the project manager **12** and the contractor **14**. The contractor **14** may then further transmit the document to a sub-contractor **15**. Each party may maintain a different EDMS **21**, **22**, **24**, **25** and a copy of the construction document is stored in each EDMS, which may not be synchronized with each other. This may cause double handling of information and require manual data entry by each party to their own EDMS. This is particularly inefficient in document management and the risk of human error or missing records is unavoidably increased. In some cases, the contractor **14** may modify the drawing before sending the document to the sub-contractor **15**. Therefore, the sub-contractor **15** has no measure to authenticate the originality of the received document and may consider such a revised version as the original version.

[0007] In the event of incompliance in the construction work or other defective issues, the responsibility for such defects is usually difficult to identify. Evidence with respect to the construction records, drawings, and contracts may be difficult to retrieval. The authenticated original version of the construction document may never be appropriately transferred to the front-end parties and engineering teams. The on-site work records may also never properly transferred to the project manager.

[0008] Thus, there is a need in the construction industry for a cloud-based solution to enable comprehensive document management. In particular, a cloud-based document management system that can maintain an immutable and non-corruptible copy of the construction documents is preferred. Furthermore, other desirable features and characteristics will become apparent from the subsequent detailed description and the appended claims, taken in conjunction with the accompanying drawings and this background of the disclosure.

SUMMARY OF THE INVENTION

[0009] An exemplary embodiment of the present disclosure provides a system and a method for managing a construction project with an immutable record of construction documents and executing each of the construction documents using live data and tracking codes are provided. In a first aspect, the computer system comprises an attribute extraction module configured to extract one or more pertinent information about the construction document to obtain attributes of the construction document; a blockchain network comprising a plurality of nodes for managing a blockchain comprising a plurality of blocks, each node comprising one or more processors and storing at least a portion of the blockchain; a tracking code generator for generating the tracking code for each block in the blockchain, wherein each tracking code is associated to a particular

construction document and can be used to directly access the block storing said particular construction document; and a data repository, being isolated from the blockchain network, configured to perform real-time management of the live data and the tracking codes for the construction documents in the blockchain. When the construction document is received by the system, the construction document is stored in a block added to the blockchain network. The live data is a changeable record comprising the attributes, thereby the data repository manages the changeable record of the live data and the tracking code for each of the construction documents and provides direct access of the blocks in the blockchain. The construction documents are decentralized in the blockchain network to maintain an immutable and non-corruptible copy of the construction documents.

[0009a] In a second aspect, there is provided a common data environment (CDE) system for managing a construction project accessible by a plurality of parties with an immutable record of building information modeling (BIM) data and executing each of the BIM data using live data and tracking codes, the system comprising: an attribute extraction module configured to extract one or more pertinent information about the BIM data to obtain attributes of the BIM data; a blockchain network comprising a plurality of nodes for managing a blockchain comprising a plurality of blocks, each node comprising one or more processors and storing at least a portion of the blockchain; a tracking code generator for generating the tracking code for each block in the blockchain, wherein each tracking code is associated to a particular BIM data and can be used to directly access the block storing said particular BIM data; and a data repository, being isolated from the blockchain network, configured to perform real-time management of the live data and the tracking codes for the BIM data in the blockchain; wherein: when the BIM data is received by the system, the BIM data is stored in a block added to the blockchain network; the live data is a changeable record comprising the attributes, thereby the data repository manages the changeable record of the live data and the tracking code for each of the BIM data and provides direct access of the blocks in the blockchain; and the BIM data are decentralized in the blockchain network to maintain an immutable and non-corruptible copy of the BIM data.

[0009b] In a third aspect, there is provided a computer system for managing a construction project with an immutable record of construction documents and executing each of the construction documents using live data and tracking codes, the system comprising: a gateway device configured to receive the construction document and metadata of the construction document from a document originator; an attribute extraction module configured to extract one

or more pertinent information about the construction document to obtain attributes of the construction document; a blockchain network comprising a plurality of nodes for managing a blockchain comprising a plurality of blocks, each node comprising one or more processors and storing at least a portion of the blockchain; a tracking code generator for generating the tracking code for each block in the blockchain, wherein each tracking code is associated to a particular construction document and can be used to directly access the block storing said particular construction document; and a data repository, being isolated from the blockchain network, configured to perform real-time management of the live data and the tracking codes for the construction documents in the blockchain; wherein: the gateway device generates the plurality of blocks and adds the blocks to the blockchain network; the live data is a changeable record comprising the metadata and the attributes, thereby the data repository manages the changeable record of the live data and the tracking code for each of the construction documents and provides direct access of the blocks in the blockchain; and the construction documents are decentralized in the blockchain network to maintain an immutable and non-corruptible copy of the construction documents.

[0009c] In a fourth aspect, there is provided a method for managing a construction project with an immutable record of construction documents using a blockchain network and a data repository, the method comprising the steps of: extracting one or more pertinent information, by an attribute extraction module, from the construction document to obtain attributes of the construction document; generating live data, wherein the live data is a changeable record comprising the attributes; updating the blockchain network by storing the construction document in a block and adding the block to the blockchain network; generating a tracking code, by a tracking code generator, for each block in the blockchain, wherein each tracking code is associated to a particular construction document and can be used to directly access the block storing said particular construction document; and updating the data repository to store the live data and the tracking code, wherein the data repository is isolated from the blockchain network and is configured to perform real-time management of the live data and the tracking codes for the construction documents in the blockchain.

[0010] In accordance with a further aspect of the present disclosure, the system further comprises a document compiler configured to impart the tracking code to the construction document for obtaining a stamped document, such that the block storing the construction document is accessible by a user in a procession of a printed copy of the stamped document.

[0011] In accordance with a further aspect of the present disclosure, the data repository comprises an authentication unit for performing a user authentication for the access of the data repository. The authentication unit generates an authentication key for a first record in the data repository comprising the tracking code and the live data of the construction document. The authentication key is used by a data requester to access the first record in the data repository for obtaining the tracking code, thereby the data requester can directly access the block storing the construction document. The first record in the data repository is updated to link to a second record when a revised version of the construction document is received with a second tracking code and a second live data for the revised version stored in the second record in the data repository. The authentication key is used by the data requester to access the first record and the second record in the data repository for obtaining the second tracking code, thereby the data requester can directly access the block storing the revised version of the construction document.

[0012] In accordance with a further aspect of the present disclosure, the attribute extraction module receives a digital certificate of the construction document from an independent third party, such that the attributes obtainable from the attribute extraction module comprise a digital key for certifying that the construction document is a true copy.

[0013] In accordance with a further aspect of the present disclosure, the attribute extraction module comprises a file attributes extracting unit; and a data recognition unit.