

Security framework to achieve a continuous audit-based certification in compliance with the **EU-wide cloud security certification scheme**

Authors

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Trustworthy Blockchain based-tools for auditors in a certification process

Introduction

MEDINA project aims to develop an automatic framework for continuous evidence-based auditing to achieve EUCS certification compliance in an easy way. However, automatic tools also need to be trustworthy to enhance objectivity, accuracy, efficiency, and consistency while reducing risks. They help auditors and organizations maintain the credibility of the certification process and support ongoing improvement efforts.

MEDINA considers the use of the **Blockchain** technology as a secure backbone as it is valuable in trusted systems because of its ability to provide data immutability, transparency, security, decentralisation and resistance to tampering, which contributes to the reliability and integrity of the MEDINA framework. There are two components in MEDINA which provide enhance trustworthy information for auditors.

MEDINA Evidence and Assessment Results Trustworthiness System

The MEDINA Evidence Trustworthiness Management System, provides a secure mechanism to maintain an audit trail of evidence and assessment results. It is implemented in **Smart Contracts** backboned by a **Blockchain network**, providing the following functionalities:

- It includes the logic to provide the required information to be audited (about evidence and assessment results).
- It provides long-term information recording, creating a secure record of information on a verifiable (verification), permanent (traceability) and resistant to modification (**integrity**) way.
- It includes the logic for external users to access audited information (about evidence and assessment results) in a graphical and user-friendly way.
- It provides a trustworthy records for auditors to be able to perform manual or automated inspections when needed while guaranteeing the integrity of information.

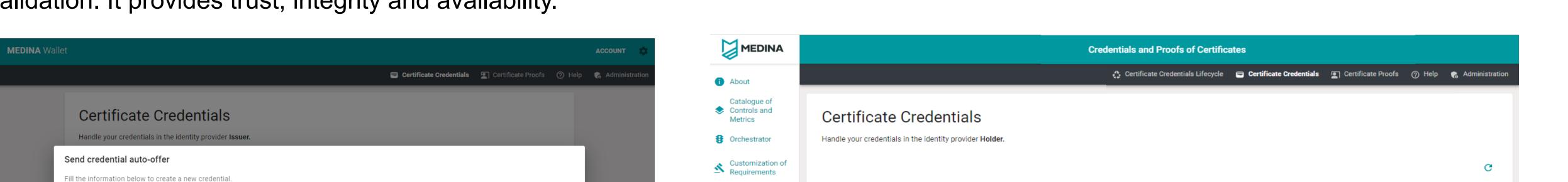
MEDINA Tr	rustworthiness	System											
lumber of evidences					Numb	er of assessment results							
Number of pieces of evidence 13,023						Number of assessment results 12,280							
ook for specific:													
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2023-02-15	1676457278988769372		b8629170-8ddb-4b0e-a7b0-47d5a101aa3f		/subscriptions/463cd324-9281-4ba1-b42d-ef90d		Clouditor Evidences Collection		N/A		%40%F2X%00D%A4%2B%2C%2CP%40%D3X%1E%		
2023-02-15	16764572779551174	97	a6ed113b-89bb-4273-9c73-09e9b2d	8cc93	/subscriptions/463cd324-9	281-4ba1-b42d-ef90d	Clouditor Evid	ences Collection		N/A		%F5%DA%A1%E8%96	6%1B%5E5%40P%A8i%CE%
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2023-02-15	16764572738538658	36	a1747320-8d16-4c27-9aef-0626ad91	7a8e	/subscriptions/463cd324-9	281-4ba1-b42d-ef90d	Clouditor Evid	ences Collection		N/A		H%DCf%E7%B85%00	%17%D1%E5%936%8A%C3z
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Assessment Result id		Metric	c Id			Assessment Result Hash					Compliance Hash		
Select	\sim	Sele	ect	\sim		Select		\sim			Select	~	
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Registered Assessment Results													
Date per day	\downarrow timestamp		Assessment id		Metric id		Assessment H	lash		Compliance Ha	ash	Associated evidence	es
2023-02-15	16764590601721493	48	61ab60c2-bdad-4221-8ec9-a73f25ec	Idac3	AtRestEncryptionEnabled		%85%16B%A2	%E0%A3%F8%7F%70	C%5C%3B%84%	%15%E5iY%B6	%A0-%402%BF%E8%D0%D3%BA%2	5ff4081d-4aaf-4841-	-9581-aa883ddd835f
2023-02-15	16764588232913461	73	2c67eb59-502c-4d40-bf60-7202c5c6	i32ab	OSLoggingEnabled		%DEL~%DF%C	24%F8 %9C%94%F4W	VPrtOf%85k%00	7%CCo%0D~z_	%3C%3A0%82%82%EE%7B%5Db%.	5e237f69-5f3f-45d5-	-9493-6d8abab85b77
2023-02-15	16764587593864426	34	974ecba0-15b6-4204-857b-ac305f4c	10a26	AtRestEncryptionEnabled		%F5%BB%ED?	AE%97%FEG%00b%	81%09%60%99	%15%E5iY%B6	%A0-%402%BF%E8%D0%D3%BA%2	0c5adf1d-8d3b-4a56	6-82d4-daee70eaa987
2023-02-15	16764584592799864	24	b492f28f-b29f-4759-91a2-d449cddea	101	AtRestEncryptionEnabled						%A0-%402%BF%E8%D0%D3%BA%2	100 1 115 0701 1/50	

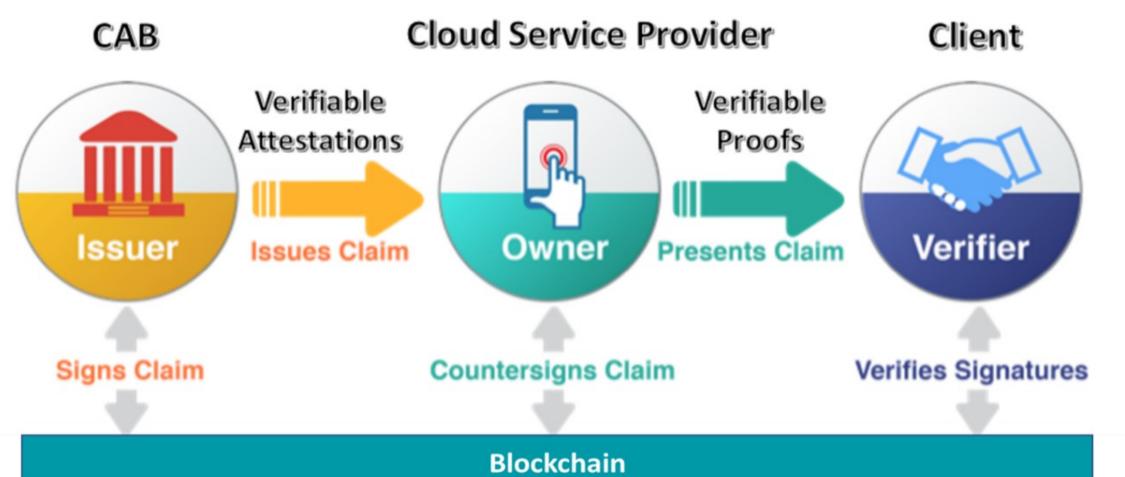
	Integrity Validation of Evidence	admin a		
About	الله List of Evidence م Evidence الله List of Assessment Results الله الم	Assessment Result	? Help	
Catalogue of Controls and Metrics	MEDINA Evidence Trustworthiness System			
Orchestrator	This is the current integrity check status of the MEDINA evidence			
Customization of	Evidence ID Integrity Check			
Requirements	79f6d84d-1686-4605-b7d5-f1c789b74b6e			
Continuous Certificate	176ab185-0a9f-434d-85df-3c0f2cd1a7d8			
Evaluation	ddc76419-0fbd-4daa-b9f5-a0bd5113b82c			
Risk Assessment	61da7d64-1143-460a-ba75-38f695641212			
Organisational Evidence	156f5a1b-a006-4cc9-87c2-6eb72c2e1e5f			
Assessment Credentials and Proofs of Certificates	19a9f11e-3c14-4973-b788-8bf9ff930699			
	b199daba-3645-4a69-a831-593c840d7101			
Integrity Validation of	71fab566-37ec-49af-812b-038caa893925			
Evidence	28eab3c5-5db2-4bb2-8d14-a894df145a50			
120	7925efef-cb32-49fe-ae07-32912e1ab8bf			
project has received funding	432a6c71-1dcf-4036-bd10-39d7b87e1c0e			
the European Union's Horizon 20 research and innovation	6b7ff38e-3c34-49ac-a3df-de564d10ae46			
amme under grant agreement No 952633.	137db061-254f-4f87-a816-f26306a64b97			

MEDINA Self Sovereign Identity Framework

The MEDINA Self Sovereign Identity (SSI) Framework provides a secure mechanism for Cloud Service Providers (CSPs) to prove the certification status of their cloud services according to the Certification Authority Board (CAB) issuance. It is composed of four main components:

- **Issuer:** It creates, signs and issues verifiable credentials with the cloud service certification status. The CAB will be the trusted authority acting as issuer of the conformity assessment result reports.
- **Owner:** It refers to the CSP; it locally owns, stores and controls the credentials about his cloud services. It also generates verifiable proofs of the certification status based on the own verifiable credentials.
- **Verifier**: It refers to an external user or auditor who needs to identify cloud service certification status based on verifiable credentials issued by trusted issuers.
- **Blockchain:** It is the secure global repository for public key identifiers in SSI, needed for the signatures' validation. It provides trust, integrity and availability.





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MEDINA SSI Tecnalia Holder TEST (c8c96e64-0c3c-47c8-81d7-9aa20a5f5452) Organisational Evidence Assessment Type: Schema id: Type: Continuous Continuous Continuous Continuous Attributes: Attributes: Condentine continuous 	09876454-fbda-4520-bd87-b4f129e8f0 J3t3dq1f3PT3yjBEFeqxHT:2:medina:6. J3t3dq1f3PT3yjBEFeqxHT:3:CL:2609:d J3t3dq1f3PT3yjBEFeqxHT:4:J3t3dq1f3 12 certificate_status: removal, cloud
Owned schema Organisational Schema id: Schema id: Owned schema Evidence Cred def id: Schema id: J3t3dq1f3PT3yjBEFeqxHT:3:CL:2609:default (version 1.0) Continuous Revision: Schema id:	J3t3dq1f3PT3yjBEFeqxHT:3:CL:2609:d J3t3dq1f3PT3yjBEFeqxHT:4:J3t3dq1f3 12
- Owned schema J3t3dq1f3PT3yjBEFeqxHT:3:CL:2609:default (version 1.0)	J3t3dq1f3PT3yjBEFeqxHT:4:J3t3dq1f3 12
- Owned schema J3t3dq1f3PT3yjBEFeqxHT:3:CL:2609:default (version 1.0)	12
J3t3dq1f3PT3yjBEFeqxHT:3:CL:2609:default (version 1.0)	
J3t3dq1f3PT3yJBEFeqxH1:3:CL:2609:default (version 1.0) Attributes: Attributes:	certificate_status: removal, cloud
Credentials and	
Attributes	
Certificates	54440026-4dc7-4c56-92a6-2be01d7f87
cloud service id	J3t3dq1f3PT3yjBEFeqxHT:2:medina:6.
Cred det id:	J3t3dq1f3PT3yjBEFeqxHT:3:CL:2609:d
Validation of	J3t3dq1f3PT3yjBEFeqxHT:4:J3t3dq1f3
Evidence Revision:	10
Attributes:	certificate_status: issued, cloud_s
(Revoked	
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