Moving Picture, Audio and Data Coding
by Artificial Intelligence
www.mpai.community

MPAI Technical Specification

Compression and Understanding of Industrial Data MPAI-CUI

WD 0.4

WARNING
Use of the technologies described in this Technical Specification may infringe patents, copyrights or intellectual property rights of MPAI Members or non-members.
MPAI and its Members accept no responsibility whatsoever for damages or liability, direct or consequential, which may result from use of this Technical Specification.
Readers are invited to review Annex 2 – Notices and Disclaimers.

Compression and Understanding of Industrial Data

1   Introduction

Moving Picture, Audio and Data Coding by Artificial Intelligence (MPAI) is an international Standards Developing Organisation with the mission to develop *AI-enabled data coding standards*. Research has shown that data coding with AI-based technologies is generally *more efficient* than with existing technologies. Compression and feature-based description are notable examples of coding.

Compression and understanding of industrial data (MPAI-CUI) is an MPAI Standard, comprising the "AI-based Company Performance Prediction (CPP)" Use Case. CPP uses AI to extract the most relevant information from industrial data, with the aim of assessing the performance of a company and predicting the risk of bankruptcy long before it may happen.

The current version of MPAI-CUI has been developed by the MPAI Compression and Understanding of Industrial Data Development Committee (CUI-DC). Future versions of the standard may extend the scope of the Use Case and/or add new Use Cases in the scope of Compression and Understanding of Industrial Data.

In the following Terms beginning with a capital letter are defined in *Table 1* if they are specific to this MPAI-CUI Standard and to *Table 10* if they are common to all MPAI Standards.

The AI Framework (AIF) execution environment (MPA-AIF) [2] depicted in **Error! Reference source not found.** enables Interoperable AI applications and services.
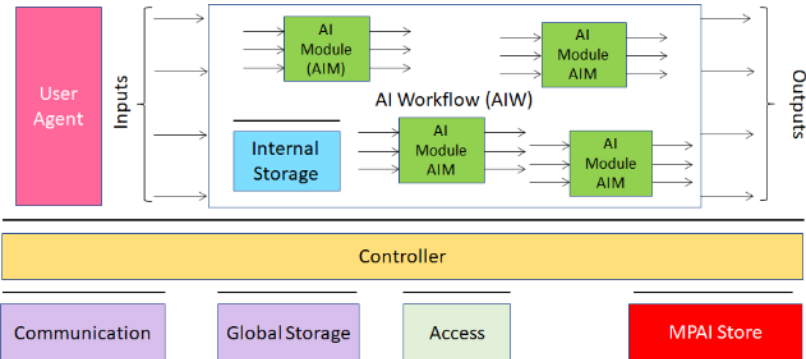
Figure 1 –Architecture and Components of the AI Framework (AIF)

MPAI-CUI normatively specifies the technologies required to support the AI-based Company Performance Prediction Use Case (CPP). *Figure 2* is the instantiation of the general AIF Architecture to the CPP Use Case. Note: the Internal Storage and Access of **Error! Reference source not found.** are not represented.
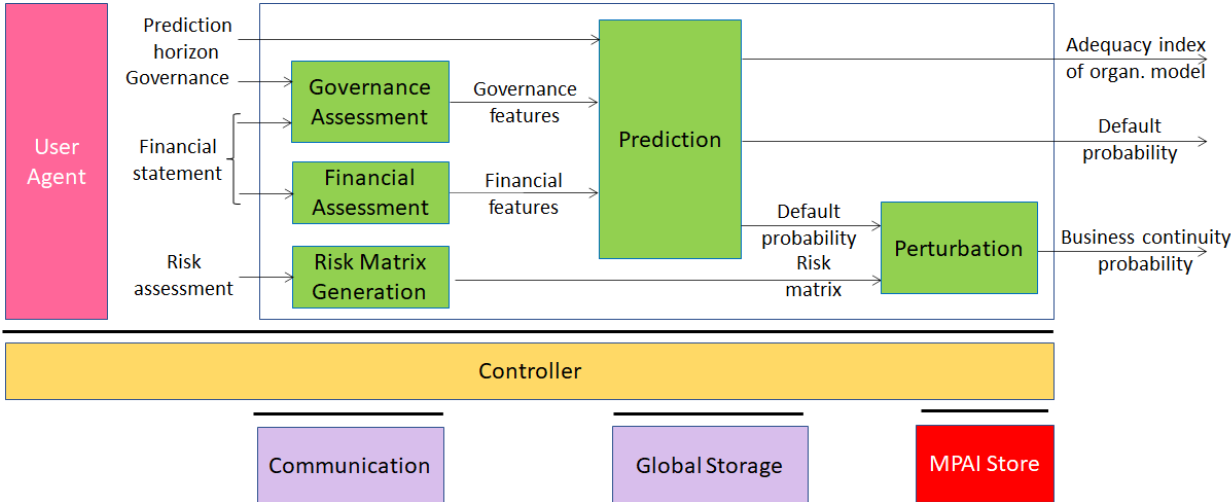
Figure 2 – AI-based Company Performance Prediction Reference Model

The rectangle including green boxes in *Figure 2* is called AI Workflow (AIW). The AIW is characterised by the following normative elements:

1. The <u>format and semantics of the input data</u>, i.e., "Prediction Horizon", "Governance", "Financial Statement" and "Risk Assessment".
2. The <u>function of the AIW</u>, i.e., "Compute company performance indicators in a given prediction horizon".
3. The <u>format and semantics of the output data</u>, i.e., "Adequacy index of organisational data", "Default probability" and "Business continuity probability".
4. The Connections of the green boxes – called AI Modules (AIM).

Each AIM, like the one depicted in **Error! Reference source not found.** called Governance Assessment,

Figure 3 – An example of AI Module (AIM)

is characterised by the following normative elements:
1. The <u>format and semantics of the input data</u>, i.e., "Governance" and "Financial Statement".
2. The <u>function</u>, i.e., "Compute the Governance Features".
3. The <u>format and semantics of the output data</u>, i.e., "Governance Features".
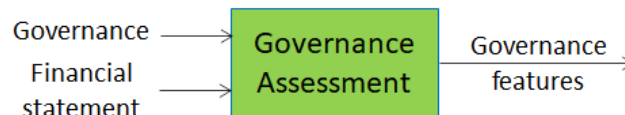AIMs are defined by their functions and interfaces, not by their internal architectures, which may need not be known and may be based on AI or data processing, and implemented in software, hardware or hybrid software and hardware technologies.

MPAI defines Interoperability as the ability to replace an AIM in an AIW with another AIM having the same normative elements and Interoperability Level and obtain a functionally equivalent AIM. An Implementation may have 3 different Interoperability Levels:

Level 1   An AIF Implementation running an AIW composed of AIMs performing any proprietary function and exposing any proprietary interface but exposing the interfaces required to be executed in the AIF.
Level 2   An AIF Implementation running an AIW composed of AIMs whose functions and interfaces are specified by an MPAI Application Standard.
Level 3   An Implementation running an AIW composed of AIMs certified to possess the attributes of Reliability, Robustness, Replicability and Fairness – collectively called Performance.

2   Scope of the MPAI-CUI standard

The AI-based Company Performance Prediction Use Case of the Compression and Understanding of Industrial Data (MPAI-CUI) Standard
1. Predicts the performance of a Company, from its Governance, Financial and Risk data (see subsections 6.2.2, 6.2.3 and 6.2.4). The time of prediction is given as Prediction Horizon see 6.2.1).
2. Measures the Performance of the Company with Default Probability, Adequacy Index of Organisational Model, and Business Continuity Index (see 6.2.8, 6.2.9 and 6.2.10).
Company Performance Prediction normatively defines the AIW and the connections of the AIMs, the AIMs and the Formats of the input and output data of the AIW and the AIMs.
The word *normatively* implies that an Implementation claiming Conformance to:
1.   An *AIW*, shall have:

    a. The function specified in Section 5.1.1.
    b. The input and output data specified in Subsection 5.1.2
    c. The AIM Topology specified Subsection 5.1.3.
    d. The AIMs with the functions specified in Subsection 5.1.4.
2. An *AIM*, shall have:
    a. Perform the AIM function specified by the appropriate section of Section 6.1.
    b. Receive as input and produce as output data in the formats specified in Section 6.2.
3. A *Data Format*, the data shall have a format specified in Section 6.2.

Users of this Technical Specification should note that:
1. This Technical Specification defines the possible levels of conformance of an Implementation but does not mandate any.
2. Implementers decide the Interoperability Level their Implementation satisfies.
3. Implementers can use the Reference Software to develop their Implementations [4].
4. Implementers can use the Conformance Testing specification to test the Conformance of an Implementation with this Technical Specification [5].
5. Performance Assessors assess the Grade of Performance of an Implementation based on the results of Performance Assessment [6].
6. The Governance of the MPAI Ecosystem is outlined in Annex 3 and specified in [1].

3 Terms and definitions

The Terms used in this Technical Specification specific of MPAI-CUI and whose first letter is capital have the meaning defined in *Table 1*. The general MPAI Terms are defined in *Table 10*.

Table 1 – MPAI-CUI terms

Term	Definition
Financial features	A set of indexes and ratios computed using financial statement data.
Financial statement	Data produced based on a set of accounting principles driving maintenance and reporting of company accounts so that financial statements can be consistent, transparent, and comparable across companies.
Governance features	A set of indexes/parameters that are used to assess the adequacy of the organizational model.
Risk assessment	Attributes that indicate the internal assessment that the company performs to identify and measure potential or existing vertical risks, and their impact on business continuity.
Risk matrix	Table composed of two rows for the risks (cyber and seismic) and four columns for the characteristics (occurrence, business impact, gravity and risk retention) as evaluated by the company.

4 Normative references

The following documents are normatively referenced by MPAI-CUI.

1. MPAI Document: Governance of the MPAI Ecosystem V.1
2. MPAI Technical Specification: AI Framework (MPAI-AIF) – under development
3. MPAI Technical Specification: Compression and Understanding of Industrial Data (MPAI-CUI) V.1

4. MPAI Reference Software: Compression and Understanding of Industrial Data (MPAI-CUI) V.1
5. MPAI Conformance Testing: Compression and Understanding of Industrial Data (MPAI-CUI) V.1
6. MPAI Performance Assessment: Compression and Understanding of Industrial Data (MPAI-CUI) V.1
7. International Financial Reporting Standard. List of IFRS Standards. Available online: https://www.ifrs.org/issued-standards/list-of-standards/
8. International Organization for Standardization. ISO 31000 – Risk Management. Available online: https://www.iso.org/files/live/sites/isoorg/files/store/en/PUB100426.pdf
9. International Organization for Standardization. ISO 27005 Information technology -- Security techniques -- Information security risk management
10. International Organization for Standardization. ISO/IEC 27032 -- Information technology — Security techniques — Guidelines for cybersecurity.
11. Federal Emergency Management Agency (FEMA). Earthquake-Resistant Design Concepts. An Introduction to the NEHRP Recommended Seismic Provisions for New Buildings and Other Structures. FEMA P-749/December 2010.

5 Use Case Architecture

5.1 AI-based Company Performance Prediction

5.1.1 Function

The AI-based Company Performance Prediction Use Case) Standard
3. Predicts the performance of a Company, from its Governance, Financial and Risk data (see subsections 6.2.2, 6.2.3 and 6.2.4). The time of prediction is given as Prediction Horizon see 6.2.1).
4. Measures the Performance with Default Probability, Adequacy Index of Organisational Model, and Business Continuity Index (see subsections 6.2.8, 6.2.9 and 6.2.10).

5.1.2 Input/output data

Input	Comments
Prediction Horizon	Number of months of prediction.
Governance	Governance data.
Financial Statement	Full financial statement.
Risk Assessment	The company assessment of the impact of vertical risks: cyber and seismic assessed according to ISO 31000 Risk Management [8], and ISO 27005 Information security risk management [9], specific for cyber risk management.
Output	**Comments**
Default probability	the probability of the company default in the specified prediction horizon.
Adequacy index of organisational model	the adequacy of the organisational model expressed as a linear score in the 0 to 1 range in the specified prediction horizon.
Business continuity probability	the probability of an interruption of the operations of the company for less than 2% of the specified prediction horizon.

5.1.3 Implementation Architecture

Error! Reference source not found. (repeated below for convenience) gives the normative Architecture of the AI-based Company Performance Prediction Use Case.
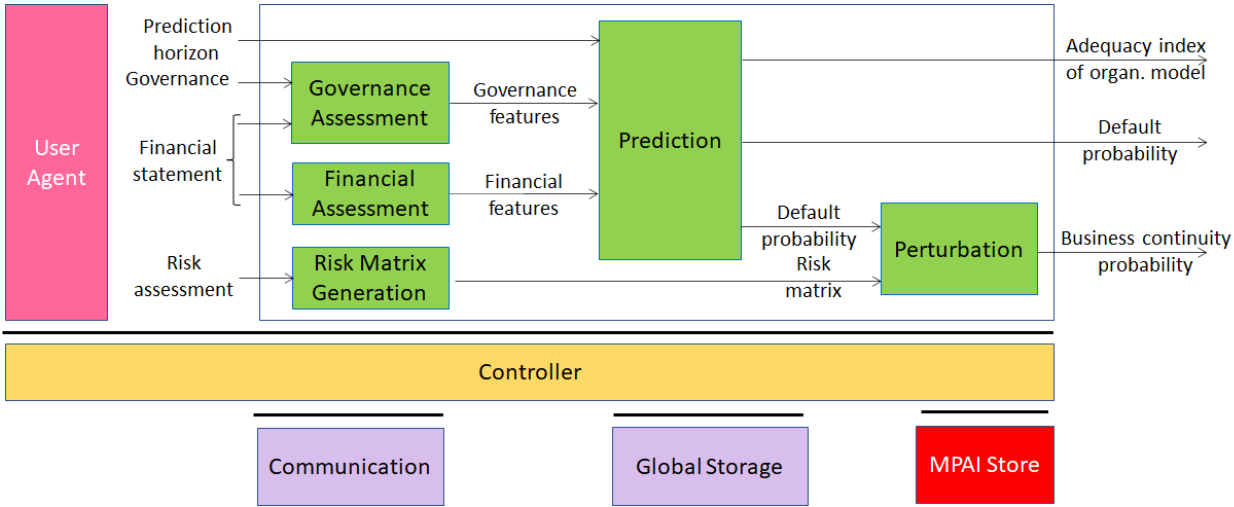
This is how AI-based Company Performance Prediction operates:
1. User defines a Prediction Horizon and feeds Governance, Financial Statement and Risk Assessment data.
2. Governance Assessment produces Governance Features by processing Governance and Financial data.
3. Financial Assessment produces Adequacy of Financial Features by processing Financial Statement data.
4. Risk Matrix Generation produces the Risk Matrix by processing Risk Assessment data.
5. Prediction produces Adequacy Index of Organisational Model and Default Probability by processing Governance Features and Financial Features.
6. Perturbation produces Business Continuity Probability by processing Default Probability and Risk Matrix.

5.1.4 AI Modules

The AI Modules in **Error! Reference source not found.** perform the functions described in *Table 2.*

Table 2 – AIMs of AI-based Company Performance Prediction

AIM	Function
Financial Assessment	Computes the financial features defined in (see 6.2.5).
Governance Assessment	Computes the governance features defined in (see 6.2.6)_.
Risk Matrix Generation	Builds the risk matrix defined in (see 6.2.7).
Prediction	Computes 1. The Default Probability (see 6.2.8) in a prediction horizon 2. The Adequacy Index of Organizational Model (see 6.2.9).
Perturbation	Perturbs the Governance Features and Financial Features to compute the Business Continuity Probability (see 6.2.10).

5.1.5   AIW Metadata

Specified in Annex 4 Section 0.

6   AI modules

6.1   MPAI-CUI AIMs and their data

6.1.1   AI-based Performance Prediction

Table 3 gives the I/O data of AI-based Company Performance Prediction.

Table 3 – I/O data of the AI-based Company Performance Prediction AIW

AIM	Input Data	Output Data
Financial Assessment	Financial Statement Data	Financial Features
Governance Assessment	Governance Data	Governance Features
Risk Matrix Generation	Risk Assessment	Risk Matrix
Prediction	Financial Features Governance Features Prediction horizon	Default probability Adequacy Index of Organizational Model
Perturbation	Default probability Risk Matrix	Business Continuity probability

The AIM Metadata are specified in Annex 4 Section 3.

6.2   Data Formats

Table 4 gives the links (column 2) to the Subsections where the Data Formats (column 1) are defined. Column 3 gives the Use Cases that uses the Data Formats.

Table 4 – Data formats

Name of Data Format	Subsection	Use Case
Prediction horizon	6.2.1	CUI
Financial statement	6.2.2	CUI
Governance	6.2.3	CUI
Risk assessment	6.2.4	CUI
Financial features	6.2.5	CUI
Governance features	6.2.6	CUI
Risk matrix	6.2.7	CUI
Default probability	6.2.8	CUI
Adequacy index of organisational model	6.2.9	CUI
Business continuity probability	6.2.10	CUI

6.2.1   Prediction Horizon

The number of months into the future that represents how far ahead Prediction computes the Default Probability.

6.2.2 Financial Statement

The financial statement provided by the Company in JSON format. The JSON data are accessible from https://mpai.community/standards/mpai-cui/data/FinancialStatementData-JSON/.

6.2.3 Governance

The governance data provided by the Company in JSON format. The JSON data are accessible from https://mpai.community/standards/mpai-cui/data/GovernanceData-JSON/.

6.2.4 Risk assessment

The risk assessment data provided by the Company in JSON format *RiskMatrixData-JSON*. The JSON data are accessible from https://mpai.community/standards/mpai-cui/data/.

6.2.5 Financial features

The Financial features, computed directly from the financial statement data, are given in *Table 5*.

Table 5 – Financial features

Feature	Name	Feature type	Feature value
1	Revenues	Revenue/Profit	Absolute value
2	EBITDA margin	Revenue/Profit	Percentage (%)
3	EBITDA	Revenue/Profit	Absolute value
4	Quick ratio	Revenue/Profit	Absolute value
5	Current ratio	Revenue/Profit	Percentage (%)
6	Net working capital	Revenue/Profit	Absolute value
7	Net Financial Position	Cost/Debt	Absolute value
8	Net short-term assets	Cost/Debt	Absolute value
9	Shareholder funds-Fixed assets	Cost/Debt	Absolute value
10	Long-term liability ratio	Cost/Debt	Percentage (%)
11	Coverage of fixed assets	Cost/Debt	Absolute value
12	Amortization rate	Cost/Debt	Percentage (%)
13	Debt on sales (%)	Cost/Debt	Absolute value
14	Interest coverage ratio	Cost/Debt	Percentage (%)
15	Average stock turnover	Production	Absolute value
16	Stock coverage days	Production	Absolute value
14	Return on Investments (ROI)	Revenue/Profit	Percentage (%)
15	Return on asset (ROA)	Revenue/Profit	Percentage (%)
16	Return on sales (ROS)	Revenue/Profit	Percentage (%)
17	Return on equity (ROE)	Revenue/Profit	Percentage (%)
18	Cash flow	Production	Absolute value
19	Interest on sales	Cost/Debt	Percentage (%)
20	Type of financial statement	Financial statement type	Enumeration

Feature n. 20: enumeration elements: Abbreviated, Micro, Detailed.

Table 6 specifies how the features of *Table 5* (column 2) are normatively computed according to International Financial Reporting Standard (column 4) [1]. The definitions of column 3 are informative.

Table 6 – Financial features specifics

Feature	Name	Definition	Formula	Data type
1	Revenues	The total amount of revenues	Directly provided in the financial statement	String of real numbers
2	EBITDA margin	A measure of a company's profitability by comparing its gross revenues with its earnings	EBITDA/Revenues	Percentage
3	EBITDA	A measure of a company's profitability	Operating margin + (Depreciation + Amortization + Writedowns)	String of real numbers
4	Quick ratio	The company's ability to meets the short-term obligations with its only liquid assets	(Current assets - inventory)/Current liabilities	String of real numbers
5	Current ratio	The company's ability to meets the short-term obligations with its current assets (e.g., cash, inventories, etc.)	(Current assets)/Current liabilities	String of real numbers
6	Net working capital	A measure of a company's liquidity and its ability to meet short-term obligations, as well as fund operations of the business	Current assets - Current liabilities	String of real numbers
7	Net Financial Position	A financial ratio that expresses the overall financial position of the company by including all liabilities of financial nature	Due to banks + Due to lenders – Total liquid funds	String of real numbers
8	Net short-term assets	A margin that expresses the company's ability to meet current short-term liabilities through the use of cash and cash equivalents and short-term receivables	Trade and other accounts + Total liquids funds – Short term liabilities	String of real numbers
9	Shareholder funds-Fixed assets	The company's financial solidity, thus its ability to finance itself from shareholders' equity	Shareholders' funds – Fixed assets	String of real numbers
10	Long-term liability ratio	The incidence of long-term debts on the total liabilities	Long- and medium-term liabilities /Total assets	String of real numbers

11	Coverage of fixed assets	An asset self-coverage ratio, which expresses the ratio of equity to tangible assets	Tangible fixed assets/Shareholders funds	String of real numbers
12	Amortization rate	The portion of capital invested in tangible fixed assets that has already been recovered	Amortization funds/ Tangible assets	String of real numbers
13	Debt on sales (%)	The company's ability to cover its debts with the revenues from sales	Total debts /Revenues	Percentage
14	Interest coverage ratio	The degree to which the operating profit is able to cover the cost of financial interests.	Operating margin + Depreciation, Amortization and Writedowns/ Interests	String of real numbers
15	Average stock turnover	The measure that expresses how often the warehouse is renewed	(Stocks-Advances)/Turnover *365	String of real numbers
16	Stock coverage days	The average length of time during which the stocks are in warehouses	Stocks/ Cost goods sold *365	String of real numbers
14	Return on Investments (ROI)	The profitability of an investment, measuring the amount of return of that particular investment, relative to its cost	Operating margin / (Shareholder's funds + Bonds + Due to banks + Due to shareholders for loans + Due to other lenders)	Percentage
15	Return on asset (ROA)	The profitability of a company in relation to its total assets	Operating margin / Total assets	Percentage
16	Return on sales (ROS)	Efficiency of a company in turning sales into profits	Operating margin / Total revenues	Percentage
17	Return on equity (ROE)	The company's annual result divided by the value of its total shareholders' equity	Result (profit or loss)/Shareholder's funds	Percentage
18	Cash flow	The money coming in and going out of the company during a specific accounting period	Result (profit or loss) + (Depreciation + Amortization + Writedowns)	String of real numbers
19	Interest on sales	A measure of the incidence of interest expenses on turnover created by the company and absorbed at the service of the third-party capital employed	Interest/Revenues	Percentage

20	Type of financial statement	The type of financial statement that the company prepares according to accounting regulations	Given by the reference jurisdiction	Enumeration

Feature n. 20: enumeration elements: Abbreviated, Micro, Detailed.

6.2.6 Governance features

The Governance features, computed directly from the governance data, are given in *Table 7*.

Table 7 – Governance features

Feature	Name	Feature value
1	Number of stakeholder individuals	Integer
2	Number of stakeholder companies	Integer
3	Shareholder share	Percentage (%)
4	Shareholders gender	Enumeration
5	Decision-makers gender	Enumeration
6	Number of decision-makers	Integer
7	Members of the Revision and Advisory Board	Integer
8	Presence of the advisory company	Binary
9	Number of decision-makers by the same family	Integer
10	Company phase	Enumeration

Features n. 4 and n. 5: enumeration elements: Female, Male.
Feature n. 10: enumeration elements: Startup, Mature, Historical.

Table 8 specifies how the features of *Table 7* (column 2) are normatively computed. The definitions of column 3 are informative.

Table 8 – Governance features specifics

Feature	Name	Definition	Data type
1	Number of stakeholder individuals	The total numbers of stakeholder individuals in the company	Integer
2	Number of stakeholder companies	The total numbers of stakeholder companies in the company	Integer
3	Shareholder share	The share owned by each shareholder in the company	Percentage
4	Shareholders gender	The gender of shareholders	Enumeration
5	Decision-makers gender	The gender of decision-makers	Enumeration
6	Number of decision-makers	The total numbers of decision-makers, members of the board of directors and representatives	Integer
7	Members of the Revision and Advisory Board	The total numbers of auditors and advisors	Integer
8	Presence of an advisory company	The presence of a company specialized in the corporate advisory	Binary

9	Number of decision-makers by the same family	The number of decision-makers that have the same family name	Integer
10	Company phase	The company phase according to its age	Enumeration

Features n. 4 and n. 5: enumeration elements: Female, Male.
Feature n. 10: enumeration elements: Startup, Mature, Historical.

6.2.7 Risk matrix

Table 9 gives the four characteristics, defined by ISO 31000 [8], for the vertical risks considered:
1. *Cyber risk* defined as the preservation of confidentiality, integrity and availability of information [10].
2. *Seismic risk* defined as the measure of the possible losses associated with the behavior of a building or structure in likely earthquakes [11].

Each risk has four characteristics as indicated in *Table 9*:

Table 9 – Risk characteristics

N.	Characteristic	Data type
1	Occurrence	Real
2	Business impact	Real
3	Gravity	Real
4	Risk retention	Percentage (%)

1. **Occurrence**: likelihood of the risk happening [8]. It can have three possible outcomes:

Low Probability   1   the risk may occur only in exceptional circumstances or is unlikely to occur.

Medium Probability   2   the risk may occur at some time.

High Probability   3   the risk is expected to occur.

2. **Business Impact**: consequences of a risk event [8]. It can take three values:

Minor   1   Relatively minor changes in the company processes and/or products and services.

Moderate   2   Some minor changes in the company processes and/or products and services.

Major   3   Company processes and/or products and services are altered significantly.

3. **Gravity**: impact on the ability of the company to deliver compliant products to the customer; to the internal efficiency; to damage to people, the environment, or property measured in terms of the estimated time needed to restore normal business activities. It can take five values:

Irrelevant   1   The risk has no impact on the ability to deliver compliant products to the customer; no loss of internal efficiency; no damage to people, environment, or property. The estimated recovery time is from 1 to 8 hours.

Not very relevant   2   The risk has minor impacts on the ability to deliver compliant products to the customer; marginal loss of internal efficiency; no damage to people, environment, or property. The estimated recovery time is from 2 to 5 days.

Relevant   3   May result in significant sensitive consequences on product conformity or on-time delivery; may lead to a substantial loss of internal efficiency (massive rework or 100% selections); no damage to people and the

		environment but possible major damage to property. The estimated recovery time is from 3 to 10 days.
Very relevant	4	Can have very important consequences on the conformity of the products or the impossibility of their delivery; no damage to persons, any marginal damage to the environment or major property damage. The estimated recovery time is from 4 to 14 days.
Serious	5	The occurrence of the risk has very important consequences on the conformity of products or the impossibility of delivery; involves damage to people, the environment or damage important damage to property. The estimated recovery time is greater than 15 days.

4. **Risk Retention** portion of the risk that the Company decides to retain (percentage) [8].

The risk matrix is a table composed of two rows for the risks and four columns for the characteristics.

6.2.8   Default probability

It is a score in the 0 to 1 range that represents the probability of the company default in a specified number of future months dependent on financial features. It is computed by Prediction using the financial features.

6.2.9   Adequacy index of organisational model

It is a score in the 0 to 1 range that linearly represents the adequacy of the organisational model. Its value can be used to identify potential critical points or conflicts of interest that can lead to an increase in the risk of default. It is computed by Prediction using the governance and financial features.

6.2.10 Business continuity probability

It represents the probability of an interruption of the operations of the company for a period of time less than 2% of the prediction horizon. It is computed by Perturbation using Default probability and Risk Matrix.

Annex 1 – MPAI-wide terms and definitions (Normative)

The Terms used in this standard whose first letter is capital and are not already included in *Table 1* are defined in *Table 10*.

Table 10 – MPAI-wide Terms

Term	Definition
Access	Static or slowly changing data that are required by an application such as domain knowledge data, data models, etc.
AI Framework (AIF)	The environment where AIWs are executed.
AI Workflow (AIW)	An organised aggregation of AIMs implementing a Use Case receiving AIM-specific Inputs and producing AIM-specific Outputs according to its Function.
AI Module (AIM)	A processing element receiving AIM-specific Inputs and producing AIM-specific Outputs according to its Function.
Application	A usage domain target of an Application Standard
Channel	A connection between an output port of an AIM and an input port of an AIM. The term "connection" is also used as synonymous.
Communication	The infrastructure that implements message passing between AIMs
Component	One of the 7 AIF elements: Access, Communication, Controller, Internal Storage, Global Storage, MPAI Store, and User Agent
Conformance	The attribute of an Implementation of being a correct technical Implementation of a Technical Specification.
Conformance Tester	An entity authorised by MPAI to Test the Conformance of an Implementation.
Conformance Testing	The normative document specifying the Means to Test the Conformance of an Implementation.
Conformance Testing Means	Procedures, tools, data sets and/or data set characteristics to Test the Conformance of an Implementation.
Connection	A channel connecting an output port of an AIM and an input port of an AIM.
Controller	A Component that manages and controls the AIMs in the AIF, so that they execute in the correct order and at the time when they are needed
Data format	The standard digital representation of data and their semantics.
Ecosystem	The ensemble of the following actors: MPAI, MPAI Store, Implementers, Conformance Testers, Performance Testers and Users of MPAI-AIF Implementations as needed to enable an Interoperability Level.
Explainability	The ability to trace the output of an Implementation back to the inputs that have produced it.
Fairness	The attribute of an Implementation whose extent of applicability can be assessed by making the training set and/or network open to testing for bias and unanticipated results.
Function	The operations effected by an AIW or an AIM on input data.
Global Storage	A Component to store data shared by AIMs.
Internal Storage	A Component to store data of the individual AIMs.
Identifier	A name that uniquely identifies an Implementation.
Implementation	1. An embodiment of the MPAI-AIF Technical Specification, or 2. An AIW or AIM of a particular Level (1-2-3) conforming with a Use Case of an MPAI Application Standard.

Interoperability	The ability to functionally replace an AIM with another AIM having the same Interoperability Level
Interoperability Level	The attribute of an AIW and its AIMs to be executable in an AIF Implementation and to be proprietary (Level 1) or to pass the Conformance Testing (Level 2) or the Performance Testing (Level 3) of an MPAI Application Standard.
Knowledge Base	Structured and/or unstructured information made accessible to AIMs via MPAI-specified interfaces
Message	A sequence of Records transported by Communication through Channels.
Normativity	The set of attributes of a technology or a set of technologies specified by the applicable parts of an MPAI standard.
Performance	The attribute of an Implementation of being Reliable, Robust, Fair and Replicable.
Performance Assessment	The normative document specifying the procedures, the tools, the data sets and/or the data set characteristics to Assess the Grade of Performance of an Implementation.
Performance Assessment Means	Procedures, tools, data sets and/or data set characteristics to Assess the Performance of an Implementation.
Performance Assessor	An entity authorised by MPAI to Assess the Performance of an Implementation in a given Application domain
Profile	A particular subset of the technologies used in MPAI-AIF or an AIW of an Application Standard and, where applicable, the classes, other subsets, options and parameters relevant to that subset.
Record	A data structure with a specified structure
Reference Software	A technically correct software implementation of a Technical Specification containing source code, or source and compiled code.
Reliability	The attribute of an Implementation that performs as specified by the Application Standard, profile and version the Implementation refers to, e.g., within the application scope, stated limitations, and for the period of time specified by the Implementer.
Replicability	The attribute of an Implementation whose Performance, as Assessed by a Performamce Assessor, can be replicated, within an agreed level, by another Performamce Assessor.
Robustness	The attribute of an Implementation that copes with data outside of the stated application scope with an estimated degree of confidence.
Service Provider	An entrepreneur who offers an Implementation as a service (e.g., a recommendation service) to Users.
Standard	The ensemble of Technical Specification, Reference Software, Conformance Testing and Performance Assessment of an MPAI application Standard.
Technical Specification	(Framework) the normative specification of the AI Framework. (Application) the normative specification of the set of Use Cases belonging to an Application Domain along with the AIMs required to Implement the Use Cases. the collection of Use Cases relevant to the Application Domain that include: 1. The formats of the Input/Output data of the AIWs implementing the Use Cases. 2. The Topology of the AIMs of the AIWs. 3. The formats of the Input/Output data of the AIMs belonging the AIW.
Time Base	The protocol specifying how Components can access timing information

Topology	The set of AIM Connections of an AIW.
Use Case	A particular instance of the Application domain target of an Application Standard.
User	A user of an Implementation.
User Agent	The Component interfacing the user with an AIF through the Controller
Version	A revision or extension of a Standard or of one of its elements.
Zero Trust	

Annex 2 - Notices and Disclaimers Concerning MPAI Standards
(Informative)

The notices and legal disclaimers given below shall be borne in mind when downloading and using approved MPAI Standards downloaded from https://www.mpai.community/resources/.

In the following, "Standard" means the collection of four documents: "Technical Specification", "Reference Software" and "Conformance Testing" and, where applicable, "Performance Testing" approved and published by MPAI at https://www.mpai.community/resources/.

Life cycle of MPAI Standards
MPAI Standards are developed in accordance with the MPAI Statutes. An MPAI Standard may only be developed when a Framework Licence has been adopted. MPAI Standards are developed by especially established MPAI Development Committees who operate on the basis of consensus, as specified in Annex 1 of the MPAI Statutes. While the MPAI General Assembly and the Board of Directors administer the process of the said Annex 1, MPAI does not independently evaluate, test, or verify the accuracy of any of the information or the suitability of any of the technology choices made in its Standards.

MPAI Standards may be modified at any time by corrigenda or new editions. A new edition, however, may not necessarily replace an existing MPAI standard. Visit the web page to determine the status of any given published MPAI Standard.

Comments on MPAI Standards are welcome from any interested parties, whether MPAI members or not. Comments shall mandatorily include the name and the version of the MPAI Standard and, if applicable, the specific page or line the comment applies to. Comments should be sent to the MPAI Secretariat. Comments will be reviewed by the appropriate committee for their technical relevance. However, MPAI does not provide interpretation, consulting information, or advice on MPAI Standards. Interested parties are invited to join MPAI so that they can attend the relevant Development Committees.

Coverage and Applicability of MPAI Standards
MPAI makes no warranties or representations concerning its Standards, and expressly disclaims all warranties, expressed or implied, concerning any of its Standards, including but not limited to the warranties of merchantability, fitness for a particular purpose, non-infringement etc. MPAI Standards are supplied "AS IS".

The existence of an MPAI Standard does not imply that there are no other ways to produce and distribute products and services in the scope of the Standard. Technical progress may render the technologies included in the MPAI Standard obsolete by the time the Standard is used, especially in a field as dynamic as AI. Therefore, those looking for standards in the Data Compression by Artificial Intelligence area should carefully assess the suitability of MPAI Standards for their needs.

IN NO EVENT SHALL MPAI BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO: THE NEED TO PROCURE SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF

THE PUBLICATION, USE OF, OR RELIANCE UPON ANY STANDARD, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE AND REGARDLESS OF WHETHER SUCH DAMAGE WAS FORESEEABLE.

MPAI alerts users that practicing its Standards may infringe patents and other rights of third parties.

Users of MPAI Standards should consider all applicable laws and regulations when using an MPAI Standard. The validity of Conformance Testing is strictly technical and refers to the correct implementation of the MPAI Standard. Moreover, positive Performance Assessment of an implementation applies exclusively in the context of the MPAI Governance and does not imply compliance with any regulatory requirements in the context of any jurisdiction. Therefore, it is the responsibility of the MPAI Standard implementer to observe or refer to the applicable regulatory requirements. By publishing an MPAI Standard, MPAI does not intend to promote actions that are not in compliance with applicable laws, and the Standard shall not be construed as doing so. In particular, users should evaluate MPAI Standards from the viewpoint of data privacy and data ownership in the context of their jurisdictions.

Implementers and users of MPAI Standards documents are responsible for determining and complying with all appropriate safety, security, environmental and health and all applicable laws and regulations.

Copyright

MPAI draft and approved standards, whether they are in the form of documents or as web pages or otherwise, are copyrighted by MPAI under Swiss and international copyright laws. MPAI Standards are made available and may be used for a wide variety of public and private uses, e.g., implementation, use and reference, in laws and regulations and standardisation. By making these documents available for these and other uses, however, MPAI does not waive any rights in copyright to its Standards. For inquiries regarding the copyright of MPAI standards, please contact the MPAI Secretariat.

The Reference Software of an MPAI Standard is released with the MPAI Modified Berkeley Software Distribution licence. However, implementers should be aware that the Reference Software of an MPAI Standard may reference some third party software that may have a different licence.

Annex 3 – The Governance of the MPAI Ecosystem (Informative)

Level 1 Interoperability

With reference to **Error! Reference source not found.**, MPAI issues and maintains a standard – called MPAI-AIF – composed of the following:

1. An environment called AI Framework (AIF) running AI Workflows (AIW) made where aggregations of interconnected AI Modules (AIM).
2. AIWs are implementations of Use Cases.
3. AIMs expose standard interfaces (e.g., access to Controller API).
4. A distribution system of AIFs, AIWs and AIMs called MPAI Store from which an AIF Implementation can download AIWs and AIMs.

Implementers' benefits	Upload to the MPAI Store and have globally distributed Implementations of - AIFs conforming to MPAI-AIF. - AIWs and AIMs performing proprietary functions executable in AIF.
Users' benefits	Rely on implementations that have been tested for security.
MPAI Store	- Tests Implementations for conformance to MPAI-AIF. - Verifies Implementations' security, e.g., absence of malware. - Indicates unambiguously that Implementations are Level 2.

Level 2 Interoperability

In a Level 1 AIW Implementation, an Implementer can use proprietary AOWs and AIMs within the constraints of the MPAI-AIF Standard. In a Level 2 implementation, however, the AIW must be an Implementation of an MPAI Use Case and the AIMs must conform with an MPAI Application Standard.

Implementers' benefits	Upload to the MPAI Store and have globally distributed Implementations of - AIFs conforming to MPAI-AIF. - AIWs and AIMs conforming to MPAI Application Standards.
Users' benefits	- Rely on Implementations of AIWs and AIMs with functions and interfaces reviewed during standardisation. - Achieve a level of explainability of the AIW operation because the AIM functions and interfaces are known.
Market's benefits	- Open AIW and AIM markets foster competition leading to better products. - Competition of AIW and AIM Implementations fosters AI innovation.
MPAI Store's role	- Tests Conformance of Implementations with the relevant MPAI Application Standard. - Verifies Implementations' security. - Indicates unambiguously that Implementations are Level 2.

Level 3 Interoperability

MPAI does not generally set standards on how and with what data an AIM should be trained. This is an important differentiator that promotes competition leading to better solutions. However, the performance of an AIM is typically higher if the data used for training are in greater quantity and more in tune with the scope. Training data that have large variety and cover the spectrum of all cases of interest in breadth and depth typically lead to higher "quality" Implementations

For Level 3, MPAI normatively specifies the process, the tools and the data or the characteristics of the data to be used to Assess the Grade of Performance of an AIM or an AIW.

Implementers' benefits	May claim their Implementations have passed Performance Assessment.
Users' benefits	Get assurance the Implementation being used performs correctly, e.g., it has been properly trained.
Market's benefits	Implementations' Performance Grades stimulate the development of more Performing AIM and AIW Implementations.
MPAI Store's role	- Verifies the Implementations' security - Indicates unambiguously that Implementations are Level 3.

The MPAI ecosystem

Figure 4 is a high-level description of the MPAI ecosystem operation applicable to fully conforming MPAI implementations:

1. MPAI establishes and controls the not-for-profit MPAI Store (step 1).
2. MPAI appoints Performance Assessors (step 2).
3. MPAI publishes standards (step 3).
4. Implementers submit Implementations to Performance Assessors (step 4).
5. If the Implementation Performance is acceptable, Performance Assessors inform Implementers (step 5a) and MPAI Store (step 5b).
6. Implementers submit Implementations to the MPAI Store (step 6); The Store Tests the Implementation Conformance and security.
7. Users download Implementations (step 7).
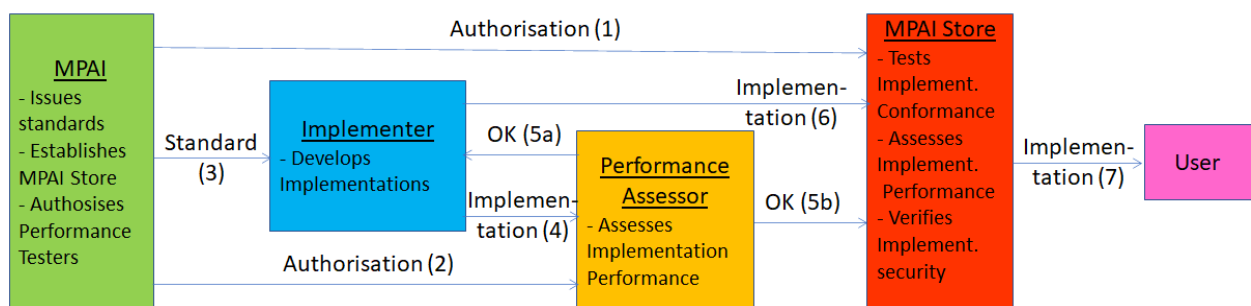
Figure 4 – The MPAI ecosystem operation

The Ecosystem operation allows for AIW and AIF Implementations
1. To be proprietary: security is verified and Conformance to MPAI-AIF Tested (Level 1).
2. To be conforming to an MPAI Application Standard: security is verified and Conformance to the relevant MPAI Application Standard Tested (Level 2).
3. To be Level 2 and have additionally their Reliability, Robustness, Fairness and Replicability Assessed (Level 3).

The MPAI Store shall duly display the Interoperability Level of Implementations.

MPAI offers Users access to the promised benefits of AI with a guarantee of increased transparency, trust and reliability as the Interoperability Level moves from 1 to 3.

Annex 4 – AIW and AIM Metadata

1 ID linearisation

Note: Fields that are used to generate automatic IDs may not contain ":" characters.

When one needs to reference them from other contexts, automatic unique IDs for AIWs/AIMs can be generated with the following formula:

```
AIM->Implementer_ID:(S:AIM->Standard->Name:AIM->Standard->Version:AIM->Standard->Use_Case:AIM-
>Standard->Name|U:AIM->User_Defined->Name):AIM->Version
```

Examples:

- `00089:(S:(MMC:CWE:2:_MAIN_)):123 // A workflow`
- `00089:(S:(MMC:CWE:2:GovernanceAssessment)):345 // A sub-module of a workflow`
- `00089:(U:PCA_based_analysis):75`

In the following, 00089 will be used as Implementer Identifier.

2 AIW metadata

```
"AIM": {
        "Implementer_ID": ###, // Number provided by MPAI store, e.g., 00089
        "Standard": { // Defined by MPAI, selected by implementer
                "Name": "CUI",
                "Use_Case": "CPP",
                "Version": "1",
                "Name": "_MAIN_" // Always _MAIN_ for workflows
        } | "User_Defined": { // Provided by implementer
                "Name": "MyCUIPCC"
        },
        "Version": "*", // Provided by implementer
        "Profile": "Main" // Defined by MPAI, selected by implementer
        "Description": "This AIW implements MPAI-CUI Company Performance Prediction (PCC)
Use Case",
        "Ports": [
                {
                        "Name": "PredictionHorizon",
                        "Direction": "InputOutput",
                        "Record_Type": "{int8 PredictionHorizon} PredictionHorizon_t",
                        "Type": "Software",
                        "Protocol": ""
                },
                {
                        "Name": "Governance",
                        "Direction": "InputOutput",
                        "Record_Type": "float32 [] Governance_t",
                        "Type": "Software",
                        "Protocol": ""
                },
                {
                        "Name": "FinancialStatement",
                        "Direction": "InputOutput",
                        "Record_Type": "float32[] FinancialStatement_t",
                        "Type": "Software",
                        "Protocol": ""
                },
                {
                        "Name": "RiskAssessment",
                        "Direction": "InputOutput",
                        "Record_Type": "float32[] RiskAssessment_t",
                        "Type": "Software",
                        "Protocol": ""
                },
                {
                        "Name": "AdequacyIndex",
                        "Direction": "OutputInput",
                        "Record_Type": "{float32 AdequacyIndex} AdequacyIndex_t",
                        "Type": "Software",
                        "Protocol": ""
                },
                {
                        "Name": "DefaultProbability",
                        "Direction": "OutputInput",
```

```
                            "Record_Type": "{float32 DefaultProbability} DefaultProbability_t",
                            "Type": "Software",
                            "Protocol": ""
                },
                {
                            "Name": "BusinessContinuityProbability",
                            "Direction": "OutputInput",
                            "Record_Type": "{float32 BusinessContinuityProbability}
BusinessContinuityProbability_t",
                            "Type": "Software",
                            "Protocol": ""
                },
        ]
        "AIMs": [
                // Automatic ID for module 1
                "GovernanceAssessment": "@*:(S:(CUI:CPP:1:GovernanceAssessment)):*"
                // Automatic ID for module 2
                "FinancialAssessment": "@*:(S:(CUI:CPP:1:FinancialAssessment)):*",
                // Automatic ID for module 3
                "RiskMatrixGeneration": "@*:(S:(CUI:CPP:1:RiskMatrixGeneration)):*",
                // Automatic ID for module 4
                "Prediction": "@*:(S:(CUI:CPP:1:Prediction)):*",
                // Automatic ID for module 5
                "Perturbation": "@*:(S:(CUI:CPP:1:Perturbation)):*"
        ],
        "Topology": [
                "PredictionHorizon": {
                        "Output": {
                                "Module": "",
                                "Port": "PredictionHorizon"
                        },
                        "Input": {
                                "Module": "Prediction",
                                "Port": "PredictionHorizon"
                        }
                },
                "Governance": {
                        "Output": {
                                "Module": "",
                                "Port": "Governance"
                        },
                        "Input": {
                                "Module": "GovernanceAssessment",
                                "Port": "Governance"
                        }
                },
                "FinancialStatement_1": {
                        "Output": {
                                "Module": "",
                                "Port": "FinancialStatement"
                        },
                        "Input": {
                                "Module": "GovernanceAssessment",
                                "Port": "FinancialStatement"
                        }
                },
                "FinancialStatement_2": {
                        "Output": {
                                "Module": "",
                                "Port": "FinancialStatement"
                        },
                        "Input": {
                                "Module": "FinancialAssessment",
                                "Port": "FinancialStatement"
                        }
                },
                "RiskAssessment": {
                        "Output": {
                                "Module": "",
                                "Port": "RiskAssessment"
                        },
                        "Input": {
                                "Module": "RiskMatrixGeneration",
                                "Port": "RiskAssessment"
```

```
                                }
                        },
                        "GovernanceFeatures": {
                                "Output": {
                                        "Module": "GovernanceAssessment",
                                        "Port": "GovernanceFeatures"
                                },
                                "Input": {
                                        "Module": "Prediction",
                                        "Port": "GovernanceFeatures"
                                }
                        },
                        "FinancialFeatures": {
                                "Output": {
                                        "Module": "FinancialAssessment",
                                        "Port": "FinancialFeatures"
                                },
                                "Input": {
                                        "Module": "Prediction",
                                        "Port": "FinancialFeatures"
                                }
                        },
                        "RiskMatrix": {
                                "Output": {
                                        "Module": "RiskMatrixGeneration",
                                        "Port": "RiskMatrix"
                                },
                                "Input": {
                                        "Module": "Perturbation",
                                        "Port": "RiskMatrix"
                                }
                        },
                        "AdequacyIndex": {
                                "Output": {
                                        "Module": "Prediction",
                                        "Port": "AdequacyIndex"
                                },
                                "Input": {
                                        "Module": "",
                                        "Port": "AdequacyIndex"
                                }
                        },
                        "DefaultProbability_1": {
                                "Output": {
                                        "Module": "Prediction",
                                        "Port": "DefaultProbability"
                                },
                                "Input": {
                                        "Module": "",
                                        "Port": "DefaultProbability"
                                }
                        },
                        "DefaultProbability_2": {
                                "Output": {
                                        "Module": "Prediction",
                                        "Port": "DefaultProbability"
                                },
                                "Input": {
                                        "Module": "Perturbation",
                                        "Port": "DefaultProbability"
                                }
                        },
                        "BusinessContinuityProbability": {
                                "Output": {
                                        "Module": "Perturbation",
                                        "Port": "BusinessContinuityProbability"
                                },
                                "Input": {
                                        "Module": "",
                                        "Port": "BusinessContinuityProbability"
                                }
                        }
                }
        ],
        "Authentication": "ENC.V.?",
```

```
            "TimeBase": "PROT.V.?",
            "ResourcePolicies": [
                    "CPU": ?
            ],
            "UserAPIProfile": "Low.V",
            "ControllerAPIProfile": {
                    Version: "27",
                    Level: "High"
            },
            "Implementations": [
                    {
                            "Type": "Source",
                            "Function_Name": "CompanyPerformancePrediction_Implementer_Name",
                            "Language": "C",
                            "Architecture": "",
                            "OS": "",
                            "OS_Version": "",
                            "ID": ""
                    }
            ],
            "Documentation": [
                    { "Type": "tutorial",
                      "URI": https://mpai.community/standards/mpai-cui/
                    }
            ]
}
```

3   AIM metadata

3.1   GovernanceAssessment

```
"AIM": {
        "Implementer_ID": ###, // Number provided by MPAI store
        "Standard": { // Defined by MPAI, selected by implementer
                "Name": "CUI",
                "Use_Case": "CPP",
                "Version": "2",
                "Name": "GovernanceAssessment"
        } | "User_Defined": { // Provided by implementer
                "Name": "MYGA"
        },
        "Version": "*", // Provided by implementer
        "Profile": "Main", // Defined by MPAI, selected by implementer
        "Description": "This AIM implements ...",
        "Ports": [
                {
                        "Name": "Governance",
                        "Direction": "InputOutput",
                        "Record_Type": "float32 [] Governance_t",
                        "Type": "Software",
                        "Protocol": ""
                },
                {
                        "Name": "FinancialStatement",
                        "Direction": "InputOutput",
                        "Record_Type": "float32[] FinancialStatement_t",
                        "Type": "Software",
                        "Protocol": ""
                },
                {
                        "Name": "GovernanceFeatures",
                        "Direction": "OutputInput",
                        "Record_Type": "float32[] GovernanceFeatures_t",
                        "Type": "Software",
                        "Protocol": ""
                }
        ],
        "AIMs": [ ], // Does not depend on other AIMs
        "Topology": [ ], // Does not depend on other AIMs
        "Authentication": "ENC.V.?",
        "TimeBase": "PROT.V.?",
        "ResourcePolicies": [
                "CPU": ?
```

```
        ],
        "UserAPIProfile": "Low.V",
        "ControllerAPIProfile": {
                Version: "27",
                Level: "High"
        },
        "Implementations": [
                {
                        "Type": "Source",
                        "Function_Name": "GovernanceAssessment_Implementer_Name",
                        "Language": "C",
                        "Architecture": "",
                        "OS": "",
                        "OS_Version": "",
                        "ID": ""
                }
        ],
        "Documentation": [
                { "Type": "tutorial",
                  "URI": https://mpai.community/standards/mpai-cui/
                }
        ]
}
```

3.2 Financial Assessment

```
"AIM": {
        "Implementer_ID": ###, // Number provided by MPAI store
        "Standard": { // Defined by MPAI, selected by implementer
                "Name": "CUI",
                "Use_Case": "CWE",
                "Version": "2",
                "Name": "FinancialAssessment"
        } | "User_Defined": { // Provided by implementer
                "Name": "MYFA"
        },
        "Version": "345", // Provided by implementer
        "Profile": "Main", // Defined by MPAI, selected by implementer
        "Description": "This AIM implements ...",
        "Ports": [
                {
                        "Name": "FinancialStatement",
                        "Direction": "InputOutput",
                        "Record_Type": "float32[] FinancialStatement_t",
                        "Type": "Software",
                        "Protocol": ""
                },
                {
                        "Name": "FinancialFeatures",
                        "Direction": "OutputInput",
                        "Record_Type": "float32[] FinancialFeatures_t",
                        "Type": "Software",
                        "Protocol": ""
                }
        ],
        "AIMs": [ ], // Does not depend on other AIMs
        "Topology": [ ], // Does not depend on other AIMs
        "Authentication": "ENC.V.?",
        "TimeBase": "PROT.V.?",
        "ResourcePolicies": [
                "CPU": ?
        ],
        "UserAPIProfile": "Low.V",
        "ControllerAPIProfile": {
                Version: "27",
                Level: "High"
        },
        "Implementations": [
                {
                        "Type": "Source",
                        "Function_Name": "FinancialAssessment_Implementation_Name",
```

```
                "Language": "C",
                "Architecture": "",
                "OS": "",
                "OS_Version": "",
                "ID": ""
            }
        ],
        "Documentation": [
            { "Type": "tutorial",
              "URI": https://mpai.community/standards/mpai-cui/
            }
        ]
}
```

3.3 Risk Matrix Generation

```
"AIM": {
        "Implementer_ID": ###, // Number provided by MPAI store
        "Standard": { // Defined by MPAI, selected by implementer
                "Name": "CUI",
                "Use_Case": "CPP",
                "Version": "2",
                "Name": "RiskMatrixGeneration"
        } | "User_Defined": { // Provided by implementer
                "Name": "MYRMG"
        },
        "Version": "345", // Provided by implementer
        "Profile": "Main", // Defined by MPAI, selected by implementer
        "Description": "This AIM implements ...",
        "Ports": [
                {
                        "Name": "RiskAssessment",
                        "Direction": "InputOutput",
                        "Record_Type": "float32 [] RiskAssessment_t",
                        "Type": "Software",
                        "Protocol": ""
                },
                {
                        "Name": "RiskMatrix",
                        "Direction": "OutputInput",
                        "Record_Type": "float32 [] RiskMatrix_t",
                        "Type": "Software",
                        "Protocol": ""
                }
        ],
        "AIMs": [ ], // Does not depend on other AIMs
        "Topology": [ ], // Does not depend on other AIMs
        "Authentication": "ENC.V.?",
        "TimeBase": "PROT.V.?",
        "ResourcePolicies": [
                "CPU": ?
        ],
        "UserAPIProfile": "Low.V",
        "ControllerAPIProfile": {
                Version: "27",
                Level: "High"
        },
        "Implementations": [
                {
                        "Type": "Source",
                        "Function_Name": "RiskMatrixGeneration_Implementer_Name",
                        "Language": "C",
                        "Architecture": "",
                        "OS": "",
                        "OS_Version": "",
                        "ID": ""
                }
        ],
        "Documentation": [
                { "Type": "tutorial",
                  "URI": https://mpai.community/standards/mpai-cui/
```

```
            }
        ]
}
```

3.4 Prediction

```
"AIM": {
        "Implementer_ID": ###, // Number provided by MPAI store
        "Standard": { // Defined by MPAI, selected by implementer
                "Name": "CUI",
                "Use_Case": "CPP",
                "Version": "2",
                "Name": "Prediction"
        } | "User_Defined": { // Provided by implementer
                "Name": "MYP"
        },
        "Version": "345", // Provided by implementer
        "Profile": "Main", // Defined by MPAI, selected by implementer
        "Description": "This AIM implements ...",
        "Ports": [
                {
                        "Name": "GovernanceFeatures",
                        "Direction": "InputOutput",
                        "Record_Type": "float32 [] GovernanceFeatures_t",
                        "Type": "Software",
                        "Protocol": ""
                },
                {
                        "Name": "FinancialFeatures",
                        "Direction": "InputOutput",
                        "Record_Type": "float32 [] FinancialFeatures_t",
                        "Type": "Software",
                        "Protocol": ""
                },
                {
                        "Name": "AdequacyIndex",
                        "Direction": "OutputInput",
                        "Record_Type": "{float32 AdequacyIndex} AdequacyIndex_t",
                        "Type": "Software",
                        "Protocol": ""
                }
                {
                        "Name": "DefaultProbability",
                        "Direction": "OutputInput",
                        "Record_Type": "{float32 DefaultProbability} DefaultProbability_t",
                        "Type": "Software",
                        "Protocol": ""
                }
        ],
        "AIMs": [ ], // Does not depend on other AIMs
        "Topology": [ ], // Does not depend on other AIMs
        "Authentication": "ENC.V.?",
        "TimeBase": "PROT.V.?",
        "ResourcePolicies": [
                "CPU": ?
        ],
        "UserAPIProfile": "Low.V",
        "ControllerAPIProfile": {
                Version: "27",
                Level: "High"
        },
        "Implementations": [
                {
                        "Type": "Source",
                        "Function_Name": "Prediction_Implementer_Name ",
                        "Language": "C",
                        "Architecture": "",
                        "OS": "",
                        "OS_Version": "",
                        "ID": ""
                }
```

```
        ],
        "Documentation": [
                { "Type": "tutorial",
                  "URI": https://mpai.community/standards/mpai-cui/
                }
        ]
}
```

3.5   Perturbation

```
"AIM": {
        "Implementer_ID": ###, // Number provided by MPAI store
        "Standard": { // Defined by MPAI, selected by implementer
                "Name": "CUI",
                "Use_Case": "CPP",
                "Version": "2",
                "Name": "Perturbation"
        } | "User_Defined": { // Provided by implementer
                "Name": "MYPTB"
        },
        "Version": "345", // Provided by implementer
        "Profile": "Main", // Defined by MPAI, selected by implementer
        "Description": "This AIM implements ...",
        "Ports": [
                {
                        "Name": "DefaultProbability",
                        "Direction": "InputOutput",
                        "Record_Type": "{float32 DefaultProbability} DefaultProbability_t",
                        "Type": "Software",
                        "Protocol": ""
                },
                {
                        "Name": "RiskMatrix",
                        "Direction": "InputOutput",
                        "Record_Type": "float32 [] RiskMatrix_t",
                        "Type": "Software",
                        "Protocol": ""
                },
                {
                        "Name": "BusinessContinuityProbability",
                        "Direction": "OutputInput",
                        "Record_Type": "{float32 BusinessContinuityProbability}
BusinessContinuityProbability_t",
                        "Type": "Software",
                        "Protocol": ""
                }
        ],
        "AIMs": [ ], // Does not depend on other AIMs
        "Topology": [ ], // Does not depend on other AIMs
        "Authentication": "ENC.V.?",
        "TimeBase": "PROT.V.?",
        "ResourcePolicies": [
                "CPU": ?
        ],
        "UserAPIProfile": "Low.V",
        "ControllerAPIProfile": {
                Version: "27",
                Level: "High"
        },
        "Implementations": [
                {
                        "Type": "Source",
                        "Function_Name": "Prediction_Implementer_Name",
                        "Language": "C",
                        "Architecture": "",
                        "OS": "",
                        "OS_Version": "",
                        "ID": ""
                }
        ],
        "Documentation": [
```

```
              { "Type": "tutorial",
                "URI": https://mpai.community/standards/mpai-cui/
              }
      ]
}
```