

CLAIMS

1. A digital contract computer platform configured to generate, validate, manage, and monitor executable machine contract programmes representing
5 corresponding digital contracts, each digital contract configured to control and monitor the operation of one or more contract input data sources , the digital contract computer platform comprising
- a User Interface, UI, accessible by at least one user through a computer device; and
a digital contract generation logic configured to generate a digital contract to control
10 and/or monitor the operation of one more user specified contract input data sources, based on input data received from the at least one user through the User Interface, UI, the digital contract generation logic comprising:
- a source data file generation logic, SDFGL comprising
- a semantic search query generation logic, SSQGL, configured to generate,
15 based on information extracted from the user input data, at least one search query comprising a plurality of search criteria;
- a knowledge database system comprising an operative statement database containing a plurality of operative statements each tagged with a set of metadata information, and a semantic search engine configured to execute the at least one
20 search query generated by the SSQGL so as to identify and retrieve from the operative statement database a set of operative statements associated with metadata information matching the search criteria of the at least one search query, wherein the retrieved operative statements are configured to control and/or monitor the operation of the one or more user specified one or more contract input data sources during the execution of
25 the digital contract;
- a document generation logic configured to present to the user for selection, through the User Interface, the operative statements retrieved from the operative statement database, and, based on the user selection, to generate a source digital data file;
- 30 a parser logic configured to analyse the source digital data file and at least extract operative data from the operative statements in the source digital data file, the parser logic comprising a machine contract generation logic, MCGL, configured to generate, based on the extracted operative data, a machine contract programme, which when executed performs the operations specified in the operative statements contained in the
35 source digital data file;

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a machine contract validation logic, MCVL, comprising an execution engine which is configured to execute the machine contract programme for different contract data input combination values to determine the executorial performance of the digital contract under different operating scenarios and/or conditions, the MCVL is configured to assign
5 a risk factor to each operative statement, which is compared to a predetermined performance threshold, wherein if the risk factor is within a first threshold range from the performance threshold, then a validation signal is generated, otherwise the MCVL generates an alert signal, indicating a vulnerability in the machine contract programme, wherein upon receiving a validation signal the machine contract programme is
10 transmitted to the at least one user to be signed, and upon signature the machine contract programme is hashed and placed on a versioning database ready to be used for execution by a desired application associated with the corresponding one or more contract input data sources; and

a performance monitoring module communicatively coupled to contract input
15 data sources associated with the machine contract programme, the performance monitoring module being configured to monitor the execution of the digital contract by monitoring the operation of the corresponding contract input data sources and accordingly evaluate, based on input data received from the connected contract input data sources, the performance of the machine contract program .

20 2. The digital contract computer platform claim 1, wherein the MCVL is configured to validate the performance of the generated machine contract programme by at least applying a set of input value combinations to the contract data inputs and recording the corresponding output values for each operative statements.

25 3. The digital contract computer platform of claim 2, the MCVL comprising a risk analysis engine configured to assign a risk factor to each of the corresponding operative statements associated with each output value, the risk factor being indicative of the enforceability of each operative statement by the digital contract and/or the functionality of the machine contract programme during execution.

30 4. The digital contract computer platform of any one of the preceding claims, wherein the digital contract generation logic comprises a master data file generation logic, MDFGL, configured, upon receiving a validation signal, to generate, based on the content of the source digital data file, a master digital data file representing the underlying legal contract containing the contractual terms and conditions executed and/or monitored by the digital contract, wherein at least the master digital data file is forwarded to the at
35 least one user and/or parties to the digital contract for approval, and wherein upon

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approval, the master digital data file and the corresponding machine contract programme are stored in a versioned database.

5 5. The digital contract computer platform of any one of the preceding claims, wherein the metadata information comprising a risk factor, and/or a classification, and/or an ontology, and/or expected output values of each operative statement for different input value combinations.

6. The digital contract computer platform of any one of the preceding claims, wherein the operative statement database is a graph database.

10 7. The digital contract computer platform of claim 6, wherein the least one search query is in a graph search query language.

8. The digital contract computer platform of any one of preceding claims, wherein the knowledge database system, comprises a knowledge graph logic configured to update and enrich the operative statements and associated metadata information stored in the operative database with information received and/or retrieved from a plurality of information sources.

9. The digital contract computer platform according to claim 8, wherein the plurality of information sources comprising external connected devices and systems, and/or the output values generated from the machine contract validation logic, and/or information received from the at least one user and/or the administrator of the system, and/or the contract input sources.

10. The digital contract computer platform of any one of claims 8 or 9, wherein the knowledge graph logic comprising a set of trained algorithms configured to update and enrich the operative statements and associated metadata information.

25 11. The digital contract computer platform of any one of the preceding claims, wherein the machine contract programme and master digital data file are hashed and stored in the versioning database.

12. The digital contract computer platform of any one of the preceding claims , wherein the MCVL is configured to validate the machine code program by:

- 30 - reading the machine contract programme;
- generating a set of test conditions for each operative statement;
- executing the machine contract programme for each test condition;
- storing the output values generated from each test condition;
- generating, for each output value, the corresponding set of operative statements by submitting the output values to the parser logic, whereby each

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output value is processed and associated with a corresponding operative statement; and

- assigning, by means of the risk analysis engine, a risk factor to each generated operative statement.

5 13. The digital contract computer platform of any one of the preceding claims, wherein the risk analysis engine is configured to assign a risk factor to an operative statement, based on metadata information stored in the graph database.

10 14. The digital contract computer platform of claim 13, wherein the risk analysis engine comprises a statistical risk calculation engine configured to calculate a risk factor based on historical information associated with an operative statement.

15 15. The digital contract computer platform of claim 14, wherein the historical information is retrieved from information stored in the knowledge graph logic, and/or retrieved from external information sources.

16 16. The digital contract computer platform of any one of the preceding claims , wherein the performance monitoring module is configured to periodically validate the performance of a machine contract programme stored in the version database by resubmitting it for validation to the machine code validation logic, MCVL.

20 17. The digital contract computer platform of claim 16, wherein the step of resubmitting the machine contract programmes to the machine code validation logic, MCVL, is triggered by an update of the content of the operative statement database.

25 18. The digital contract computer platform of any one of preceding claims to 16, wherein the performance monitoring module is configured, upon detecting an executional performance issue with a machine contract programme and/or receiving a dispute communication from at least one of the parties and/or at least one user, for issuing a dispute notification signal.

19. The digital contract computer platform of claim 18, wherein the performance monitoring module comprises a dispute resolution engine configured, upon the issuance of a dispute notification signal, to activate a dispute resolution event sequence, and notify the parties involved and/or at least one user of the suspension of the disputed contract.

30 20. The digital contract computer platform of claim 19, wherein the dispute resolution engine is configured to suggest dispute resolution proposals to at least one user and/or parties for resolving the contract dispute, and wherein upon an acceptance by the parties and/or at least one user of a dispute resolution proposal, the dispute resolution engine is permitted to generate an updated master digital data file and corresponding

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machine contract programme for the disputed contract and resume the execution of the updated digital contract.

21. The digital contract computer platform of claim 20, wherein the dispute resolution proposal comprise a set of operative statements retrieved from the knowledge database
5 system.

22. The digital contract computer platform of any one of the preceding claims, wherein the performance threshold is selected by the parties and/or the at least one user.

23. The digital contract computer platform of any one of the preceding claims, wherein the at least one contract input data source is a device and/or a system
10 configured for transmitting data collected from a predetermined operational environment.

24. The digital contract computer platform of any one of the preceding claims, wherein the at least one contract input data source is part an Internet of Things, IoT, infrastructure.

25. The digital contract computer platform of any one of the preceding claims, wherein the contract input data source comprises at least one IoT sensor.
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26. The digital contract computer platform of any one of the preceding claims, wherein the UI comprises a set of input and output data fields.

27. The digital contract computer platform of any one of the preceding claims, wherein the digital contract generation logic comprises a cryptographical module
20 comprising a set of cryptological protocols for hashing, digitally signing and encrypting data stored in the versioned database.

28. A method for generating, validating, managing, and monitoring executable machine contract programs representing corresponding digital, the method comprising:

accessing, through a User Interface running on the computer device of at least
25 one user, a digital contract generation logic configured to generate a digital contract, based on input data received from the at least one user through the User Interface, UI, wherein the digital contract generation logic is configured to perform the steps of:

generating, based on information extracted from the user input
30 data, at least one search query comprising a plurality of search criteria;

searching in an operative database for operative statements matching the search criteria, wherein the operative statements are configured to control and/or monitor the operation of at least one contract input data source during the execution of the digital contract;

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presenting to the user for selection through the UI, the retrieved set of operative statements, and, based on the user selection, to generate a source digital data file;

5 generating, based on the extracted operative data, a machine contract programme , which when executed performs the operations specified in containing a set of software programme statements representing the extracted operative data, which machine contract programme represents the digital contract executing the operative statements contained in the source digital data file;

10 validating by means of a machine contract validation logic, MCVL, the executional performance of the generated machine contract programme under different operating scenarios and/or conditions by assigning a risk factor to each operative statement, which is compared to a predetermined performance threshold, wherein if the risk factor is
15 within a first performance threshold range from the threshold, then a validation signal is generated, otherwise the MCVL generates an alert signal, indicating a vulnerability in the machine contract programme, wherein upon receiving a validation signal the machine contract programme is transmitted to the at least one user to be signed, and upon
20 signature the machine contract programme is hashed and placed on a versioning database ready to be used for execution by a desired application; and

monitoring and evaluating the execution and performance of the digital contract based on input data received from the corresponding
25 connected contract input data sources associated with the operative statements of the machine contract programme.