CLAIMS

What is claimed is:

1. A method of facility management for identifying an actionable event in relation to a building using at least one processor, the method comprising:

obtaining a plurality of sensor data from a plurality of sensors, respectively, wherein each sensor of the plurality of sensors is associated with a building asset of a plurality of building assets of the building, each building asset of the plurality of building assets has a corresponding digital representation in a building information database, and for said each building asset, the corresponding digital representation of the building asset has one or more attribute parameters, a location parameter and one or more sensor observation parameters associated therewith, the one or more attribute parameters indicating one or more attributes assigned to the building asset, the location parameter indicating a location of the building asset and the one or more sensor observation parameters indicating one or more sensor observation values obtained based on one or more sensor data from one or more sensors associated with the building asset of the plurality of sensors;

identifying an actionable event based on the one or more attribute parameters, the location parameter and the one or more sensor observation parameters associated with that of one or more building assets of the plurality of building assets, and further based on a predetermined actionable event condition associated with the one or more building assets; and

triggering a predetermined task associated with the predetermined actionable event condition for the actionable event identified,

wherein the one or more building assets are multiple building assets,

said identifying the actionable event further based on the predetermined actionable event condition comprises determining whether the location parameters associated with said multiple building assets satisfy a relative location condition associated with said multiple building assets based on a predetermined reference distance or range of distance between said multiple building assets, and

the predetermined task associated with the predetermined actionable event condition comprises tasking one or more individuals detected based on one or more sensor data obtained from one or more sensors associated with a first building asset of said multiple building assets

to attend to the actionable event at a second building asset of said multiple building assets in relation to one or more sensor observation parameters associated with the second building asset.

2. The method according to claim 1, wherein said identifying the actionable event based on the predetermined actionable event condition comprises, for each of the one or more building assets:

determining whether the one or more sensor observation parameters associated with the building asset satisfy corresponding one or more predetermined sensor observation conditions associated with the building asset included in the predetermined actionable event condition;

determining whether the one or more attribute parameters associated with the building asset satisfy corresponding one or more predetermined attribute conditions associated with the building asset included in the predetermined actionable event condition; and

determining whether the location parameter associated with the building asset satisfy a corresponding location condition associated with the building asset included in the predetermined actionable event condition.

3. The method according to claim 2, wherein

the actionable event is identified if the predetermined actionable event condition is determined to be satisfied.

4. The method according to claim 3, wherein the predetermined task associated with the predetermined actionable event condition is determined to be satisfied if at least:

the one or more predetermined sensor observation conditions associated with that of the one or more building assets included in the predetermined actionable event condition are determined to be satisfied;

the one or more predetermined attribute conditions associated with that of the one or more building assets included in the predetermined actionable event condition are determined to be satisfied; and

the location condition associated with that of the one or more building assets included in the predetermined actionable event condition is determined to be satisfied.

5. The method according to any one of claims 1 to 4,

wherein the predetermined actionable event condition is included in an actionable event condition database, and

the method further comprises adding a new actionable event condition in the actionable event condition database via an actionable event condition generation user interface.

6. The method according to claim 5, wherein said adding the new actionable event condition comprises:

receiving, via the actionable event condition generation user interface, one or more building asset identity inputs, each building asset identity input designating a corresponding building asset of the plurality of building assets for which the new actionable event condition is associated with; and

for each of the one or more building asset identity inputs,

receiving, via the actionable event condition generation user interface, one or more sensor observation type inputs designating one or more sensor observation parameters associated with the designated building asset for which the new actionable event condition is associated with;

receiving, via the actionable event condition generation user interface, one or more function operator inputs designating one or more functions for subjecting the designated one or more sensor observation parameters to; and

receiving, via the actionable event condition generation user interface, one or more reference value inputs designating one or more reference values based on which one or more results of the one or more functions are compared respectively for determining an outcome on whether the new actionable event condition with respect to the designated building asset is satisfied.

7. The method according to claim 6, wherein

the one or more building asset identity inputs are multiple building asset identity inputs designating multiple building assets for which the new actionable event condition is associated with, and

said adding the new actionable event condition further comprises:

receiving, via the actionable event condition generation user interface, an integration operator type input designating an integration operator for integrating the outcomes

on whether the new actionable event condition with respect to said multiple designated building assets are satisfied.

8. The method according to claim 6 or 7, wherein

the one or more building asset identity inputs are selected from a predefined set of building asset identities corresponding to building assets of the building available for a user to select,

the one or more sensor observation type inputs are selected from a predefined set of sensor observation types available for the user to select for the designated building asset,

the one or more function operator inputs are selected from a predefined set of functions available for the user to select, and

the integration operator type input is selected from a predefined set of integration operators available for the user to select.

9. The method according to claim 8, further comprising updating, for each building asset of the plurality of building assets, the one or more sensor observation parameters associated with the corresponding digital representation of the building asset with the one or more sensor observation values based on the one or more sensor data obtained from the one or more sensors associated with the building asset, wherein

the predefined set of functions comprises a set of time-based functions and a set of spatial-based functions,

the set of time-based functions comprises one or more of an average function, a maximum function, a minimum function, a maximum range function, a cumulative sum function, a differential cumulative sum function, a differential absolute cumulative sum function, a count number of occurrences above or below a threshold function and a value difference between time instances function, and

the set of spatial-based functions comprises one or more of an average function, a summation function, a maximum function, a minimum function, a maximum range function and a value difference between locations function.

10. The method according to any one of claims 1 to 9, wherein for each building asset of the plurality of building assets, the one or more attribute parameters associated with the

corresponding digital representation of the building asset indicates a current purpose or function of the building asset or a status of the building asset.

11. The method according to any one of claims 1 to 10, wherein for each building asset of the plurality of building assets, the building asset is a room, an area or a building equipment, and wherein each sensor of the plurality of sensors is an imaging sensor, a distance sensor, an Internet of Things (IoT) sensor, an inertial measurement unit (IMU) sensor or a feed sensor.

12. The method according to any one of claims 1 to 11, wherein

the building information database is a digital twin database for the building, and

for each building asset of the plurality of building assets, the corresponding digital representation of the building asset is a corresponding digital twin object in the digital twin database.

13. A system for facility management for identifying an actionable event in relation to a building, the system comprising:

at least one memory; and

at least one processor communicatively coupled to the at least one memory and configured to:

obtain a plurality of sensor data from a plurality of sensors, respectively, wherein each sensor of the plurality of sensors is associated with a building asset of a plurality of building assets of the building, each building asset of the plurality of building assets has a corresponding digital representation in a building information database, and for said each building asset, the corresponding digital representation of the building asset has one or more attribute parameters, a location parameter and one or more sensor observation parameters associated therewith, the one or more attribute parameters indicating one or more attributes assigned to the building asset, the location parameter indicating a location of the building asset and the one or more sensor observation parameters indicating one or more sensor observation values obtained based on one or more sensor data from one or more sensors associated with the building asset of the plurality of sensors;

identify an actionable event based on the one or more attribute parameters, the location parameter and the one or more sensor observation parameters associated with that of one or

more building assets of the plurality of building assets, and further based on a predetermined actionable event condition associated with the one or more building assets; and

trigger a predetermined task associated with the predetermined actionable event condition for the actionable event identified,

wherein the one or more building assets are multiple building assets,

said identifying the actionable event further based on the predetermined actionable event condition comprises determining whether the location parameters associated with said multiple building assets satisfy a relative location condition associated with said multiple building assets based on a predetermined reference distance or range of distance between said multiple building assets, and

the predetermined task associated with the predetermined actionable event condition comprises tasking one or more individuals detected based on one or more sensor data obtained from one or more sensors associated with a first building asset of said multiple building assets to attend to the actionable event at a second building asset of said multiple building assets in relation to one or more sensor observation parameters associated with the second building asset.

14. The system according to claim 13, wherein said identify the actionable event based on the predetermined actionable event condition comprises, for each of the one or more building assets:

determining whether the one or more sensor observation parameters associated with the building asset satisfy corresponding one or more predetermined sensor observation conditions associated with the building asset included in the predetermined actionable event condition;

determining whether the one or more attribute parameters associated with the building asset satisfy corresponding one or more predetermined attribute conditions associated with the building asset included in the predetermined actionable event condition; and

determining whether the location parameter associated with the building asset satisfy a corresponding location condition associated with the building asset included in the predetermined actionable event condition.

15. The system according to claim 14, wherein

the actionable event is identified if the predetermined actionable event condition is determined to be satisfied.

16. The system according to claim 15, wherein the predetermined task associated with the predetermined actionable event condition is determined to be satisfied if at least:

the one or more predetermined sensor observation conditions associated with that of the one or more building assets included in the predetermined actionable event condition are determined to be satisfied;

the one or more predetermined attribute conditions associated with that of the one or more building assets included in the predetermined actionable event condition are determined to be satisfied; and

the location condition associated with that of the one or more building assets included in the predetermined actionable event condition is determined to be satisfied.

17. The system according to any one of claims 13 to 16,

wherein the predetermined actionable event condition is included in an actionable event condition database, and

the at least one processor is further configured to add a new actionable event condition in the actionable event condition database via an actionable event condition generation user interface.

18. The system according to claim 17, wherein said add the new actionable event condition comprises:

receiving, via the actionable event condition generation user interface, one or more building asset identity inputs, each building asset identity input designating a corresponding building asset of the plurality of building assets for which the new actionable event condition is associated with; and

for each of the one or more building asset identity inputs,

receiving, via the actionable event condition generation user interface, one or more sensor observation type inputs designating one or more sensor observation parameters associated with the designated building asset for which the new actionable event condition is associated with;

receiving, via the actionable event condition generation user interface, one or more function operator inputs designating one or more functions for subjecting the designated one or more sensor observation parameters to; and

receiving, via the actionable event condition generation user interface, one or more reference value inputs designating one or more reference values based on which one or more results of the one or more functions are compared respectively for determining an outcome on whether the new actionable event condition with respect to the designated building asset is satisfied.

19. The system according to claim 18, wherein

the one or more building asset identity inputs are multiple building asset identity inputs designating multiple building assets for which the new actionable event condition is associated with, and

said add the new actionable event condition further comprises:

receiving, via the actionable event condition generation user interface, an integration operator type input designating an integration operator for integrating the outcomes on whether the new actionable event condition with respect to said multiple designated building assets are satisfied.

20. The system according to claim 18 or 19, wherein

the one or more building asset identity inputs are selected from a predefined set of building asset identities corresponding to building assets of the building available for a user to select,

the one or more sensor observation type inputs are selected from a predefined set of sensor observation types available for the user to select for the designated building asset,

the one or more function operator inputs are selected from a predefined set of functions available for the user to select, and

the integration operator type input is selected from a predefined set of integration operators available for the user to select.

21. The system according to claim 20, wherein

the at least one processor is further configured to update, for each building asset of the plurality of building assets, the one or more sensor observation parameters associated with the corresponding digital representation of the building asset with the one or more sensor observation values based on the one or more sensor data obtained from the one or more sensors associated with the building asset,

the predefined set of functions comprises a set of time-based functions and a set of spatial-based functions,

the set of time-based functions comprises one or more of an average function, a maximum function, a minimum function, a maximum range function, a cumulative sum function, a differential cumulative sum function, a differential absolute cumulative sum function, a count number of occurrences above or below a threshold function and a value difference between time instances function, and

the set of spatial-based functions comprises one or more of an average function, a summation function, a maximum function, a minimum function, a maximum range function and a value difference between locations function.

22. The system according to any one of claims 13 to 21, wherein for each building asset of the plurality of building assets, the one or more attribute parameters associated with the corresponding digital representation of the building asset indicates a current purpose or function of the building asset or a status of the building asset.

23. The system according to any one of claims 13 to 22, wherein

the building information database is a digital twin database for the building, and

for each building asset of the plurality of building assets, the corresponding digital representation of the building asset is a corresponding digital twin object in the digital twin database.