Metaverse Standards Forum
Decentralized Credit Scoring for Metaverse Applications

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Status: Approved for Public Distribution

Version: 1.0

Reviewer	Due Date	Status	Contact
Digital Asset Management Working Group	December 17, 2024	Complete	digital_asset_management @lists.metaverse-standards.org
MSF Domains (Peer Review)	March 05, 2025	Complete	oversight@lists.metaverse-standards.org
Use Case Taskforce	May 16, 2025	Complete	use_case_task_force@lists.metaverse-standards.org

The purpose of this template is to provide a structured framework for collecting and documenting use cases within the Metaverse Standards Forum (MSF). Use cases are essential for understanding real-world scenarios where metaverse technologies are applied and where interoperability challenges may arise. This template guides MSF members in providing a concise yet comprehensive description of a use case, including its title, identifier, and summary. It also encourages contributors to list the benefits of the use case, identify actors or entities involved, and describe the use case scenario in detail, emphasizing interactions, challenges, and requirements. Additionally, it prompts the inclusion of relevant technical information, such as implementations, success metrics, and challenges faced. This template aims to facilitate the gathering of valuable use-case data to inform standards development and foster collaboration within the MSF community.

MSF members and MSF Domain Groups are invited to submit use cases.

NOTE: Organizations such SDOs who want to submit and add a use case would need a sponsor that is an MSF member. This process is established in order to have a contact person in MSF that can handle discussions and resolve open issues within regular meetings.

Eligible submitters:

- MSF Domain Groups
- MSF Members (Principal and Participant)
- External Organizations with Liaison Agreements (with the support of a MSF member that acts as sponsor)

- Standard Development Organizations (with the support of a MSF member that acts as sponsor)

Minimum Requirements for MSF Member Submissions not part of a Domain Group:

- Minimum required number of proposers: 3
- Minimum required number of supporters: 5

NOTE: Use cases submitted by SDOs and Liaison Organizations would also need to fulfill the same requirements (and would need a sponsor) unless they are submitted by a Domain Group.

MSF: *Metaverse Standards Forum*
POG: *Pre-qualified Organizations and Groups*
SPP: *Standards Related Publications and Projects*
DWG: *Domain Working Groups*
WG: *Working Group*
SDO: *Standards Development Organization*

Use Case Title

Decentralized Credit Scoring for Metaverse Applications

Use Case Identifier

MSF2024-DCS-001

- Version 1.0
- Year of Release: 2025

Summary of Use Case

Description: This Use Case Examines the Implementation of Decentralized Credit Scoring Mechanisms utilizing User-Controlled Data Sources. The aim is to provide a more accurate, privacy-focused, and Interoperable Credit Scoring System that can be used across various applications in the Metaverse.

Benefits:

- Enhanced User Privacy and Control over Personal Data.
- Improved accuracy and inclusivity in Credit Scoring.
- Increased Interoperability between different Financial and Non-Financial Services in the Metaverse.

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Contributors and Supporters

- Digital Asset Management Working Group
- MSF Domains (Peer Review)
- Use Case Taskforce

Keywords

Decentralized Credit Score, User-Controlled Data, Credit Assessment, Metaverse, Interoperability, Privacy, Blockchain

Actors/Entities

- **End Users:** Individuals seeking to Utilize Decentralized Credit Scores. They Control and Provide Access to their Credit Data. “Holders” in the Decentralized Identity (DID) Framework.
- **Verification Service Providers:** Entities that Validate and Generate End User Credit Data, ensuring its accuracy and integrity. “Issuers” in the DID Framework.
- **Businesses and Brands:** Financial Institutions, Rental Agencies, Employers, and Other Entities, Using Credit Scores for Decision-Making. They assess creditworthiness based on decentralized data. “Verifiers” in the DID framework.
- **Metaverse Platform Providers:** Providers of Virtual Environments where Interactions Occur. They Facilitate Secure and Interoperable Data Exchange within the Metaverse. Platforms can also be Verification Service Providers if they create User Credit Data.
- **Reputation (or Credit) Analytics Tools:** Systems that analyze and interpret Decentralized Credit Data to Provide Insights and Credit Scores.

Detailed Description of Use Case/Scenario

Preconditions:

- End Users have access to Decentralized Identity Management Tools.
- Verification Service Providers are integrated with Metaverse Platforms.
- Reputation Analytics Tools have the necessary Infrastructure to Process Decentralized Credit Data.

Main Flow:

1. **End User Data Control:** End Users receive their Credit Data from multiple Verification Service Providers in an Identity Wallet.
2. **Data Sharing:** End Users Grant Access to their Credit Data to Credit Analytics Tools.
3. **Credit Assessment:** Businesses and Brands use Credit Analytics Tools to Access and Evaluate the End User’s Credit Data to determine eligibility for various services (e.g., loans, rentals, and employment).

4. **Decision Making:** Based on the Credit Assessment, Businesses and Brands Make Informed Decisions regarding the End User's Applications.
5. **Record Keeping:** Decisions and related actions are recorded in the Decentralized System, contributing to the End User's Credit History.

Alternative Flow:

- **Data Discrepancy:** If Discrepancies are found in the Credit Data, End Users and Verification Service Providers are Notified to Correct the Data before reassessment.
- **Service Denial:** If the Service Application is Denied, End Users are provided with Reasons and Suggestions to Improve their Creditworthiness.

Postconditions

- **Credit Data Maintenance:** End Users Maintain Control over their Credit Data Post-Assessment.
- **Credit Scores Improvement:** Successful Interactions Improve End Users' Decentralized Credit Scores.

Implementations and Demonstrations or Technical Feasibility

Implementations and Demonstrations

- **Metabank:** A Decentralized Bank in the Metaverse that Offers services such as Loans and Credit Assessments, indicating the Use of Decentralized Credit Scoring Systems. For more information, visit https://metabank.li/
- **FreshCredit:** A Blockchain-Based Platform offering Decentralized Credit Scoring Solutions. FreshCredit uses patent-pending technology to allow users to control and verify their credit data, enabling secure and reliable credit assessments. For more information, visit https://freshcredit.com/decentralized-credit-scoring-a-new-dawn/
- **Centic's FICO Crypto Credit Score:** This Solution Integrates Traditional Credit Scoring Methods with Blockchain Technology to Evaluate the Creditworthiness of Borrowers in the DeFi space. It utilizes both on-chain and off-chain data to provide a comprehensive credit score. For more information, visit https://medium.com/@centicio/an-introduction-to-fico-crypto-credit-score-22f3f41a429

Technical Feasibility

- The Use of Blockchain Technology ensures Data Security and Immutability.
- Smart Contracts Facilitate Secure and Transparent Data Sharing between End Users and Businesses.

Challenges:

- **Data Privacy and Security:** Decentralized Credit Scoring Systems must ensure that Sensitive User Data is Protected against Unauthorized Access and Breaches. The challenge lies in implementing robust encryption methods and maintaining privacy in a decentralized environment.

- **Data Verification:** Ensuring the accuracy and authenticity of user-provided data without a central authority requires advanced verification mechanisms. This includes cross-referencing on-chain and off-chain data sources.
- **Interoperability Across Platforms:** Different Metaverse Platforms and Credit Scoring Systems may use varying standards and protocols. Achieving seamless Interoperability for Credit Data Exchange is a Significant Challenge.
- **Regulatory Compliance:** Decentralized Credit systems Must Navigate a Complex Landscape of Financial Regulations that vary by region. Ensuring compliance while maintaining decentralization is difficult, and
- **Bias and Fairness:** Decentralized Systems Must Address Potential Biases in the Algorithms used for Credit Scoring. Ensuring fairness and avoiding discrimination based on race, gender, or socioeconomic status is crucial.
- **User Adoption and Trust:** Users Must Trust the Decentralized System and Feel Confident Managing their Own Data. This requires significant user education and the development of intuitive, user-friendly interfaces.
- **Scalability:** the System inability to Handle a large number of transactions Without Degrading Performance. Scalability issues also Can Lead to Delays and Reduced Reliability of the Decentralization Credit Scoring Process.
- **Cost and Efficiency:** Operating a Decentralized Network Can be Costly due to the Computational Resources required for Blockchain Operations. Balancing cost-efficiency with system performance is necessary.
- **Reputation Management:** Accurately Reflecting Decentralized Credit Scores, Assessment Results, and Associated Reputation Data Might Be Challenging — Especially When the Credit Scoring System and Metaverse Platform Lack Integration and Standardized Universal Metrics. Inaccurate or Incomplete Reflection Can Undermine the Credibility and Trustworthiness of Both the System and the Platform.

Requirements:

Technical and Functional Requirements

- **Decentralized Identity Management:** Tools for Users to Manage and Verify their Identities Securely.
- **Robust Security Measures:** Encryption and Multi-factor Authentication, to protect the Credit Scoring Assessment and Reputation Data. This should enhance security, prevent fraud and unauthorized access.
- **Reputation Data Management:** Establish a Standardized Method for Assessing the Accuracy Decentralized Credit Scoring and Reputation Data. This Includes Creating Universal Metrics that Can Be Recognized across Systems and Platforms, while ensuring accurate reflection of Credit Scores and Reputation Data, and Maintaining Integrity of all concerned Entities/Actors Assessment Scores and Reputation.
- **Notifications**: deploy real-time alert mechanisms to notify users of credit data updates through accessible Decentralized Credit Scoring Systems and Platform dashboards. This enhances transparency and helps actors accurately identify changes in credit status.

- **Regulatory Compliance Frameworks:** ensure that the Decentralized Credit Scoring Processes Comply with relevant Legal and Regulatory Requirements, including Data Protection and Privacy Laws. This would Prevent Legal issues and Enhance User Trust by ensuring lawful credit scoring assessments.
- **Scalability Solutions:** develop Scalable Solutions that can handle large volumes of Decentralized Credit Scoring assessments without leading to Performance Degradation, while also maintaining reliability and efficiency of the assessment process even as the number of applications grows.
- **Verification Services:** utilize Third-Party Verification Service Providers, where needed, to authenticate the Credit Scoring Process and Validate the Assessment before completing the transfer. Ensure the legitimacy of the scoring and protect against fraudulent activities.
- **User-Friendly Interfaces:** design Intuitive and User-friendly Interfaces for Initiating and Completing Decentralized Credit Scoring Assessments. Improve User Satisfaction and encourage more users to participate in decentralized credit scoring.
- **Audit and Reporting Tools:** Implement Tools for Auditing Credit Scoring Assessment Results and associated Reputation Data. Provide transparency and accountability, helping to resolve disputes and verify credit scoring results.
- **Compliance with Existing Standards:** Adherence to Established Standards for Financial Data Exchange and Blockchain Operations.

Interoperability Requirements:

- **Cross-Platform Compatibility:** ensure that Decentralized Credit Scoring and the associated Reputation Data can be exchanged and recognized across different Credit Scoring Systems and Metaverse Platforms. Reduce barriers to Decentralized Credit Scoring Assessments and promote a more Interconnected Metaverse Ecosystem.
- **APIs and Data Formats:** support interoperability between various Decentralized Credit Scoring Systems and Metaverse Platforms through APIs and standardized data formats. Enhance compatibility and seamless interaction between different Systems and Platforms.
- **Standardized Protocols:** Implement Standardized Protocols for Decentralized Credit Scoring and Metaverse Platforms to ensure high degrees interoperability. This would help facilitate seamless and error-free exchange of Decentralized Credit Scoring Assessment and Reputation Data between systems and platforms, reducing confusion and improving User Experience.
- **Unified Credit Scoring Standards:** Develop Unified Metaverse Oriented Credit Scoring Assessment Standards that captures applicable details such as Credit Results and Reputation Information. Simplify the Decentralized Credit Scoring Process and ensure that all relevant information is consistently maintained.

Other Key Considerations:

- **Privacy:** secure handling and protection of sensitive Decentralized Credit Scoring and Reputation Data, sharing such information only with concerned parties and strictly with the explicit consent of the End-Users and all applicable actors / entities.
- **Cybersecurity:** robust cybersecurity measures to safeguard Credit Scoring and Reputation Data against breaches and unauthorized access. This includes encryption, secure access controls, and provision of audit trails for regular security audits.
- **Identity Verification:** Ensure that Reasonable Identification and Authorization are Conducted by Verification Service Providers, while End-Users Provide Access to their

Credit Data. However, Verification and Scoring Functions Should Remain Operationally Separate to Uphold Compliance, Prevent Conflicts of Interest, and Align with KYC/AML Requirements.

- **Networking and Latency:** Efficient Transfer of Decentralized Credit Scoring Mechanisms without latency issues, while ensuring that the Credit and associated Reputation Data is accessible in real-time.
- **Ownership:** provide End-Users with the ability to maintain oversight on their Credit and Reputation Data usage, storage and sharing to ensure continuous compliance with the consent they have granted.
- **Digital Ethics:** address ethical considerations by establishing or affiliating with an Ethics Board tasked with providing oversight, including regularly reviewing and guiding the ethical use of Credit and Reputation Data.
- **Provenance:** accurate tracking of data sources and changes to maintain the integrity and trustworthiness of End-Users Credit and Reputation Data.
- **Accessibility:** ensuring Credit Data, Scoring Results and Reputation Data is accessible to End-Users, with varying levels of technical expertise and accessibility requirements.

Relevant Domain Working Group (WGs):

- NA

Relevant Pre-qualified Organizations and Groups (POGs):

- **W3C (World Wide Web Consortium):** develops standards for the web, including those related to privacy, security, and identity management, which are crucial for the interoperability of metaverse technologies (www.w3.org).
- **Decentralized Identity Foundation (DIF):** develops open protocols and standards for decentralized identifiers (DIDs), secure messaging, authentication, data storage, and interoperability to enable effective and secure exchange of identity-related data across decentralized systems and platforms (https://identity.foundation)

Relevant Specifications, Publications and Projects (SPPs):

The following standards and specifications enable Identity Verification for Decentralized Credit Scoring by leveraging cryptography and blockchain-based Identity Verification and Authentication techniques:

- W3C Decentralized Identifiers (DID)
- W3C Verifiable Credentials
- DIF DIDComm Protocol
- DIF DID Authentication (DID Auth)

Related Use Cases

- Unified Reputation Management for Metaverse Entities (MSF2024-REPUMME-001)
- Cybersecurity Reputation Data Storage Use Case (MSF2024-001-REPCDS)
- Humanity Attestation in Metaverse Environments Use Case (MSF2024-001-POH)
- Shared KYC/AML Verification Use Case (MSF2024-REPSKA-001)

Additional Comments

- This document is a living artifact and may be subject to revisions on a periodic basis to reflect the future state of Decentralized Credit Scoring for Metaverse Applications, and or based on feedback received from MSF stakeholders that warrants an update in the future.