Nomination for the Best Customer Happiness Initiative Award

Implementation of IT software and hardware to minimize damages caused by water leakages, severe weather conditions and HVAC equipment breakdown.

1. Strategy & Principles

The arrival of the COVID19 pandemic followed by the chain of COVID-related global events has significantly changed the business landscape leaving no businesses un-affected and Mansions and its clients are not excluded. Within our organization, we had several workshops with the key management personnel brainstorming on the development of the new strategies and new focus points that would help us to satisfy our clients and keep them happy.

One of the issues that we faced during the pandemic and particularly during times when countries' borders were closed preventing travelers to return to their homes was the increased number of complaints on private units water leakages and equipment breakdowns. An in-depth investigation revealed that owners not being able to return to their homes due to lockdown faced many challenges with the maintenance of their HVAC systems and other equipment responsible for health and safety within their apartments and villas. As well as they faced an issue with the rectification of water leakages and the rectification of broken air conditioning systems that, in some cases, caused major damages to their properties. The Dubai law does not permit common area management companies to enter into private property without owners' authorization hence making equipment monitoring and maintenance a difficult task. A system for proactive monitoring of the HVAC and other systems must have been designed.

To address these issues, a unique solution has been developed by Mansions together with the leading energy and facility management software developer Granlund Manager. The hardware part of the solution has been supplied by COBA BOS. The initiative has been implemented in of the project from Mansions' portfolio, a well-known gated villa community XXII Carat Club Villas. XXII Carat Club Villas is an ultra-luxury beachfront residential villas community located on the Palm Jumeirah island which holds Dubai's record for the most expensive villa sold in June 2021 for $32.5M.

Advanced facility and energy management of luxury villas is a very critical service for villa owners because of the hot and humid conditions at the Palm Jumeirah. In addition, villas are often unoccupied especially during the hot period which makes remote monitoring and fast maintenance response critical. To provide high-quality facility and energy management services a solution that integrates seamlessly home automation, building automation, and metering data to facility and energy management processes in real-time was implemented.

Figure 1 – XX Carat Villa community as seen on COBA software

The implemented solution includes Granlund Manager Facility and Energy Management and COBA Building Operating System. The implemented solution has rich Building Information Modelling (BIM) based data model, which includes information about buildings and technical systems and all stakeholders.

2. Standards & Innovation

Granlund Manager Energy Management is based on ISO 50001 and Facility Management software on ISO 40001:2018 standards. Different technical systems are integrated into COBA Building Operating System via standard protocols including BACnet, Modbus, M-bus, LON, EnOcean, and KNX. The system utilizes wired and wireless communication technologies on all layers of the system – Management, Control, and Field layers. This enables flexible additions and changes to the system whenever required. Information from COBA BOS utilizes the latest REST API interface to Granlund cloud service. The system is event-driven from sensors to servers and user interface clients. This enables fast response from service providers to avoid damages to valuable properties.

Data management solution is based on BIM modeling. In COBA BOS and Granlund Manager, all the data modeling is based on the BIM model (IFC model). Properties, technical systems, and users are modeled similar way which enables seamless flow of information and creates a digital twin of the properties.

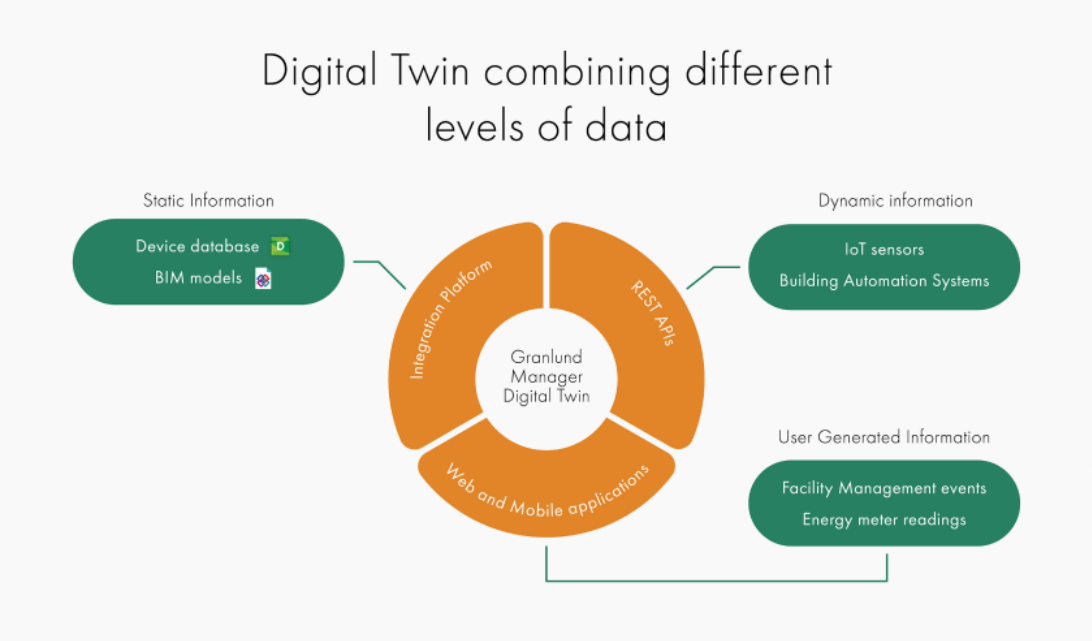

Figure 2 – XX Carat digital twin model

A digital twin has been produced for each out of 22 villas within a community reflecting the unique equipment layout and individual features of each villa. Figure 2 above describes the structure of a digital twin. As seen above, the central role is given to a software solution that connects various parts of the system that previously were not connected which did not allow to proactively respond to equipment breakdowns within villas.

3. Systems & Metrics

Mansions completely innovative solution consists of a network of state-of-the-art sensors and other monitoring devices located inside the private villas, an advanced Building Management System (BMS) that accepts the signals from the monitoring devices, and energy and management software that analyses the behavior of the villas HVAC systems manage different scenarios and produces step-by-step instructions for the maintenance team for rectification of the issues.

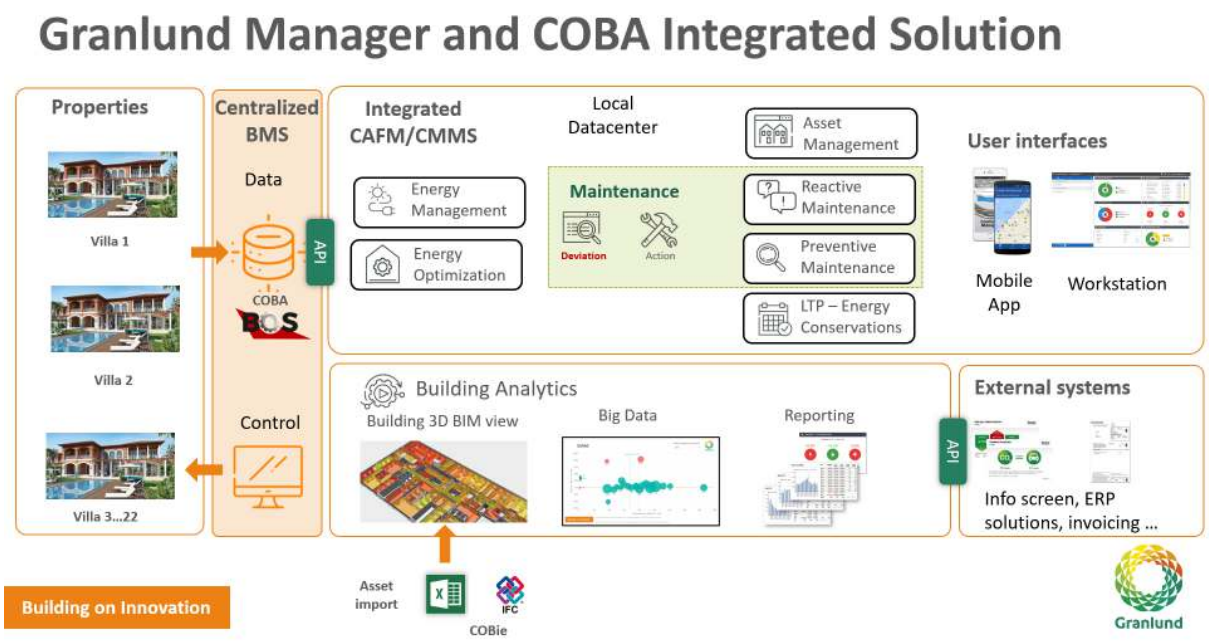

Figure 3 – Complete solution process diagram

The solution has been designed to guarantee our clients' (villa owners/occupants) that the condition of their equipment and equipment working regimes are closely monitored giving our clients assurance that any damages caused by equipment breakdown are prevented. All critical and maintenance alarms are automatically generated and transferred to BOS and FM solutions. All relevant stakeholders get information in real-time and fast response can be provided. Comprehensive indoor condition and consumption information is also collected to EM solution and reported to all stakeholders dynamically on any device. A client can also activate a mobile app by scanning a QR code. With mobile app clients and their service personnel can view all automatic service requests, scheduled maintenance tasks and can create new service requests manually.

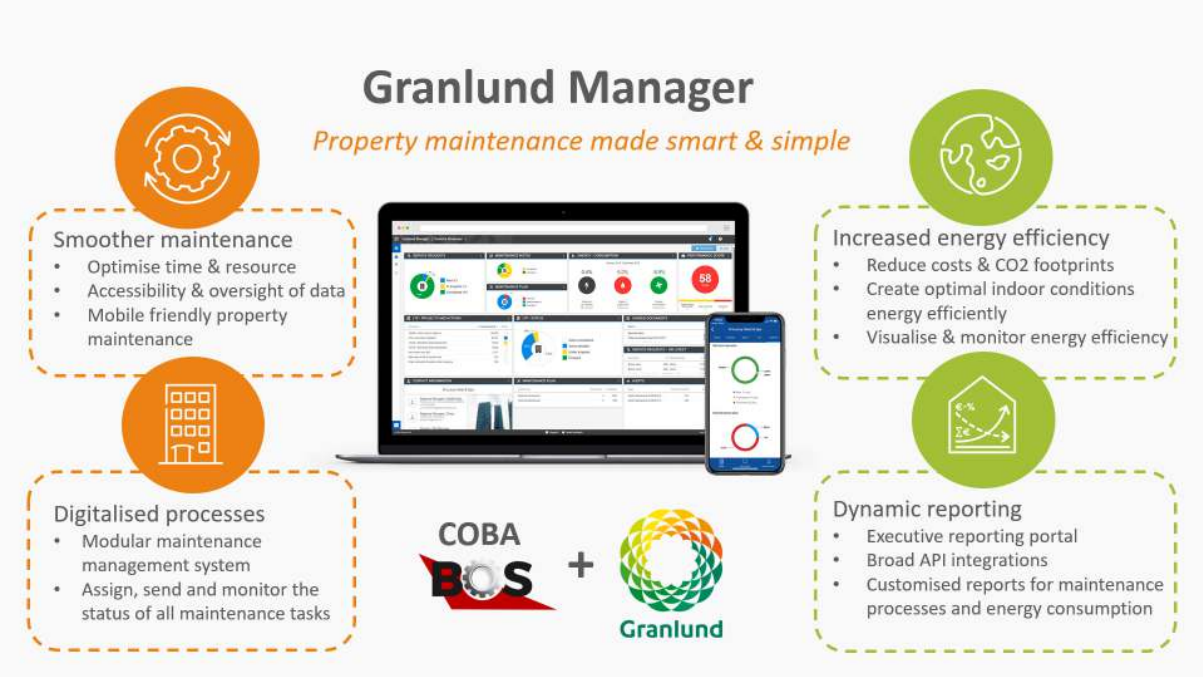

Figure 4 – Functionality of energy and facility management software

A most critical feature of the system is the comprehensive leakage detection system in the XXII Carat Club Villas. It captures leakages and condensation water overflows and enables rapid response before any damage is caused. Implemented solutions have given peace of mind to the villa owners as they do not need to worry about a water leakage damaging their properties and belongings.

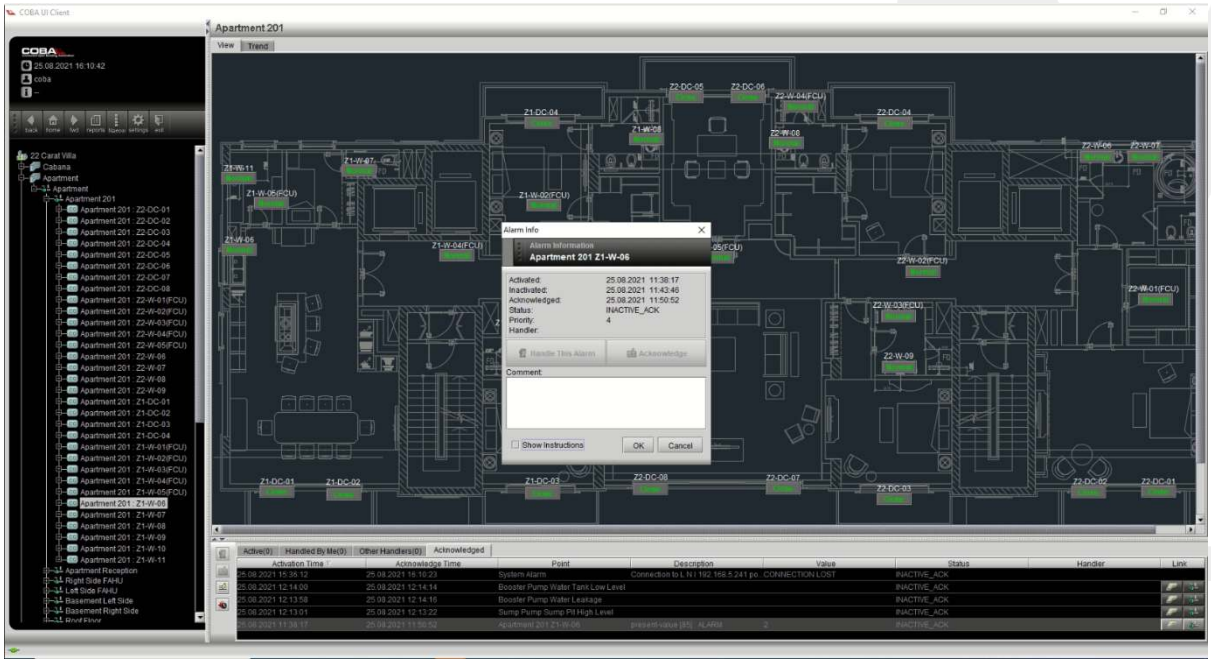

Figure 5 – Actual monitoring system and sensors layout

The key stakeholders involved in system design and implementation were the main contractor, design consultants, MEP contractor, automation system contractor, FM&EM solution provider, and FM company.

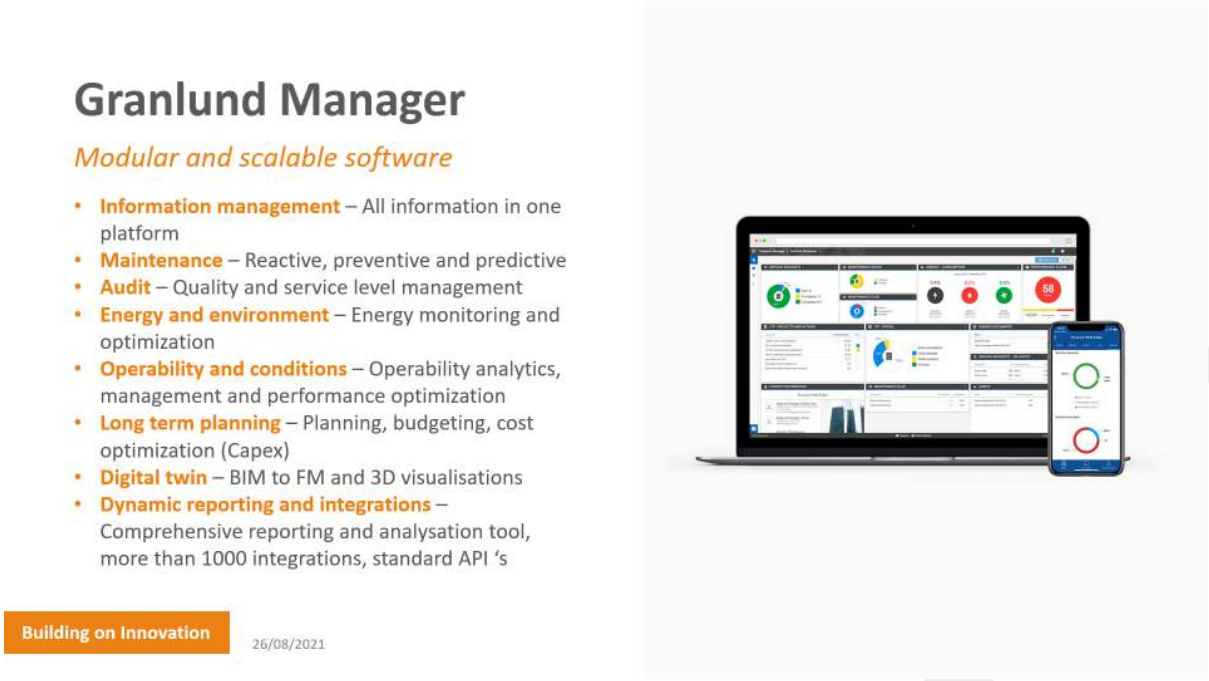

Figure 6 – Key features of the implemented energy and management software

The most important criteria for customer happiness are the number of avoided damages to property, the second is good indoor living conditions (when premises is occupied), and the third is the level of consumption of energy and water. The proposed system monitors and controls MEP systems, monitors condensation water overflows, and protects the domestic water pumps in various locations of the premises by shutting them down in case of water leakage or flooding thus preventing pumps and other equipment from electrical shorts. Rapid response FM team is required to avert any serious damages due to leakages.

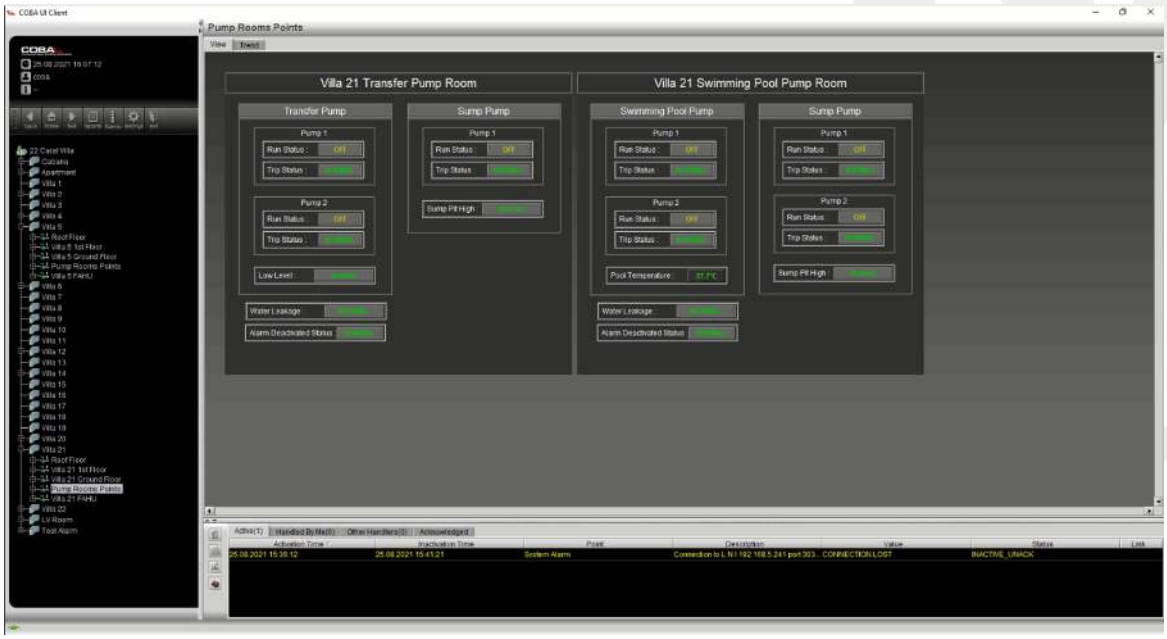

Figure 7 – Actual dashboard that displays pump working conditions

Mansions set several KPIs (Key Performance Indicators) for the on-site Facility Management team and these are response time, work execution time, indoor air quality, energy efficiency, operability of technical systems.

Customer happiness is measured via customer feedback, manual service requests, response time and execution time, indoor air conditions, and energy efficiency.

Each villa owner is granted access to a mobile app, which can be installed on IOS or Android systems. The App allows the owner to monitor the condition of the equipment in real-time, raise a service request, report a breakdown, or request a maintenance team to visit the premises for inspection. Full history of all the breakdowns and historical system settings and results are also available for viewing.

Figure 8 – Actual layout of villa as seen by the client via mobile App

4. Effectiveness & Evidence

The installed system was a great help to the operations team to detect the leakages on time and address the issues causing the leakages. During the first year of operation, there were more than 300 alarms reported and timely actions were taken by the Facility Management team to avert further damages. The water leakage incidents that caused damages account for less than 1% of the total incidents reported in the facilities. Continuous remote support is being offered to the operations team by the BMS supplier's technical support team to ensure the smooth functioning of the system.

Some of the important indicators related to the improved performance of the service team are shown in Figure 9 below. It can be seen, that using the integrated Granlund – COBA solution allows the team to resolve 98% of all the service requests raised automatically as well as manually by the villa owners. It also shows that there are as many as 1,500 service requests usually raised during one month from all the villas with an average response time of 10 minutes.

Whiles the individual jobs' execution time can be improved, it must be noted that nearly 50% of the incoming requests are resolved within the same day, which is a good performance considering the nature of the requests e.g. water leakages rectification, equipment repair, maintenance, etc.

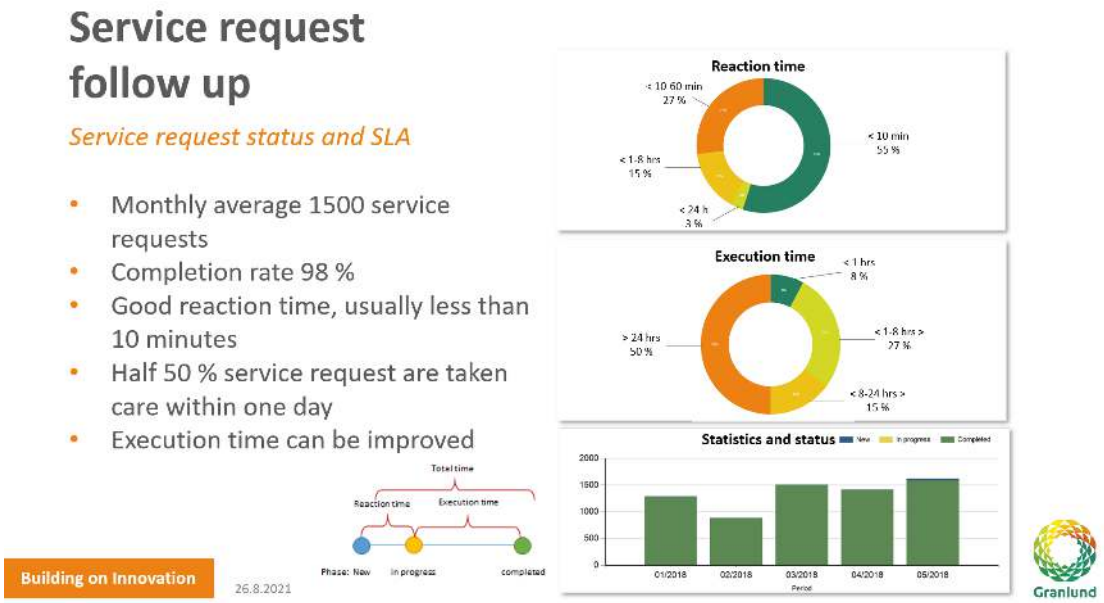

Figure 9 – Actual performance statistic

Energy management software regularly collects comprehensive energy consumption data (RTH, kW/h) and information on indoor air quality (temperature, humidity), which allows establishing an efficient air quality and energy consumption benchmark for every villa depending on the use of the premises. The software then communicates the best scenario equipment settings to the HVAC equipment and Facility Management team allowing them to proactively achieve energy savings while maintaining good comfortable living conditions. The customers usually do not notice any changes in the settings but enjoy comfortable indoor temperatures and air quality.

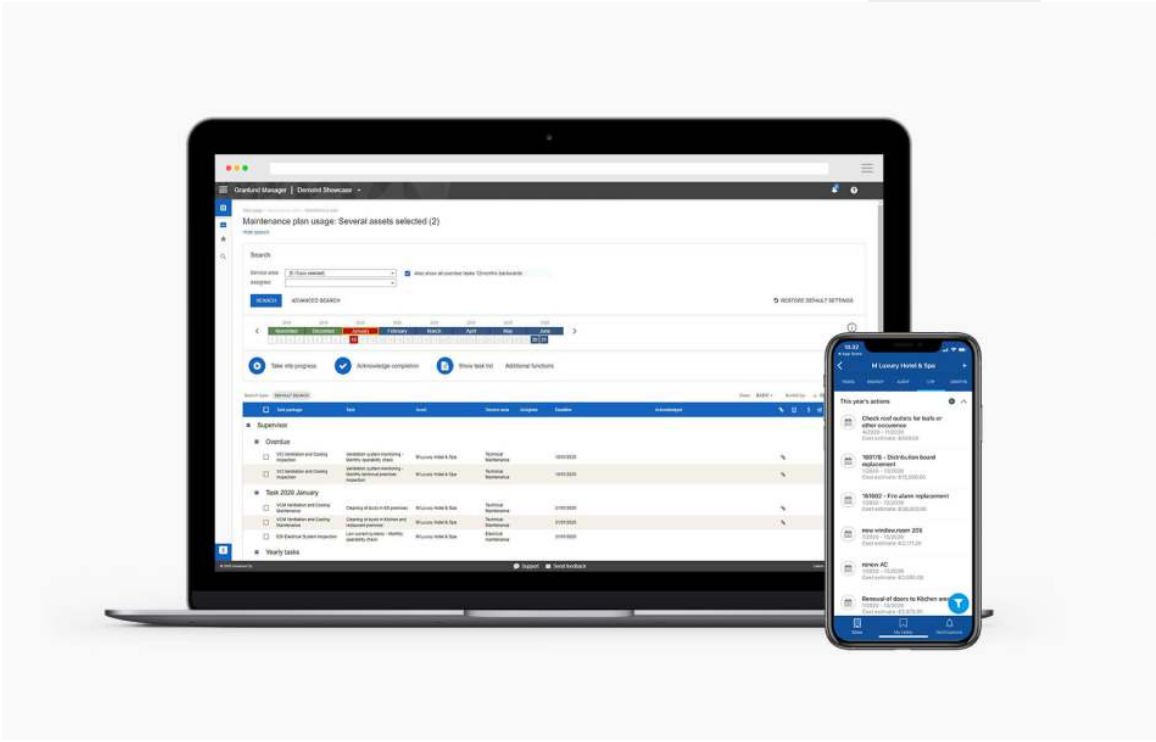

Figure 10 – Actual view of the planned and reactive maintenance schedule

Depending on the equipment usage, preventive maintenance works done on all technical equipment inside and outside the private premises are automatically added to the calendar forming a planned preventive maintenance schedule to be followed by the on-site technical team. Tasks are visible to the maintenance teams on a daily, weekly, monthly, and yearly basis and available for viewing by the project management team. Tasks can be viewed and acknowledged also on a mobile device. The implemented solution through its continuously adjusted proactive maintenance schedule extends the life of the equipment and prevents equipment failures contributing to the happiness of the residents.

5. Business Continuity & Resilience

Coronavirus disease (COVID-19) is having an unprecedented and unpredictable impact on the world's economy. The pandemic has driven the world toward adapting to the current circumstances regardless of the business, sector, or industry.

In the context of the COVID-19 pandemic, many homeowners were not able to get back home to take care of their equipment and premises and maintenance contractors rooming around the city was restricted due to measures implemented by the local authorities. As a way to serve the end client, remote connectivity of the system was implemented which enabled solution providers to check on the health of the system advising the client of any possible faults or issues related to the system and/or their premises.

All stakeholders can now operate systems and see reports locally and remotely. Service providers can monitor and operate solutions both locally and remotely. This significantly reduces the need for site visits and physical contact between people.

Mansions will continue searching for the best-in-class IT software and hardware solutions and implement them for the benefit and happiness of our clients.