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**Digital technique application of building and residence
community - Part 3: Property management**

建筑及居住区数字化技术应用 第3部分:物业管理

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3 Terms and definitions

3.1 The facility and equipment digitization management: integrating the operation monitoring of the facilities and equipment inside the building and residence community on a management platform, and carrying out the monitoring and control of the operating state and the fault alarms of those facilities and equipment.

3.2 The building information modeling operation and maintenance system: a system that uses techniques such as the internet of things, big data, cloud computing and mobile communication to integrate data entered in real time and data imported from original sources, loads them into the BIM model in real time, and so achieves smart operation and maintenance management based on the BIM model.

4 Abbreviations

AI: artificial intelligence. API: application programming interface. APP: application. BIM: building information model or modelling. CIM: city information model or modelling. OA: office automation system. PC: personal computer. pH: potential of hydrogen.

5.1 Database

5.1.1 Database system design. Besides meeting GB/T 42455.1, the design follows the principles of being scientific, systematic, inheritable, compatible, extensible and operable; provides the basic system operations of reading and writing, copying, moving and deleting; provides fast file retrieval with unified retrieval, cataloguing, addition and deletion of data resources; provides both offline and real-time data import; and updates the data periodically

or in real time.

5.1.2 Data range. The data should include personnel data, that is population, identity and residence information and the related bindings; building data, that is the basic information on the building, its standard address information and the related electronic documents; facility and equipment data, that is the attributes of the facilities and equipment, the internet-of-things data and the data collected from or exchanged with smart devices; event and message data, that is the basic information on events arising during project operation and maintenance and their handling flow; and BIM model data, that is the BIM model information on the building structure, the building spaces and the related facilities and equipment.

5.1.3 Data storage. Besides meeting GB/T 42455.1, storage shall provide automatic and manual backup and batch updating and deletion, and should support full and incremental backup and compressed storage.

5.1.4 Data processing. The data involved in processing, including personal information, important data and other data, is identified and a data protection catalogue formed and kept up to date; the identified data is classified and graded under the relevant national standards; the data is protected against leakage, theft, alteration, destruction and improper use; important data and sensitive personal information receive particular protection; and the whole life cycle of data processing is recorded so that it can be audited and traced.

5.1.5 Data sharing and exchange. Besides meeting GB/T 38664.1 and GB/T 42455.1, data exchange should use a service interface; management functions for creating, publishing, maintaining and withdrawing interfaces shall be provided; browsing the interface list, viewing interface details and applying for interface sharing shall be supported; and a log query function shall allow multi-dimensional analysis and multi-criteria search of interface calls.

5.2 Application system, internet of things system and BIM operation and maintenance system

5.2 Application system. The unified portal is compatible with mainstream browsers; system users and resources can be added, deleted, changed and queried; data templates can be exported and imported; system administrators and user roles can be defined, with different function rights, resource reading rights and form and API operating rights assigned to different roles; APIs can be added, deleted, changed, queried, grouped, authorized and access-controlled; and the system is used from several ends, such as a PC, an APP and a mini-program.

5.3 Internet of things system. The functions of the sensing and identification internet-of-things system should include device management, network management, system management, interface maintenance and alarms, and system monitoring and

configuration changes shall be supported. Cross-system, cross-product and cross-domain information exchange shall be supported and interoperability between heterogeneous components and subsystems achieved. At least one identification coding scheme laid down in a national standard shall be used. Systems and devices that are changed or connected to the internet of things shall be reviewed and managed. Batch management of devices, such as batch updating, deletion, registration, disabling and activation, should be provided. A device deregistration function shall be provided, and after deregistration the historical information on the device shall be kept for the required period.

5.4.1 BIM operation and maintenance system design. The BIM engine is chosen and built on the principles of data security and system reliability. The platform function modules should include model and document management, space management, asset management, facility and equipment maintenance management, energy management and emergency management. The platform should be integrated with the building equipment monitoring system, the security system, the entrance control system, the environment monitoring system and the energy control system. The platform shall have open data integration interfaces and secondary development extension, and shall use internet, internet-of-things and mobile-end application functions.

5.4.2 BIM operation and maintenance model. The basic data of the operation and maintenance model shall be based on the as-built model and optimized according to the operation and maintenance content and requirements; the model should be split and organized by space and by system according to the way it is used; it shall be updated dynamically and continuously from the data of the physical building; and the management and analysis of its data shall be carried out by operation and maintenance software, which should be built on a cloud platform and provide the basic functions of searching, reading, classifying, calculating and giving early warning.

5.4.3 BIM operation and maintenance application. Real-time monitoring, analysis and control of the operating state of the facilities and equipment; querying of dynamic operating information and rapid location of abnormal conditions; setting of alarm rules with an automatic alarm when a device threshold is triggered; linkage with other application systems so that business steps follow on automatically; automatic and manual setting of operation and maintenance plans, carried out on a cycle or as a single job; refined management of the whole life cycle of the facilities and equipment, with the operation and maintenance process closed; and real-time saving and backup of the operation and maintenance data, with classified searching, viewing and analysis supported.

6 Requirements for the digital technique application of property management and service

6.1 General provisions. The digital management software for property management and service shall exchange data with the digital facility monitoring management database, the

integrated security management database and the owner information service database. The function modules shall include integrated management, safety management, customer and public services, environmental maintenance management and operation and maintenance service management, and the modules shall support information exchange and linkage. The system shall provide customization of the database structure, the reports, the query criteria and the operating interface. Basic data such as property information and owner information may be exchanged with other software as required by the relevant documents.

6.2 Integrated management. Administration, personnel and finance are managed digitally, with the organizational structure, staffing and job responsibilities defined, and process approval, document management, financial reimbursement, communication and sharing, and performance assessment carried out digitally. Personnel are managed by staff category with different rights on the management platform, and owners and visitors should be managed through the application platform with electronic files created for owners. Asset management records the location of the building, the property type, the area, the distribution of facilities, the building structure, the room number and the layout; the use status of the property should be managed and summarized by categories such as tenancy status; material purchasing and issue should be managed digitally with stock in and out and stock enquiry; and QR codes should be generated for facilities and equipment so that each item has its own code. Quality management uses a centrally handled owner service model in which complaints, repair requests and paid services are dispatched, tracked and supervised through one platform, connects the property, personnel, environmental maintenance, order maintenance and engineering modules into a complete business flow supporting several tasks triggered at once, and should set up a service evaluation mechanism that collects owner feedback, issues targeted rectification work orders and evaluates the result. Supplier management builds supplier databases by category of material, article and service, supporting contract management, information recording and summary evaluation.

6.3 Safety management. Order maintenance covers entrance and exit control, surveillance, traffic signalling and parking charge management at vehicle passages and garage gates, with a real-time file for each vehicle bound to vehicle, parking space and property information, automatic switching between fixed and temporary charging, control and alarm push for vehicles under watch, retrieval and statistical analysis of passage records, networked management of entrances with mobile payment and entrance space display, data exchange with other systems through the interface of GA/T 1400.4, two-way speech between an unattended entrance intercom and the control room, linkage between the vehicle entrance control system and the fire alarm system to raise the barrier, and compliance with GB 51348 and GB 50348. Entrance control management provides rights setting, real-time monitoring, record query, abnormality alarm and emergency access, should support remote door opening, and shall open standardized data interfaces for