace; thus, it should be ensured that there are no security gaps within the platform.

6 Conclusions

This deliverable reported on the evaluation results from the Cycle 2 TRUSTS Trials that were executed between February and September 2022. D5.11 is the final deliverable of WP5, addressing Task 5.3 ‘Performance evaluation and lessons learnt’, concluding the lessons learnt from the TRUSTS trials as well as recommendations for the TRUSTS data marketplace in order to become operational.

The lessons that were obtained are applicable to all TRUSTS UCs and will be given as feedback to the technical WPs for the TRUSTS platform optimization, while these lessons learnt will be treated as a guide after the completion of TRUSTS project.

During the reported period, an extensive improvement in the platform usability was noticed, however the trials still dealt with a few limitations, given that the TRUSTS environment was not completely operational. Nevertheless, the platform progressed to a significant level, enabling consistent deployment of the selected UCs scenarios and Test Cases. The identification of lessons learnt, and the corresponding recommendations described in this deliverable provide a solid ground for the platform to become fully operational in the near future.

ANNEX I: TRUSTS UC1 Technical Validation

UAT Scope			
UAT - In Scope		**UAT - Out of Scope**	
In Scope • Companies’ subscription, • Enrolment process, • Assets (applications and service) upload and catalogue search, • Recommendation, • Contract fulfilment and billing, • Federation, • Assets (two applications and one service) usage/execution.		Out of Scope *List features that are not tested.*	
UAT Team Roles & Responsibilities			
Name	**Roles**	**Responsibilities**	
GIANNA AVGOUSTI	UC LEADER	TRIALS DIRECTIONS AND FUNCTIONALITIES TO TEST, EXECUTION OF STEPS	
KYRIACOS NEOCLEOUS	TECH PERSON	TECH GUIDANCE AND EXECUTION OF STEPS	
UAT Entry Criteria			
Criteria			
Entry Criteria Required TRUSTS platform portal and corporate node			
UAT Test Results			
Test Cases	**PASS/FAIL**	**Tested By**	**Date Tested**
Test Case 1 **Companies’ subscription (EBOS)** *Test Procedure:* 1. *eBOS accesses the TRUSTS data marketplace portal (https://www.trusts-data.eu/trusts-data-marketplace/)* 2. *eBOS accesses the registration area and reads the terms and pre- conditions.* 3. *eBOS reads the portal information and informative text. Also, standards that the TRUSTS marketplace complies with and privacy policies e.g., GDPR, etc.* 4. *eBOS downloads the TRUSTS registration contract, reads it, and electronically signs it.* 5. *eBOS then completes the registration form and uploads and submits the contract back to TRUSTS.*	PASS	eBOS	30/08/22

6. *The TRUSTS platform system/operator checks, approves, and activates the contract.* 7. *eBOS is contacted and requested to deploy a corporate node on its premises.* 8. *The TRUSTS corporate node is deployed on eBOS premises and eBOS is introduced into the catalogue to be visible in all federated nodes.*			
Test Case 2 ***Companies' subscription (NOVA)*** *Test Procedure:* 1. NOVA *accesses the TRUSTS data marketplace portal (https://www.trusts-data.eu/trusts-data-marketplace/)* 2. *NOVA accesses the registration area and reads the terms and pre-conditions.* 3. *NOVA reads the portal information and informative text. Also, standards that the TRUSTS marketplace complies with and privacy policies e.g., GDPR, etc.* 4. *NOVA downloads the TRUSTS registration contract, reads it, and electronically signs it.* 5. *NOVA then completes the registration form and uploads and submits the contract back to TRUSTS.* 6. *The TRUSTS platform system/operator checks, approves, and activates the contract.* 7. *NOVA is contacted and requested to deploy a corporate node on its premises.* 8. *The TRUSTS corporate node is deployed on eBOS premises and EBOS is introduced into the catalogue to be visible in all federated nodes.*	PASS	eBOS	30/08/22
Test Case 3 **Companies' subscription (InBestMe)** *Test Procedure:* 1. *InBestMe accesses the TRUSTS data marketplace portal(https://www.trusts-data.eu/trusts-data-marketplace/)* 2. *InBestMe accesses the registration area and reads the terms and pre-conditions.* 3. *eBOS reads the portal information and informative text. Also, standards that the TRUSTS marketplace complies with and privacy policies e.g., GDPR, etc.* 4. *InBestMe downloads the TRUSTS registration contract, reads it and electronically signs it.* 5. *InBestMe then completes the registration form and uploads and submits the contract back to TRUSTS.*	PASS	eBOS	30/08/22

6. *The TRUSTS platform system/operator checks, approves, and activates the contract.* 7. *InBestMe is contacted and requested to deploy a user node on its premises.* 8. *The TRUSTS user node is deployed on InBestMe premises and InBestMe is introduced into the catalogue to be visible in all federated* nodes.			
Test Case 4 ***Assets onboarding (service)*** *Test Procedure:* 1. The UC1 *application provider (eBOS) accesses the TRUSTS (after scenario 1) and logins.* 2. *The TRUSTS platform verifies credentials and validity of subscription.* 3. *eBOS accesses the TRUSTS service upload area.* 4. *eBOS uploads the AML Screening service in the TRUSTS respective area.* 5. *TRUSTS operator checks the service quality and security issues, and if all is ok, TRUSTS accepts the corresponding service.* 6. *TRUSTS introduces the AML Screening service in the catalogue. Terms of usage of the service are included* by the provider.	PASS	eBOS	30/08/22
Test Case 5 ***Assets onboarding (AML RiSC application)*** *Test Procedure:* 1. The *UC1 application provider (eBOS) accesses the TRUSTS (after scenario 1) and logins.* 2. *The TRUSTS platform verifies credentials and validity of subscription.* 3. *eBOS accesses the TRUSTS application upload area.* 4. *eBOS uploads the AML RISC application in the TRUSTS respective area.* 5. *TRUSTS operator checks the application quality and security issues, and if all is ok, TRUSTS accepts the corresponding application.* 6. *TRUSTS introduces the AML RISC application in the catalogue. Terms* of usage of the application are included by the provider.	PASS	eBOS	30/08/22
Test Case 6 ***Assets onboarding (AML TRM application)***	PASS	eBOS	30/08/22

Test Procedure: 1. *The UC1 application provider (eBOS) accesses the TRUSTS (after scenario 1) and logins.* 2. *The TRUSTS platform verifies credentials and validity of subscription.* 3. *eBOS accesses the TRUSTS application upload area.* 4. *eBOS uploads the AML TRM application in the TRUSTS respective area.* 5. *TRUSTS operator checks the application quality and security issues, and if all is ok, TRUSTS accepts the corresponding applications.* 6. *TRUSTS introduces the AML Transaction Monitoring application in the catalogue. Terms of usage of the application are included by the provider.*			
Test Case 7 ***Applications/Service/Datasets search on catalogue*** *Test Procedure:* 1. UC1 end-users' accesses TRUSTS and logins. 2. The TRUSTS platform verifies credentials and validity of subscription. 3. UC1 end-user's representative uses the search engine to search keywords on preferred applications/services in a user-friendly manner. 3. UC1 end-users searches the "eBOS" keyword in the catalogue. 4. UC1 end-users searches the "AML" keyword in the catalogue. 4. UC1 end-users searches the "AML RiSC" application in the catalogue. 5. UC1 end-users searches the "AML Screening" service in the catalogue. 6. UC1 end-users searches the "AML Transaction Monitoring" application in the catalogue. 9. The search/recommender's engine responds and proposes applications/services/datasets as well as metadata.	PASS	eBOS	30/08/22
Test Case 8 ***End-user's purchase of AML Screening service (Contract fulfilment)*** *Test Procedure:* 1. *UC1 end-user accesses the AML Screening service and selects the appropriate contract they desire to acquire.*	PASS	eBOS	30/08/22

2. *Appropriate billing is issued according to the subscribers' contract and compensation is achieved according to the applications provider contract (per-use, per-month etc.).* 3. *Subscription and payment are done.* 4. *UC1 end-user is then given a link to download on premises the adequate AML Screening service.* 5. *The TRUSTS operator verifies remotely the identity and security of the installation, credentials, and validity of subscription.* 6. *The system automatically checks the logs for contract fulfilment and any quality issues that may need to be manually catered.*			
Test Case 9 ***End-users' dataset onboarding/announcement (AML RiSC dataset)*** *Test Procedure:* 1. The *TRUSTS subscriber or UC1 end-user (NOVA, InBestMe) accesses TRUSTS and logins.* 2. *The TRUSTS platform verifies credentials and validity of subscription.* 3. *The TRUSTS subscriber or UC1 end-user reaches the Dataset's upload area, uploads, and describes the appropriate data and information about their dataset, including the fact that it is only to be used through the AML RiSC application.* 4. *The TRUSTS subscriber or UC1 end-user creates a contract for their dataset in order to be available for purchase through the TRUSTS platform by any interested user.* 5. *The TRUSTS platform operator automatically checks if the dataset's information is complete and introduces it to the TRUSTS catalogue to be visible and discoverable through search functionality in all federated nodes.*	PASS	eBOS	30/08/22
Test Case 10 ***End-users' dataset onboarding/announcement (AML TRM dataset)*** *Test Procedure:* 1. *The TRUSTS subscriber or UC1 end-user (NOVA, InBestMe) accesses TRUSTS and logins.* 2. *The TRUSTS platform verifies credentials and validity of subscription.*	PASS	eBOS	30/08/22

3. *The TRUSTS subscriber or UC1 end-user reaches the Dataset's upload area, uploads, and describes the appropriate data and information about their dataset, including the fact that it is only to be used through the AML TRM application.* 4. *The TRUSTS subscriber or UC1 end-user creates a contract for their dataset in order to be available for purchase through the TRUSTS platform by any interested user.* 5. *The TRUSTS platform operator automatically checks if the dataset's information is complete and introduces it to the TRUSTS catalogue to be visible and discoverable through search functionality in all federated nodes.*			
Test Case 11 ***Federation*** *Test Procedure:* 1. TRUSTS *federates with Europeana and OpenAire (EOSC: European Open Science Cloud: open-source data) initiatives.* 2. *Europeana and OpenAire assets (datasets) are merged with the TRUSTS datasets catalogue.* 3. *TRUSTS federates with external marketplace (TRUSTS clone) and privacy is agreed.* 4. *Smart federation contract is signed including compensation agreement for each transaction.* 5. *Catalogues are merged.* 6. *UC1 end-user accesses TRUSTS* 7. *UC1 end-user accesses the external marketplace (TRUSTS clone)* 8. *UC1 end-user successfully searches and finds a desired asset from the merged catalogue.* 9. *UC1 end-user purchases and downloads the desired asset as per SC4.*	PASS	eBOS	30/08/22
Test Case 12 ***AML Screening service execution*** *Test Procedure:* 1. *UC1 end-user accesses the adequate AML Screening service UI (after purchasing it)* 2. *UC1 end-user successfully searches/screens a person (an entity) based on the adequate UC1 service execution/requirements.*	PASS	eBOS	30/08/22

3. *UC1 end-user receives the search results of the AML Screening service execution requirements for the entity search and verifies that it is properly running.* 4. *UC1 end-user successfully searches/screens an organisation based on the adequate UC1 service execution/requirements.* 5. *UC1 end-user receives the search results of the AML Screening service execution requirements for the organisation search and verifies that it is properly running.*			
Test Case 13 ***AML RiSC application execution*** *Test Procedure:* 1. *UC1 end-user accesses the adequate AML RiSC application UI (after purchasing and downloading it on premises).* 2. *UC1 end-user input data on premises based on the adequate UC1 RiSC application execution/requirements.* 3. *3. UC1 end-user starts using the AML RiSC application and verifies that it is properly running.* 4. *UC1 end-user successfully trains data models ('Model Training').* 5. *EBOS executes successful predictions of the trained model.* 6. *UC1 end-user successfully uploads a second dataset (i.e., perhaps bought from TRUSTS datasets list) for the ensemble model training.* 7. *UC1 end-user executes successful training of the ensemble model (with the applicability of the ML/AI).* 8. *UC1 end-user executes successful prediction of the ensemble model (with the applicability of the ML/AI).* 9. *UC1 end-user can download/export and offer to share/sell their trained models through the TRUSTS platform.*	PASS	eBOS	30/08/22
Test Case 14 ***AML Transaction Monitoring execution*** *Test Procedure:* 1. *EBOS accesses the adequate AML Transaction Monitoring application UI (after purchasing and downloading it on premises).*	PASS	eBOS	30/08/22

2. *EBOS successfully inputs/uploads data on premises based on the adequate UC1 TRM application execution/requirements.* 3. *EBOS successfully trains a model using input data.* 4. *EBOS successfully predicts the potential suspicious transactions and gets results.* 5. *EBOS successfully trains an ensemble model.* 6. *EBOS executes predictions with the Ensemble model.* 7. *EBOS used the AML TRM application and verified that it is properly running.* 8. *EBOS can offer to share/sell their data models through the TRUSTS platform.*			
Addendums & Appendices			
Include any additional documents or link to screenshots/video to support the above Link to screenshot and trials documentation https://docs.google.com/spreadsheets/d/1QbZbHFxCvRCn_HWysfQYAjWKk4z6Fk75/edit#gid=301930559			

ANNEX II: TRUSTS UC2 Technical Validation

UAT Scope	
UAT - In Scope	**UAT - Out of Scope**
In Scope SC1: Applications/service onboarding. SC2: Companies’ subscriptions. SC3: Dataset’s uploading / announcement. SC4: Service catalogue usage SC6: Federation SC7: Dataset’s announcement, recommendation, and matching SC8: PSI usage SC9: Banking application usage SC10: De-anonymization risk analysis application usage	Out of Scope SC5: Contract fulfilment, service performance tracking, quality evaluation

UAT Team Roles & Responsibilities		
Name	**Roles**	**Responsibilities**
Ioannis Routis	UC leader, observer	coordinate the trial sessions, user creation
Konstantinos Theodoropoulos	Nova corporate node handler	dataset uploading / consumption
Carolin Sakir-Soultani	PB representative	user creation
Emmanouil Adamakis	FORTH representative	handle PSI, Banking and D/A application onboarding and consuming as well as execution / FORTH and PB node handler
Panagiotis Kanakakis	LSTech tech person	assist in NOVA node handling

UAT Entry Criteria
Criteria
Entry Criteria *Testing environment, 2 nodes (provider) thru 2 VMs, 3 UC2 applications and multiple datasets available to be uploaded for the execution of the UC2 supporting applications.*

UAT Test Results			
Test Cases	**Pass/Fail**	**Tested By**	**Date Tested**
Test Case 1 Application onboarding ***Example:*** 1. PSI application onboarding 2. Banking application onboarding 3. D/A application onboarding *Results:* • Successful onboarding of PSI app • Successful onboarding of Banking app • Successful onboarding of D/A app • Contract created	Pass	Emmanouil Adamakis, ALL	31-08-2022

Test Case 2 Company subscription ***Example:*** 1. PB subscription 2. Nova subscription *Results:* • admin subscription not available via the UI but with commands via CKAN instance. • only a simple user account can be created via the UI • but the user account cannot access the apps for download • only the system admin can access the apps and download them • External user subscription service provided	Pass	Emmanouil Adamakis, ALL	31-08-2022
Test Case 3 Dataset’s uploading / announcement. ***Example***: 1. PB dataset uploading & consumption 2. Nova dataset uploading & consumption *Results:* • Successful onboarding of datasets • Contract created	Pass	Emmanouil Adamakis, ALL	31-08-2022
Test Case 4 Service catalog usage. *Results:* The search was successful, and the results were correct	Pass	Emmanouil Adamakis, ALL	31-08-2022
Test Case 7 Dataset’s announcement, recommendation, and matching ***Example***: 1. Recommendation of similar data assets to Nova corporate node *Results:* • Recommended asset could be consumed	Pass	Ioannis Routis, ALL	31-08-2022
Test Case 8 PSI application usage ***Example:*** 1. PSI application onboarding / downloading / usage *Results:* • *Successful onboarding of* PSI application • *Successful download of* PSI application • *Successful usage of* PSI application	Pass	Emmanouil Adamakis, ALL	31-08-2022

Test Case 9 Banking application usage ***Example:*** 1. Banking application onboarding / downloading / usage *Results:* ● *Successful onboarding of* Banking application ● *Successful download of* Banking application ● *Successful usage of* Banking application	Pass	Emmanouil Adamakis, ALL	31-08-2022
Test Case 10 D/A application usage ***Example:*** 1. D/A application onboarding / downloading / usage *Results:* ● *Successful onboarding of* D/A application ● *Successful download of* D/A application ● *Successful usage of* D/A application	Pass	Emmanouil Adamakis, ALL	31-08-2022

ANNEX III: TRUSTS UC3 Technical Validation

UAT Scope	
UAT - In Scope	**UAT - Out of Scope**
In Scope The scope of the trials is to contribute the TRUSTS development process and verify that the produced environment complies with the project scope	Out of Scope Logs
UAT Assumptions and Constraints	
UAT Assumptions	
UAT Constraints	
• Non-implemented functionalities • Need of a technical person to execute the trial	

UAT Risks			
Description	**Probability High | Medium | Low**	**Impact High | Medium | Low**	**Mitigation**
Test environment infrastructure availability	Low	Medium	A UAT environment was set up at REL’s infrastructure.
User availability	Low	Medium	In order to mitigate any user availability issues, the majority of trial stakeholders were REL employees.
The process of obtaining partner certificates	Low	High	In order to mitigate any disruptions in obtaining partner certificates, the on-time availability of the certificate by IDS was ensured.

UAT Team Roles & Responsibilities		
Name	**Roles**	**Responsibilities**
MANOS PASCHALAKIS	UC LEADER	OBSERVER
KONSTANTINOS KRYSTALLIS	SOFTWARE ENGINEER	TRIALS DIRECTIONS AND FUNCTIONALITIES TO TEST
NIKOS FOURLATARAS	SOFTWARE ENGINEER	TECH GUIDANCE

UAT Entry Criteria
Criteria
Entry Criteria: Availability of VM platform environment Required: Data, Apps, Metadata, Services
UAT Requirements-Based Test Cases
Test Cases

SC1 - Actors Onboarding and maintenance Service Provider onboarding to TRUSTS platform, in our case BANK (Customer) and REL (Service Provider) connect	*Expected Results:* Registration is successfully completed and both parties are able to self-register new users. Rights/Roles assignment

to the TRUSTS UI, make new accounts and each user gets the appropriate rights/roles.	from both NODE administrators is also tested to function properly, the customer and the service provider can proceed and perform maintenance.		
SC2: Services onboarding and maintenance Create a service, define the description for the service, upload packages and send metadata to the broker. Notifications to the service consumer are not yet implemented.	*Expected Results:* REL can create a service, upload the required packages to provide the service. Metadata is sent to and from the customer. Notifications should be sent to the service consumer.		
SC3 - Catalogue search for data and services *The BANK user can connect to the CENTRAL NODE and search for a service, a service can be selected, and the user can choose to sign a contract with the partner to buy their services. Contract payment and signing is not yet implemented.*	*Expected Results:* The BANK user should be able to connect successfully on the CENTRAL NODE and be able to search for a service. Once a service is selected, the user can choose to sign a contract with the partner in order for the service provider to provide their services.		
SC4 - Download/Consume data *REL provides a service. BANK requests from the service provider the result of the service. BANK receives the processed result from the service provider (REL).*	*Expected Results:* REL can successfully provide a service on the TRUSTS platform. The BANK can request the result from the service provider and successfully receive back their result.		
SC5 - Service Usage Analysis and Billing (service inclusion in the marketplace) REL launches the service on a specific date and the TRUSTS platform records all transactions between the BANK and REL. The BANK requests the transaction information, and after authorizing the request the TRUSTS platform sends the requested information. The BANK stores the received information and proceeds to send the payment information to TRUSTS and REL, as requested by REL. Afterwards, REL receives a notification about the transaction and continues to provide the service until the expiration date.	*Expected Results:* REL can successfully provide a service on the TRUSTS platform. The BANK can request the result from the service provider and successfully receive back their result. After the expiration of the contract REL stops providing the service to the BANK		
UAT Test Results			
Test Cases	**PASS/ FAIL**	**Tested By**	**Date Tested**
SC1 - Actors Onboarding and maintenance *Example*: 1. BANK user and REL user connect to the TRUSTS UI. 2. BANK user and REL user request new accounts and partner certificates. 3. IDS administrator fulfils the requests for the certificates and fills the appropriate account information.	PASS	REL QA TEAM	31-08-2022

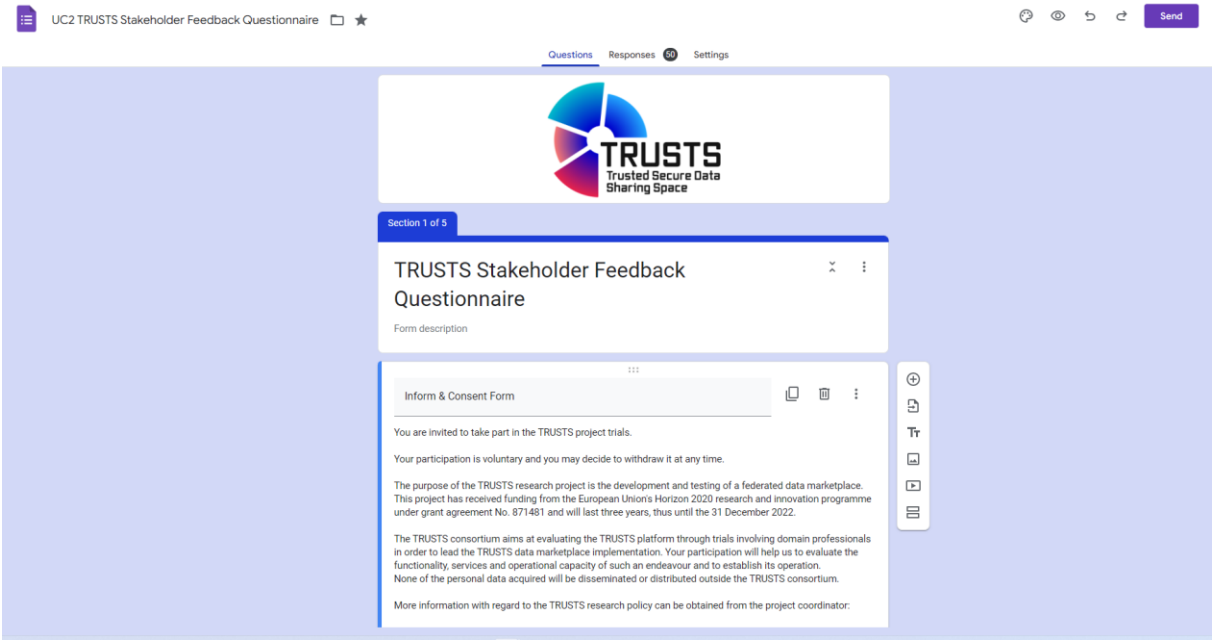
4. BANK administrator user and REL administrator user create additional users with the appropriate rights. 5. BANK administrator user changes the rights of other users by changing their roles.			
SC2: Services onboarding and maintenance ***Example**:* *Test Procedure:* 1. REL user with the appropriate rights creates services at REL’s premises. 2. REL user connects to the UI portal. 3. REL user defines new service description. 4. REL user uploads packages for the services. 5. REL user sends the metadata to the broker. 6. REL user updates a service by uploading a new version of it. 7. Notifications are being sent with the form of messages to any consumer of the services.	PASS	REL QA TEAM	31-08-2022
SC3 - Catalog search for data and services ***Example**:* *Test Procedure:* 1. BANK user connects to UI portal. 2. BANK user searches for REL’s service. 3. BANK user selects REL’s service. 4. BANK user gets the result of the service in the form of a package. 5. BANK user initiates a contract.	PASS	REL QA TEAM	31-08-2022
SC4 - Download/Consume data ***Example**:* *Test Procedure:* 1. REL offers a service. 2. BANK issues a request for a service. 3. BANK receives the result of the service.	PASS	REL QA TEAM	31-08-2022
SC5 - Service Usage Analysis and Billing (service inclusion in the marketplace) ***Example**:* *Test Procedure:* REL launches the availability of the service on the date mentioned in the contract. 1. The TRUSTS platform records all activity between BANK and REL. 2. BANK requests the history of transactions from TRUSTS that REL provided within the period of the contract. 3. TRUSTS checks the authentication of the request. 4. TRUSTS sends transaction information. 5. BANK receives the information and stores them. 6. REL requests payment from the BANK.	PASS	REL QA TEAM	31-08-2022

1. BANK pays the bill and sends the payment information to TRUSTS and REL. 2. A notification is sent to REL and the transaction closes. 3. After the expiration of the contract REL stops providing the service to the BANK.			
Addendums & Appendices			
Include any additional documents or link to screenshots/video to support the above			

ANNEX IV: TRUSTS Stakeholder Feedback Questionnaire

During the cycle 2 of Trials for the demonstration of TRUSTS data marketplace platform, an updated, more UX specific questionnaire was used for recording the trials participant’s feedback. The questionnaire was online stored into the official repository of TRUSTS project, accessible through the following link: https://docs.google.com/forms/d/e/1FAIpQLScv0Jcp_OWY9wX_G2OTYv4bytG574MGaINDs7MFVOxNNmMSUg/viewform?usp=sharing

A screenshot from the questionnaire is projected below.



ANNEX V: TRUSTS UC1 full Cycle 2 Test Cases set

TRUSTS UC1_SC1_TC1

TRUSTS UC1	**‘Smart big-data sharing and analytics for Anti-Money Laundering compliance’**
UC1-SC1	**Companies’ subscription**
UC1-SC1 steps	1. eBOS accesses the TRUSTS data marketplace portal (https://www.trusts-data.eu/trusts-data-marketplace/) 2. eBOS accesses the registration area and reads the terms and pre-conditions. 3. eBOS reads the portal information and informative text. Also, standards that the TRUSTS marketplace complies with and privacy policies e.g., GDPR, etc. 4. eBOS downloads the TRUSTS registration contract, reads it, and electronically signs it. 5. eBOS then completes the registration form and uploads and submits the contract back to TRUSTS. 6. The TRUSTS platform system/operator checks, approves, and activates the contract. 7. eBOS is contacted and requested to deploy a corporate node on its premises. 8. The TRUSTS corporate node is deployed on eBOS premises and eBOS is introduced into the catalogue to be visible in all federated nodes.
Test Case UC1-SC1-TC1	**eBOS subscription (application provider)**

TRUSTS UC1_SC1_TC2

TRUSTS UC1	**‘Smart big-data sharing and analytics for Anti-Money Laundering compliance’**
UC1-SC1	**Companies’ subscription**
UC1-SC1 steps	1. NOVA accesses the TRUSTS data marketplace portal (https://www.trusts-data.eu/trusts-data-marketplace/) 2. NOVA accesses the registration area and reads the terms and pre-conditions. 3. NOVA reads the portal information and informative text. Also, standards that the TRUSTS marketplace complies with and privacy policies e.g., GDPR, etc. 4. NOVA downloads the TRUSTS registration contract, reads it and electronically signs it. 5. NOVA then completes the registration form and uploads and submits the contract back to TRUSTS. 6. The TRUSTS platform system/operator checks, approves, and activates the contract. 7. NOVA is contacted and requested to deploy a corporate node on its premises.

	8. The TRUSTS corporate node is deployed on eBOS premises and eBOS is introduced into the catalogue to be visible in all federated nodes.
Test Case UC1-SC1-TC1	**NOVA subscription (end-user)**

TRUSTS UC1_SC1_TC3

TRUSTS UC1	**‘Smart big-data sharing and analytics for Anti-Money Laundering compliance’**
SCENARIO UC1-SC1	**Companies’ subscription**
UC1-SC1-TC3	InBestMe subscription (end-user)
	1. InBestMe accesses the TRUSTS data marketplace portal (https://www.trusts-data.eu/trusts-data-marketplace/) 2. InBestMe accesses the registration area and reads the terms and pre-conditions. 3. eBOS reads the portal information and informative text. Also, standards that the TRUSTS marketplace complies with and privacy policies e.g., GDPR, etc. 4. InBestMe downloads the TRUSTS registration contract, reads it and electronically signs it. 5. InBestMe then completes the registration form and uploads and submits the contract back to TRUSTS. 6. The TRUSTS platform system/operator checks, approves, and activates the contract. 7. InBestMe is contacted and requested to deploy a user node on its premises. 8. The TRUSTS user node is deployed on InBestMe premises and InBestMe is introduced into the catalogue to be visible in all federated nodes.
Test Owner	**(InBestMe) UC1 end-user**

TRUSTS UC1_SC2_TC1

TRUSTS UC1	**‘Smart big-data sharing and analytics for Anti-Money Laundering compliance’**
SCENARIO UC1-SC2	**Assets onboarding (service)**
UC1-SC2	1. The UC1 application provider (eBOS) accesses the TRUSTS (after scenario 1) and logins. 2. The TRUSTS platform verifies credentials and validity of subscription. 3. eBOS accesses the TRUSTS service upload area. 4. eBOS uploads the *AML Screening service* in the TRUSTS respective area.

	5. TRUSTS operator checks the service quality and security issues, and if all is ok, TRUSTS accepts the corresponding service. 6. TRUSTS introduces the *AML Screening service* in the catalogue. Terms of usage of the service are included by the provider.
Test Case UC1-SC2-TC1	**AML Screening service onboarding**

TRUSTS UC1_SC2_TC2

TRUSTS UC1	**‘Smart big-data sharing and analytics for Anti-Money Laundering compliance’**
SCENARIO UC1-SC2	**Assets onboarding (application)**
UC1-SC2	1. The UC1 application provider (eBOS) accesses the TRUSTS (after scenario 1) and logins. 2. The TRUSTS platform verifies credentials and validity of subscription. 3. eBOS accesses the TRUSTS application upload area. 4. eBOS uploads the *AML RISC application* in the TRUSTS respective area. 5. TRUSTS operator checks the application quality and security issues, and if all is ok, TRUSTS accepts the corresponding application. 6. TRUSTS introduces the *AML RISC application* in the catalogue. Terms of usage of the application are included by the provider.
Test Case UC1-SC2-TC2	**AML RISC application onboarding**

TRUSTS UC1_SC2_TC3

TRUSTS UC1	**‘Smart big-data sharing and analytics for Anti-Money Laundering compliance’**
SCENARIO UC1-SC2	**Assets onboarding (application)**
UC1-SC2	1. The UC1 application provider (eBOS) accesses the TRUSTS (after scenario 1) and logins. 2. The TRUSTS platform verifies credentials and validity of subscription. 3. eBOS accesses the TRUSTS application upload area. 4. eBOS uploads the AML TRM application in the TRUSTS respective area. 5. TRUSTS operator checks the application quality and security issues, and if all is ok, TRUSTS accepts the corresponding applications. 6. TRUSTS introduces the *AML Transaction Monitoring application* in the catalogue. Terms of usage of the application are included by the provider.
Test Case UC1-SC2-TC3	**Transaction Monitoring application onboarding**

TRUSTS UC1_SC3_TC1

TRUSTS UC1	**‘Smart big-data sharing and analytics for Anti-Money Laundering compliance’**
SCENARIO UC1-SC3	**Applications/Service/Datasets search on catalogue**
UC1-SC3	1. UC1 end-users’ accesses TRUSTS and logins. 2. The TRUSTS platform verifies credentials and validity of subscription. 3. UC1 end-user’s representative uses the search engine to search keywords on preferred applications/services in a user-friendly manner. 4. UC1 end-users search the “*eBOS*” keyword in the catalogue. 5. UC1 end-users search the “*AML*” keyword in the catalogue. 6. UC1 end-users search the “*AML RiSC*” application in the catalogue. 7. UC1 end-users search the “*AML Screening*” service in the catalogue. 8. UC1 end-users search the “*AML Transaction Monitoring*” application in the catalogue. 9. The search/recommender’s engine responds and proposes applications/services/datasets as well as metadata.
Test Case UC1-SC2-TC1	**Applications/Service search on catalogue by EBOS**

TRUSTS UC1_SC4_TC1

TRUSTS UC1	**‘Smart big-data sharing and analytics for Anti-Money Laundering compliance’**
SCENARIO UC1-SC4	**End-user’s purchase of AML Screening service (Contract fulfilment)**
	1. UC1 end-user accesses the *AML* Screening service and selects the appropriate contract they desire to acquire. 2. Appropriate billing is issued according to the subscribers’ contract and compensation is achieved according to the applications provider contract (per-use, per-month etc.). 3. Subscription and payment are done. 4. The UC1 end-user is then given a link to download on premises the adequate *AML* Screening service. 5. The TRUSTS operator verifies remotely the identity and security of the installation, credentials, and validity of subscription. 6. The system automatically checks the logs for contract fulfilment and any quality issues that may need to be manually catered.
Test Case UC1-SC4-TC1	**Contract fulfilment by UC1 end-user**

TRUSTS UC1_SC4_TC2

TRUSTS UC1	**‘Smart big-data sharing and analytics for Anti-Money Laundering compliance’**

SCENARIO UC1-SC4	**End-user’s purchase of AML RISC application (Contract fulfilment)**
	7. The UC1 end-user accesses the *AML RISC application* and selects the appropriate contract they desire to acquire. 8. Appropriate billing is issued according to the subscribers’ contract and compensation is achieved according to the applications provider contract (per-use, per-month etc.). 9. Subscription and payment are done. 10. The UC1 end-user is then given a link to download on premises the adequate *AML RISC application.* 11. The TRUSTS operator verifies remotely the identity and security of the installation, credentials, and validity of subscription. 12. The system automatically checks the logs for contract fulfilment and any quality issues that may need to be manually catered.
Test Case UC1-SC4-TC1	**Contract fulfilment by UC1 end-user**

TRUSTS UC1_SC4_TC3

TRUSTS UC1	**‘Smart big-data sharing and analytics for Anti-Money Laundering compliance’**
SCENARIO UC1-SC4	**End-user’s purchase of AML TRM application (Contract fulfilment)**
	1. The UC1 end-user accesses the AML TRM application and selects the appropriate contract they desire to acquire. 2. Appropriate billing is issued according to the subscribers’ contract and compensation is achieved according to the applications provider contract (per-use, per-month etc.). 3. Subscription and payment are done. 4. The UC1 end-user is then given a link to download on premises the adequate AML TRM application. 5. The TRUSTS operator verifies remotely the identity and security of the installation, credentials, and validity of subscription. 6. The system automatically checks the logs for contract fulfilment and any quality issues that may need to be manually catered.
Test Case UC1-SC4-TC1	**Contract fulfilment by UC1 end-user**

TRUSTS UC1_SC5_TC1

TRUSTS UC1	**‘Smart big-data sharing and analytics for Anti-Money Laundering compliance’**
SCENARIO UC1-SC5	**End-users’ dataset onboarding/announcement**

	1. The TRUSTS subscriber or UC1 end-user (NOVA, InBestMe) accesses TRUSTS and logins. 2. The TRUSTS platform verifies credentials and validity of subscription. 3. The TRUSTS subscriber or UC1 end-user reaches the Dataset’s upload area, uploads, and describes the appropriate data and information about their dataset, including the fact that it is only to be used through the AML RiSC application. 4. The TRUSTS subscriber or UC1 end-user creates a contract for their dataset in order to be available for purchase through the TRUSTS platform by any interested user. 5. The TRUSTS platform operator automatically checks if the dataset’s information is complete and introduces it to the TRUSTS catalogue to be visible and discoverable through search functionality in all federated nodes.
Test Case UC1-SC5-TC1	**End-users’ dataset onboarding/announcement (AML RiSC dataset)**

TRUSTS UC1_SC5_TC2

TRUSTS UC1	**‘Smart big-data sharing and analytics for Anti-Money Laundering compliance’**
SCENARIO UC1-SC5	**End-users’ dataset onboarding/announcement**
	1. The TRUSTS subscriber or UC1 end-user (NOVA, InBestMe) accesses TRUSTS and logins. 2. The TRUSTS platform verifies credentials and validity of subscription. 3. The TRUSTS subscriber or UC1 end-user reaches the Dataset’s upload area, uploads, and describes the appropriate data and information about their dataset, including the fact that it is only to be used through the AML TRM application. 4. The TRUSTS subscriber or UC1 end-user creates a contract for their dataset in order to be available for purchase through the TRUSTS platform by any interested user. 5. The TRUSTS platform operator automatically checks if the dataset’s information is complete and introduces it to the TRUSTS catalogue to be visible and discoverable through search functionality in all federated nodes.
Test Case UC1-SC5-TC2	**End-users’ dataset onboarding/announcement (AML RiSC dataset))**

TRUSTS UC1_SC6_TC1

TRUSTS UC1	**‘Smart big-data sharing and analytics for Anti-Money Laundering compliance’**
SCENARIO UC1-SC6	**Federation**

	1. TRUSTS federates with Europeana and OpenAire (EOSC: European Open Science Cloud: open-source data) initiatives. 2. Europeana and OpenAire assets (datasets) are merged with the TRUSTS datasets catalogue. 3. TRUSTS federates with an external marketplace (TRUSTS clone) and privacy is agreed. 4. Smart federation contracts are signed including compensation agreements for each transaction. 5. Catalogues are merged. 6. UC1 end-user accesses TRUSTS 7. UC1 end-user accesses the external marketplace (TRUSTS clone) 8. UC1 end-user successfully searches and finds a desired asset from the merged catalogue. 9. UC1 end-user purchases and downloads the desired asset as per SC4.
Test Case UC1-SC6-TC1	**Federation**

TRUSTS UC1_SC7_TC1

TRUSTS UC1	**‘Smart big-data sharing and analytics for Anti-Money Laundering compliance’**
SCENARIO UC1-SC7	**AML Screening service execution**
	1. UC1 end-user accesses the adequate AML Screening service UI (after purchasing it) 2. UC1 end-user successfully searches/screens a person (an entity) based on the adequate UC1 service execution/requirements. 3. The UC1 end-user receives the search results of the AML Screening service execution requirements for the entity search and verifies that it is properly running. 4. UC1 end-user successfully searches/screens an organisation based on the adequate UC1 service execution/requirements. 5. The UC1 end-user receives the search results of the AML Screening service execution requirements for the organisation search and verifies that it is properly running.
Test Case UC1-SC7-TC2	**AML Screening service execution**

TRUSTS UC1_SC8_TC1

TRUSTS UC1	**‘Smart big-data sharing and analytics for Anti-Money Laundering compliance’**
SCENARIO UC1-SC8	**AML RiSC application execution**

	1. UC1 end-user accesses the adequate AML RiSC application UI (after purchasing and downloading it on premises). 2. UC1 end-user input data on premises based on the adequate UC1 RiSC application execution/requirements. 3. The UC1 end-user starts using the AML RiSC application and verifies that it is properly running. 4. The UC1 end-user successfully trains data models (‘Model Training’). 5. EBOS executes successful predictions of the trained model. 6. UC1 end-user successfully uploads a second dataset (i.e., perhaps bought from TRUSTS datasets list) for the ensemble model training. 7. UC1 end-user executes successful training of the ensemble model (with the applicability of the ML/AI). 8. UC1 end-user executes successful prediction of the ensemble model (with the applicability of the ML/AI). 9. UC1 end-users can download/export and offer to share/sell their trained models through the TRUSTS platform.
Test Case UC1-SC8-TC1	**AML RiSC application execution**

TRUSTS UC1_SC9_TC1

TRUSTS UC1	**‘Smart big-data sharing and analytics for Anti-Money Laundering compliance’**
SCENARIO UC1-SC9	**AML Transaction Monitoring execution**
	1. EBOS accesses the adequate AML Transaction Monitoring application UI (after purchasing and downloading it on premises). 2. EBOS successfully inputs/uploads data on premises based on the adequate UC1 TRM application execution/requirements. 3. EBOS successfully trains a model using input data. 4. EBOS successfully predicts the potential suspicious transactions and gets results. 5. EBOS successfully trains an ensemble model. 6. EBOS executes predictions with the Ensemble model. 7. EBOS used the AML TRM application and verified that it is properly running. 8. EBOS can offer to share/sell their data models through the TRUSTS platform.
Test Case UC1-SC9-TC2	**AML Transaction Monitoring execution**

ANNEX VI: TRUSTS UC2 full Cycle 2 Test Cases set

UC2 platform test scenarios

TRUSTS UC2	**Agile Marketing through Data Correlation**		
SCENARIO UC2-SC1	**Application Onboarding**		
REQUIREMENTS REFERENCE	FR1, FR2, FR3, FR10, FR11, FR12, FR13, FR14, NFR2, FR36, FR37, NFR4, NFR5, NFR6, FR44		
SCENARIO TEST PROCEDURE	**ASSUMPTIONS & CONSTRAINTS**	**EXPECTED RESULTS**	**ADDITIONAL NOTES**
On boarding of applications (onboarding, smart contract, inclusion to the service catalogue, quality test). Federation issues should be tested e.g., service onboarding in different federated nodes.	At least the **PSI, the Banking application and deanonymization risks analysis applications** are successfully on-boarded on TRUSTS nodes.	The applications are successfully checked for security and malfunction issues and on-boarded to TRUSTS using the provided UI. A respective smart contract is issued, and the service usage rules are defined.	End to end service onboarding process to be fulfilled.
1. The application provider accesses the TRUSTS and logins. 2. The TRUSTS platform verifies credentials and validity of subscription. 3. The application provider reads the portal information and informative text, as well standards that the TRUSTS marketplace complies to and privacy policies e.g., GDPR, etc. 4. The application provider accesses the TRUSTS application upload area. 5. The application provider uploads the application 6. TRUSTS operators check the application quality and security issues and if all is ok, TRUSTS accepts the corresponding application. 7. TRUSTS introduced the application in the catalogue to be available to all federated nodes. Terms of usage of the application are included in the application description as well.			
SCENARIO UC2-SC2	**Companies’ subscription**		
REQUIREMENTS REFERENCE	NFR1, FR25, FR27, FR28, FR30, FR31, FR33A, FR36, FR37, NFR4, NFR5, FR44		
SCENARIO TEST PROCEDURE	**ASSUMPTIONS & CONSTRAINTS**	**EXPECTED RESULTS**	**ADDITIONAL NOTES**

Companies’ subscription (selection of plan, subscription, signing the contract/smart contract, companies’ representative’s definition, and roles). Federation issues should be tested e.g., companies subscribed in different federated nodes.	Successful subscription of NOVA, PB, FORTH, LST, KNOW and RSA. Successful definition of roles. Successful enrolment of NOVA, PB, FORTH, LST, KNOW and RSA representatives.	NOVA, PB, FORTH, LST, KNOW and RSA are subscribed to a specific subscription service using the UI provided by TRUSTS. Companies’ users are subsequently enrolled according to the rules of the subscription that each company chose.	User friendliness, Clear processes, ability to verify and modify logs.

1. The subscriber (NOVA, PB, FORTH, LST, KNOW, RSA) accesses the TRUSTS data marketplace portal (https://www.trusts-data.eu/trusts-data-marketplace/)
2. The UC2 end-user accesses the registration area and reads the terms and pre-conditions.
3. The UC2 end-user downloads the TRUSTS registration contract, reads it and electronically signs it.
4. The UC2 end-user then completes the registration form and uploads and submits the contract back to TRUSTS.
5. The TRUSTS platform system/operator checks, approves, and activates the contract.
6. The subscriber is contacted and requested to deploy a user/corporate node on its company's premises.
7. The TRUSTS user/corporate node is deployed in the UC2 end-user (subscribers) premises, and the TRUSTS subscriber (UC2 end-user) is introduced into the catalogue to be visible in all federated nodes.

SCENARIO UC2-SC3	**Metadata uploading**		
REQUIREMENTS REFERENCE	FR1, FR2, FR3, FR7, FR8, FR9, FR10, FR11, FR12, FR13, FR14, NFR2, NFR3, FR18, FR19, FR20, FR21, FR23, FR24, FR32, FR35, FR36, FR37, NFR4, NFR5, NFR6, FR42, FR43, FR44		
SCENARIO TEST PROCEDURE	**ASSUMPTIONS & CONSTRAINTS**	**EXPECTED RESULTS**	**ADDITIONAL NOTES**
NOVA and PB onboard the metadata. Federation issues should be tested e.g., companies subscribed in different federated nodes.	Successful upload of metadata and introduction to the catalogue	The metadata upload process is successfully performed, their lifecycle is defined, and they are discoverable in the catalogue.	User friendliness, Clear processes, ability to verify and modify logs.

1. The metadata provider accesses the TRUSTS and logins.
2. The TRUSTS platform verifies credentials and validity of subscription.
3. The metadata provider reads the portal information and informative text, as well standards that the TRUSTS marketplace complies to and privacy policies e.g., GDPR, etc.
4. The metadata provider accesses the TRUSTS metadata upload area.
5. The metadata provider uploads the application
6. TRUSTS operators check the metadata quality and security issues and if all is ok, TRUSTS accepts the corresponding metadata.

7. TRUSTS introduced the metadata in the catalogue to be available to all federated nodes. Terms of usage of the metadata are included in the metadata description as well.

SCENARIO UC2-SC4	**Asset catalogue usage**		
REQUIREMENTS REFERENCE	FR4, FR5, FR6, FR7, FR8, FR9, FR18, FR19, FR20, FR23, FR24, FR25, FR26, FR27, FR28, FR31, FR33B, FR37, NFR4, NFR5, NFR6, FR38, FR39, FR40, FR41, FR42, FR43, FR44		
SCENARIO TEST PROCEDURE	**ASSUMPTIONS & CONSTRAINTS**	**EXPECTED RESULTS**	**ADDITIONAL NOTES**
Search in service catalogue by NOVA and PB for discovering the appropriate metadata, the adequate PSI, deanonymization risk analysis, etc. services. Federation issues should be tested e.g., transparently searching to all federated nodes.	• Return adequate response in <1sec. • User task success > 90% • User satisfaction, SUS score > 70	NOVA and PB search through the catalogue for the required service transparently to all federated nodes. In addition, they may see the T&Cs of the services usage.	Search in service catalogue using keywords across all federated nodes.

1. The subscriber representatives (NOVA, PB) access TRUSTS and logins.
2. The TRUSTS platform verifies credentials and validity of subscription.
3. The subscriber representative uses the search engine to search keywords on preferred applications/service/datasets in a user-friendly manner.
4. The search/recommender’s engine responds and proposes applications/services/datasets as well as metadata.
5. NOVA and PB select the appropriate metadata and application and initiate the usage process

SCENARIO UC2-SC5	**Contract fulfilment, service performance tracking, quality evaluation**		
REQUIREMENTS REFERENCE	FR4, FR10, FR11, FR12, FR13, FR14, FR15, FR16, FR17, NFR1, NFR3, FR26, FR27, FR28, FR30, FR33A, FR33B, FR37, FR44		
SCENARIO TEST PROCEDURE	**ASSUMPTIONS & CONSTRAINTS**	**EXPECTED RESULTS**	**ADDITIONAL NOTES**
Ensure smart contract fulfilment, evaluate transaction logs, collect users’ evaluation, improve operations if necessary.	At least 3 contracts are fulfilled.	Transactions are logged and validated. Users are rated. Compliance to law is confirmed.	Contract fulfilment, transaction logs existence, user evaluation existence, process to evaluate complete process by the TRUSTS operations to improve performance.

1. The UC2 end-user accesses the desired data asset and selects the appropriate contract they desire to acquire.
2. Appropriate billing is issued according to the subscribers’ contract and compensation is achieved according to the application/service provider contract.
3. Payment is done.
4. The subscriber is then given a link to download on premises the adequate application/service.
5. The TRUSTS operator verifies remotely the identity and security of the installation, credentials, and validity of subscription.
6. The system automatically checks the logs for contract fulfilment and any quality issues that may need to be manually catered.

Note: According to the TRUSTS GA:
A Federated Data Market at European level shall provide:

1. hierarchical levels of privacy, that allow a data owner full control not only over who is able to access the data and at which granularity, but also who is able to view the metadata,
2. hierarchical layers of certification for data services to foster trust in the market actors,
3. the fully flexible combination of data and services available at different providers to create a new data product or service,
4. an automatic brokerage system, enabling the identification and recommendation of data and services to be used for a specific use-case,
5. tooling for a human broker to create customised offers for their customers, opening a new business field in the industry (i.e., the data broker).

These services are designed to lower the barrier to entrance on the data market by actors ranging from private entrepreneurs and innovators, SMEs, or NGOs, to large, multinational enterprises.

SCENARIO UC2-SC6	**Federation**		
REQUIREMENTS REFERENCE	FR2, FR4, FR5, FR7, FR13, FR14, FR17, FR23, FR26, FR27, FR28, FR37, FR38,		
SCENARIO TEST PROCEDURE	**ASSUMPTIONS & CONSTRAINTS**	**EXPECTED RESULTS**	**ADDITIONAL NOTES**
Ensure that federation is achieved with neighbouring marketplaces in terms of metadata/service/subscriber’s catalogue, smart contract, privacy policies.	At least 3 transactions from federated marketplaces are fulfilled.	Transactions are logged and validated from different marketplaces.	Contract fulfilment, transaction logs existence, user evaluation existence, process to evaluate complete process by the TRUSTS operations to improve performance.

1. TRUSTS federates with external marketplace and privacy are agreed
2. External marketplace assets are merged with TRUSTS catalogue.
3. UC2 end-users search and find a desired asset from the merged catalogue
4. UC2 end-users purchase and download it.
5. A process of connection which involves exchange of information (e.g., IP addresses, certificates) between the end-users and TRUSTS operator.

6. Federation contracts are signed including compensation agreements for each transaction.			
SCENARIO UC2-SC7	**Dataset’s announcement, recommendation, and matching**		
REQUIREMENTS REFERENCE	FR2, FR4, FR5, FR6, FR7, FR8, FR9, FR17, NFR2, NFR3, FR18, FR19, FR20, FR21, FR22, FR23, FR24, FR25, FR26, FR27, FR29, FR33B, FR34, FR35, FR37, NFR4, FR42, FR43, FR44		
SCENARIO TEST PROCEDURE	**ASSUMPTIONS & CONSTRAINTS**	**EXPECTED RESULTS**	**ADDITIONAL NOTES**
Ensure that the users will be able to announce datasets and their characteristics.	At least 3 datasets announcements will be included in the catalogue. At least 3 matchmaking successes will be performed. At least 3 relevant recommended datasets are proposed.	Dataset’s announcements are successfully performed. Matchmaking of NOVA and PB request with available datasets is successfully performed	Contract fulfilment, transaction logs existence, user evaluation existence, process to evaluate complete process by the TRUSTS operations to improve performance existence.
1. The users will announce dataset and related attributes e.g., dataset that they cannot upload (e.g., CRM). Such an announcement will be entered in the datasets catalogue. 2. The users will announce their needs. Such announcements will enter a needed catalogue. 3. Recommendation and matchmaking will be automatically offered by the TRUSTS platform.			

UC2 asset scenarios

TRUSTS UC2	**Agile Marketing through Data Correlation**		
SCENARIO UC2-SC8	**PSI usage**		
REQUIREMENTS REFERENCE	FR1, FR3, FR4, FR7, FR8, FR9, FR10, FR14, FR17, NFR3, FR18, FR27, FR29, FR31, FR32, FR33A, FR34, FR35, FR36, NFR5, NFR6, FR38, FR39, FR40, FR41, FR42, FR43,		
SCENARIO TEST PROCEDURE	**ASSUMPTIONS & CONSTRAINTS**	**EXPECTED RESULTS**	**ADDITIONAL NOTES**
Ensure that the users can correlate datasets using PSI	At least 1 dataset will be uploaded by NOVA and 1 by PB. The PSI application is installed in the NOVA and PB corporate nodes	Datasets of various sizes are successfully correlated using PSI	Contract fulfilment, transaction logs existence, user evaluation existence, process to evaluate complete process by the TRUSTS operations to improve performance existence.

1. The users will announce dataset and related attributes e.g., dataset that they cannot upload (e.g., CRM). Such an announcement will be entered in the datasets catalogue.
2. The PSI application will be on-boarded to the TRUSTS platform.
3. NOVA and PB procure PSI usage
4. NOVA and PB download from TRUSTS PSI and install it to the corporate node
5. NOVA and PB successfully correlate datasets through PSI

SCENARIO UC2-SC9	**Banking application usage**		
REQUIREMENTS REFERENCE	FR1, FR3, FR4, FR7, FR8, FR9, FR10, FR14, FR17, NFR3, FR18, FR27, FR29, FR31, FR32, FR33A, FR34, FR35, FR36, NFR5, NFR6, FR38, FR39, FR40, FR41, FR42, FR43		
SCENARIO TEST PROCEDURE	**ASSUMPTIONS & CONSTRAINTS**	**EXPECTED RESULTS**	**ADDITIONAL NOTES**
Ensure that the users have correlated data through PSI. Then the banking application analyses the outcome.	At least 1 dataset will be uploaded by NOVA and 1 by PB. The PSI application is installed in the NOVA and PB corporate nodes. The Banking application is installed in PB.	Datasets of various sizes are successfully correlated using PSI. Then the outcome is used by the Banking application.	Contract fulfilment, transaction logs existence, user evaluation existence, process to evaluate complete process by the TRUSTS operations to improve performance existence.

1. The users will announce dataset and related attributes e.g., dataset that they cannot upload (e.g., CRM). Such announcement will be entered the datasets catalogue
2. The PSI application will be on-boarded to the TRUSTS platform
3. NOVA and PB procure PSI usage
4. NOVA and PB download from TRUSTS PSI and install it to the corporate node
5. NOVA and PB successfully correlate datasets through PSI
6. The banking application is on-boarded to the TRUSTS platform
7. PB procures the Banking Application usage
8. PB uses the Banking application to analyse the PSI correlation outcome.

SCENARIO UC2-SC10	**De-anonymization risk analysis application usage**		
REQUIREMENTS REFERENCE	FR1, FR3, FR4, FR7, FR8, FR9, FR10, FR14, FR17, NFR3, FR18, FR27, FR29, FR31, FR32, FR33A, FR34, FR35, FR36, NFR5, NFR6, FR38, FR39, FR40, FR41, FR42, FR43		
SCENARIO TEST PROCEDURE	**ASSUMPTIONS & CONSTRAINTS**	**EXPECTED RESULTS**	**ADDITIONAL NOTES**

The de-anonymization risk analysis application is available to the TRUSTS platform.	The de-anonymization risk analysis application is available to the TRUSTS platform.	Various datasets will be analysed for de-anonymization risk by the De-anonymization risk analysis application.	Contract fulfilment, transaction logs existence, user evaluation existence, process to evaluate complete process by the TRUSTS operations to improve performance existence.
1. The de-anonymisation risk analysis application will be on-boarded to the TRUSTS platform 2. NOVA and PB procure de-anonymization risk analysis usage 3. NOVA and PB use the de-anonymisation risk analysis application in various anonymised datasets.			

ANNEX VII: TRUSTS UC3 full Cycle 2 Test Cases set

TRUSTS UC3	**“The data acquisition to improve customer support service”**		
UC3-SC1	**Actors Onboarding and maintenance**		
REQUIREMENTS REFERENCE	FR32, FR36, FR31, FR30, FR44		
SCENARIO TEST PROCEDURE	**ASSUMPTIONS & CONSTRAINTS**	**EXPECTED RESULTS**	**ADDITIONAL NOTES**
Service Provider onboarding to TRUSTS platform, in our case BANK (Customer) and REL (Service Provider) connect to the TRUSTS UI, make new accounts and each user gets the appropriate rights/roles.		Registration is successfully completed and both parties can self-register new users. Rights/Roles assignment from both NODE administrators are also tested to function properly; the customer and the service provider can proceed and perform maintenance.	
1. BANK user and REL user connect to the TRUSTS UI. 2. BANK user and REL user request new accounts and partner certificates. 3. IDS administrator fulfils the requests for the certificates and fills the appropriate account information. 4. BANK administrator user and REL administrator user create additional users with the appropriate rights. 5. BANK administrator user changes the rights of other users by changing their roles.			
UC3-SC2	**Services onboarding and maintenance**		
REQUIREMENTS REFERENCE	FR1, FR2, FR3, FR4, FR18, FR19, FR20, FR23, FR24, FR32, FR36, FR44		
SCENARIO TEST PROCEDURE	**ASSUMPTIONS & CONSTRAINTS**	**EXPECTED RESULTS**	**ADDITIONAL NOTES**
Create a service, define the description for the service, upload packages and send metadata to the broker. Notifications to the service consumer		REL can create a service, upload the required packages to provide the service. Metadata is sent to and from the customer.	

are not yet implemented.		Notifications should be sent to the service consumer.	

1. REL user with the appropriate rights creates services at REL’s premises.
2. REL user connects to the UI portal.
3. REL user defines new service description.
4. REL user uploads packages for the services.
5. REL user sends the metadata to the broker.
6. REL user updates a service by uploading a new version of it.
7. Notifications are being sent with the form of messages to any consumer of the services.

UC3-SC3	**Catalogue search for data and services**		
REQUIREMENTS REFERENCE	FR5, FR6, FR7, FR8, FR44		
SCENARIO TEST PROCEDURE	**ASSUMPTIONS & CONSTRAINTS**	**EXPECTED RESULTS**	**ADDITIONAL NOTES**
The BANK user can connect to the CENTRAL NODE and search for a service, a service can be selected, and the user can choose to sign a contract with the partner to buy them services. Contract payment and signing are not yet implemented.		The BANK user should be able to connect successfully on the CENTRAL NODE and be able to search for a service. Once a service is selected, the user can choose to sign a contract with the partner for the service provider to provide their services.	

1. BANK user connects to UI portal.
2. BANK user searches for REL’s service.
3. BANK user selects REL’s service.
4. BANK user gets the result of the service in the form of a package.
5. BANK user initiates a contract.

UC3-SC4	**Download/Consume data**		
REQUIREMENTS REFERENCE	FR18, FR24, FR29, FR36, FR44		
SCENARIO TEST PROCEDURE	**ASSUMPTIONS & CONSTRAINTS**	**EXPECTED RESULTS**	**ADDITIONAL NOTES**
REL provides a service. BANK requests from the service provider the result of the service. BANK receives the		REL can successfully provide a service on the TRUSTS platform. The BANK can request the result from the	

processed result from the service provider (REL).		service provider and successfully receive back their result.	

1. REL offers a service.
2. BANK issues a request for a service.
3. BANK receives the result of the service.

TRUSTS UC3	**“The data acquisition to improve customer support service”**		
UC3-SC5	**Service Usage Analysis and Billing (service inclusion in the marketplace)**		
REQUIREMENTS REFERENCE	FR10, FR11, FR12, FR13, FR14, FR15, FR16, FR17, FR33, FR36, FR44		
SCENARIO TEST PROCEDURE	**ASSUMPTIONS & CONSTRAINTS**	**EXPECTED RESULTS**	**ADDITIONAL NOTES**
REL receives payment from BANK user, a contract is established for the allowance of the service and the history of transactions is provided to them.		REL successfully receives payment from BANK user, a contract is established for the allowance of the service and the history of transactions is provided to them.	

1. REL launches the availability of the service on the date mentioned in the contract. 2. The TRUSTS platform records all activity between BANK and REL.
2. BANK requests the history of transactions from TRUSTS that REL provided within the period of the contract.
3. TRUSTS checks the authentication of the request.
4. TRUSTS sends transaction information.
5. BANK receives the information and stores them.
6. REL requests payment from the BANK.
7. BANK pays the bill and sends the payment information to TRUSTS and REL.
8. A notification is sent to REL and the transaction closes.
9. After the expiration of the contract REL stops providing the service to the BANK.