

Building as Intelligent Enterprises using SAP Leonardo IOT Solutions.  
All Analytics Intelligent Enterprise. Sensor Analytics, Cloud/On-Premises Analytics and Dashboard Analytics

By Rafael Vasquez

Chadwick Intelligent Building Solutions (also CHIN) is a New York Building development company responsible for the building of residential and commercial buildings in Manhattan. CHIN building managers uses SAP ERP, SAP S/4 Hana to monitor and coordinate building Mechanical, Electrical and Plumbing systems every day. This SAP solution is being optimized for then and the cost of repair and maintenance of building systems as well as the operation of the repair fleet has go down by 20% in the last year. Currently maintenance supervisor's login into a SAP Cloud solution put together by their IT Development team to review any notifications for a system repair or system documentation request including building drawings and equipment specs. Also an automation process generates pdf SAP Reports analyzing building operations and includes Key Performance indicators and recommendations. This system also includes notifications to specific repair personal and managers. Any task that needs approval during workflow of data and information between field repairs, building managers and system suppliers is resolve directly from within the SAP Solution. Finally this solution is being put together using SAP Cloud for Real State and SAP Intelligence Assets, SAP HANA, SAP S/4 Hana.

However, CHIN is facing a challenge in creating a Building Intelligent enterprise solution by adding IOT, Machine Learning and Predictive analytics to every building, car fleet and technical personal. By converting buildings intelligent to every maintenance operation bring better control of all their buildings operations. Buildings can be aware of where a problem occurs and send a signal to their fleet operators using SAP Cloud Platform. CHIN business owner of the company see the potential of SAP Leonardo IOT ready to use and ready to build solutions and assembles a pilot team of engineers, designers, building managers to make building operations total transparent by integrating a Building IOT Kit with vision, pressure, humidity, temperature, motion sensors to be share and integrated to present SAP Cloud Platform SAP ERP and SAP S/4 Hana systems.

Very challenging proposition but today SAP Leonard IOT for intelligent enterprises offers a suite of ready to use and ready to build solutions to develop powerful dashboard. CHIN decides to develop a Dashboard solution name Building Cognito as a mobile solution for their Building Intelligent Enterprise ecosystem. the IOT technology to connect building systems using IOT Edge technology. Building IOT Kit using Leonardo IOT applications and Templates can apply business rules to communicate to SAP ERP, S/4 on a common database model. Use streaming edge and predictive analytics microsystems to create applications that automates the process of repairs. Mathematical functions can be run at the edge to predict changes on temperatures, climate conditions and order field personal attend any problems by using mobile devices without waiting for someone to detect a problem.

This SAP Cloud Platform will be integrated using SAP Leonardo IOT, SAP Edge Services, Leonardo IOT Bridges. Extended business solutions will be install at the building edge server to guarantee secure transmission to mobile development solutions running on Ipads and Iphones.

Starting by integrated data from IOT Sensors, SAP ERP, SAP Hana to create remarkable dashboard solutions using SAP GUI, SAP Eclipse, SAP IOT Sensor templates. This total visibility solution will make buildings function as demand generator without too much personal, data entry form, procurement managers but rather used SAP Integrated to fleet management to improve inbound outbound operations now sensor inform field technicians to the telemetric system build in

The concept of the Internet of Things (IoT) presents unprecedented possibilities for manufacturing building systems to improve the development of real state and management and operation of facilities management. Sensors, a tiny chip, can register changes in temperature, light, pressure, sound, and motion inside and outside building environments. These sensors have been used by building managers, planners and transportation specialists to measure vehicular traffic of fleet technician workforce to match car expenses and data produced helps in determining the capacity for roads and other planning tasks. Sensor technology is being applied to commercial real estate and other types of businesses, and the benefits are considerable. In terms of property evaluation and market analysis, the information that's obtained from sensors can be tremendously valuable. We can put sensors on the equipment in a building, and every ten seconds we get a read on the air temperature, which is helpful in determining if the air conditioning system is working efficiently or needs maintenance, and we can generate a work order to fix it.

With the emergence of IOT any part of a real estate object, like a building, can become a point to capture and send data for analysis and action. The speed of data transmission and processing time has increased tremendously. A scanner can provide basic temperature monitoring and support a building automation system that uses IoT, and we can look for an integrated solution that senses and adjusts heat and humidity based on the number of people that have entered the building. Advanced analytics combined with IOT can change the way real estate operators are managing their business.

#### Building as Intelligent Enterprise using SAP Leonardo IOT Solutions

- 1- Building Devices IOT Kit are install at Building Sites, building manufacturer and Building suppliers to verify guarantees, warranties and service level agreement using SAP Portal, SAP Cloud Platform and SAP Analytics. Wireless or direct connect sensors detect any anomalies as sensors identifies temperature, light, pressure, sound from its physical surroundings via BLE, RFID, WIFI, Zigbee, etc.
- 2- IOT Edge Connect Gateway - IOT Gateway Hardware is configure with Streaming Services processor emitter security configuration Value Monitor Rule Type. Sensor Watchdog Rule Type. Time State Rule Type.Event chaining rules for local machine learning analysis at the edge. Install at building sites
- 3- Message on JSON XML Protocol and HTTP MQTT Connectivity are send to building manufacturer to SAP Portal.
- 4- Back end systems bind to Device data Sensor data master data Business Rules Rules Processes HistoricalSystems CRM HCM SCM and IOT Platform all configure using SAP Cloud Portal Cockpit.
- 5- Finally SAP Fiori IOT Templates are Develop. Client Iphone Android SAP Fiori Launchpad Adapters. Reverser Proxy SAP Web Dispatcher. ABAP Front End Server SAPUI5 SAP JQuery Plugs-in SAPUI5 Core Device. ABAP Back End Server Search Model Search Model.Data Layer SAP HANA - SAP HANA XS Engine

#### Case Study

Vasquez Real Estate Developers Inc owns about 50 residential and commercial buildings In New York city. They want to hire CHIN to install an IOT Developer Kit in every building to detect any anomalies on the electrical systems of the buildings. Light sensors are install in every hallway to detect lack of lighting, changes on temperatures and IOT Edge sevice send message to the SAP Cloud platform of their business partner.

SAP Edge Analytics use business rules to send trough the cloud a message to the appropriate Building superintendent and building manager using machine learning to recommend any solution to detected Problem by any IOT sensor located on the building

This solution use SAP ERP, SAP HANA, SAP S/4 Hana, SAP On premises and SAP Cloud to aggregate all data from any building and present the information using and iphone, ipad, or android devices used by building field supervisors to located any problem using IOT Technology and SAP Edge.

