PRODUCT BUILD | QA | UX | APPLICATION MODERNIZATION

# Major Property Rental Provider

## 4Services Maintenance Technician Management

Our client engaged gravity9 in providing a vast modernization of internal and customer facing digital systems, with the intent of becoming a truly digital-first operator in the American property rental sector. Part of that program created "4Services", which overhauled a previously troubled disparate set of systems and processes used to book and manage maintenance of rental properties. These systems suffered a lack of standardization, synching issues, and a high time and resource requirement which frustrated users and customers. gravity9 developed a standardized process and 6 distinct products to support technician workflow which are utilized across the United States. The solutions were built around .NET, React, SQL Server and Cosmo DB. gravity9 also provided manual testing of the products and collaborated with the client's incumbent providers of automated testing. The resulting suite has delivered significant benefits (ease of use, lower resource overheads, a streamlined user-friendly experience) to internal users, external customers and maintenance technicians engaged by the client to conduct property maintenance.

## Utilized Technology Stack

**Cloud:** Azure, Azure Kubernetes Service

**Database:** Azure SQL, CosmosDB, Blob Storage

**Backend:** NET, Microsoft CRM, Geotab, Box, Micro-services, Azure Service Bus, Event Hub, SignalR, Google Maps (integration)

**Frontend:** React, Micro-frontends, Design System, Progressive Web Application

## Review of Challenges

Our client are one of the largest are one of the largest suppliers to the property rental market in the United States. They selected gravity9 to consult and enable a wide scale program of modernization across their business, as part of a pivot to embrace technology and pioneer a digital approach to business in the property market not previously seen. This case study addresses just one part of that larger initiative.

The client's maintenance teams deal with every aspect of property maintenance, whether the property is occupied by a resident or vacant. Internal users of the 4Services system (employees) take calls or receive online support requests from customers (renters of properties) and schedule/manage suitable maintenance technicians (plumbers, electricians and so forth).

Previously there were many disparate systems and non-standardized processes which led to inefficiencies in the entire end to end process including: booking issues, mismanagement of workloads and technicians, and frustration for users, customers, and technicians. Information could be incorrect or erroneous due to synching issues when technicians are in areas of low or no internet connectivity, resulting in lots of places things could (put simply) break.

Centralization and standardization were urgently needed to ensure a better customer experience and greater ease-of-use/efficiency for internal users and maintenance technicians (and this would result in better reporting, analysis, decisions, and cost savings across the board).

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## Our Solution

gravity9 implemented a standardized process, rolled out across the United States, and made up of six distinct products which support technician workflow.

**Scoping Management:** This data repository tool provides a means to define condition issues (what is wrong with a property), remedies (how to fix it), locations, and different asset types. This provides reference data usable during the technician's workflow, a standardized way to enter issues beginning with the resident, consistent reporting across regions and (as a result) the ability to benchmark. Furthermore, this formed useful reference data with which to power a predictive AI model that would allow residents to raise maintenance requests through conversational interfaces.

**Territory Management:** This tool allows the organization a way to detail out the hierarchy of the maintenance organization - from the highest level through to the technician. In this tool, users were able to visually utilize a map and carve out territories for their technicians.

**Resource Management:** Through this tool, employees can be assigned to the Territory Management tool above and integration points (for other systems) can be created. GeoTab is used to track the Technician's truck.

**Scheduling:** A tool to view Maintenance Technician's positions, work orders and schedules overlayed on a geographic map. Two types of scheduling are involved: the first is Dynamic Scheduling, in which users can view all open work orders on a map, layered with technician routes, locations and type of work (to aid effective scheduling). The second is Work Order specific and uses the same tool for a specific assignment. This tool also allows users to be able to see where their technicians are at any point (via real time integration with GeoTab devices on technician's vehicles) to ensure they are on task, as well as to interact with them in case of needs from other technicians. This helps to ensure technicians are optimized, organized, and drives higher customer satisfaction.

**Work Order Management:** Technicians use this product to view work orders, issues, and customer information – and to record issues as resolved, close open issues or escalate them for the attention of vendors or management. It is a tactical tool allowing users to visually progress through states of work orders, assign ways to fix problems, add before/after images of work orders and additional comments, and escalate to a 3rd party if required. A state machine was implemented to guide technicians through the process, and guided experiences put in place to help to train new technicians with standard operating procedures, or a "typical" asset malfunction.

**Maintenance Monitoring:** This is a management tool for service requests that have been received. It includes a customer-accessible website for raising maintenance issue requests. These can then be queried and triaged and new work orders created (to dispatch maintenance technicians). The flow of the work order can be followed, rescheduled, unscheduled and escalated.

These products combine to provide a complete digital workflow for client technicians to receive, triage, and manage the resolution of customer (renter) property issues, as well as the associated contact with (and management) of property maintenance technicians in the field.

## Our Approach

Following high level discussions of the challenges faced, gravity9 set about the more granular process of defining and addressing what was needed. Thorough requirement gathering with IT and business stakeholders took place to identify what "was" and what "needed to be," and iterative UX design/review sessions took place (with approval gained before development began).

A development team was assigned to each product, with a scheduling team and a Maintenance Experience team brought in to accelerate progress in key areas. The solutions were built around .NET, React, and Azure cloud. Microsoft CRM was also used, with gravity9 developing customization and plugins to address native integration and messaging challenges to feed updates from external systems. Google Maps integration was chosen for map-related views, and Micro Frontends were leveraged to allow feature UI fragment use across multiple persona interfaces (and those fragments could be updated without a need to redeploy the parent platform), assisting future scalability.

For offline scenarios for technicians in the field where network connectivity was low or offline, gravity9 built in progressive web application (PWA). Coupled with local storage, this approach provided extra resilience and a fault-tolerant design to help mitigate problems in areas of low connectivity.

Manual testing was conducted by gravity9 teams, who collaborated on automated testing with an external vendor the client had existing agreements with, and overall delivery of gravity9's solution was on time. Further user and product support was provided post-launch, as well as ongoing maintenance and further updates and add-ons to the systems developed, like using Generative AI to schedule and optimize technician's working routes.

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WE'RE BUILDING BETTER DIGITAL PRODUCTS

> "The modernization of the system delivered a positive experience for everyone involved."

## Subsequent Outcomes

Thanks to our solution, a streamlined and consistent experience could be enjoyed by employees, customers, and maintenance technicians.

For the client's internal users, a more enjoyable working experience with less mandatory repetition of tasks, efficient scheduling with assistance in the intelligent booking of workloads and routes.

For our client's customers, quicker resolution of issues thanks to more efficient booking and deployment of maintenance technicians, leading to greater customer satisfaction.

For maintenance technicians, an optimized working route, and workload, leads to a more sensible approach to tasks and a less stressful interaction between customers and staff. Thanks to the way our solution was built, less tribal knowledge needed to be shared between incumbent staff and new employees, reducing training time and costs.

To sum up, the modernization of the system delivered a positive experience for everyone involved and, from a business perspective, significantly reduced wastage in time and resources.

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